Energy from the Wind: Annotated Bibliography

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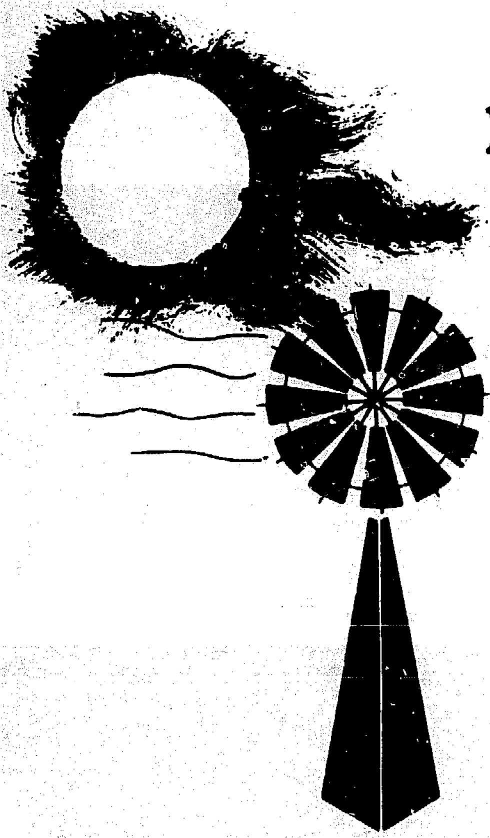

ENERGY FROM THE WIND

Annotated Bibliography

CUMULATIVE INDEXES
TO
BASIC VOLUME AND
FIRST - THIRD SUPPLEMENTS

April 1982

Compiled By

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Colorado State University

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CUMULATIVE INDEXES

TO

Basic Volume, August 1975
First Supplement, April 1977
Second Supplement, December 1979
Third Supplement, April 1982

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ENERGY FROM THE WIND – ANNOTATED BIBLIOGRAPHY

CUMULATIVE INDEXES

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INTRODUCTION TO CUMULATIVE INDEXES

This volume contains Author, Subject, Report Number, and Conference Proceedings Indexes to all four volumes of ENERGY FROM THE WIND — ANNOTATED BIBLIOGRAPHY.

Under each index term, the entry numbers are grouped by the volume in which they appeared. This makes the indexes useful both to those who have merged the volumes, and to those who have left them separate.

EXAMPLE:

ARGENTINA
(B) 19250009, 19520009
(1) 19620022, 19640028
(2) 19670020
(3) 19800129

In this case, entries 19250009 and 19520009 are to be found in the Basic Volume; entries 19620022 and 19640028 are in the First Supplement; entry number 19670020 is in the Second Supplement; and entry number 19800129 is in the Third Supplement.

CROSS REFERENCES

Cross references are included to enhance the usefulness of the Subject Index.

SEE references are used to refer from an incorrect term to the correct term.

EXAMPLE:

AEOLIAN LANDFORMS---SEE EOLIAN LANDFORMS

SEE ALSO references are used to refer from a correct term to other correct terms which are related and may be of interest.

EXAMPLE:

ALCOA---SEE ALSO ALUMINUM
AFRICA---SEE ALSO NAMES OF COUNTRIES

HIGH VOLUME DESCRIPTORS

There are a number of terms which are used so frequently in the bibliography that to list all of the entry numbers would result in long lists which would be tedious and inefficient to search manually. For these terms, the entry numbers have been replaced with the statement:

HIGH VOLUME DESCRIPTOR---USE
ONLY IN COMPUTER SEARCHING, IN
COMBINATION WITH OTHER DESCRIP-
TORS. SEE INTRODUCTORY PAGES
FOR INFORMATION ON WINDSEARCH.

These terms can be used quite efficiently, when combined with other terms, when formulating strategies for doing a WINDSEARCH. The WINDSEARCH service is described following this introduction.

The subject indexing in this volume for the Basic Volume and First Supplement uses the thesaurus developed during the compilation of the Second and Third Supplements, and is far superior to the very limited "Broad Subject or Type of Material Index" originally issued with those volumes.

AN ALTERNATIVE TO
TEDIOUS MANUAL LITERATURE SEARCHING –

WINDSEARCH

ENERGY FROM THE WIND – ANNOTATED BIBLIOGRAPHY now includes in four volumes over 6300 references to wind power. Manually searching these volumes could be very time-consuming and, due to the single-term approach necessary, not very efficient. The entire file is on computer and searchable. The main advantage of this is the ability to combine terms to fine-tailor searches to specific interests. Also, some terms are so frequently used as to be virtually useless in manually searching. But, when combined with other terms by the computer, they can help identify a very specific body of literature.

We are offering WINDSEARCH – access to the data base at low, cost-recovery rates. You may find that a fairly inexpensive WINDSEARCH is much more cost-effective than manually searching the four volumes of ENERGY FROM THE WIND. You simply submit a statement of the subject of your search, including all relevant keywords, synonyms, and other requirements (language, date, geographic location, type of material, etc.). Through various combinations of these parameters we produce a special listing of relevant citations.

This service is priced to just recover our costs, and will vary from search to search, depending on their complexity. Searches will range from $10.00 minimum to $40.00 or $50.00 for more complicated strategies. Search requests can be mailed, or phoned in, and will be invoiced when printouts are mailed to you.

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303-491-8476

To order a WINDSEARCH by mail, use the request form on the reverse of this page.

WINDSEARCH

ENERGY FROM THE WIND – ANNOTATED BIBLIOGRAPHY

The computer system used to produce ENERGY FROM THE WIND has a search component which allows the running of custom literature searches tailored to the requestor's needs. Keywords can be combined using the Boolean "and", "or", or "and not" to produce specialized lists of references on narrower aspects of wind energy. Any part of the references can be searched. The most common, and efficient, use of the system is to combine descriptors from the Subject Index. These can be further combined with free terms, date of publication, language, issuing agency, or any other parameters which can be easily identified in the reference.

SAMPLE SEARCHES:

1. All references on "design – small scale" and ("developing countries" or "remote areas" or "appropriate technology").
2. All references from the Brace Research Institute.
3. All references to "patents" on "vertical axis" turbines from 1976 to date.

* *

WINDSEARCH REQUEST FORM

SUBJECT OF WINDSEARCH:

A. State subject of search in sentence form, using descriptors from Subject Index when appropriate: ______

______

______

______

B. List additional descriptors, free terms, synonyms relevant to the subject: ______

______

______

C. List any additional requirements, such as years to be covered, type of material, etc.: ______

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Engineering Research Center
Colorado State University
Fort Collins, Colorado 80523

*You will be billed a minimum of $10.00 for your WINDSEARCH. The actual amount will depend on the complexity of the search and be based on our costs.

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SUBJECT INDEX

REPORT NUMBER INDEX

110. The Edmund wind wizard. Wind Power Dig. 1(3): 28, Fall-Winter 1975.

12a

111. Eggers, A.J. Solar energy: status and prospects as a national resource. ASHRAE J: 41-43, November 1975.

4, 6

The current state of solar energy R&D, including objectives of the six solar program areas,is examined. Areas are: bio-conversion, ocean thermal conversion, wind energy, photovoltaics, solar thermal conversion, and solar heating and cooling of buildings (including agricultural applications). Proved economically viable,power systems for heating and cooling buildings, bioconversion to fuels, and wind energy should be commercially available in the late 1970's. Power systems based on solar thermal, photovoltaic, and ocean thermal technology are expected to be available in the mid-1980's.

112. Eldridge, F.R. Wind machines. McLean, Va., Mitre Corporation, October 1975. NSF-RA-N-75-051. 77 p. NTIS, PB249936, 1975. 85 p.

1, 2, 4, 5, 6

The purpose of this document is to provide a brief survey of the present status of the viability, history, taxonomy, and future potential of various types and sizes of wind machines that might be used to help meet future U.S. energy demands. The document also discusses various possible applications of wind machines, as well as siting problems, performance characteristics and system designs for such machines.

113. Electro survives first year. Wind Power Dig. 1(2) : 14, Summer 1975.

4

An owner's experience with his 12V-500 watt Electro windplant is described.

114. Elliott, D.E. Economic wind power. Appl. Energy 1(3): 167-197, July 1975.

5

The development of a cheap rugged windmill--from the initial wind tunnel tests, through power output/capital investment optimization exercises to the final design and running--is traced. It is shown that the concept of a constant-speed, self-regulating, fixed-blade windmill appears to be a practical way of achieving a rugged low cost windmill which will produce power with a low overall cost/kWh generated. The cost reduction achieved by using extruded aluminum blades of constant cross-section far outweighs the slight loss in performance incurred in comparison with tapered blades and the fatigue life of the blades should be reasonably long. For supplying cheap kWh, a relatively small-diameter, high-speed machine designed to give its maximum output at wind speeds of about 50 mph is to be preferred to large-diameter, low-speed machines.

115. Emerson, A.D., ed. The future is now. Greater Los Angeles Area Energy Symposium, Proceedings of a Conference held April 3, 1975, in Los Angeles, California. North Hollywood, Cal., Western Periodicals Company, 1975. Los Angeles Council of Engineers and Scientists Proceedings Series Volume 1.

3, 4, 6

116. Energy: Demand vs. supply. Edited by D. Reische. The Reference Shelf Volume 47, No. 5. New York, H. W. Wilson Co., 1975.

2, 4

This book is a collection of articles or excerpts from articles on energy. Included is an article by G. Soucie on wind power, taken from his article in Audubon, May 1974. (See 1974: 19)

117. Energy crisis in America. Washington, Congressional Quarterly, 1975. 93 p.

2, 4

Wind power is discussed briefly in the chapter on "New Sources of Energy."

118. Engstrom, S. Renewable energy resources: wind energy from a Swedish viewpoint. Ambio 4(2): 75-79, 1975.

6

Interest in wind power as a natural source of energy has revived, and this article takes a look at the historical perspective, new technical developments and remaining problems, questions of economy, ecological considerations, and the future perspective.

119. Engstrom, S. Vindkraft i sverige ett realistiskt komplement? [Is wind power in Sweden a realistic source of energy?] VVS Tidskv. Vaerme Vent. Sanit. Kyltetek. 46(12): 23-29, Dec. 1975. (In Swedish)

6

The article presents a review of the current status of development of wind power plants in Sweden from both the engineering and economic points of view.

120. Euler, K.J. Are there new energy sources. Eletrotech. Z. A96(1): 52, 1975. (In German)

6

121. Executive summaries of project reports of the Council. Texas Governor's Energy Advisory Council, Austin, Texas. NTIS, PB249936, March 1, 1975. 142 p.

6

As part of the work of the Texas Governor's Energy Advisory Council a series of special projects were initiated to gather information, provide background, evolve technological assessments, and develop analyses and projections on a series of topics related to energy in Texas. This document presents brief Executive Summaries of each of the reports. A summary of the objectives, program, and management plan under which the work of the Council was carried out is included.

122. Fact sheet - solar energy. Federal Energy Administration, Wash., GPO, 1975. 9 p.

4

This brochure presents a brief review of solar energy status, including a section on wind power.

123. Ferber, R. A pilot study on public reactions to wind energy devices. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 380-384.

3, 4

This study seeks to explore, in a preliminary way, reactions of the general public in various parts of the country toward the construction of different types of windmills for generating electric energy. It should throw light on the extent to which people may object to the placement of windmills in different types of landscapes, as well as the extent to which different types of people are likely to raise such objections.

124. Finch, R.D. and H. Hahn. Texas Energy Scenarios. Texas Governor's Energy Advisory Council, Austin, Texas. NTIS, PB243357, January 1975. 93 p.

4, 6

This report presents four scenarios of the future of energy in the state of Texas. The first case is a Baseline Scenario which projects the future as it might have appeared during the relatively stable period from 1967 to 1970. This is then compared with a Market Forces Scenario in which various constraints on the operation of the U.S. market are removed. A Regulated Conservation Scenario and a New Technology Scenario are then presented to illustrate the trends that might result from government actions aimed at reducing demand or increasing supply.

125. Fischer, J. The past and the future of wind energy in Denmark. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 162-166.

1, 3, 6

126. Flatau, A. Review of power from the wind. Energy Research and Development, 5th Annual Symposium, Wash., D.C., March 13-14, 1974. Wash., Edgewood Arsenal, January 1975, p. 101-116. Available from NTIS.

3, 4

A graphically and tabularly documented overview of applications is presented.

127. Focusing on energy--unclearly. New York Times, March 3, 1975, Section 3, page 3.

4

The U.S. Energy R&D Administration, the newest federal bureaucracy, was established to direct and coordinate all governmental energy activities under a single agency. ERDA is responsible for developing such disparate programs as more efficient car engines, atomic bombs, windmills for generating electricity, nuclear power plants for producing more fuel than they consume, solar panels for heating and cooling buildings, and the conversion of coal into gas.

128. Frair, L.C. Proposed allocation model of wind power systems to geographical regions. Proc. AIIE Annual Conf. Conv., 26th. Washington, D.C., May 20-23, 1975, p. 377-381.

3, 6

An allocation model is presented that may be used to generate plans for the implementation of wind power systems in suitable geographic regions. The proposed allocation model consists of four main steps. In step one, the energy requirements that are to be furnished by wind power are determined. Secondly, the number and type of wind power systems needed to satisfy the wind energy requirements specified in step one are determined. The third step consists of the application of a screening mechanism which evaluates the feasibility of the allocation from step two in regard to technological capabilities, gross economic considerations, social and political considerations, and environmental guidelines. Step four consists of a detailed benefit-cost analysis.

129. Freeman, B.E. A new wind energy site selection methodology. Quarterly Report covering period March 17, 1975, to June 16, 1975. LaJolla, Calif., Science Applications, July 1975. 57 p.

6

Progress during the first quarter year of the "New Wind Energy Site Selection Methodology" investigation is reported. Work has begun on two major tasks: field data acquisition, and mathematical model design, development, and documentation.

130. Freeman, B.E. A new wind energy site selection methodology. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 356-359.
3, 6

131. Friedlander, G.D. Energy's hazy future. The power forecasting game, played so avidly by so many in 1970, is now a cautious exercise with fewer, more expert participants. IEEE Spectrum 12(5): 32-40, May 1975.
4

This is a good review of the current status of the world's energy situation and some summarized information from the papers presented at a session entitled "Electrical Energy Technology Forecast" held at the 1975 Winter Meeting of the IEEE Power Engineering Society.

132. Friedmann, P.P. Aeroelastic modeling of large wind turbines. Presented at the 31st Annual National Forum of the American Helicopter Society, Washington, D.C., May 1975.
3, 5

A set of coupled flap-lag-torsional equations of motion for a single wind turbine blade are derived in a general, nonlinear, partial differential form. These equations are suitable for determining the aeroelastic stability or response of large wind turbine blades. Methods for solving the equations together with some possible simplification of the equations are discussed. Finally, the formulation of the complete rotor-tower aeroelastic problem is considered in general terms.

133. Gabel, M. Energy earth and everyone; a global energy strategy for spaceship earth. San Francisco, Cal., Straight Arrow Books, 1975. 160 p.
1, 2, 4, 6

This book contains a small amount of historical and general information about wind power.

134. Galanis, N., S. Narasiah and C.C. Dang. Use of wind energy for the aeration of waste waters: a case study. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-12-1 to V-12-3.
3, 6, 8, 15

Solid wastes and waste waters of domestic and industrial origin are the damaging by-products of our modern industrial civilizations.

In the treatment of these waste waters some of the important steps are screening, sedimentation and aeration followed by disinfection. Aeration is a significant phase consisting of providing waste waters with oxygen in order to promote bacterial growth and consequent bio-degradation of the organic wastes. The design presented in this report is a first attempt to assess the feasibility of using wind energy for the aeration of waste waters.

135. Generator marketed by AeroPower. Wind Power Dig. 1(3): 29, Fall-Winter 1975.

12a

136. Glaser, P.E. New sources of power - solar energy. ASCE Eng. Issues, J. Prof. Act. 101(4): 461-470, October 1975.

6

In the very near term, solar energy can provide hot water and space heating, and in the intermediate term, space cooling for both commercial and residential buildings. In the longer term, terrestrial solar power systems based on focused solar energy, wind energy, or ocean thermal gradients are possible regional sources of auxiliary power. Photovoltaic conversion of solar energy to electricity with solar cells could provide supplemental power if the costs of solar cells are reduced. By the year 2000, a satellite solar power station could be a technically and economically viable continuous source of primary electric power whenever needed throughout the world. It will use solar cells to collect the solar radiation, which would then be converted to microwave energy. The Microwaves will be beamed to a receiving antenna on earth and be reconverted to electricity. Such solar systems can help meet future energy demands without significant detriment to man's environment.

137. God bless Mr. Savonius! Mother Earth News, No. 36: 129, November 1975.

12a

This is a report of a working S-rotor windplant.

138. Goddard, B. Wind power work at Helion. Wind Power Dig. 1(1): 27, January 1975.

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139. Goodrich, R.F. Windspeed characteristics. Wind Power Dig. 1(3): 23-25, Fall-Winter 1975.

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140. Grace, D.J. Potential of WECS for Hawaii. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 130-132.
3, 6

Research programs for the development and use of wind turbine generators in Hawaii are reviewed.

141. Grace, D.J. Wind energy conversion research in Hawaii. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-28-1 to V-28-2.
3, 6

Wind power is a significant alternative energy resource for Hawaii. The relatively steady tradewinds coupled with terrain enhancement and a mild climate provide excellent physical conditions for wind system R&D.

142. Greeley, R.S. Working Group B. Possible utilization schedules. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 473-476.
3, 6

143. Greer, J.H. and C.S. Niederman. Power for data buoys and other remote stations. Presented at IEEE and Marine Technology Society Ocean 75 Conference, San Diego, September 22-25, 1975, p. 736-740.
3, 8, 15

To meet the requirements of a wide range of electrical loads, the NOAA data buoy office has developed and operated reliable power systems. Diesel electric generators and battery powered systems, including hybrid batteries, have been deployed from the tropics to the arctic. Performance of these power systems is evaluated. Other power systems, involving solar and fuel cells, seawater batteries, wind powered generators, wave active turbine generators, and radioactive power generator units, are briefly discussed.

144. Grey, J. The science and technology of nonconventional energy sources for developing countries. Office for Science and Technology, United Nations, August 31, 1975.
6

145. Griffin, O.M. Ocean as a renewable source of energy. J. Eng. Ind. 97(3): 897-908, August 1975.
6

146. Hackleman, M. The Homebuilt wind-generated electricity handbook. Mariposa, Cal., Earthmind, 1975. 194 p.
2, 12a

The author of "Wind and Windspinners" brings us this larger book covering such topics as wind machine restoration, towers, installation, controlling, auxiliary generating equipment and design notes. The whole is delightfully illustrated and provides much needed information for the home-builder.

147. Hamilton, R. Can we harness the wind? Nat. Geogr. 148(6): 812-829, December 1975.
1, 4, 6

Wind power has been used in the U.S. and in Europe for many years. Today some 150,000 old windmills are still utilized in the U.S. Wind power generation is feasible in many special situations, but will not be generally available till costs come down. Examples of the use of wind, from private homes to oil exploration, are described. Many generator designs and energy storage methods are reviewed.

148. Hammond, A.L. Artificial tornadoes: novel wind energy concept. Science 190(4211): 257, October 17, 1975.
4, 5

A novel energy concept involves the utilization of intense vortices, similar to miniature tornadoes, inside large circular towers. This wind system appears capable of generating far more power than conventional wind turbines of similar size can. A combination of the tornado-like vortex and the tower in which it is generated collects and concentrates energy from a far greater volume than the air immediately around the turbine blades does.

149. Hans Meyers' talk. Wind Power Dig. 1(2): 23-24, Summer 1975.
4

150. Hardy, D.M. Wind power studies: initial data and numerical calculations. Progress report, September-December 1975. NTIS, UCRL-50034-76-1, October 15, 1975. 44 p.
6

Initial data collection and numerical modeling results in wind-energy research conducted by the Lawrence Livermore Laboratory are reported. The use of conventional and laser anemometry is described. Also discussed is the development of a data-collection and data-processing capability appropriate for a major numerical study of wind energy as well as a three-dimensional numerical model of wind fields over complex terrain. Illustrative numerical calculations of nondivergent vector wind fields are presented.

151. Harrah, B. and D. Harrah. Alternate sources of energy: a bibliography of solar, geothermal, wind and tidal energy, and environmental architecture. Metuchen, New Jersey, Scarecrow Pr., 1975. 216 p.
2, 16

The Harrahs bring together here over 1,700 books, articles, and reports on solar, geothermal, wind and tidal energy. Some 150 entries deal with unconventional energy sources in general, another 1,200 are devoted to solar power, and the remainder are distributed among the other three power sources. Works cited range from popular books and magazine articles to quite technical reports. An appendix gives names and addresses of periodicals and organizations in the field.

152. Helicopter technology aids wind effort. Aviat. Week 103: 52-55, October 13, 1975.
4, 5

Substantial technology transfer from U.S. helicopter manufacturers to the federal wind energy program promises to bring the vital elements of low cost and high reliability into this area of energy research.

153. Henry Clews sells franchise. Wind Power Dig. 1(2): 15, Summer 1975.
4

154. Heronemus, W.E. The University of Massachusetts wind furnace project: A summary statement. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 404-407.
3, 8, 15

The wind furnace is a system intended to use wind energy or a combination of wind plus photo-thermal energy to provide heating at the residential level in climates characterized by about 6200 degree days of heating requirement (based on 65°F).

155. Heronemus, W.E. Wind power: a significant solar energy resource. Aware 57: 2-7, June 1975.
6

Windpower can be a significant part of our future solar driven energy system, and it is one of those few solar processes that could be exploited in the near term. From a speech presented before the American Chemical Society, Philadelphia, April 1975.

156. Heronemus, W.E. and J.G. McGowan. Ocean thermal power and wind-power systems--natural solar energy conversion for near-term impact on world energy markets. Energy Symposium: Energy Delta/Supply vs. Demand. 140th Annual Meeting of American Association for the

Advancement of Science, San Francisco, February 25-27, 1974. American Astronautical Society. A.A.S. Science and Technology Series 35: AAS74-034, p. 491-506, 1975.

3, 6

The potential of two energy conversion systems which use the natural solar collection of the earth and its atmosphere over land and sea as their power input is discussed. The first concept, for large scale power generation, is based on a Rankine cycle heat engine driven by the thermal difference (15 to 22 degrees Celsius) which exists between the warm tropical surface waters of the ocean and the great mass of cold water below. Windpower, the second concept, is discussed in the context of small to large scale systems comprising a number of methods for extracting a portion of the kinetic energy of the earth's atmosphere. A brief history and a current status report on recent research developments as well as the basic technical descriptions of these concepts are presented. Suggested configurations for energy distribution systems utilizing these natural energy resources complete with energy storage and transmission systems are given. In addition to the potential impact of these systems, the recognized technological and institutional problems standing in the way of their potential implementation are enumerated.

157. Herron, R.C. Energy conversion apparatus. U.S. Patent 3,895,236. July 15, 1975. 8 p.

17

An energy conversion apparatus is described for converting forces occurring in nature to electrical energy. Natural forces such as wind, gravity, etc. are converted to reciprocating linear motion which is then converted to electricity either directly or after a linear to rotary motion conversion.

158. Herwig, L.O. Solar energy systems: practical alternatives for the 1980's. Am. Nucl. Soc. Trans. 21: 144-145, June 1975. (Abstract)

6

The National Solar Energy Program plan to develop reliable, economically viable, solar-based power systems is described. The plan encompasses six approaches to utilization of solar energy which depend on collection, absorption, and conversion of the sun's radiation either through direct interactions, e.g., thermal, photovoltaic, or photosynthetic, or through indirect interactions in wind and ocean.

159. Herwig, L.O. U.S. Solar Energy Research Program. Am. Geophys. Union EOS Trans. 56(2): 58-61, February 1975.

4, 6

During the past four years, NSF has been developing program plans for increased federal support of terrestrial solar energy research. The status and plans of the U.S. Solar Energy Research Program are described. Research is organized under the program areas of: heating and cooling of buildings and agricultural applications; solar thermal conversion; photovoltaic conversion; bioconversion to fuels; wind energy conversion; and ocean thermal conversion. The NSF-Research Applied to National Needs solar energy budget for FY75 is estimated at $50 million. The FY71 budget was $1.2 million.

160. Hewson, E.W. Generation of power from the wind. Amer. Meteorol. Soc. Bull. 56(7): 660-675, July 1975.

4, 6

There is vast energy available in the earth's winds for man's use. It is conservatively estimated that the wind power available to man is the equivalent of the output of 1000 typical fossil fueled or nuclear power plants of 1000 megawatts (MW) capacity each. By contrast, the water power potential of the earth is only one-tenth as large. Large wind generators have been built and used during the past 50 years. Research on wind power sites in the mountainous, coastal and valley areas of the Pacific Northwest is being conducted. Terrain modification, aerogenerator "farms," special duty installations, environmental impacts, land use, and net energy costs are all taken into consideration. It is concluded that wind power shows promise of supplying substantial amounts of supplementary electrical energy and that the development of this wind power potential should proceed with the federal government taking a lead role.

161. Hewson, E.W. Wind-power potential in the Pacific Northwest. In: Citizens' Forum on Potential Future Energy Sources, Proceedings. Portland, Ore., Oregon Department of Geology and Mineral Industries. Miscellaneous Paper No. 18, 1975, p. 7-24.

3, 6

Research on the wind-power potential of Oregon and neighboring areas described in this article, was commenced in 1971 by Oregon State University under the sponsorship of the four Oregon P.U.D.'s and has continued since that time under the same sponsorship. The primary thrust of the research has been to study various possible wind-power sites, especially those at or near the Oregon coastline and in the Columbia River Valley. These studies have involved the detailed analysis of existing wind records and the establishment of new wind-measuring stations. At the same time, the wind tunnel at Oregon State University has been enlarged and improved to permit model studies of air-flow patterns around terrain features. If a comparison of model and actual air-flow patterns over and near pronounced terrain features shows satisfactory agreement, then the location of desirable wind-power sites will be greatly facilitated and expediated. Other project uses of the wind tunnel are also described.

162. Hewson, E.W., R.W. Baker and R. Brownlow. Wind power potential in selected areas of Oregon. Oregon State University, Report No. PUD 75-3, August 1975. Third Progress Report. Corvallis, Oregon, Oregon State University, 1975.

6

During the third year of the project, research centered on further analysis of potential wind power sites, the development of a promising new wind analysis technique and continued research on wind tunnel simulations of wind flow over a model of a coastal headland. Offshore coastal power sites look promising, though expensive. The report concludes with an assessment of the feasibility of wind power in Oregon after three year's research, with a recommendation.

163. Hickok, F. Handbook of solar and wind energy. Boston, Cahners, 1975. 130 p.

2, 4

164. Hillman, E.K. Wind-driven motive apparatus. U.S. Patent No. 3,899,268. August 12, 1975. 6 p.

5, 17

A wind driven apparatus having pairs of vanes mounted upon a rotatable shaft is disclosed. Each of the vanes is laterally slidable upon the shaft to cyclically vary the surface area on either side of the shaft; however, the vanes are not rotatable with respect to the shaft. Rotation of the shaft, and attached power takeoff pulleys, is effected by the wind acting upon a greater surface area on one side of the shaft than the other.

165. Hollomon, J.H. and M. Grenon. Japan. Ford Foundation Energy Policy Project Report: Energy Research and Development, 1975, p. 205-222.

4, 6

Japan may become, without any domestic natural resources, the world's second most powerful economic nation. Since 1958, various unsuccessful attempts were made to improve the coal industry situation, which reached its peak in 1961 and has been decreasing steadily. Oil covers more than 70% of the total energy mix, and will continue to do so for the next 15 years. At least 99% of this oil is imported. There is little natural gas production in Japan, but various contracts with other nations could raise the level of imports to 30 million metric tons in 1985. Electricity is generated by thermal rather than hydro capacity. With oil as the dominant fuel for thermal production, aside from power production and nuclear energy, only a small amount of R&D is performed in the energy field. Some research has been done on nonconventional energy sources, such as solar energy (and the manufacture of a solar battery), wave energy, wind energy, geothermal energy, and coal gasification and liquefaction.

166. Huge windmills may power cities. Mach. Des. 47: 12, January 23, 1975.
4

167. Hughes, W.L., H.J. Allison and R.G. Ramakumar. Development of an electrical generator and electrolysis cell for a wind energy conversion system. Final Report July 1, 1973 - July 1, 1975. Oklahoma State University, Stillwater, Okla. NTIS, PB243909, July 10, 1975. 280 p.
13

This final report describes progress made at the Oklahoma State University on wind energy utilization. The specific objectives of this research program were: (1) to develop and build a working field modulated generator system in the 10/20 kW range suitable for use in a wind energy system to deliver standard 110/220 V single-phase 60 Hz power over a 2 to 1 range of speeds; (2) to develop and build a working high-pressure moderate-temperature electrolysis system in the 2-3 kW input range in the available high pressure test facility; and (3) to design and construct a wind generator test station at the Stillwater airport using existing field modulated generators and bicycle-wheel type aeroturbines developed by the American Wind Turbine Company. Final reports are presented covering performance details on the products of each of the three objectives. A large Appendix reproduces 13 papers generated during the two year contract period.

168. Hundemann, A.S. Windpower (A Bibliography with abstracts). Report for 1964 - December 1974. NTIS/PS-75/348. NTIS, February 1975. 90 p. Supersedes COM-74-11103.
16

The feasibility, use, and engineering aspects of windpower and windmills are covered in 85 abstracts. Many of the reports are recent NASA translations of European and Russian research conducted from 1934 to 1959.

169. Hurlebaus, W.H. A perspective on wind mission analysis. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 88-91.
3, 6, 13

170. Hurlebaus, W.H. Subgroup position paper. Subgroup 4: wind energy systems. In: Magnitude and Deployment Schedule of Energy Resources. Proceedings of a conference held on July 21-23, 1975, Portland, Oregon. Edited by Walter D. Loveland. Corvallis, Oregon, Oregon State Unviersity, September 1975.

3, 6

171. Hybrid windmill notes. Wind Power Technical Memo WTM 2. Sylmar, Cal., Helion, 1975.

4, 12a

This summarizes J. Parks' knowledge of hybrid windmills.

172. Igra, O. Israeli work on aerogenerator shrouds. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 149-155.

3, 10

Past work in Israel has shown that wind turbines enclosed in specially designed shrouds can increase the output of power of the turbine by a factor of 3 or so, as compared with unshrouded turbines under the same free wind stream conditions. However, first generation shrouds were found to be unacceptable for economical use, i.e., the ratio of the shroud's total length to throat diameter was of the order of 7. The main purpose of the present work was to arrive at a compact shroud configuration, without sacrificing aerodynamic performance. The results clearly indicate that it is possible to obtain shrouds with a total length to throat diameter ratio that is smaller than 3, and that have an aerodynamic performance similar to the first-generation model.

173. Igra, O. Shrouds for aerogenerator. Ben Gurion University of the Negev, Department of Mechanical Engineering, Report No. 2, March 1975. 53 p.

10

In order to exploit the wind power as economically as possible, it was suggested that the wind turbine be enclosed inside a specially-designed shroud. Past work has shown that such shrouds can increase the output power of a given turbine by a factor of 3 or so, as compared with the bare configuration under the same free stream conditions. However, the geometry of the first generation shrouds was unacceptable for economical use, i.e., the ratio of the shroud's total length to throat diameter was of the order of 7. The main purpose of the present work was to arrive at a compact shroud configuration without sacrificing good aerodynamic performance. The results clearly indicate that it is possible to obtain shrouds with total length to throat diameter ratio smaller than 3, with performance similar to the first-generation model.

174. Inglis, D.R. Wind power now! Bull. Atom. Sci. 31(8): 20-26, October 1975.

4

Harnessed by methods which are already well known, the wind could soon supply a substantial fraction of our energy needs at an economical cost; yet the government's pace is inexcusably slow. A prompt start might unshackle the United States from its nuclear ball and chain.

175. Institute of Environmental Sciences. Annual Technical Meeting, 21st, Anaheim, Cal., April 14, 1975. Vol. I: Energy and the Environment. Vol. II: Technical Division Proceedings, including career guidance forum notes. Mt. Prospect, Illinois, Institute of Environmental Sciences, 1975.

3, 4

176. Intersociety Energy Conversion Engineering Conference, 10th, Newark, Delaware, August 18-22, 1975. New York, Institute of Electrical and Electronics Engineers, Inc., 1975. 1572 p.

3, 4

The 227 papers presented at the conference cover solar buildings, solar heating and cooling, solar thermal electric generation, solar utilization, space solar systems, LMFBR, energy storage and components, automotive engines, fuel cells, urban systems, nuclear power systems, thermionic energy conversion, photovoltaic conversion lithium batteries, topping cycles, unique engines, molten salt/solid electrolyte batteries, synthetic liquid fuels from coal and oil shale, energy conservation, thermoelectric systems, aqueous batteries, alternative fuels, isotopic power systems, Stirling cycle engines, wind systems, Brayton cycle systems, hydrogen, biomedical power, Rankine cycle systems, wind system applications, and heat pipe applications.

177. Investigation of the feasibility of using windpower for space heating in colder climates. Third Quarterly Progress Report covering the final design and manufacturing phase of the project, September to December 1975. NTIS, ERDA/NSF/00603-75/T1, December 1975. 165 p.

6, 8

Progress during the third quarter has been inadequate. The overall project is now 4 weeks behind schedule, which means that data collection at Solar Habitat One will not begin until mid-March 1976, the twelfth month of this phase of the work. System design and cost analysis are summarized.

178. Jack Park's wind experiments. Mother Earth News, No. 32: 101, March 1975.

12a

Several photographs and a description of J. Park's "hybrid" wind turbines are shown, with information about his book, which is indexed under 1975:258.

179. Jacobs, M.L. and P.R. Jacobs. Clutch-controlled, wind-operated, power producing propeller. U.S. Patent No. 3,891,347. June 24, 1975.

5, 17

A clutch-controlled, wind-operated, multibladed power producing propeller includes a plurality of propeller blades mounted on a hub for rotation about a power output shaft, a clutch connected between the hub and output shaft and operable to remain disengaged until the propeller blades attain a predetermined speed of rotation. The clutch then engages to transmit power from the propeller to the output shaft.

180. James, E.C. Unsteady aerodynamics of variable pitch vertical axis windmill. American Institute of Aeronautics and Astronautics and American Astronautical Society, Solar Energy for Earth Conference, Los Angeles, April 21-24, 1975. AIAA Paper 75-649. 7 p.

3, 5, 9

A linearized theory is developed to treat the unsteady aerodynamics of a vertical axis windmill. The wind speed is uniform and steady. The circular orbit of the blades represents a large amplitude flight path motion. Along this trajectory the blades are free to execute small amplitude pitching. The results include blade force, moment, power required to sustain a specified windmill speed, and the rate of energy loss due to shedding of vorticity. Relative to the wind speed, the high and low speed cases of windmill operation are investigated.

181. Jayadev, T.S. Novel electric generation schemes for wind power plants. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 298-306.

3, 13

A variable speed prime mover would drive a conventional a.c. generator with d.c. excitation, resulting in variable frequency. To interconnect the wind energy system (WES) to existing power systems demands the output of WES to be of constant frequency and voltage. Constant voltage can be obtained by common voltage regulator techniques, but obtaining constant frequency from a variable frequency generator is not simple. Converting WES output to "utility grade" power by cost effective techniques is discussed.

182. Jayadev, T.S. and R.T. Smith. Generation schemes for wind power plants. IEEE Trans. Aerosp. Electron. Syst. AES11(4): 543-550, July 1975.
13

This paper reviews various electric generation schemes for wind energy conversion suitable for interconnection with a power grid. The schemes can be generally classified as constant speed constant frequency (CSCF) and variable speed constant frequency (VSCF) systems. Historically, only CSCF systems have been used for large power generation in wind power plants. However, with the advent of power electronics and the availability of solid state devices capable of handling large amounts of power, VSCF systms are becoming competitive. Various schemes under each classification are discussed and compared. It is stressed, however, that the optimum choice of the generating scheme is not decided by considering the generator alone. The optimum choice is one which minimizes the cost of energy generated by the wind power plant.

183. John M. Thalmann's wind turbine. Mother Earth News, No. 31: 82, January 1975.
12a

The author has built a wind turbine closely related to the Savonius S-rotor.

184. Johnson, C.C., R.T. Smith and R.K. Swanson. Electric utility aspects of windpower. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 307-309.
3, 13

185. Johnson, C.C., R.T. Smith and R.K. Swanson. Survey of windpower development in the United States and Europe. Interamerican Conference on Materials Technology, 4th. Proceedings. Caracas, Venezuela, June 29 - July 4, 1975, p. 577-582. Published for Southwest Research Institute, San Antonio, Texas, by Cent. Reg. de Ayuda Tec., Agencia para el Desarrollo Int. (AID), Buenos Aires, Argentina, 1975.
3, 4, 6, 11

Windpower use for electrical power generation is reviewed in terms of past and current development, both in the USA and Europe. Technical data and operating experience are presented for a number of important windpower generation systems (WGS) in Denmark, Germany, and particularly, the Putnam 1000 kW plant at Grandpa's Knob, Vermont. Recent programs initiated by the National Science Foundation are described, as well as the USA windpower R&D program proposed for the next 5-10 year period. Consideration is given to the maximum available power from the wind and how much of this power can actually be extracted and utilized. Various systems for processing the variable speed mechanical power of wind turbines are discussed in terms of complexity, cost, availability, and specific application. Systems evaluated include synchronous, induction, commutator, and solid-state power conversion techniques. The means for storage of the varying electrical energy output are described.

186. Johnson, G.L., F.W. Harris and N.R. Michal. Farm hydrogen system load factor analysis using both wind and electric utility power in southern Kansas. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-9-1 to V-9-3.

3, 9, 14

The KSU College of Engineering is investigating a proposed fuel system that involves the use of hydrogen as a mobile fuel for farms throughout the Great Plains states. The system envisioned is that of vertical axis wind rotors driving electrical generators which supply power to electrolysis cells. Off-peak electric energy from coal and nuclear-fueled conventional generating stations could be used to insure a stable energy supply during light wind conditions. The hydrogen is collected and stored for use as needed in the farm heat engines. Rotors, control systems, and special-purpose electrolysis cells are now in the preliminary design stage.

187. Jordan, P.F. Improved rotors through utilization of aeroelastic effects. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11-1975. McLean, Va., Mitre Corp, 1975. NSF-RA-N-75-050, p. 247-248.

3, 5

188. Justus, C.G. Annual power output potential for 100 kW and 1 MW aerogenerators. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 360-366.

3, 6

Previous estimates of wind power potential in the U.S. have been based on statistics of the mean wind speed at various sites across the country. While the average power output of a wind generator will certainly depend on the mean wind speed, it will also have a dependence on other factors, e.g., variance of wind speed about the mean. A method for computing actual expected output power from a wind generator, given the observed wind speed distribution, and results of application of this method, in the form of aerogenerator plant factor (ratio of average power output to rated power) for the continental U.S. are presented. Plant factors are evaluated for aerogenerators with characteristics of NASA's 100 kw Plumbrook unit and the design characteristics of NASA's 1 MW aerogenerator.

189. Justus, C.G. National wind energy statistics for large arrays of aerogenerators. Prog. Rep. No. 1, covering the period January 15, 1975 through September 30, 1975. Atlanta, Ga., Georgia Institute of Technology, School of Aerospace Engineering, October 1975. 29 p.

5

The purpose of this study is to evaluate and analyze the wind energy output statistics of realistically simulated arrays of aerogenerators in various regions of the contiguous 48 states of the U.S. This brief report describes analysis procedures used and the results from two sample runs of one month each on limited size arrays of sites.

190. Justus, C.G. Nationwide assessment of potential power output from aerogenerators. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-21-1 to V-21-3.

3, 6

Previous estimates of wind power potential in the U.S. have been based on statistics of the mean wind speed at various sites across the country. While the average power output of a wind generator will certainly depend on the mean wind speed, it will also have a dependence on other factors, e.g., variance of wind speed about the mean. This report presents: 1) a method for computing actual expected output power from a wind generator, given the observed wind speed distribution, and 2) results of application of this method, in the form of aerogenerator plant factor (ratio of average power output to rated power) for the continental U.S.

191. Justus, C.G. Working Group E. Wind characteristics/site survey. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 487-490.

3, 6

192. Kaplan, G. For solar power; sunny days ahead? IEEE Spectrum 12(12): 47-52, December 1975.
4, 6

The future of sun-derived electric power is clouded by budgetary constrains, institutional and public inertia, and poor incentives. Wind power is discussed as one form of solar energy.

193. The Kedco 1200. Wind Power Dig. No. 2: 14, Summer 1975.
12b

This is a news item about the sale of Jack Park's "12/16 footer" windplant design to Kedco Inc., a California firm which plans to market a 1,200 watt wind generator.

194. Kenned, A.M. and B. Parvin. The second New Zealand Energy Conference. New Zealand Energy J. 48(6): 98-108, June 25, 1975.
3, 4

Many sources are available for analyzing past energy trends and forecasting future ones in New Zealand. The activities of the New Zealand Energy R&D Committee are described. Transportation energy use, static energy production and use, raw materials, and renewable energy resources in New Zealand are reviewed.

195. Killen, R. G.E. systems studies of large-scale WECS. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp. NSF-RA-N-75-050, p. 37-45.
3, 6

The cost of generating electrical power by wind turbine generator systems is analyzed for different wind regions. Minimum cost systems are discussed. Various system configurations are studied.

196. Kling, A. Precessor system for wind energy conversion. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 465-467.
3, 5

The Precessor Wind Energy Conversion System is based on a concept which utilizes the rotor system of a wind energy converter as a gyroscope and uses the precession, which occurs whenever an external torque is exerted on a spinning rotor, to position the rotor to face into the wind and to adjust its position to the slightest changes of wind direction. The system does not fight against the precessional forces of the rotors, but puts precession to work for the system.

197. Koekebakker, J. More than oil and gas to North Sea energy. Energy Int. 12(5): 18-19, May 1975.

4

198. Kolm, K., et al. Evaluation of wind-energy sites from aeolian geomorphologic features mapped from LANDSAT imagery. First results. NTIS, ERDA/NSF/00598-75/T1, December 1, 1975. 39 p.

6

This research effort relates aeolian geomorphologic features, interpreted from satellite imagery, to areas of high-wind-energy potential. Preliminary results, gathered during spring and summer months, were evaluated statistically to determine the critical interrelationships for the Killpecker test area. These tests indicate that the morphology of individual dunes is not a unique indicator of wind velocity or persistence, but the morphology of the dune field is an indicator that can be used to predict areas of high wind-energy potential. These results will be used as a guide to prediction of other areas of high wind-energy potential. Field measurements will then be used to test these predictions. Similar evaluations are being made in the Big Hollow Area where aeolian erosional phenomena dominate the geomorphologic development.

199. Krueger, J.N. Evaluation of wind energy available in North Dakota. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-20-1 to V-20-3.

3, 6

The University of North Dakota's Wind Energy project was initiated in November of 1973. The purpose of the project was to make an evaluation of the energy in the winds blowing over North Dakota during a year's time. Energy would be extracted from the wind by a conventional high speed propeller coupled to an electric generator. Continuous readings of the wind velocity and the energy produced would be recorded.

200. Lapin, E.E. Theoretical performance of vertical axis wind turbines. ASME Paper 75-WA/Ener-1, 1975. 11 p.

9

An elementary theory is developed for the power extraction capability of a vertical axis wind turbine comprising a number of blades which operate either at fixed or at continuously variable incidence. The performance according to that theory is computed for some examples and applied to estimate the economic feasibility of a turbine of 10 megawatt rating.

201. Larsen, H.C. Summary of a vortex theory of the cyclogiro. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-8-1 to V-8-3.

3, 5

The cyclogiro was first proposed by Congreve in 1828 as a man-powered airborne vehicle. In the succeeding 147 years, it has received sporadic development. Several theories based on aerodynamics of wings combined with the momentum theorem to calculate a uniform induced flow through the rotor have been developed. An Army Air Corps study of 1943-45 recommended against the further development of the cyclogiro, although aircraft utilizing the concept were competitive or superior to fixed wing aircraft. This was because of the high level of vibration due to heavy, cumbersome mechanical blade actuation mechanisms, unsteady aerodynamic effects, and the lack of a suitable theory to predict correctly the induced flow through the rotor. The auto-rotation characteristics of the cyclogiro clearly indicated that it could be used as a windmill. The successful use of the fly-by-wire concept in modern aircraft, stability augmentation systems, and the modern high-speed digital computer have advanced technology to the point where these techniques can be utilized to design and control cyclogiros, and provided the impetus for a careful reappraisal and analysis of the problem. This paper is a brief summary of the progress so far, and an application to the design of wind energy generation devices.

202. Lawand, T.A., et al. Solar energy potential for Canada. In: International Solar Energy Congress and Exposition. 1975. Rockville, Md., International Solar Energy Society, 1975, p. 4-5.

3, 6

203. Leckie, J., et al. Other homes and garbage. San Francisco, Sierra Club Books, 1975.

2, 4

A section on the fundamentals of wind energy systems is included.

204. Lee, D.G. Wind power. Nat. Wildlife 13(5): 30-33, August-September 1975.

4, 6

Included in this brief overview of wind energy developments and potential is a chart of wind speeds of 32 U.S. metropolitan communities.

205. Liljedahl, L.A. Wind energy use in rural and remote areas. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 393-399.
3, 6, 8

Historically, agriculture was a major user of wind generated power before inexpensive power from other sources became available. Because of this, it is reasonable to expect that agriculture, rural and remote area applications can again play an important role in the development of a future viable wind energy industry in the United States as fossil fuels become more scarce and expensive and that the wind energy used in such applications can substitute for an appreciable portion of the fossil fuel energy currently used in the current agricultural industry.

206. Lindley, C.A. Wind machines for the California Aqueduct. In: Workshop on Wind Energy Conversion System, 2d, Wash., June 9-11, 1975. McLean Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 104-111.
3, 15

The use of wind turbine generators to provide some of the electric power needed for the California Aqueduct pumping systems is analyzed.

207. Lindley, D. New Zealand's place in the energy economics of the Pacific Basin countries. Presented at Energy in the Pacific Basin, a Conference at Pepperdine University, Malibu, Cal., December 17-19, 1975.
3, 6

After a brief review of the energy economies of some ten Pacific Basin countries which draws attention to some similarities and many differences, the paper deals in some detail with the energy economy of New Zealand. In spite of considerably undeveloped coal, hydro and geothermal resources and the promise of further discoveries of natural gas and condensate, New Zealand still has the long-term problem of finding a way of reducing its considerable dependence on oil imports. The future possibilities for using bioconversion, solar, wind, geothermal, and hydro resources to reduce this dependence are discussed.

208. Lindquist, O.H. Application of wind power systems to the service area of the Minnesota Power and Light Company. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 98-103.
3, 6, 13

The objective of Honeywell's study is to define the attributes and performance requirements of a system capable of yielding a satisfactory return on investment to a utility company. An initial system definition will be developed by designing and evaluating the most cost-effective system based on available wind information and today's technology. The system will be tailored to the Minnesota Power and Light (MPandL) Company region. Within MPandL's region is located a sparsely populated, high-wind-energy area that could be used to alleviate the load problems caused by a fast-growing taconite industry. In addition, the nation's highest utility load factor and operational flexibility derived from having significant hydro and high voltage d-c sources place MPandL in an ideal position to accept the output expected from wind power systems.

209. Lindsley, E.F. First report on Smokey Yunick's total energy system. Pop. Sci. 207(2): 56-59, August 1975.
4, 6, 12b

Wind and sun will heat, cool, and make electricity, liquid fuel and fertilizer.

210. Lindsley, E.F. New inverter gives wind power without batteries. Pop. Sci. 207(4): 50, 52, October 1975.
4

Hans Meyer's device that converts dc into ac for household use and eliminates the need for storage batteries is discussed.

211. Lindsley, E.F. Robert Landing: he rides on the wind. Pop. Sci. 206(4): 116-117, April 1975.
4, 12b

212. Lissaman, P.B.S. Working Group G. Possible improvements in conventional wind energy conversion systems. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 498-501.
3, 5, 13

213. Lissaman, P.B.S. Innovative and advanced system concepts. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 413-416.
3, 13

214. Little new under the sun. Resources for the Future, No. 48: 10-12, January 1975.
6

Solar heating and cooling is generally believed to have the best chance of making a substantial energy impact in the near term. Electricity generation from solar energy, solar cells, ocean thermal gradients, wind power, and bioconversion techniques are possible, or nearly possible today, but economically they shape up on the minus side of conventional techniques. At best, by 1980 about 1% of U.S. homes could be generating up to 80% of their energy requirements, which, given the cost of oil, could save about $2 billion/yr.

215. Ljungstroem, O. Swedish wind energy program, a three year R and D plan, 1975-1977. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 140-148.

3, 6

A first phase of a three year program was started by the National Swedish Board for Technical Development (STU) in January of 1975, and it is expected that the STU-proposed program will be carried on to form a basis for decision as regards implementation of large scale wind energy systems in the late 1980s. The main features of the STU WECS-program, its background and achievements to date are described.

216. Lotker, M. Northeast Utilities' participation in the Kaman/NASA wind power program. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 59-68.

3, 6, 7, 13

Northeast Utilities is currently supporting the Concept Selection, Optimization, and Preliminary Design of Large Wind Generators Study conducted by Kaman Aerospace Corporation under NASA contract. Our purpose in these activites, which are internally funded, is to maintain an intimate contact with the wind generator design effort in order to best be able to factor it into our generation plans, and to insure that the product of this research will meet the technical and institutional constraints of our industry.

217. McCallum, B. Environmentally appropriate technology: developing technologies for a conserver society in Canada. Ottawa, Canada, Advanced Concepts Centre, March 1975. 91 p.

2, 4, 6

This primer for government policymakers describes how a new school of thought evolved from the environmental movement, the back to the land movement and biotechnics. Renewable energy sources were rediscovered and ways to use them for architecture, agriculture and transportation are discussed. Windrotors are included in the discussion.

218. McCartney, J.F. and M.A. Cates. Selection of power sources for remote ocean oriented applications. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 1318-1327.

3, 15

219. McCloud, J.L. and J.C. Biggers. How big is a windmill - Glauert revisited. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 9 p.

3, 5

The obvious similarities to propellers and helicopter rotors suggest that helicopter technology might be used to improve wind generator performance, perhaps including development of a windmill airfoil. In a back-to-basics approach, this paper reviews the analyses of Glauert to determine basic size-power relations. The energy method of Wheatley developed for helicopter/auto-gyro performance prediction is then incorporated into the basic theory. Equations and charts are presented showing ratios of power output to the ideal power capability as functions of mean blade lift and drag coefficients, solidity and rotor tip speed ratio. It is found there is little possibility for improved performance by using improved airfoils. The basic assumptions of the Glauert theory are reviewed and means are suggested for achieving the basic power capability indicated by momentum theory.

220. McCormack, M. Luncheon address. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 72-78.

3, 4

221. McGowan, J.G. and W.E. Heronemus. Ocean thermal and wind power: alternative energy sources based on natural solar collection. Environ. Aff. 4(4): 629-660, 1975.

6

This article discusses the two most important natural solar collection methods for large-scale energy production: (1) the collection of solar energy by the Earth's atmosphere that causes the winds; and (2) the natural collection of incoming solar radiation by the oceans that creates large temperature differences in the ocean waters. The size of these energy conversion systems could range from a few kilowatts for individual household windpower systems to large-scale 400-MW ocean thermal difference power plants. The historical development of systems designed to utilize these renewable energy sources and their potential for making a significant contribution to the energy supply of the U.S. are discussed. Recent research results and technological developments in total power systems and important subsystem components, including those used for the storage of energy, are discussed. An attempt is made to enumerate the recognized technological and institutional problems standing in the way of their potential implementation. A compilation of 63 footnotes completes the articles.

222. McGowan, J.G., W.E. Heronemus, and G. Darkazalli. Wind and solar thermal combinations for space heating. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 974-980.
3, 6, 8

This paper presents the results of an analytical study that was carried out to model and determine the feasibility of a residential heating system for the Northeastern section of the United States, designed to be powered or augmented by a wind generator system. In addition to windpowered electrical resistance heating systems (with and without thermal energy storage), the possibility of combining these systems with a flat plate solar collector is investigated.

223. MacKillop, A. Wind power. Ecologist 5(1): 23-26, January 1975.
6

Economic and consumer prejudice weigh heavily against wider use of wind energy. Existing technology is very well proven; however, little is known about supplies of wind energy particularly at the local level. Limits to energy extraction from wind, energy available in wind, wind regimes, and windmill characteristics are discussed.

224. McLaughlin, M. Windmill power. McCalls 102(9): 39, June 1975.
4

225. Magnas, H.L. Solar energy projects of the federal government. NTIS, PB241620, January 1975. 151 p.
6

This report identifies 171 Solar Energy projects administered by 14 different Federal agencies between July 1973 and January 1975. Solar categories included are: Heating and cooling of buildings; wind energy conversion; solar thermal conversion; ocean thermal conversion; photovoltaic electric power systems; and bioconversion to fuels. An introductory chapter provides an overview and analysis of the Federal effort in Solar Energy and categorizes projects by agency, the amount of funding, and the major program areas. Appendices provide brief summaries of each of the 171 projects.

226. Manalis, M.S. Airborne windmills. Energy source for communication aerostats. American Institute of Aeronautics and Astronautics, Lighter than Air Technology Conference, Snowmass, Colorado, July 15-17, 1975. Paper 75-923. 19 p.
3, 8, 15

Practical systems are described which will enable the placing of an aerogenerator on communication aerostats. These tethered aerostats are high-altitude platforms for wide-area telecommunication and broadcast functions. The purpose of this effort is to investigate the use of airborne windmills to increase the operational availability of the aerostat system. Preliminary calculations indicate that useful amounts of power could be generated economically without increasing the weight of the aerostat and without appreciably changing its angular position.

227. Manser, B.L. and C.N. Jones. Power from wind and sea--the forgotten panemone. Thermofluids Conference: Energy--Transportation, Storage and Conversion. Preprints of Papers. Brisbane, Australia, December 3-5, 1975. Sydney, Australia, Institute of Engineering, 1975. (National Conference Publ. No. 75/9) p. 37-41.

3, 6, 9

The Savonius rotor, a special form of panemone, has scientific application as a current velocity meter in hydrographic investigations, but its industrial users are limited at present to powering ventilators. The practical advantages of a machine of such extreme simplicity, and the uncertainty as to its performance or underlying principles of operation, led the Department of Mechanical Engineering of Queensland University to begin investigations into vertical-axis machines in general, and the Savonius rotor in particular. This paper reports some preliminary results. It is suggested that an extension of the Savonius rotor geometry leads to a multiblade rotor, resembling the cross-flow fan or the Banki turbine.

228. Marshall, W. Stretching energy independence. New Sci. 65(941): 695-697, March 20, 1975.

4

229. Marwitz, J. and R. Marrs. Locating areas of high wind energy potential by ERTS observations of aeolian geomorphology. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 353-355.

3, 6

The objective of the research is to test whether ERTS observations of aeolian geomorphology features can be used to locate areas of favorable wind energy conversion sites.

230. Mason, R.M., et al. Macro analysis of the potential for fuel savings using wind generators in a utility power grid. In: Modeling and Simulation. Vol. 6. Proceedings of the Sixth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-25, 1975. Part 1. Pittsburgh, Pa., Instrument Society of America, 1975, p. 121-126.

3, 6

Surveys of wind energy potential were conducted and an electric power grid model was developed to examine the potential of using wind energy as a means of conserving fuel. An economic interpretation of the results is presented.

231. Massart, G. Utilisation de l'energie eolienne. [Utilization of wind energy.] Onde Electr. 55(4): 225-230, April 1975. (In French)
6

Utilization of wind energy, which is available in important quantities on the earth's surface, cannot be conceived without having a good idea of all the factors involved. The first part of this article sums up these factors, meteorological as well as technological. The second part is a quick survey of attempts to use wind energy on more or less large scale as well as of projects actually studied.

232. Mayo, L.H. Legal-institutional implications of wind energy conversion resources. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 385-391.
3, 4, 6

The principal concern of this unsolicited project is to examine the existing legal and institutional constraints on, and the corresponding changes necessary to optimize development of a variety of possible wind power configurations in certain defined social and geographical environments.

233. Meier, R.C. Concept selection and analysis of large wind generator systems. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 10 p.
3, 6, 7

The increasing need to develop alternative energy sources has renewed interest in the use of wind energy for the generation of utility quality electricity. This paper discusses a program to evolve a preliminary design of a cost competitive large wind generator system. An examination of a number of technically feasible alternative wind energy configurations is reported, and the rationale used in selecting the preferred system concept is presented. In addition, preliminary results of an optimization study conducted on the preferred concept are summarized. These show that considerable latitude in the selection of the system design parameters is possible. This permits design decisions to be based on other important factors such as development risk and the suitability of common component designs for systems with different power ratings.

234. Meier, R.C. Concept selection, optimization, and preliminary design of large wind generators. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 46-58.
3, 6, 7

A preliminary design of a large wind generator system for use by electric utilities is described. The conceptual design task covered the examination of a number of suitable WGS concepts, an evaluation of three of the most promising of these concepts, and the selection of the system concept which appeared to be most suitable for the utility application. The parametric analysis covered the development of a computer program capable of optimizing the system and its components, and the system optimization. The applications and requirements analysis identified with specific utility interface requirements of a WGS in a standard electric utility application, and estimated the cost goals necessary for the system to be competitive with conventional generation equipment. These three initial tasks have been completed, and the results are presented.

235. Meliss, M., D. Oesterwind, and A. Voss. Non-nuclear and non-fossil energy resources and their possibilities for future power generation. Kerntechnik 17(7): 301-306, July 1975.

6

This paper presents a brief survey of non-nuclear and non-fossil energy resources, besides the energy of solar radiation, which could be harnessed by mankind. The discussion covers geothermal and tidal energy, wind, wave and glacier energy, and oceanic heat, the potential and the location-dependence of these energy resources and the current status of technological development for their exploitation.

236. Mercadier, Y. and R. Camarero. A design method of optimum aerogenerator systems. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-15-1 to V-15-3.

3, 5, 13

The aim of this paper is to describe a computerized method for the design of wind energy conversion systems. For the purpose of the study the systems are composed of three components: wind characteristics, wind turbine and energy converter.

237. Meroney, R.N. Sites for wind-power installations. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 344-352.

3, 6

The objective of this research is to increase technical capacity to locate favorable wind system sites, reduce uncertainty in the prediction or validation of the characteristics of sites, and thus assist in the sizing and performance prediction of wind systems. The research will include evaluation of low speed aerodynamics over terrain and boundary flow conditions over ridges and in valley exits to mountain barriers by means of modeling and analytic techniques.

238. Meroney, R.N. Sites for wind-power installations. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-19-1 to V-19-3.
3, 6

The objective of this research is to increase technical capacity to locate favorable wind system sites, reduce uncertainty in the prediction or validation of the characteristics of sites, and thus assist in the sizing and performance prediction of wind systems. The research will include evaluation of low speed aerodynamics over terrain and boundary flow conditions over ridges and in valley exits to mountain barriers by means of modeling and analytic techniques.

239. Michaud, L.M. Proposal for the use of a controlled tornado-like vortex to capture the mechanical energy produced in the atmosphere from solar energy. Amer. Meteorol. Soc. Bull. 56(5): 530-534, May 1975.
5

The energy of the wind could be harnessed by controlling the atmospheric process so that wind energy is released at high intensity at selected locations. An engine consisting of a controlled tornado-like vortex is proposed.

240. Miller, R.H. Research on wind energy conversion systems. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 261-264.
3, 5

241. Minardi, J.E. and M. Lawson. Electrofluid dynamic (EFD) wind generator. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-6-1 to V-6-3.
3, 14

242. Minardi, J.E. and D.H. Whitford. The Madaras rotating cylinder concept for electric power generation. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-7-1 to V-7-3.
3, 6. 14

Analytical, wind tunnel, and full scale studies of a novel wind powered electrical generating plant were conducted in the 1930-1934 time period. This system, invented by Julius

Madaras, using the Magnus force generated by rotating, vertically mounted cylinders to propel an endless train around a closed track. Generators geared to the car axles produced the electric power. The system was proven to be technically feasible, and preliminary cost figures were encouraging. The project was discontinued due to the lack of funds in the depression years. The system concept is presented along with current results from our study including performance data and cost estimates of the Madaras rotor system.

243. Moran, E. Gary Bregg: windpower in a drum. Pop. Sci. 207(2): 104-105, August 1975.

4, 12b

Gary Bregg's S-rotor is described.

244. Moreland, W.B. An application of a hydrodynamic wind model to wind energy prospecting in mountainous terrain. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-18-1 to V-18-4.

3, 6

The capability to extrapolate wind data into areas where measurements are not available is vital to the selection of wind energy conversion sites. There is an urgent need to develop techniques that may be employed in evaluating, accurately and efficiently, the wind power potential of candidate wind energy conversion sites.

245. Morgan, H.O. Wind energy research. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-27-1.

3, 4

Considerable research has been done on wind turbines throughout the past several hundred years. Some design relationships are pointed out along with other research developments.

246. Morgan, M.G., ed. Energy and man: technical and social aspects of energy. N.Y., IEEE, 1975. 521 p.

2, 4

This book includes a wide ranging collection of reprints of articles and technical reports dealing with the technical aspects of energy crisis. Although the greatest emphasis is on electrical energy, it includes geothermal, solar, wind, and oceanic sources.

247. Morino, L. Nonpotential aerodynamics for windmills in shear-winds. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 229-233.
3, 5

A new formulation is presented for nonpotential (viscous and inviscid) tridimensional incompressible aerodynamic flow, with application to windmills in shear winds.

248. Mulcahy, M.J. Working Group H. Interface with utilities and users. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 502-507.
3, 4, 6, 13

249. Muraca, R.J. Working Group F. Computer models/system design. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 491-497.
3, 6, 13

250. Muraca, R.J., M.V. Stephens and J.R. Dagenhart. Theoretical performance of cross-wind axis turbines with results for a catenary vertical axis configuration. National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va. NASA-TM-X-72662. NTIS, N76-11032, October 1975. 85 p.
5, 9

A general analysis capable of predicting performance characteristics of cross-wind axis turbines was developed, including the effects of airfoil geometry, support struts, blade aspect ratio, windmill solidity, blade interference and curved flow. The results were compared with available wind tunnel results for a catenary blade shape. A theoretical performance curve for an aerodynamically efficient straight blade configuration was also presented. In addition, a linearized analytical solution applicable for straight configurations was developed. A listing of the computer program developed for numerical solutions of the general performance equations is included in the appendix.

251. NASA awards contracts for design of windmill generators. Space World L-3-135: 33-34, March 1975.
4

252. Nassar, E.M. Model study of the reciprocating wind machine. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-5-1 to V-5-3.
3, 5

In this report the concept of the linearly moving, reciprocating airfoil cascade is being introduced as a possible means for the conversion of wind energy into useful mechanical energy. A small scale model of the reciprocating wind machine has been built and tested. The results assert the technical feasibility of the concept. Because of its inherent geometrical properties, the machine possesses a strong potential for use in urban areas as well as other conventional wind sites. Currently, the research efforts at the IIT aim at measuring the output power of the machine, estimating its efficiency and establishing means for further improvements.

253. Niemi, E.E. Transient response of wind power generators to wind gusts. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-17-1 to V-17-3.
3, 5

This paper addresses itself to the turbulence scale of wind variability and describes some ongoing research and results obtained to date. To develop some insight into the effects of wind gusts on wind turbine behavior a representative wind generator configuration is chosen, and the transient response of the turbine to axial wind gusts is examined using analytical methods.

254. Noll, E.M. Wind/solar energy for radio communications and low-power electronic/electric applications. Indianapolis, Indiana, H.W. Sams, 1975. 208 p.
2, 8, 15

255. Olsson, L.E., O. Holme, and R. Kreig. Wind characteristics and wind power generation: a three year meteorological program in Sweden. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 336-340.
3, 6

A three year program for studies of meteorological aspects of wind power has been initiated in Sweden. The objective of the program is to provide a scientific base for evaluating the potential for wind energy conversion in Sweden. This includes preparation of meteorological-aerodynamic base-material for construction and site evaluation as well as studies of alternative optimal groupings and performance characteristics of various wind energy conversion systems to be used in a local, regional and national scale.

256. Oman, R.A. and K.M. Foreman. Cost effective diffuser augmentation of wind turbine power generators. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 426-432.
3, 5, 6, 10

The Diffuser-Augmented Wind Turbine (DAWT) concept to be developed in this project is aimed at increasing the output and reducing the cost, the off-duty time, and the technical risk of large wind turbine systems for commercial power production. Rotors 100 feet in diameter and larger, encased in diffuser shrouds, with the shroud supports functioning as a variable stator stage ahead of the rotor are studied. The stator blades have trailing edge flaps that need no pitch or speed change to accommodate the wind speed variations. The goals of the project are to demonstrate large aerodynamic augmentation with very compact diffusers, design and compute the performance of stator/rotor systems that give efficient performance at precisely constant rotational speeds over a broad wind range with fixed-pitch rotors, and to establish cost comparisons for these and competitive wind systems.

257. Ormiston, R.A. Dynamic response of wind turbine rotor systems. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 9 p.
3, 5

The basic response characteristics of wind turbine rotor blades are developed using elementary analytical techniques. The uncoupled flapping response to the vertical gradient of wind, crosswind, rotor shaft yaw precession, and gravity forces; and the uncoupled lead-lag response to gravity forces are treated. The influence of blade number and hub articulation on blade loads and tower loads is examined and basic scaling relationships are discussed.

258. Park, J. Simplified wind power systems for experimenters. 2d ed. Sylmar, Cal., Helion, 1975. 80 p.
2, 5, 12a

This book covers basics to exotica gently yet completely in workbook format with example problems next to clear drawings and graphs.

259. Parker, A. World energy resources: a survey. Energy Pol. 3(1): 58-66, May 1975.
4

Information contained in the detailed publication "World Energy Conference Survey of Energy Resources 1974" is summarized.

Resources of coals and lignites, peat and noncommercial fuels, petroleum, natural gas, hydraulic energy, nuclear energy, geothermal energy, tidal power, ocean thermal gradients, wind power, and solar energy are reviewed. The coal equivalent of world annual energy consumption rose from 4707 MT in 1963 to 7410 MT in 1972, that is, by 54.7% in 10 years. Per capita consumption of energy per annum increased by 33% in the same period.

260. Parvin, B. The sun, the wind, and the warrior. New Zealand Energy J. 48(11): 245-247, November 25, 1975.

4

Solar energy and its basic problems are surveyed in Australia, the U.S., and New Zealand. Wind power is discussed as an energy source for New Zealand.

261. Pelser, J. Wind energy research in the Netherlands. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 188-195.

3, 6

The research and development programs for wind turbine generators in the Netherlands are reviewed.

262. Porch, W.M. and S.S. Sussman. Preliminary feasibility study on using Doppler Lidar wind measurements for wind-power prospecting. California University, Lawrence Livermore Lab. NTIS, UCID-16967, December 4, 1975. 15 p.

6

A preliminary feasibility study indicates that present laser transmitters and receivers are capable of ranges applicable to wind-power prospecting and site surveying. This study shows that a CO_2 laser system is preferable, given present technology. However, in tropical areas, such as Oahu, Hawaii, the advantages of the CO_2 system are somewhat reduced due to absorption by water vapor, although they still outweigh present visible laser systems.

263. Proposal for the use of a controlled tornado-like vortex to capture the mechanical energy produced in the atmosphere from solar energy. Am. Meteorol. Soc. Bull. 56(5): 530-534, May 1975.

5

An engine consisting of a controlled tornado-like vortex to harness the energy of the wind by controlling the atmospheric process, so that wind energy is released at high intensity, is described. Based on an average of 10 w/sq m, the amount of mechanical energy produced in the atmosphere is 5100 TW, while that of humans is 10 TW. Control of the atmospheric engine could make the vast amount of mechanical energy being produced in the atmosphere available to do useful work.

264. Pruyn, R.R., W. Wiesner and P.G. Sulzer. Performance and structural design aspects of a one-bladed electric-power-generating windmill. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 9 p.

3, 5, 6

Design approaches to electric-power-generating windmills that may achieve economically attractive cost of energy are discussed. Innovative approaches to the design of the three highest cost components; rotor, gearbox, and tower are presented. Advantages of the one-bladed rotor are shown. The importance of rotor hub articulation is discussed. Sizing of the windmill so that there can be an adequate market to justify production is also considered. The need for standardization in assumptions made in the accounting aspects of cost analyses, and the requirements for wind prospecting to determine with assurance the geographic areas that have sufficient wind are shown.

265. Puthoff, R.L. Status of 100 kW experimental wind turbine generator project. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 21-35.

3, 5

The Energy Research and Development Administration and the NASA Lewis Research Center have engaged jointly in a Wind Energy Program which includes the design and erection of a 100 kW wind turbine generator. This test machine consists of a rotor turbine, transmission, shaft, alternator, and tower. The rotor, measuring 125 feet in diameter and consisting of two variable pitch blades, operates at 40 rpm and generates 100 kW of electrical power at a wind velocity of 18 mph. The entire assembly is placed on top of a tower 100 feet above ground level. The machine is currently in the assembly phase and will be ready for operation in August 1975.

266. Puthoff, R.L. and P. Sirocky. The 100 kW experimental wind turbine generator project. Presented at the Wind Energy Workshop, Washington, D.C., June 11, 1975. NTIS, N75-29546, 1975. 19 p.

3, 14

The Energy Research and Development Administration and the NASA Lewis Research Center engaged jointly in a Wind Energy Program which included the design and erection of a 100 kW wind turbine generator. This test machine consists of a rotor turbine, transmission, shaft, alternator, and tower. The rotor, measuring 125 feet in diameter and consisting of two variable pitch blades, operates at 40 rpm and generates 100 kW of electrical power at a wind velocity of 18 mph. The entire assembly is placed on top of a tower 100 feet above ground level. The machine was scheduled to be ready for operation in August 1975.

267. Quinn, P.J. Wind turbine. U.S. Patent No. 3,902,072. August 26, 1975. 8 p.

5, 17

A wind power generator is described which has a horizontally rotatable platform with a plurality of vertical blades mounted around its periphery, all of the blades rotating coaxially around a central axis and each rotating on its own axis. The vertical blade rotation is responsive to changes in wind direction, as well as to changes in wind velocity and the rotation of each blade is controlled in such manner that through about three quarters of the platform rotation power is absorbed from the wind, while during the remaining period in which the blades are traveling against the wind, the blades will be substantially in phase with the wind for minimum resistance.

268. Radcliff, S.V. Design for an energy self-sufficient community. In: 21st annual technical meeting of the Institute of Environmental Sciences. Vols. I and II. Mt. Prospect, Ill., Institute of Environmental Sciences, 1975, p. 180-182.

3, 4

269. Ramakumar, R. Continuous duty solar energy system concepts. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 759-764.

3, 6

Two continuous-duty solar energy system concepts are presented in this paper--one for the near term future (1980's) and one for the long term future (1990's and beyond). These systems have evolved as a result of a cumulative research effort at Oklahoma State University, spread over a decade and a half. Technical and economic aspects of these systems are discussed.

270. Ramakumar, R. Development and adaptation of field modulated generator systems for wind energy applications. In: Workshop on Wind Energy Conversion Systems, 2d., Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 279-289.

3, 14

The plans are summarized for the development and adaptation of field modulated generator systems for wind energy applications to be undertaken at Oklahoma State University under a National Science Foundation Grant No. AER 75-00647.

271. Ramakumar, R. Harnessing wind power in developing countries. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 966-973.

3, 6

This paper discusses the possibilities of harnessing wind power in developing countries to mitigate the burdens imposed by high price of imported fuel and to augment total energy supply. Special emphasis is given to the use of variable-speed constant-frequency field modulated generator systems to tap wind energy in constant frequency ac form for use in conjunction with conventional utility systems and with isolated conventional generating units.

272. Ramakumar, R., H.J. Allison and W.L. Hughes. Economics of solar and wind energy systems for large scale power generation. In: Energy-Engineering-Environment. Annual Frontiers of Power Technology Conference, 7th, Stillwater, Okla., October 9-10, 1974. Proceedings. Stillwater, Oklahoma, Oklahoma State University, 1975, p. 11-1 to 11-21.

3, 6, 7

A case is made for the continued development of solar and wind energy systems to provide viable alternatives to fossil fuels in the years to come. A simplified economic analysis of solar and wind energy systems of the type being developed at Oklahoma State University is presented and the calculated generation costs in mills per kWh are compared with those of conventional fuel-burning systems for different fuel costs, load factors and interest rates. The results show that certain aspects of solar and wind energy conversion can, at present, generate energy at costs competitive with conventional systems and that more favorable conditions can be expected in the future as fossil fuels become scarce and fuel costs further go up as predicted.

273. Ramakumar, R., H.J. Allison and W.L. Hughes. The Oklahoma State University wind energy research program. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-26-1 to V-26-3.

3, 4, 6

A vigorous research and development program was started in 1960 at OSU to investigate the possibility of tapping non-depletable energy sources such as solar and wind energy to provide a viable alternative to fossil fuels. The effort in the area of wind energy has resulted in the construction of a prototype windmill farm pumping 60 Hz ac energy into an existing power line using variable-speed constant-frequency field-modulated generator systems. This research report summarizes these activities and discusses the economic future of wind energy systems.

274. Ramakumar, R., H.J. Allison and W.L. Hughes. Solar energy conversion and storage systems for the future. IEEE Trans. Power Appar. Syst. 94(6): 1926-1934, November-December 1975.

4, 11

Solar energy research under way at Oklahoma State University in solar energy technology is discussed. Several components required to engineer a continuous duty power system from intermittent energy sources, such as solar radiation and wind energy, have been developed. A solar energy storage system for the future is outlined, and the economics of such a system are presented. Present methods of solar energy collection, conversion, storage, and utilization are reviewed. Appendixes include energy storage comparisons, properties of hydrogen, electrolysis data, and information on wind power.

275. Ramakumar, R. and W.L. Hughes. An assessment of solar and wind energy from the electric utility viewpoint. In: Energy-Environment-Engineering; Proceedings of the Eighth Annual Frontiers of Power Technology Conference, Stillwater, Oklahoma, October 1-2, 1975. Stillwater, Oklahoma, Oklahoma State University, 1975, p. 14-1 to 14-16.

3, 6

The paper discusses briefly the prospects of several technologies for supplementing energy resources in the coming decade, including wind energy, biomass, solar thermal conversion, ocean thermal gradient systems, and photovoltaic conversion, and then gives an assessment of solar and wind energy economics. Break-even capital cost limits for solar and wind energy systems have been calculated for different fuel costs, interest rates, and load factors. The necessity of the electric utility sector to look into such variable power sources as solar and wind is expressed.

276. Ramakumar, R. and W.L. Hughes. Electrical technology overview and research at Oklahoma State University as applied to wind energy systems. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 265-278.

3, 4, 5

A brief overview is presented of the electrical technology research associated with wind energy conversion systems. Salient features of the research work at Oklahoma State University as applied to wind energy systems sponsored by NSF/RANN Grant GI-39457 are also included.

277. Ramakumar, R., W.L. Hughes and H.J. Allison. Wind energy utilization prospects. Annual Technical Meeting of the Institute of Environmental Sciences, 21st, Anaheim, Cal., 1975. Proceedings. Mt. Prospect, Ill. Institute of Environmental Sciences, 1975, p. 138-142.

3, 6

The chief technical, economic, and environmental aspects of wind energy utilization are considered. One approach being studied is to allow the aeroturbine RPM to vary with wind velocity and employ variable-speed constant-frequency generating systems to obtain constant-frequency power to be pumped into existing utility mains. Study of generation costs for wind energy systems indicates that wind energy has the potential to be competitive at present as a supplemental energy source. Wind energy systems appear to be environmentally benign, though more research is needed on the impact of large scale wind energy utilization.

278. Reaping the wind. Mach. Des. 47: 28-29, November 13, 1975.

4

279. Red Rocker, W. Winnie Red Rocker reports. Wind Power Dig. 1(1): 28, January 1975.

4, 12a

The author describes work with a small wind machine made from a twelve volt car generator.

280. Reed, J.W. Some climatological estimates of wind power availability. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-16-1 to V-16-3.

3, 6

The Western Great Plains experiences a great flux of wind power that might be exploited. Even with conservative assumptions about collection efficiency, the supply exceeds total national demands by a factor of at least two. Wind speed increases with height above the ground friction layer, so that very large turbines, 30-60 m in diameter, could capture even more energy than shown by weather station anemometer data.

281. Reed, J.W. Wind climatology. Sandia Labs., Albuquerque, New Mexico. SAND-75-5531. NTIS, CONF-750615-1, 1975. 8 p.

5, 6

National assessments were made to find suitable test and evaluation locations. Detailed analyses have begun of specific station records to derive parametric relationships needed for turbine design. Characteristics of long wind-speed time-series will determine selection criteria for cut-in, cut-off, and rated speed, as well as storage system dimensions.

282. Reed, J.W. Wind climatology. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 319-325.

3, 5, 6

National assessments were made to find suitable test and evaluation locations. Detailed analyses have begun of specific station records to derive parametric relationships needed for turbine design. Characteristics of long wind-speed time-series will determine selection criteria for cut-in, cut-off, and rated speed, as well as storage system dimensions.

283. Reed, J.W. and B.F. Blackwell. Some climatological estimates of wind power availability. Sandia Labs., Albuquerque, New Mexico, SAND-75-5295. NTIS, CONF-750602-1, 1975. 6 p.

6

The Western Great Plains experiences a great flux of wind power that might be exploited. Even with conservative assumptions about collection efficiency, the supply exceeds total national demands by a factor of at least two. Wind speed increases with height above the ground friction layer, so that very large turbines, 30 to 60 m in diameter, could capture even more energy than is shown by weather station anemometer data.

284. Refining wind power. Mech. Illus. 71: 20, 22, May 1975.

4

285. Reichle, L.F.C. The economics of nuclear power. Ebasco News 28(5): 22-31, September-October 1975.

6

Energy conservation can make some contribution to solving the energy problem, but the U.S. standard of living cannot be increased or even maintained by using less energy per capita. Coal and nuclear power are the only feasible fuels for additional and replacement central station power in this century and possibly for some time thereafter. Even with a maximum effort, less natural gas and oil will be produced in 10-20 years than in 1975. Solar and fusion power utilization will be well beyond the year 2000, while geothermal and wind power have only limited potential. Synthetic gas and oil and shale oil, much of which may be environmentally unacceptable, will be very expensive. Nuclear energy, the least expensive alternative, is safe, reliable, and environmentally acceptable. Congress, the federal government, and state agencies should unshackle its development.

286. Reitan, D.K. Progress report on employing a non-synchronous AC/DC/AC link in a wind-power application. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 290-297.

3, 5

This report is concerned with the experimental electrical work to date regarding building a 20 kW non-synchronous variable frequency input-fixed frequency output AC/DC/AC three-phase to single phase link.

287. Remarks by wrap-up panel. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 514-522.

3, 4, 6, 13

288. Report of Task Force on Wind Energy. Report to the Committee on Alternate Energy Sources for Hawaii, March 1975.

6

289. Report to the Secretary of the Interior. Energy Commun. 1(1): 57-103, 1975.

4

The government and the public must have a good understanding of the position and problems that the nation faces with respect to energy. The U.S. has sufficient potential energy resources from most sources to rely on continuing expansion of production as required to meet growing needs and to remain largely self-sufficient in energy, provided that the nation follows policies designed to achieve that objective. The current position, development problems, outlook for, and recommendations involving wind, solar, and tidal energy, petroleum liquid fuels, natural gas, coal, hydroelectric power, nuclear energy, synthetic oils, and synthetic gas are summarized.

290. Review of Project Independence. Blueprint-Panel Sub-Committee Reports on FEA-Interagency Task Forces. Commerce Technical Advisory Board, Washington, D.C. Report on CTAB Recommendations for a National Energy Program. Sub-Committee Working Documents. NTIS, COM-75-10500, 1975. 308 p.

4, 6

Data, assumptions, and background information used to develop Project Independence Blueprint are discussed. Topic areas covered include: Energy demand/conservation; Coal; Oil, Natural gas; Nuclear energy; Future energy sources; Oil shale; Transportation; Water and environment; Human resources; Finance; and Materials, equipment, and construction.

291. Robinson, J.P. Is the answer to the energy crisis blowin' in the wind? Ocean Ind. 10(1): 37-39, January 1975.

4, 6

The ability of a wind plant to capture power from the wind is discussed. Wind-driven power generators work; the key is how to get the costs down to make them competitive with other energy sources. Large capacity wind plants are more economical, but large wind plants in existence are primarily research models. A wind plant built to develop 1000 kW might cost $3.5 million; 4880 windmills would be required on offshore platforms to supply the same annual energy total as one 12,000 BPD oil platform.

292. Rogers, S.E. Environmental effects of wind energy conversion systems? In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 375-379.

3, 4, 6

A Battelle study designed to evaluate and give some answers regarding environmental impact of wind energy conversion systems is described.

293. Rohrbach, C. Experimental and analytical research on the aerodynamics of wind turbines. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 239-246.

3, 5

This aerodynamic research program is aimed at providing a reliable, comprehensive data bank on a series of wind turbines covering a broad range of prime aerodynamic and geometric shape variables. Such data obtained under controlled laboratory conditions on turbines designed by the same method, of the same size, and tested in the same wind tunnel are currently not available in the literature. Moreover, this research program is further aimed at providing a basis for evaluating the adequacy of existing wind turbine aerodynamic design methodology, for assessing the potential of recent, advanced theories, and for indicating the need for further method development and refinement.

294. Rohrbach, C. and R. Worobel. Performance characteristics of aerodynamically optimum turbines for wind energy generators. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 10 p.

3, 5

This paper presents a brief discussion of the aerodynamic methodology for wind energy generator turbines, an approach to the design of aerodynamically optimum wind turbines covering a broad range of design parameters, some insight on the effect on performance of nonoptimum blade shapes which may represent lower fabrication costs, the annual wind turbine energy for a family of optimum wind turbines, and areas of needed research.

On the basis of the investigation, it is concluded that optimum wind turbines show high performance over a wide range of design velocity ratios; that structural requirements impose constraints on blade geometry, that variable pitch wind turbines provide excellent power regulation and that annual energy output is insensitive to design rpm and solidity of optimum wind turbines.

295. Romanelli, P.J. Electrical generating equipment and electric utility requirements for high-power wind generator systems. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 1251-1257.
3, 6, 7

The National Science Foundation and NASA's Lewis Research Center are cooperating on a five-year Wind-Energy Program, the objective of which is to provide the technology for cost competitive wind-driven electric-power generation. The five-year program provides for development of large scale (100--3000 kW) systems and advancing technology via supporting research and technology. General Electric under contract to NASA-Lewis (NAS 3-19403) is involved in one aspect of this effort. This contract covers conceptual design, parametric analyses and preliminary design of Wind Generator Systems (WGS) for electric utility applications. In conceptual design, various approaches were investigated and trade-offs conducted to determine the most cost effective designs. Parametric analyses have been conducted to optimize the design and determine the cost sensitivity of the design to the parameters over the range of powers considered. Preliminary design will define system detail and provide more accurate performance and cost analyses.

296. Salieva, R.B. Technico-economic analysis of the utilization of inexhaustible energy sources. Geliotekhnika No. 5: 52-57, 1975. (In Russian)
6

An economic analysis is conducted concerning the design, construction and utilization of solar power plants and wind power plants. Methods are presented for determining operational costs, for reducing them, and for calculating the real cost of producing solar and wind energy. Criteria are presented for selecting cost-optimal output power.

297. Salter continues RD-7000 research. Wind Power Dig. 1(2): 30, Summer 1975.
4

The RD-7000 prototype turbine designed by E.L. Salter is described.

298. The Salter RD-7000 wind turbine. Mother Earth News, No. 32: 104, March 1975.

8, 12b

Described is Edmund L. Salter's turbine, being developed by Wind Power Systems, Inc. of San Diego. The turbine can produce 7,000 watts of 120-volt current in a 25-28 mph wind and a maximum of 1000 watts at 32 mph. The unit should provide enough electricity to run a single family home in any location with a minimum average yearly wind velocity of 8 mph.

299. Savino, J.M. Introduction to wind energy conversion systems technology. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 197-201.

3, 4

NASA's wind research is discussed.

300. Savino, J.M. Wind power. In: Solar Energy for Earth, an AIAA Assessment. Edited by H.J. Killian, G.L. Dugger, and J. Grey. Sponsored by the AIAA Technical Committee on Electric Power Systems. New York, AIAA, April 21, 1975, p. 72-81.

4

A historical background on windmill use, the nature of wind, wind conversion system technology and requirements, the economics of wind power and comparisons with alternative systems, data needs, technology development needs, and an implementation plan for wind energy are presented. Considerable progress took place during the 1950's. Most of the modern windmills feature a wind turbine electricity generator located directly at the top of their rotor towers.

301. Savino, J.M. and F.R. Eldridge. Wind power. Astronaut. Aeronaut. 13(11): 53-57, November 1975.

4, 6

Small numbers of wind-energy power plants can serve locales, and conceivably, after suitable demonstrations and development for mass production, could be built and emplaced at a capacity equivalent to a 1000-MW conventional plant's in a much shorter time than the conventional plant.

302. Schmidt, F.H. Meteorological aspects of energy production. Ned. Tijdschr. Natuurkd. 41(12): 171-177, 1975.

6

The use of solar radiation and wind as sources of energy in Holland is discussed. The changes in wind speed with altitude and the resultant changes in energy are calculated and temperature changes owing to variations in the CO_2 concentration of the atmosphere are determined.

303. Seath, D.D. Testing a wind generator rotor. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-4-1 to V-4-3.
3, 5

The purpose of this paper is to describe the design, construction and operation of a wind generator rotor test trailer.

304. Sevier, H.G. Wind-power turbine development and application. In: The Potential of Solar Energy for Canada, Conference of the Solar Energy Society of Canada, Inc., Ottawa, June 2-3, 1975. Ottawa, Solar Energy Society of Canada, 1975, p. V45-53.
3, 8, 9

This paper describes a vertical-axis wind turbine developed by Bristol to provide power for an automatic weather station on a Beaufort Sea ice island. The vertical-axis layout was selected since it meets the operational requirements for compact shipment, east of assembly, ruggedness, and high reliability in a harsh environment. The 8.7 foot diameter Bristol windmill is designed to start in a 10 mph wind, deliver one kilowatt of mechanical power from a 25 mph wind, and structurally withstand winds up to 100 mph. The turbine shaft is direct-coupled to a unique form of alternator that has negligible starting torque, and achieves optimum operation in the 100-200 rpm range. The windmill is mounted in a special support frame that permits installation on essentially unprepared sites with a minimum of assembly tools and labor, and using a very simple foundation.

305. Sforza, P.M. Harnessing a "tornado." Mech. Eng. 97(10): 65, October 1975.
4, 5

A jet-age, "super-windmill" that can produce five times more electric power than existing wind-energy systems has been invented by Pasquale M. Sforza, at Polytecnic Institute of New York.

306. Sforza, P.M. Vortex augmentor concepts for wind energy conversion. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 433-442.
3, 5

Suitably designed aerodynamic surfaces are used to generate tornado-like vortical concentration of the natural wind.

These surfaces are configured in such a way as to direct the aerodynamic vortices to an appropriately designed rotor system for the purpose of transforming the energy of the wind to shaft work. Such a system constitutes the Vortex Augmentor Concept (VAC). An illustration of the VAC is given. A triangular, or delta, aerodynamic surface at an angle of attack to the wind will generate vortices by leading edge separation of the flow. The contribution of the vortices to the total lift coefficient on such a delta surface is shown.

307. Sharman, H. Wind and water sources of energy in the U.K. Energy Options in the U.K., Symposium, London, March 1, 1975. London, Latimer New Dimens Ltd., 1975, p. 51-64.
3, 6

A survey of the development of tidal water sources and wind power generating plants is presented.

308. Shumann, W.A. Wind generator study funds sought. Aviat. Week 102: 57-58, January 13, 1975.
4, 9

The vertical-axis generator running at Sandia Laboratories in Albuquerque, N.M., is described.

309. Simon, A.L. Energy resources. New York, Pergamon Press, 1975. 165 p.
2, 4

This book on energy resources contains a chapter on wind power.

310. Sladky, J. and P. Klimas. Aerodynamics of the Savonius rotor. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-3-1 to V-3-2.
3, 5, 10

This paper represents a summary of a continuing study of high solidity ratio cross-flow rotors in general, and the Savonius rotor in particular. At present the problem is approached from both the theoretical as well as the experimental viewpoints. An analytical model is being developed which will account for the variations of forces with the angle of rotation. The experimental study concentrates on geometric relationships of the rotor elements and on optimizing the blade configuration. The effect of various performance enhancing devices such as shrouds is also being examined.

311. Smidth, F.L. Instructions for the FLS aeromotor. Translated from the Danish report Memo 7050, date unknown. Translation: Kanner Associates, Redwood City, Cal., N75-16075. NTIS, January 1975. 28 p.

5, 14

A comprehensive study of the complete system necessary for the conversion of wind power to electrical power is reported. Complete descriptions of the propeller, gear system, dynamo, starter propeller, and braking mechanism are given, as they relate to the system manufactured by F. L. Smidth and Co. of Denmark. Complete instructions for the operation and maintenance of the system are given. The safety systems and an overall view of the system's operation are also presented. Diagrams showing the entire system in detail are included.

312. Smith, M.C. Wind power system optimization. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 1258-1263.

3, 6

It is shown that wind power system optimization can be achieved by consideration of the four quantities of average annual energy extracted, wind statistics, efficiency of conversion of wind energy to shaft rotation energy and the cost characteristics of the wind interaction elements (blades), the electric generator and the remaining system components. The problem reduces to the determination of two dimensionless parameters as a function of the wind statistics. These parameters determine the optimum blade diameter and the generator size. Example wind statistics and an example optimization problem are given.

313. Smith, R.T. and C.E. Burton. Effect of wind harmonic and gust torques on induction generators. Part 1. ASME Paper 75-WA/Pet-4, 1975.

5, 14

This paper presents a method of direct simulation of induction generator performance for calculation of responses to applied shaft torques arising from harmonics caused by tower shadow, wind variations, and other disturbances to a wind-powered turbine. Wind-gust induced torques are also applied to the induction generator, inertia model. It is shown that typical values of machine parameters and wind data result in stable operation of the generator. The approach can easily be extended to include refinements and detailed representations of the mechanical system.

314. Smith, R.T. and T.S. Jayadev. Electrical generation by wind power. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 1246-1250.
3, 6, 7

Considerable attention is now being given to investigate wind energy as a supplemental source to meet the growing energy demands. NASA is conducting proof-of-concept experiments and is currently designing a 100 kw system. Large wind generating stations (WGS) of the sizes of 1000 kw to 10,000 kw are contemplated, although most of the wind power plants of the past were of small sizes (say less than 10 kw), pumping water or generating electricity in conjunction with battery storage. This paper discusses some electric generation schemes for large wind power plants (of capacities of 1000 kw or more) which may be suitable for interconnection with a power grid.

315. Solar energy sources list, March 1975. Manufacturers, designers, and builders. Washington, D.C., National Wildlife Federation, 1975. 13 p.
2

316. Some small innovators heat homes by sun, light them by wind. Wall St. J., March 18, 1975, p. 1.
4, 8

For a small group of architects, engineers, and innovators, energy independence is not just a political platitude but a reality. Their homes are outfitted with various devices to produce and preserve energy. All employ equipment to capture heat from the sun, and some use windmill generators to provide electricity. Homemade heat is stored in large water tanks, in rocks under the floor, or in concrete walls. These efforts are privately funded since federal research money is not directed toward energy conservation at the family level.

317. Sondak plans wind museum. Wind Power Dig. 1(2): 16, Summer 1975.
1, 4

318. Sorensen, B. Energy and resources. Science 189(4199): 255-260, July 25, 1975.
6

Since World War II Denmark has developed a 90% dependence on oil from the Middle East. The country has practically no nonrenewable energy sources. A plan based on potential renewable energy resources of Denmark through which solar and wind energy would supply the nation's needs by the year 2050 is outlined. Solar and wind energy systems and requirements are described. The project is economically feasible according to estimates of the cost of various alternatives during the 25 year depreciation period adopted. However, initial cost per energy unit produced is higher than that for most alternatives, so action due to purely private initiative is not expected.

319. Soucie, G. Plugging in the oceans for future energy needs. Audubon 77(5): 115-122, September 1975.

6

Energy resources of the sea include offshore winds, ocean thermal differences, tides, ocean currents, waves, salinity gradients, and the extraction of hydrogen, fusion fuel, and phytoplankton for synthetic fuel production. The potentials of these resources vary considerably in magnitude, harness-ability, geographic applicability, practicability, and environmental impact.

320. Special wind plant section. Mother Earth News, No. 32: 99-104, March 1975.

4, 12a

This special section includes notice of a windplant design service, a new newsletter, and several articles, which are indexed individually in this bibliography.

321. Spera, D.A. Structural analysis of wind turbine rotors for NSF-NASA mod-0 wind power system. NASA Lewis Research Center. NASA-TM-X-3198. N75-17712. NTIS, March 1975. 39 p.

5

Preliminary estimates of vibratory loads and stresses in hingeless and teetering rotors for the proposed 100 kW wind power system are presented. Stresses in the shank areas of the 19-m (62.5-ft) blades are given for static, rated, and overload conditions. The teetering rotor has substantial advantages over the hingeless rotor with respect to shank stresses, fatigue life, and tower loading. A teetering rotor will probably be required in order to achieve a long service life in a large wind turbine exposed to periodic overload conditions.

322. Spierings, P.A.M. and M.C. Cheney. Application of composite bearingless rotor concept to wind turbine rotor. Progress Report, June 3, 1975 - October 31, 1975. NTIS, COO-2614-1, December 1, 1975. 25 p.

5

The objective of the one year program is to explore the feasibility of the Composite Bearingless Rotor (CBR) for use as a wind turbine and to evaluate several automatic control concepts designed to improve efficiency and cost effectiveness. The program consists of the design of a full-scale wind turbine, the design and fabrication of a dynamically scaled model, wind tunnel experiments, and analytical studies. To date, the design work has been completed, the model wind turbine support tower has been fabricated and assembled with a generator. The model blades and other hardware are under construction. This interim progress report contains descriptions of the full scale and model designs, a review of the performance characteristics expected of the wind turbine, and an outline of the remaining tasks of the program. Appendices are included to provide detailed information on some of the design characteristics of the model wind turbine.

323. Stepler, R. Eggbeater windmill. Pop. Sci. 206(5): 74-76, May 1975.
4

Sandia Laboratories windmill combining Darrieus and Savonius designs is described.

324. Stever, H.G. Exotic energy resources. New Zealand Energy J. 48(11): 238-240, November 25, 1975.
4

U.S. research programs for future fuel from oil shale, geothermal energy, solar heating and cooling, solar thermal conversion, photovoltaics, wind power, bioconversion, ocean thermal conversion, and fusion are surveyed.

325. Stickney, G.H. Wind/solar energy investigation, a feasibility study. Ph.D. Thesis. Ann Arbor, University Microfilms, 1975. 489 p. U.M. Order No. 76-1311.
6, 8

The question of utilizing the wind and sun to provide the energy required by an average home for space heating, air conditioning, and a hot water supply was considered. Energy requirements were compared with the daily availability of wind and solar energy and the storage needed to reconcile the two was determined. Preliminary design procedures are shown for wind and solar energy collection and systems storage. Initial design procedures are also shown for an accompanying heating and cooling system. Although wind and solar energy are free, non-depleting and non-polluting, the high initial cost of the required hardware causes them to be economically noncompetitive with more conventional fuels. Specifically, this system was estimated to have an annual cost in 1975 of around 2-1/2 times that of a home heated by natural gas and about 13 percent higher than an all electric home. However, this cost was estimated to drop by at least one third by 1985.

326. Stodhart, A.H. Wind power in Britain; past work and present position. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 133-139.

3, 4

The development program for wind turbine generators in the United Kingdom is reviewed.

327. Stoeckert, C. Wind turbine driven generator to recharge batteries in electric vehicles. U.S. Patent No. 3,876,925. April 8, 1975. 8 p.

8, 15, 17

A wind turbine driven generator for the recharging of batteries utilized as the power source for various vehicles, and particularly an automotive electrically driven vehicle is described. Wind driven vanes of particular design are mounted to rotate about a vertical shaft disposed in or on the roof of the vehicle, the vanes being completely enclosed within a suitable housing of either rectangular or circular configuration. The wind driven vanes rotate while the vehicle is under way, or, if air currents are prevalent, even while the vehicle is not in motion, thus to drive a suitably mounted generator for more or less continuous recharge of the battery system. The generator is mounted within the hub around which the vanes rotate, and comprises a stationary stator, and rotating rotor.

328. Storable, renewable hydrogen power--key to unlocking energy from the sun, wind, tides. Pop. Sci. 206(3): 88-91, March 1975.

6

In the hydrogen economy, hydrogen would be the common element making possible generation, storage, and reuse of all other forms of energy in the most efficient, least polluting way. Thermochemical and direct thermal dissociation of hydrogen using nuclear reactors is described. Heat from solar concentrations could produce hydrogen thermochemically. Some hydrogen storage difficulties are discussed.

329. Strickland, J.H. Darrieus turbine: a performance prediction model using multiple streamtubes. Sandia Labs., Albuquerque, N. M. NTIS, SAND-75-0431, October 1975. 38 p.

5, 9

A multiple streamtube performance prediction model for the Darrieus turbine is presented. This model is shown to predict the performance of small-scale rotors, for which test data is available, much more accurately than the single streamtube model. The model is capable of predicting the overall rotor power output and the distribution of aerodynamic forces along the rotor blades. The model can be used to study the effects of rotor geometry variations such as blade solidity, blade taper, and variations in rotor height-to-diameter ratios. In addition, spacial variations in freestream velocity such as that produced by atmospheric wind shear can be easily incorporated into the model.

330. Strickland, J.H., S.R. Ford and G.B. Reddy. The Darrieus turbine: a summary report. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-2-1 to V-2-3.

3, 9

This paper describes work which is presently in progress at Texas Tech University concerning the characteristics of the vertical axis Darrieus wind turbine. A computer model which is capable of predicting the steady-state performance of the Darrieus rotor has been developed and is presently being extended to include transient behavior as well as behavior in spatially non-uniform winds. A 14 ft. diameter two-bladed Darrieus rotor has been constructed and installed on flat, open terrain adjacent to the Texas Tech campus. Various aspects of the design and operation of this system are discussed along with analytical and experimental performance results.

331. Strickland, J.H., S.R. Ford and C.B. Reddy. A preliminary investigation of the Darrieus wind turbine. In: Application of solar energy; Proceedings of the First Southeastern Conference, Huntsville, Ala., March 24-26, 1975. Huntsville, Ala., UAH Press, 1975, p. 633-643.

3, 9

This paper describes work which is presently in progress at Texas Tech University concerning the characteristics of the vertical axis Darrieus wind turbine. A computer model which is capable of predicting the steady-state performance of the Darrieus rotor has been developed and is presently being extended to include transient behavior as well as behavior in spatially non-uniform winds. A 14 ft. diameter two-bladed Darrieus rotor has been constructed and installed on flat, open terrain adjacent to the Texas Tech campus. This rotor was instrumented such that the energy extraction rate as a function of wind speed and rotor speed could be measured and controlled. Various aspects of the design and operation of this system are discussed along with analytical and experimental performance results.

332. Summary Report. Federal Wind Energy Program. ERDA Division of Solar Energy. ERDA-84; UC-60. Washington, D.C., ERDA, October 1975. 83 p.

4

This paper presents a brief overview of the Federal research and development activities in the field of wind energy and includes abstracts of the individual projects which comprise the program.

333. Summers, C.M. Ultimate energy, the ultimate fuel, and the hydrogen link in the electrical energy system. In: Hydrogen Energy, Part B, Veziroglu, T.N., ed. New York, Plenum Publ. Corp., 1975.

4

334. Sun, sea, wind, geysers--new energy from old sources. U.S. News World Rep. 78(4): 37-39, January 27, 1975.

6

Much of the $11 billion allocated to the exploration of new energy sources will go into research of solar, wind, geothermal, and tidal energy. Solar energy heated housing is becoming popular in many parts of the nation, while the older concept of utilizing wind energy is being put to new uses. The tides, currents, and varying temperatures of the ocean also have enormous energy resource potential. Energy experts, however, agree that the major power source to replace the fossil fuels within the next few decades will be fusion energy.

335. Sun, wind, and water power: revivifies recycled buildings. Build. Syst. Des. 72(5): 7-9, 1975.

8

336. Survey of solar energy products and services - May 1975. Prepared for the Subcommittee on Energy Research, Development, and Demonstration of the Committee on Science and Technology, U.S. House of Representatives, 94th Congress, 1st Session. Science Policy Research Division, Congressional Research Service, Library of Congress. Washington, G.P.O., 1975. 555 p.

4

A section on wind energy conversion is included in this survey.

337. Swanson, R.K. and R.T. Smith. Operational, cost, and technical study of large windpower systems integrated with an existing electric utility. Progress Report, covering the period May 1, 1975 through October 31, 1975. San Antonio, Tex., Southwest Research Institute. NTIS, COO-2621-1, 1975. 30 p.

6, 13

The progress during the period 1 May 1975 to 31 October 1975 on a study of the windpower potential in the Texas Panhandle is presented with particular reference to the integration of wind-generated electrical power into an existing electric utility system. Using data from 17 wind stations in the region, it has been calculated that the specific energy output of the region can be upwards of 0.65 kwh per rated kw per hour, averaged over a yearly period. The analysis utilizes realistic wind generation system performance at three different rated wind speeds: 8, 10.7 and 13.4 m/s. Four different tower heights are assumed: 30, 46, 61 and 76 m.

338. Swanson, R.K., R.T. Smith and C. C. Johnson. Operational, cost and technical study of large windpower systems integrated with existing public utilities. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 92-97.

3, 6

The potential, the promising deployment schemes, the cost goals, and the research problems inherent in the large scale implementation of wind energy conversion systems in the Texas Panhandle are analyzed. The methodology to be developed during the program is expected to be easily transferable to other utility systems of interest.

339. Sweeney, T.E. Princeton windmill program. Princeton University, Dept. of Aerospace and Mechanical Sciences, January 1975. 29 p.

4

A non-technical description is provided of the history, present status, and future goals of the Princeton Windmill Program. Two windmills are discussed: the Sailwing windmill, which was the first windmill built at Princeton in 1966; and the autorotating vane wind machine, which also receives some priority in the Princeton program. A method to compute the electric power output of a modern windmill is presented. Problems with using wind power are discussed. Designing a windmill to withstand maximum winds can be accomplished by building a braking system; by providing blade pitch control; or by providing blade twist control. New technology, using constant frequency alternators, may eliminate the need for gearing, which has been used to convert the rotary motion of the windmill to production of power. In considering energy storage, the investment in storage is directly related to the constancy of winds in the area that the windmill is located. It is pointed out that this paper can not answer all the questions concerning wind power because much more research needs to be done.

340. Sweeney, T.E. Sailwing windmill technology. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 224-228.

3, 5

The major objective of the Princeton Windmill Program is easily stated. This is to understand the aerodynamics of a windmilling rotor and the effect of geometry upon the efficiency of such a device. Basically the chore has been to determine the optimum blade platform, blade twist and pitch angle. All work (other than small scale) has utilized the Princeton Sailwing largely becuase it is most easily changed in twist. It is also most simple and inexpensive to construct. A parallel program, utilizing small scale wind tunnel models, has enabled the pursuit of a second objective of determining the effect of center bodies upon the efficiency of a windmilling rotor.

341. Swett, C.L. A low-cost wind turbine. Mother Earth News, No. 32: 100, March 1975.

9, 12a

Long before the recent breakthroughs in vertical axis wind turbine design, the basic idea was conceived independently by many experimenters and worked up in several forms. One such invention in operation continuously since 1958 is described.

342. Templin, R.J. Availability of wind energy in Canada. In: The Potential of Solar Energy for Canada, Conference of the Solar Energy Society of Canada, Inc., Ottawa, June 2-3, 1975. Ottawa, Solar Energy Society of Canada, 1975, p. V1-V8.

3, 6

A wind energy map of Canada is presented to show those regions in which economical development of wind power may be possible. Although the theoretical wind energy available is very large, its successful exploitation requires development of wind turbines of much lower capital cost than those currently available. Current NRC plans to erect and test a large a.c. power turbine in the Gulf of St. Lawrence region are briefly described.

343. Templin, R.J. Canadian wind energy program. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 182-187.

3, 6, 9

The Canadian research and development program for vertical axis wind turbine generators is described. The wind availability in Canada is discussed.

344. Thomas, R.L. Working Group C. Viability of large systems. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 477-483.

3, 6, 7

345. Thomas, R.L. Introduction to large system design. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-A-75-050, p. 13-20.

3, 7

Design problems associated with large wind turbine generator systems are discussed. The development schedule in the U.S. for large wind turbine generator system is presented.

346. Thomas, R.L., et al. Plans and status of the NASA-Lewis Research Center wind energy project. NTIS, N75-21795, NASA-TM-X-71701, 1975. 31 p.

4, 6

Wind energy is investigated as a source of energy. The wind energy program that is managed by the NASA-Lewis Research Center is described. The Lewis Research Center's Wind Power Office, its organization, plans, and status are discussed. Major elements of the wind power project included are an experimental 100 kW wind-turbine generator; first generation industry-built and user-operated wind turbine generators; and supporting research and technology tasks.

347. Thomas, R.L. and J.E. Sholes. Preliminary results of the large experimental wind turbine phase of the National wind energy program. NTIS, N75-32594, October 1975. 14 p.

4, 6

Because of the recent National concern over the future availability of energy supplies, the Federal Government has initiated a program to investigate alternative energy sources. Among the alternatives under consideration is the utilization of wind energy. A major phase of the wind energy program is the development of reliable wind turbines for supplying cost-competitive electrical energy. This paper discusses the preliminary results of two projects in this phase of the program. First an experimental 100 kW wind turbine design and its status are reviewed. Also discussed are the results of two parallel design studies for determining the configurations and power levels for wind turbines with minimum energy costs. These studies show wind energy costs of 7 to 1.5 cents/kWh for wind turbines produced in quantities of 100 to 1000 a year and located at sites having average winds of 12 to 18 mph.

348. Thomas, R.L., T. Sholes and J.E. Sholes. Preliminary results of the large experimental wind turbine phase of the National Wind Energy Program. Presented at Frontiers of Technology Conference, Stillwater, Okla., October 1-2, 1975. NTIS, N75-32594, 1975. 25 p.
3, 6

The preliminary results of two projects in the development phase of reliable wind turbines designed to supply cost-competitive electrical energy were discussed. An experimental 100 kW wind turbine design and its status are first reviewed. The results of two parallel design studies for determining the configurations and power levels for wind turbines with minimum energy costs are also discussed. These studies predict wind energy costs of 1.5 to 7 cents per kW-h for wind turbines produced in quantities of 100 to 1000 per year and located at sites having average winds of 12 to 18 mph.

349. Thomas, R.N. In-situ determination of wind energy. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-13-1 to V-13-3.
3, 6

In small scale applications of wind energy the general rule is that the windmill site is determined by the location of the user and is not selected because it is a particularly windy place. With small windmills siting is a matter of determining whether or not there is sufficient wind at a given place to economically justify installation of a windmill. A method is needed to determine wind energy based on a simple and inexpensive technique of measurement and analysis. Such a method is proposed here that requires a few months measurement of average wind speed and very little data analysis. Expenditure in equipment and time would be small.

350. Thresher, R. Working Group D. Viability of small systems. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 484-486.
3, 6, 8

351. Tilting with windmills. Time 106: 50, July 7, 1975.
4

352. Torrey, V.W. Windmills in the history of technology. Technol. Rev. 77(5): 8-10, March/April 1975.
1

353. Translation from the Danish: windpower. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 167-172.

3, 6

The economic aspects of utilizing wind turbine generators in Denmark are analyzed.

354. Tryon, H.B. and T. Richards. Installation and initial operation of a 4100 watt wind turbine. National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio. NASA-TM-X-71831. NTIS, N76-14605, December 1975. 29 p.

4

The results are presented of 211 days of operation of the 4.1 kilowatt wind turbine, which was the largest commercially available wind turbine. The wind turbine, electric controls and load bank, and the pivoted tower are described.

355. 12/16 Windmill plans. Sylmar, Cal., Helion, 1975.

12a

These plans offer highly detailed drawings, with written instructions for construction of this all aluminum blade 2-to-5 kilowatt windmill. You get drawings for both the 12 foot, and 16 foot diameter blades, with several options for construction methods, and generators. A photo essay detailing construction methods is included, as well as the engineering information concerning the machine's design. No plans are offered for the tower, but discussion and photos show how the windmill is raised up the tower. The plans are available from Helion, Box 4301, Sylmar, Cal. 91342 at $10.00.

356. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975. 403 p.

3, 4

This wind engineering conference contains 28 papers on wind power engineering, as well as papers on boundary-layer winds, air-sea interactions, wind effects on urban areas, design for air pollution control, wind-induced noise, agricultural aerodynamics, severe storms, building code requirements, wind effects on structures, and small-scale model studies.

357. U.S. production: no turnaround expected in 1975. World Oil 180(3): 97-99, February 15, 1975.

4

Unless standby producing capacity in California's Elk Hills Petroleum Reserve is put onstream, U.S. crude production is expected to decline in 1975 by 2.5%. For 1975 U.S. natural gas production is expected to continue a moderate increase. Estimates of production in key states for 1975 are included. Geothermal capacity could be equivalent to twice California's needs by the year 2000, but other alternative energy sources will be high cost supplements for the next several years.

358. Uzzell, R.S. Method and apparatus for generating power from wind currents. U.S. Patent No. 3,883,750, May 13, 1975. 4 p.
5, 17

A wind-powered energy producing device is described which comprises a Venturi-shaped chamber mounted for rotation on a support, a rudder adapted to be acted upon by the wind to orient the openings of the chamber into the wind, and a fan positioned within the throat of the chamber to be acted upon by the wind entering the chamber. The fan is connected to an energy producing device such as a generator or the like.

359. Vale, B. and R. Vale. The autonomous house; design and planning for self-sufficiency. New York, Universe Books, 1975.
2, 4, 8

This book contains a chapter on "Harnessing the Wind" and a brief bibliography.

360. Van Waning, L.R. My experience with winchargers. Wind Power Dig. 1(2): 19-20, Summer 1975.
4

361. Vernon, R.W. Summary of NASA Lewis Research Center solar heating and cooling and wind energy programs. Presented at the Southeastern Conference on Applications of Solar Energy, Huntsville, Alabama, March [illegible]-26, 1975. Sponsored by Alabama University. NTIS, N75-26497, 1975. 25 p.
3, 6

Plans for the construction and operation of a solar heating and cooling system in conjunction with an office building being constructed at Langley Research Center, are discussed. Supporting research and technology includes: testing of solar collectors with a solar simulator, outdoor testing of collectors, property measurements of selective and nonselective coatings for solar collectors, and a solar model-systems test loop. The areas of a wind energy program that are being conducted include: design and operation of a 100-kW experimental wind generator, industry-designed and user-operated wind generators in the range of 50 to 3000 kW, and supporting research and technology for large wind energy systems. An overview of these activities is provided.

362. A vertical axis wind turbine. Mother Earth News, No. 32: 102-103, March 1975.

9

The South-Rangi "eggbeater" wind turbine is described.

363. Videan, D. Rotors in reverse. Shell Aviat. News, No. 431: 12-15, 1975.

5

In an application of helicopter rotor technology to wind power, a two bladed rotor of the teetering type is employed. There is no mechanism for keeping the rotor headed into wind, for the simple reason that it is designed to trail down wind. The blades are attached to the steel hub by means of a patented torsion link which gives a high degree of stiffness to the rotor both in the flapping and the drag planes, and furthermore imparts a low and controllable stiffness about the blade pitch axis. By this method, mechanical bearings and pitch change mechanisms are eliminated, giving the rotor infinite life with no maintenance. In operation, the rotor will start to turn in a light breeze and will achieve its operating speed of 645 revolutions per minute very quickly. Should the speed of the rotor increase owing either to a decrease in the load or an increase in the wind velocity, the self-governing characteristic comes into action. To transmit the power downwards from the rotor and hub at the top of the pylon, use is made of an automotive right-angled bevel gearbox. Power for a private house and direct heat conversion for a greenhouse are only two of a number of possible uses.

364. vonHippel, F. and R.H. Williams. Solar technologies. Bull. Atmos. Sci. 31(9): 25-31, November 1975.

4

In this overview the authors show how the varied technologies for exploiting solar energy compare to one another. They feel that a good understanding of the physical advantages and limitations of different options is necessary to provide a solar R and D program with a rational basis. With a few examples they attempt to dispel the notion that solar energy is inherently pollution free. Compared to other energy technologies capital costs of solar energy are high, but the era of cheap fossil fuels is over and there is little likelihood that we are entering an era of cheap nuclear energy. Moreover, the authors feel the resource holds very great promise, especially in the forms of wind power and photosynthetic energy, for the energy-hungry developing nations, where conditions for exploiting the resource are often favorable and per capita energy consumption is low.

365. Vukovich, F.M. and A. Clayton. A technique for optimally locating wind energy systems. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 372-374.

3, 6

366. Wade, N. New Alchemy Institute: Search for an alternative agriculture. Science 187(4178): 727-729, February 28, 1975.

4

The New Alchemists are a small group who consider modern U.S. agriculture to be a mighty edifice built on sand. They expect it to collapse, within the next 10-20 years, either from intolerable price increases in fuel and fertilizer or from the accumulating weight of biological damage caused by agricultural chemicals. The New Alchemy Institute, on a 12 acre farm near Falmouth on Cape Cod, Mass., is supported by more than 1000 associate members and funds from foundations. Greenhouse complexes, solar heating devices, and windmills are evidence of the Institute's unusual experiment. The agricultural theory of members at the New Alchemy Institute is discussed.

367. Walters, R.E. Innovative vertical axis wind machines. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 443-451.

3, 5, 9

Aerodynamic performance and structural requirements will be studied theoretically and experimentally, and initial cost estimates obtained, for two wind machine concepts. The first, a revision of the vertical axis panemone, utilizes high-lift, variable angle-of-attack, circulation-controlled airfoils; and the second, a wind energy concentrator, uses a vertical airfoil to form a strong wing tip vortex harnessed by a relatively small, highspeed turbine downstream of the wing tip.

368. Walters, R.E., et al. Innovative wind machines. Report for 1 March - 31 August 1975. NSF/RA/N-75/223. NTIS, PB252617, September 1975. 160 p.

5, 9

This report describes theoretical and experimental research concerning the evaluation of two concepts for wind (energy conversion) machines. The first concept is that of a vortex concentrator: a high-lift vertical airfoil in the ambient wind generates a trailing vortex which has its energy harnessed by a relatively small high-speed turbine located just downstream of the wing tip. The device concentrates wind energy so that for a given size turbine the potential power output is greatly increased. Work summarized in this report includes a partial review of available papers on the subject of wing trailing vortices, and some calculations concerning the anticipated output of such a device. Future theoretical and experimental efforts on this project are also discussed. The second concept described is that of a vertical axis panemone device with circulation controlled airfoils for the blades. A preliminary theoretical analysis utilizing strip theory has shown the effect of different design features on its operation, and has led to the design of a test model. The configuration, instrumentation, and control systems of the test model are discussed. Also contained is an outline for a more exact flow theory, which properly takes into account the unsteady aerodynamics involved.

369. Warren, E. Feedback on wind generator notes in TMEN [The Mother Earth News]. No. 30. Wind Power Dig. 1(3): 12-15, Fall-Winter 1975.

4

370. Wave motion can be used to tap wind energy. Energy Int. 12(4): 19-20, April 1975.

4, 6

371. Weber, W. Optimal configuration of rotor blades for horizontal wind energy converters. Z. Flugwiss. 23(12): 443-447, December 1975. (In German)

5

Considerations, methods as well as some results dealing with the aerodynamic problems of rotor blades configurations for wind energy converters are reported. The aerodynamically optimal layout of rotor blades is calculated according to a procedure presented in a block diagram. Results show some typical parameter influences on the layout and performance of two-bladed wind energy converters.

372. Weingarten, L.I. and L.V. Feltz. Material and manufacturing considerations for vertical-axis wind turbines. National SAMPE Technical Conference, 7th. Albuquerque, N.M., October 14, 1975. Materials review '75, p. 153-166. Azusa, Cal., Society for the Advancement of Material and Process Engineering, 1975. NTIS, SAND-75-5512, 1975. 14 p.

3, 5, 9

Since 1973, Sandia Laboratories has been studying wind turbines and in particular Darrieus-type vertical-axis wind turbines (VAWT) for use in remote areas and as a fuel saver for electrical power grid application. The VAWT being investigated at Sandia employs curved blades which minimize bending stresses. The tension-only stresses in the blades provide a variety of manufactured methods to be considered. Mathematical procedures that are being developed for structural analysis are discussed.

373. Weingarten, L.I. and R.E. Nickell. Nonlinear stress analysis of vertical-axis wind turbine blades. ASME Paper 75-DET-35, 1975. 4 p. Also J. Eng. Ind. 97(4): 1234-1237, November 1975.
5, 9

A Darrieus-type vertical-axis wind turbine has been proposed as an alternate to conventional horizontal axis, propeller-type machines. An advantage is that the blades will be primarily in tension, thus making for a more efficient design. In connection with its vertical-axis wind turbine program, Sandia Laboratories has developed the "troposkien" (Greek for turning rope) shape for the blade design. The prototype blade shape is similar to that of the troposkien, but more easily manufactured. The effect on the stress distribution of this alternate blade shape is investigated.

374. Wentink, T. Informal note on wind speed distribution functions. Fairbanks, Alaska, University of Alaska, Geophysical Institute, August 20, 1975.
5

Possible probability density functions and the corresponding integrals (probability distributions) describing the frequency and duration of near surface wind speeds (V) are the "Planck," Incomplete Gamma, Weibull, and another we call the TWF, functions. These are compared, using synthetic and actual wind data as inputs in computed fits to the integral functions. The TWF may be a useful quick approximation for duration curves ($\% \geq V$ vs V), being based on one constant and the mean speed, $\bar{V}$; it is

$$\% \geq V \approx 100\ e^{-a(V/\bar{V})^2},$$

where a is about 0.70 to 0.80.

375. Wentink, T. Study of Alaskan wind power and its possible applications. Annual Progress Report. Geophysical Institute, University of Alaska, Fairbanks, Alaska. NTIS, NSF/RA/N-75-263, PB-254822, January 31, 1975. 71 p.
6

376. Wentink, T. Summary of Alaskan wind power and its possible applications. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 121-129.
3, 6

The potential and possible applications of Alaskan wind power are examined. Wind data are collected at selected sites, and climatological, logistical and operational problems are identified. Alternative possible uses of wind derived power are compared.

377. Wentink, T. Wind power potential of Alaska, Part II: Surface wind data from specific coastal sites. Geophysical Institute Report, February 1975.

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378. Westh, H.C. Comparison of wind turbine generators. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 156-161.

3, 14

The "Comparative Table" contains some information about Danish propeller-driven, highspeed, 50-200 kW wind turbine generators which were in service during the period 1940-1968; and for the sake of comparison, some informative data regarding two actual NASA WTG-projects are also quoted in the table.

379. Wilcox, C.J. Design considerations for large wind mills. In: American Helicopter Society, Annual National Forum, 31st, Washington, D.C., May 13-15, 1975. Proceedings. New York, American Helicopter Society, Inc., 1975. 5 p.

3, 5

The paper discusses considerations for calculating power output and blade loadings of large wind turbines. Procedures are outlined for determining blade loadings under several operating conditions: constant wind velocity condition, varying velocity condition, gust condition, electrical disturbance condition, overspeed condition, and under idling and locked conditions, with or without ice. Failure of the Smith-Putnum wind turbine, constructed in 1939, is discussed.

380. Wilson, D.G., et al. Windmill development by model testing in water. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 981-986.

3, 5

The investigation of parametric changes in two designs of slow-speed windmills for pumping duty by means of testing similar small-scale models in water is described. The use of water models enables an optimum design to be rapidly approached. It is recommended for the development of high-power high-speed windmills.

381. Wilson, D.G. Windmill development by model testing in water. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-11-1 to V-11-2.

3, 5

The investigation of parametric changes in two designs of slow-speed windmills for pumping duty by means of testing similar small-scale models in water is described. The use of water models enables an optimum design to be rapidly approached. It is recommended for the development of high-power highspeed windmills.

382. Wilson, R.E. Applied aerodynamics of wind power machines. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 234-238.

3, 5

383. Wilson, R.E. Current problems in performance modelling. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 202-207.

3, 5

Work on the Applied Aerodynamics of Wind Power Machines has been sponsored by NSF/RANN Grant GI-41840 and has resulted in the publication of a monograph by Wilson and Lissaman. The present status of performance analysis for horizontal axis rotors is summarized.

384. Wilson, R.E. Working Group A. Standards, testing, and nomenclature. [Report] In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 469-472.

3, 4, 5

385. Wind. CoEvolution Q. No. 5: 19-20, Spring 1975.

1, 4

A brief summary of windpower is presented, including a historical chronology and advantages and disadvantages.

386. Wind energy for survival; a visit with Environmental Energies, Inc. Wind Power Dig. 1(1): 14-15, January 1975.

4

387. Wind generator promises greater efficiency. Prod. Eng. 46(9): 15-16, September 1975.

4, 5

Sforza's vortex augmentor generator which may generate eight times the power of conventional rotor-type wind-energy converters is described.

388. Wind power. Nat. Wildl. 13(5): 30-33, August-September 1975.

4

As a source of electrical power, the wind has a number of outstanding advantages, not the least of which is pollution-free transportation. At least five major U.S. universities are conducting research programs aimed at developing the highly renewable resources. NSF and NASA awarded $1 million in contracts for the design of large wind energy systems. More funds are promised next year. Some large windmill construction projects, past and present, are described.

389. Wind power and windmills. Bibliography Series No. 58. Bangalore, India, National Aeronautical Laboratory, July 1975. NTIS, NP-20897, July 1975. 161 p.

16

The 583 references listed consist of published documents including books, technical reports, and articles from 1960 to 1974. Bibliographies providing access to the literature prior to 1960 are also included.

390. Windmill studies in the United States. Electr. Rev. 196(9): 301, March 7, 1975.

6, 7

The U.S. National Science Foundation and National Aeronautics and Space Association have awarded 1/2 mill dollar contracts for preliminary designs of large wind energy systems. GE Space Division and Kaman Aerospace will examine modern versions of windmills at sizes that generate 100 kW for small communities to 3MW for possible connection into the networks of electric utilities. NASA plans 30 m dollar investment into wind energy research over next 5 years. Some of these projects are described.

391. Windplants. Wind Power Dig. 1(1): 3-13, January 1975.

12b

Information about the following windplants is provided: Aerowatt, Gillette Wind Dynamo, American Wind Turbine, Wincharger Windplant, Lubing Windmills, Electro GmbH Windplants, Dunlite Windplants, Jacobs Wind Electric, Sailwing Windmill, "12/16" footer prototype (Jack Park of Helion), water-pumping windmills, S-rotor, and Sencenbaugh.

392. Windworks presents a wind energy exposition. Wind Power Dig. 1(2): 15, Summer 1975.

4

393. Windy Ten; a Dutch windmill you can build. Wind Power Dig. 1(2): 17-18, Summer 1975.

12a

Plans for building an authentic scale replica of a wooden Dutch windmill at a cost of $350.00 are discussed.

394. Wolff, A. Second wind. Sat. Rev. 2: 5, February 8, 1975.
4

395. Woolley, M. and J. Platts. Energy on the crest of a wave. New Sci. 66(947): 241-243, May 1, 1975.
4, 6

396. Workshop on Wind Energy Conversion Systems, 2d, Washington, June 9-11, 1975. Proceedings. Edited by F. R. Eldridge. Sponsored by ERDA, Solar Energy Division and NSF-RANN. Coordinated by the Mitre Corporation, with the cooperation of the American Institute of Aeronautics & Astronautics. NSF-RA-N-75-050; MTR-6970. McLean, Va., Mitre Corp., 1975. 536 p. Cover title: Wind Workshop/2.
3, 5, 6, 13

More than 70 papers were presented in sessions on design of large systems, mission and regional analysis, international activities in wind energy, technology development, energy storage, wind characteristics, institutional issues, agricultural and rural applications and innovative and advanced system concepts.

397. Yen, J.T. Tornado-type wind energy system. Intersociety Energy Conversion Engineering Conference, 10th. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 987-994.
3, 5

A new type of wind energy system is described. Data from wind tunnel tests of a small model are presented and compared with several rough analyses. It is found that one of the analyses gives a good agreement with the data on shaft power output. Applying the analyses to larger systems one finds that for the same sized turbine and the same wind speed, power outputs of this design may be 100 to 1000 times that of the conventional design. It appears that the new system can be developed to achieve multimegawatt unit capacities.

398. Young, M.I. Dynamic optimization of weathercocking oscillations. U.S. National Conference on Wind Engineering Research, 2d, Fort Collins, Colorado, June 22-25, 1975. Conference Preprints. Fort Collins, Colorado State University, 1975, p. V-1-1 to V-1-3.
3, 5

Changes in wind direction result in transient weathercocking oscillations of conventional horizontal axis wind energy converters. This reuslts in substantial bending fatigue loadings of the individual blades and vibration of the system. The structural dynamic problem of minimizing the maximum cyclic bending stress in the windmill blades is formulated and solved as an optimal control problem where the natural frequency and fraction of critical damping are determined to minimize an integral square cyclic stress penalty function over a very long time interval. It is found that the optimum fraction of critical damping for the weathercocking oscillation varies between .55 and .65 as a variety of windmill design parameters are varied. The technique developed for optimizing the dynamics of the weathercocking oscillation is seen to apply to a variety of windpower dynamical problems.

399. Young, R.B. A concept for converting wind energy to methane. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 461-464.
3, 6, 15

In April 1975, AAI Corporation received a contract from NSF to study a concept for converting wind energy to methane. The basic approach consists of using off-shore wind to obtain hydrogen through the electrolysis of seawater. Carbon dioxide is obtained from carbonate deposits. These gases are combined to form methane. The present effort includes analysis of the processes involved, identification of the equipment and resource requirements, and an assessment of the probable cost of methane produced by this process.

400. Young, R.B., et al. Production of methane using offshore wind energy. Executive summary. NSF/RA-N-75/295A. NTIS, PB 252308, November 1975. 35 p.
6, 15

This study has assessed the potential of the electrical generation by wind energy of hydrogen, converting it to methane, and introducing it into the present natural gas pipelines. This study is limited by NSF direction to the basic objectives of defining the electrochemical process, the theoretical feasibility, and the estimated cost of producing methane gas from wind energy using calcium carbonate from underwater sands. Two primary site locations were used; Nantucket Shoals off the coast of Massachusetts and Cape Hatteras shoal water areas. The study does not include any wind energy design optimized for the electrolysis process, or the special design requirements for offshore wind power.

401. Young, R.B., et al. Production of methane using offshore wind energy. Final Report. NSF/RA/N-75/295. NTIS, PB 252307, November 1975. 79 p. Also ERDA/NSF/933-75/T1, November 1975. 131 p.
6, 15

This report describes the work accomplished during a program to investigate the feasibility of converting wind energy to methane gas. The basic approach consists of using off-shore winds to drive generators which supply electricity to electrolysis cells, Electrolysis of distilled sea water produces hydrogen. Carbon dioxide is derived from underwater carbonate deposits. These gases are combined to form methane. The methane gas produced by the process can be used in existing natural gas-burning equipment, thus conserving a valuable capital investment.

402. Zelby, L.W. Hydrogen as energy storage element. Hydrogen Energy. Hydrogen Economic Miami Energy (THEME) Conference, Proceedings. Miami Beach, Florida, March 18-20, 1974. Part A, p. 339-343. New York, Plenum Press, 1975.

3, 8

A residential wind-driven power system, using hydrogen for storage is described. The advantages of the system are that it is self-contained, and utilizes off-the-shelf components. The system is based on minimum wind velocity of 10 km/h, which represents the average wind speeds in about 50% of the conterminous states.

403. Zephyr unveils 7.5 kw generator. Wind Power Dig. 1(2): 29, Summer 1975.

4, 12b

404. Zimmer, R.P., et al. Benefit-cost methodology study with example application of the use of wind generators. Georgia Institute of Technology, Atlanta. Engineering Experiment Station. NASA-CR-134864. NTIS, N75-31571, July 1975. 411 p.

6

An example application for cost-benefit methodology is presented for the use of wind generators. The approach adopted for the example application consisted of the following activities: (1) surveying of the available wind data and wind power system information, (2) developing models which quantitatively described wind distributions, wind power systems, and cost-benefit differences between conventional systems and wind power systems, and (3) applying the cost-benefit methodology to compare a conventional electrical energy generation system with systems which included wind power generators. Wind speed distribution data were obtained from sites throughout the contiguous United States and were used to compute plant factor contours shown on an annual and seasonal basis. Plant factor values (ratio of average output power to rated power) are found to be as high as 0.6 (on an annual average basis) in portions of the central U.S. and in sections of the New England coastal area. Two types of wind power systems were selected for the application of the cost-benefit methodology. A cost-benefit model was designed and implemented on a computer to establish a practical tool for studying the relative costs and benefits of wind power systems under a variety of conditions and to efficiently and effectively perform associated sensitivity analyses.

405. Zimmer, R.P., et al. An impact analysis of a micro wind system. In: Modeling and Simulation. Vol. 6. Proceedings of the Sixth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-25, 1975. Part 1, Pittsburgh, Pa., Instrument Society of America, 1975, p. 127-131.

3, 15

A process for the recovery of steel mill stack dust has been developed and is being used to recover secondary metals by a small company in Georgia. The process is energy intensive and wind generators were studied as a means of supplying energy for part of the recovery process. Some of the results of this study are presented.

406. Zlotnik, M. Energy storage for wind energy conversion systems. In: Workshop on Wind Energy Conversion Systems, 2d, Wash., June 9-11, 1975. McLean, Va., Mitre Corp., 1975. NSF-RA-N-75-050, p. 311-318.

3, 11

The technology is discussed for storing energy in a form that will allow it to be recovered economically as electrical energy. One of the goals for energy storage R and D applied to WECS is to make the combined WECS/energy storage system economical as an independent base-load power supply for a wide range of circumstances. One approach that would make such a goal more accessible in the near term would be to recover only a portion of the stored energy--only as much as necessary--in electrical form, with the balance used or stored.

407. Browning, J.A. Windmills. U.S. Patent 3,952,723. February 14, 1975.

5, 17

A system for extracting useful energy from the wind is described which consist of a windmill, a closed circuit containing a liquid, pump means driven by the windmill to place the liquid under pressure in the circuit; and a flow control impedance to permit a predetermined constant volumetric flow of the liquid in the circuit per unit of time and across which the pressure drops to yield heat.

408. Developments in the wind. Electr. & Power 21: 299, March 20, 1975.

4

409. Lane, J.A. Outlook for alternative Energy Sources. IAEA Interregional Seminar on Nuclear Power Planning, Kingston, Jamaica, 1975. NTIS, CONF-750614-1, 1975.

3, 4, 6

410. Fields, J.C. Heating and cooling system. U.S. Patent 3,956,902. March 25, 1975.

8, 17

A system for heating and cooling an enclosure is described which comprises: first energy converting means for converting wind energy to mechanical energy; second energy converting means associated with the first converting means and adapted to convert the mechanical energy to varying amounts of electrical energy in proportion to the amount of the wind energy for use in the heating and cooling system; and thermoelectric heating and cooling means comprising a plurality of parallel connected thermoelectric devices connected to the second energy converting means for converting the electrical energy to thermal energy, the thermal energy being employed to heat and cool the interior of the enclosure.

411. Lois, L. Apparatus for extracting energy from winds at significant height above the surface. U.S. Patent 3,924,827. December 9, 1975. 8 p.

5, 17

A buoyant wing is tethered to a line an appreciable distance above the surface where the winds are at higher speed than at ground level. The other end of the line(s) is attached, for example, to an electrical generator, and provision is made for adjusting the position of the wing so that when a series of wings are utilized together with an electrical generator, one wing may be retracted while at least one other wing which is positioned to catch the wind is drawn away from the generator.

412. Solar energy resources. In: Magnitude and deployment schedule of energy resources. Proceedings. Conference on the Magnitude and Deployment Schedule of Energy Resources, Portland, Oregon, July 21, 1975, p. 9-58.

3, 6

ERDA responded to Congressional solar legislation by developing a detailed program described in a "Definition Report, the National Solar Energy Research, Development and Demonstration Program" (ERDA 49) on eight different applications of solar energy. Contributions of new energy sources of wind, photovoltaic, thermal-electric, and ocean thermal gradient are given in addition to hydroelectric expansion for 1985 to 2000. Applications of solar heating and cooling, agricultural and industrial applications, solar electric capacity, wind energy, photovoltaic systems, ocean thermal systems, and fuels from biomass are briefly discussed. Solar energy implications for the long term are summarized with specific implications indicated for the Northwest. Five subgroup papers are included:

Space Heating and Cooling, by Arnold Cohen; Electric Power Generation, by L.L. Vant-Hull; Hydroelectric Power Generation, by Frederick H. Warren; Wind Energy Systems, by W.H. Hurlebaus; and Ocean Thermal Energy Conversion, by E. Lee Leventhal. A Review of Solar Energy Resources was presented by Dwain F. Spencer.

413. Taminini, R.J. Wind driven power generator. U.S. Patent 3,924,966. December 9, 1975. 4 p.

5, 17

A rotor body is provided including a generally cylindrical side wall open at its opposite ends and supported for rotation about an axis generally coinciding with the center axis of the body. The body includes a plurality of circumferentially spaced longitudinally extending slots similarly slightly inclined relative to radial planes passing through the slots and the edge portions of the cylindrical side wall defining corresponding longitudinal edges of the slots include inwardly projecting vanes inclined at least thirty degrees relative to planes tangent to the cylindrical side wall edges inwardly from which the vanes extend.

414. Sohn, C.W. Wind power plant site selection. Thesis. Texas Tech University, May 1975.

6

A test of Putnam's ratio method using data from a number of sites is described. Data from Reese Airforce Base and Lubbock, Texas, is analyzed, and the error is found to be roughly 25%.

415. Sumner, J. Some answers to power generation lie blowing in the wind. Engineer 241: 30-31, October 2, 1975.

4

416. Sumner, J. Using wind to generate warmth and business. Engineer 241: 24-5, December 18-25, 1975.

4

417. Sumner, J. Windmill will generate heat for agriculture. Engineer 241: 9, December 4, 1975.

15

418. Chiu, A.N. Wind engineering research digest, vol. 2. Prepared in cooperation with the Wind Engineering Research Council. NTIS, PB-252838/8, 1975. 113 p.

4

A partial listing of the contents includes: Structure of wind; wind wave effects; effects on urban areas; wind loading on structures; design for hurricanes and tornadoes; environmental factors; legal factors; special problems; wind considerations in urban planning; building codes and regulations; socioeconomic effects; and wind energy.

419. Smetana, F.O. A new wind energy conversion system. NTIS, N76-20629, NASA-CR-146539, November 1, 1975. 16 p.

5, 9

It is presupposed that vertical axis wind energy machines will be superior to horizontal axis machines on a power output/cost basis and the design of a new wind energy machine is presented. The design employs conical cones with sharp lips and smooth surfaces to promote maximum drag and minimize skin friction. The cones are mounted on a vertical axis in such a way as to assist torque development. Storing wind energy as compressed air is thought to be optimal and reasons are: (1) the efficiency of compression is fairly high compared to the conversion of mechanical energy to electrical energy in storage batteries; (2) the release of stored energy through an air motor has high efficiency; and (3) design, construction, and maintenance of an all-mechanical system is usually simpler than for a mechanical to electrical conversion system.

1974

51. Abelson, P.H. Energy supply and demand during the next decade. Amer. Gas Assoc. Mon. 56(12): 12-15, 36, December 1974.

4

52. Aerospace firm to build wind-generator blades. Mach. Des. 46:10, October 17, 1974.

4

53. Are windmills feasible. Electr. Times 4287: 9, June 27, 1974.

6

The interest and activity in the windpower field around the world and the opinions of two U.K. scientists, A. Bruckner (City Univ.), and A.E. Stodhart (ERA) are presented. Dr. Bruckner's "buffer lake" concept study was made in Ulster where he believes a system build around Lough Neagh could provide 25 percent of Ulster's energy requirements. He calls for a two year programme to construct aero-generators based on existing designs.

54. Bacher, K. Putting the sun to work: a history and directory of currently available solar energy applications. NTIS, PB238189, 1974. 30 p.

4

A brief history of solar thermal energy is provided and a directory is presented of current economically and technically feasible applications. Heliothermal systems for water and space heating are at the present time more practical for short-term private and commercial uses than helioelectric and heliochemical systems. Basic background information on the use and construction of solar equipment is followed by a listing of company names, addresses, prices, and specifications. Information is provided on hot water heaters, collectors, swimming pool heaters, total home systems, glazing systems for solar control, wind power, and solar cells. A bibliography of 20 books and articles on the experimental applications of solar energy is included.

55. Back to the windmill to generate power. Bus. Week No. 2330: 140, 142, May 11, 1974.

4, 6

If any aspect of the energy shortage is considered humorous, it is the idea of erecting hundreds of giant windmills across the landscape to do their age-old job of converting the wind into power. But to a growing number of people, windmills are not such an absurd idea after all. Companies are now spending their own money to develop a new generation of windmills that will come to market as early as this year.

56. Becker, I. Energy research in Providence. Nation 218(9): 262-264, March 2, 1974.
8

The Research and Design Institute plans to turn an abandoned 19th century mill in Providence, R.I., into a prototypical electric energy conservation station and use it as headquarters. About 60% of the building's electricity will be generated from solar collectors, solar cells, a wind-powered generator, and a water turbine. A nuclear device may run the aircraft signals on the chimney.

57. Bergey, K.H. Wind power potential for the United States. Aware, No. 49: 2-5, October 1974.
6

Large-scale wind power generating systems can be built for about $200 per installed kw. This compares with today's costs of $200-$350 for conventional fuel plans and $500 for nuclear plants. Assuming a 25 year pay back of capital along with a 25% load factor, 10% interest on debt, and a conservative allowance for operating costs, a typical unit will produce electricity at an average of 2.5/kwh, which is competitive in some parts of the country today. If wind power is introduced into multi-regional power grids as base load capacity, the emergency fill-in and peaking can be accomplished by existing fossil fuel units. If the wind energy system is broad enough, the need for energy storage can be eliminated.

58. Bergey, K.H. Wind power potential for the United States. In: Wind Energy, publication of Hearing before the Subcommittee on Energy, Committee of Science and Astronautics, U.S. House of Representatives. Committee Publication No. 49, May 21, 1974. 392 p.
6

59. Bloom, G.I. Achieving Pennsylvania's energy goal. Pub. Util. Fortn. 93(12): 38-40, June 6, 1974.
4

60. Blowing in the wind. Sci. Am. 230(5): 16, May 1974.
4

NASA's sailwing windmill is described.

61. Bonnefille, R. Wind power projects of the French Electrical Authority. Translation into English of "Les Realisations de Electricité de France Concernant l Energie Eolienne." Report F40/74, no. 4. Electricite de France, Direction des Etudes et Recherches, Service Generateurs et Echangeurs de Chaleur Thermiques

et Nucleaires, April 1974, p. 1-45. Translation: Kanner Associates, Redwood City, Cal. NTIS, N75-13384, December 1974. 61 p.

6

Systematic measurement of the wind power distribution in France has shown that the design of wind generators involves two basic problems: the irregularity of the energy supply and the mechanical strength of the assembly. Since these problems have largely been solved for generators less than 10 kW, the main body of this discussion deals with practical tests on one average-power and two high-power generators. Other variants tested in France and other countries are described in less detail. Further development of average-power generators with an output on the order of 100 kW is recommended.

62. Booda, L.L. Ocean based solar-to-hydrogen energy conversion concept. Sea Technol. 15(2): 21-24, February 1974.

4

The lengthy paper "Ocean Based Solar-To-Hydrogen Energy Conversion Marco System," by William J.D. Escher and Lee A. Hanson is condensed and interpreted. Solar energy would be used to produce hydrogen as an energy form in a wholly ocean-based complex. Hydrogen is an excellent energy form since it has high energy conversion efficiency, and is plentiful, non-polluting, naturally recycled, easily transported, and storeable. The advantages of an oceanic operation include its virtually unlimited area, enormous thermal sink, immediate source of feedstock water, excellent logistics, low friction bearing surface, and the availability of the ocean thermal gradient method of energy conversion. Platform technology, and the five methods of solar conversion under study (photosynthesis, direct thermal, photovoltaic, OTG, and wind) are discussed.

63. Booth, D. When the Kuwaitis look at power from the wind. Engineer 239: 55, 59, August 22/29, 1974.

4

64. Booth, D. Winds of change might blow through the sails again. Engineer 238(6162): 44-46, April 18, 1974.

6, 12b

The present status of wind generators and currently available models and research in the USA and France are reviewed. NASA is developing a 100 kW unit with plans for 50-250 kW and 1-3 MW units. The only commercial models (1 kW and 10 kW) in U.K. are produced by Industrial Instruments.

65. Boulet, L. Innovations in generation, storage, and transportation of energy. Proceedings of the Canadian National Energy Forum. Ottawa, Canadian National Committee, World Energy Conference, 1974.

3, 4, 11

66. Brand, D. It's an ill wind, etc.: energy crisis may be good for windmills. Wall St. J., January 11, 1974. 1 p.

4, 6

67. Buonicore, A.J. Environmental implications of energy use. Presented at AICHE Energy & Environment Conference, Ohio, November 13-15, 1974. 9 p.

3, 4, 6

Much of the environmental damage from the use of energy lies in those systems that provide energy for the consumer. If these systems were to function more efficiently coupled with more efficient use by consumers, both energy production and environmental damage would be reduced. The use, potential use, advantages, and disadvantages of coal, oil, nuclear fission, hydroelectric, geothermal, oil shale, and coal gasification are surveyed. Fusion, solar, geothermal, ocean thermal, wind, tidal, and advanced chemical energy systems are all potential energy sources of the future that would cause minimum environmental damage.

68. Butler, T.W. Wind and solar energy conversion system for multistory buildings. U.S. Patent No. 3,832,853. September 3, 1974.

8, 17

69. Carter, F.H. Multi-windmill wheel power generator. U.S. Patent No. 3,944,839. July 18, 1974.

5, 9, 17

A power generator is described which comprises a supporting stationary column, a windmill wheel module rotatably supported from the column for swivelling movement about a substantially vertical axis, vertically spaced horizontal shafts rotatably journaled on the module and extending dimetrically of the vertical axis, and a plurality of windmill wheels mounted on each end of each horizontal shaft for rotating the shaft in response to axial flow of wind. A vertical shaft is supported from the column and drivingly connected to the horizontal shafts. A generator assembly is supported at the lower end of the column and is connected to the vertical shaft.

70. Carter, F.H. Wind turbine generator. U.S. Patent No. 3,793,530. February 19, 1974.

5, 17

71. Carter, F.H. Wind turbine with governor. U.S. Patent No. 3,942,026. June 11, 1974.

5, 9, 17

A wind turbine assembly is described which comprises a supporting framework including a rigid elevated platform, a turntable rotatably supported from the platform for swivelling movement about a substantially vertical axis, a horizontal shaft rotatably journalled from the turntable with the end portions of the shaft projecting diametrically therefrom, a plurality of wind wheels mounted on each end of the horizontal shaft outwardly of the turntable for rotating the shaft in response to axial flow of wind through the wind wheels. The area peripherally of the wind wheels is unconfined to provide unrestricted and untrapped wind flow in relation to the wind wheels. A vertical shaft is supported from the framework and connected to the horizontal shaft. A generator assembly is supported at the lower end of the framework and is connected to the vertical shaft.

72. Cherry, W.R. Prospects for conversion of solar energy into electrical power. Missouri Energy Council Conference on Energy Resources and Management, 1st. University of Missouri, Rolla, Missouri, April 24, 1974, p. 40-42.

3, 6

73. Chiu, A.N.L. Wind engineering research digest. Vol. 1. Hawaii University, Honolulu, Hawaii. NTIS, PB 241010, 1974. 115 p.

4

74. Clark, P. The new and revised natural energy workbook. Berkeley, Cal., Visual Purple, 1974. 97 p.

2, 4

This is basically an idea book, introducing a wide variety of energy alternatives, including 20 pages on wind power.

75. Consroe, T., et al. Alternative strategies for optimizing energy supply, distribution, and consumption systems on naval bases. Volume II. NTIS, AD 786757, January 31, 1974. 231 p.

4, 8

The report describes five advanced strategies for optimizing energy supply, distribution, and consumption systems on naval bases: (1) Solar energy applications; (2) automated building control and monitoring systems; (3) electrochemical sources--fuel cells; (4) advanced transportation technology; and (5) total energy systems. For each advanced strategy, the report contains a technology assessment, a discussion of applicability to the Navy, a discussion of costs and benefits, and recommendations for Navy implementation.

76. Coonley, D.R. Design with wind. Harrisville, N.H., Total Environmental Action, May 1974. 140 p.

2, 5, 12a

This project explores the creative use of wind in the design of buildings. Experiments on architectural models were conducted in a wind tunnel. Results indicate that substantial amounts of energy can be provided by incorporating wind turbines into the design of buildings and, simultaneously, that wind flow problems around buildings can be reduced to a minimum and structural wind loads upon buildings can be greatly reduced. Master's thesis.

77. Dambolena, I.G., F.C. Kaminsky and R.F. Rikkers. Model for the economic evaluation of wind-power systems. Joint National Meeting of the Operations Research Society of America and the Institute of Management Sciences, Boston, April 22, 1974. Amherst, Mass., University of Massachusetts, Department of Industrial Engineering, 1974.

3, 6

78. Dambolena, I.G., F.C. Kaminsky and R.F. Rikkers. A planning methodology for the analysis and design of wind-power systems. Intersociety Energy Conversion Engineering Conference, 9th, San Francisco, 1974. New York, American Society of Mechanical Engineers, 1974, p. 281-287.

3, 6

This is a review of the results obtained from the analysis of a specific wind-power system for the New England area performed by means of a described computer-based planning model designed to aid in the cost evaluation and performance simulation of alternative wind-power systems. Based on the low-cost promise of these results, it is argued that further research on wind-powered systems should be pursued and that similar planning models should be developed for the evaluation of other alternative energy systems.

79. Daniels, F. Direct use of the sun's energy. Westminster, Maryland, Ballentine Books, 1974. 271 p.

2, 4

Included in this book is a section on wind energy.

80. Davis, A.J. and R.P. Schubert. Alternative natural energy sources in building design. Blacksburg, Va., Passive Energy Systems, 1974. 252 p.

2, 8

Information needed to design a building using alternative natural energy sources is presented in this book. In the first chapter the energy consumed in buildings is studied, considering current technological solutions to energy problems, and practical alternatives to present technology. Chapter Two examines the effect of climate on building design. Chapter Three, "Energy Conservation," covers these topics: life cycle costs; conservation through the use of materials; the exclusion or inclusion of natural environment; windows; the collection, distribution, and utilization of waste heat; lighting systems; and heat transmission coefficients. Natural methods of cooling and ventilation are reviewed in Chpater Four. Chapters Five through Eight discuss the use of these alternative energy sources: water power, wind power, solar energy, and organic fuels. Integrated systems, using more than one alternative energy source, are described in Chapter Nine.

81. Dorner, H. Approaches to the optimal design of wind energy generators. Seminar Windenergie, Julich, Germany, 12 September 1974. Julich, Germany, Kernforschungsanlage, 1974, p. 53-116. (In German)
3, 5

A comprehensive survey, including an outline of the history of wind energy engineering, with discussions of the more important recent experimental projects of sizes up to 1200 kW is described. The current state of development of the aerodynamic theory of wind energy generation is described, with illustrations by comparative performance curves for the various experimental generators.

82. Eldridge, F.R. Excerpts on wind energy and related subjects. A report submitted to the Subcommittee on Energy, Committee on Science and Astronautics, U.S. House of Representatives, June 10, 1974.
6

83. Eldridge, F.R. Wind powered aqueduct systems and wind energy storage options. Mitre Corp. Report No. M74-108, October 1974.
11, 15

84. Emerson, F. Energy: the search is on. New York Post, March 18, 1974, p. 4.
4

Discussions on future sources of energy examine the potential of coal gasification and nuclear, solar, geothermal, tidal, and wind energy. Technological and economic limitations are discussed for each solution.

85. Energy crisis and energy from the sun. Symposium on Solar Energy Utilization and Panel Discussion on Solar Energy Programs and Progress, Washington, D.C., 1974. M.P. Thekaekara, ed., Washington, National Science Foundation, November 1974.
3, 4, 6

1974

86. Energy in Oklahoma. Vol. 1. Final Report of Oklahoma Energy Advisory Council, February 1, 1974. Oklahoma City, Ok., Oklahoma Energy Advisory Council, 1974.

6

87. Energy-related research and development. Prepared at the request of Frank E. Moss, Chairman, Committee on Aeronautical and Space Sciences, U.S. Senate. U.S. Senate, Committee on Aeronautical and Space Sciences. Washington, D.C., G.P.O., 1974.

4, 6

The NASA energy-related R&D programs discussed are intended to complement government-wide plans and programs now being developed and implemented. NASA's 1974 energy-related R&D comprises work in various technical fields in which technology developed for space and aeronautics has useful applications to energy needs and problems on earth. The projects include: work in solar energy utilization; wind energy systems; energy conversion, transmission and storage; transportation systems; and energy and environmental conservation. NASA projects directed to the near-term use of solar energy include a demonstration test of a residential solar heating and cooling unit and a technology program to advance the state of the art of the components and subsystems for solar heating and cooling systems. Work on solar energy utilization that could be significant in the future includes technical and economical studies of some of the components of space-based systems in which solar energy would be collected and converted to electricity in space and transmitted to earth by microwave beams.

88. Environmental action, special issue: Energy alternatives. Environ. Action 5(18): 15 p., February 1974.

4

89. Exciting concepts but with long roads to power. Coal Age 79(4): 106-110, April 1974.

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90. Fedotov, V., and V.P. Kharitonov. Standardized wind electric power unit. Mekhanizatiya i Elektrifikatsiya No. 7: 43-44, 1971. Translation: Army Foreign Science and Technology Center, Charlottesville, Virginia. NTIS, AD783764, May 9, 1974. 6 p.

14

91. Ford Foundation. Energy Policy Project. Exploring energy choices; a preliminary report of the Ford Foundation's Energy Policy Project. Washington, D.C., Energy Policy Project, 1974. 81 p.

2, 4, 6

This report gives an excellent summary of our present energy situation. It is well documented, with plenty of facts and

figures. The most interesting part, however, is an examination of three possible energy futures which could result from today's decisions. The first, which assumes that present trends continue, strains our resources to the utmost. The second uses conservation and high efficiency technology to reduce demand. In the third, energy growth is reduced to zero through changes in our way of life.

92. Ford Foundation. Energy Policy Project. A time to choose: America's energy future; final report. Cambridge, Mass., Ballinger Publ. Co., 1974. 511 p.

2, 4, 6

93. Fuller, R.B. Energy through wind power. New York Times, January 17, 1974, p. 39.

4

Possible use of solar and wind energy is discussed. Wind power is in a class by itself as the greatest terrestrial medium for harnessing and conserving solar energy.

94. Fuller, R.B. Written on the wind. Harper 248: 101, June 1974.

4

95. Gabel, J. Utilisation of unconventional energy resources. Elektrotech. Z. (ETZ) B 26(10): 264-6, May 3, 1974.

4, 6

Discussed are methods of utilizing solar, water, wind and geothermal energy. Several suggestions are described of their possible realization.

96. Glaser, P.E. An overview of solar energy applications. In: NEREM 74; Northeast Electronics Research and Engineering Meeting, Boston, October 28-31, 1974. Record. Part. 1, p. 45-50. Newton, Mass., Institute of Electrical and Electronics Engineers, Inc., 1974.

3, 6

The paper reviews briefly some of the main approaches under study and development for harnessing the sun's energy. This includes solar heating and cooling systems, renewable gas and oil fuels, solar heat engine power plants, wind energy, ocean thermal gradients, direct energy conversion using solar cells, and solar energy conversion in space for use on earth. It is pointed out that although a solar heating and cooling system is still more expensive to install than a fossil fuel system, the total costs during the operational life of the two systems are expected to be comparable in view of the spiralling prices of fossil fuels.

1974

97. Glaser, P.E. Solar power options. Symposium on Solar Energy Utilization and Panel Discussion on Solar Energy Programs and Progress, Washington, D.C., 1974. M.P. Thekaekara, ed., Washington, National Science Foundation, November 1974, p. 75-87.

3, 6, 7

Solar power potential is discussed vs. future needs. with particular attention to large-scale solar energy conversion to power by using wind, ocean thermal gradients, solar-powered heat engines, and photovoltaic energy conversion on earth and in space. The past development and the state of the art of this technology are reviewed with a projection into the future. Cost projections are given on the basis of available data. The prospects of solar energy applications are believed to be bright but slow, with significant advances over the next few decades.

98. Glaser, P.E. Tomorrow solar energy. Ind. At. Spat. 18(1): 26-30, 1974.

4, 6, 7

The worldwide concern with increasing energy consumption and the resulting undesirable effects on the environment have led to a reassessment of the potential of solar energy to meet future energy demands. Solar energy represents an inexhaustible energy source which is usefully converted and has the potential to meet a significant portion of the world's future energy requirements. The technology underlying solar energy applications is known, although substantial developments, particularly to achieve mass production and resulting cost reductions will be required. Solar energy for heating and cooling of buildings shows promise of wide-scale application over the next decade and represents not only a major means for energy conservation but also a potentially significant market for industry. Several options for the large scale use of solar energy for production of electricity, including solar thermal conversion, the direct conversion of solar energy by the photovoltaic process and the utilization of wind power and the temperature difference of sun-warmed oceans waters, if successfully developed would provide society with a significant energy alternative for the future.

99. Gohar, M.K. Improve gas turbine efficiency. Presented at 9th World Energy Conference, Detroit, September 22-27, 1974. Part 4, p. 1-21.

3, 5

1974

100. Hackleman, M. The Savonius super rotor! Mother Earth News, No. 26: 78-81, March 1974.
8

Use of the S-rotor at Earthmind, a California farm research center, is described.

101. Hackleman, M.A. Wind and windspinners: a nuts and bolts approach to wind-electric systems. Saugus, Cal., Earthmind, 1974. 115 p.
2, 12a

This book is strong on "how to" basics of building your own windplant and includes complete plans for a Savonius rotor wind system.

102. Hambraeus, G. Alternative sources of energy. Foeren. Elektr. Ration. Anvaendning 47(3): 46-50, 1974. (In Swedish)
4

103. Hammond, A.L. Individual self-sufficiency in energy. Science 184(4134): 278-282, April 19, 1974.
4, 12a

The modern autonomous house, using solar power, is described, as well as wind as a source of energy and electric cars.

104. Hartley, W. and E. Hartley. The wind shifts to windmills. Pop. Mech. 142(5): 80-85, November 1974.
4

Henry and Retta Clews built a windmill complex for their home in the Maine woods a few years ago, and people like William Heronemus are thinking in terms of how to use the wind to provide energy for large sections of the country. Heronemus foresees a vast network of windmills floating off the New England coast used to electrolyze seawater into oxygen and hydrogen. Large and small wind energy schemes by individuals and research organizations are discussed. Information on sources of small wind generators in the U.S. is included.

105. Heronemus, W.E. Alternate energy sources from the ocean. Marine Technol. Soc. J. 8(2): 35-38, February 1974.
6

106. Heronemus, W.E. Large-scale exploitability of wind energy for electricity supply. Seminar Windenergie, Julich, Germany, 12 September 1974. Julich, Germany, Kernforschungsanlage, 1974, p. 117-48. (In German)
3, 6, 7

The background of wind energy as an energy source in industrialized countries is reviewed and discussed, particularly with reference to recent R&D developments in the USA. Problems associated with the unpredictable fluctuating character of wind energy and the various possible proved and proposed energy storage media and methods are discussed. The production, collection, transport and use of wind-energy-generated synthetic fuels are discussed. Consideration is given to the economic integration of networks of wind energy generators into conventional electrical energy distribution systems.

107. Heronemus, W.E. Oceanic and atmospheric energy sources. Presented at the Solar Energy Lecture 6, Washington, D.C., March - May 1974: Sponsored by IEEE, Washington Academy of Sciences and Washington Society of Engineers. NTIS, N75-24101, April 18, 1974. 59 p.
3, 4, 6

Solar energy processes are discussed in terms of decreasing consumption of fossil fuels and utilization of renewable energy sources. Emphasis is placed on the windpower process and the ocean thermal differences process which are based on natural collection of solar energy.

108. Heronemus, W.E. A survey of possible use of windpower in Thailand and the Philippines. NTIS, PB245609, November 1974. 143 p.
6

This work was performed in an attempt to answer the question: 'Could windpower be used by the peasant farmer in Thailand or the Philippines to improve the quality of his life.' It was found that windpower was being used to a very limited extent in Thailand to move water, thus relieving either a backbreaking manual labor task, or a very expensive out-of-pocket expenditure for fuel for engine driven pumps. No evidence of existing wind pumping could be found in the Philippines.

109. Heronemus, W.E. Using two renewables. Oceanus 17: 20-27, Summer 1974.
6

The technical and economic feasibility of extracting energy from winds over the oceans and from the thermal differences in the oceans is discussed. A concept for a large wind power electric generating system has been analyzed. The wind power system could service the entire New England electricity market by 1990. The system can produce 360 billion kwh using both electricity in cable and pipeline hydrogen gas energy transmission at a cost well below that of conventional power. Discussed is an ocean thermal differences power plant, which could produce electricity or hydrogen gas at a cost that would allow either product to be transmitted from the gulf stream to almost any point in the U.S. and sold at a competitive price.

110. Heronemus, W.E. Windpower--look backward, then move forward confidently. In: Energy development; Proceedings of the Energy Sources Conferences, Anaheim, Cal., July 14-19, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 82-88. (Updates entry 1974:33)

3, 6, 8

This is a discussion of the potential of wind power utilization, and review of some wind power electricity systems for use in rural areas. Wind power has failed the test of economics when pitted against heat engines for the generation of electricity in the recent past. Now with rising costs of fossil fuels, wind power could be economic.

111. Herwig, L.O. Solar research and technology. In: Physics and the energy problem - 1974. Edited by M.D. Fiske and W.W. Havens, Jr. American Institute of Physics Conference Proceedings No. 19, New York, A.I.P., 1974, p. 379-400.

3, 4

Wind energy conversion is included in the author's description of the Federal role in solar energy research and technology for terrestrial applications, the solar energy technologies and plans in the National Solar Energy Program, and the research and technology problems that must be solved before practical systems become possible.

112. Hewson, E.W. Wind power potential in selected areas of Oregon. Oregon State University, Report No. PUD 74-2A, August 1974. Second Progress Report (Part I). Corvallis, Oregon, Oregon State University, 1974. 84 p.

6

The research conducted during the second year of the project has been a continuation of that of the first year, along with the development of a new center of activity. The collection and analysis of wind data from various sources, including the wind instruments established in the course of the present research project, has proceeded and a number of conclusions have been drawn from the data analysis. Substantial progress has been made in the wind tunnel simulations of wind flow patterns over a model of a coastal headland. A limited program of pilot balloon observations has been continued in the gorge section of the Columbia River Valley to gain more conclusive information on the severity of atmospheric turbulence in that portion of the valley. The work done in these areas is described in this portion of the report, Part I. The new focus of activity is in the analysis of the structural components of aerogenerators. This program is described in Part II of the Second Progress Report, by R.W. Thresher.

113. Hicks, N. Energy crisis impels many to study and erect windmills as power source. New York Times, May 20, 1974, p. 33.
6, 8

Wind energy is certainly not being considered as the answer to America's voracious energy needs. But for efficiency and economy it is being investigated as one of several alternative sources in what most experts believe will be a needed energy mix to light homes for the next few decades. NSF and NASA are spending $865,000 in the next two years to test an experimental 100 kw wind generator at the Lewis Research Center in Sandusky, Ohio.

114. Hiss, W.L. and J.W. Shomaker. Energy Crisis Symposium, Albuquerque, N.M., May 3, 1973. Socorro, N.M., New Mexico Bureau of Mines and Mineral Resources, 1974.
3

115. Honnef, H. Wind power turbogenerator for high altitude wind utilization. Final Report, October 1970 - September 1973. Translation of German Patent 855,284. NASA-TT-F-15455. NTIS, N74-21677, April 1974. 12 p.
17

116. Honnef, H. Wind electric power station. Final report, October 1970 - September 1973. Translation of German Patent 871,580. NASA-TT-F-15522. NTIS, N74-21682, April 1974. 14 p.
17

117. How to cut fat out of the home energy budget. Am. Gas Assoc. Monthly 56(9): 16-20, September 1974.
4

Four ways of reducing the amount of energy used to heat the average American home are: (1) lessen the amount of heat required by lowering the temperature 6°F. The fuel bill can be cut about 20%; (2) keep the heating plant working at top efficiency; (3) retain heat in the house as much as possible through improved insulation; and (4) reduce the amount of cold outside air that enters and must be heated through better caulking and weatherstripping around doors and windows. By decreasing the amount of hot water used and by improving insulation on hot water pipes, the energy bill can also be substantially cut. Alternative sources of energy are also discussed.

118. Hughes, W.L., et al. Basic information on the economic generation of energy in commercial quantities from wind. Stillwater, Oklahoma, Oklahoma State University, College of Engineering, May 1974. 50 p.
6, 7

If conventional fuels become less available or available at prices comparable to oil at $8.00 to $10.00 a barrel or higher, wind power is expected to become economically competitive for certain applications. Energy from wind can probably be harnessed through simple systems at acceptable capital costs. Wind is not considered the solution to the energy crisis. Because of the intermittency of wind availability, and, therefore, the need for huge storage systems, wind will not replace conventional central power stations. However, electric power from wind could be pumped directly into existing electric transmission line grids. Wind as a fuel supplement for electric utilities is thought to be both economically and technically feasible in the short term. Rather than concentrating on one or two energy sources, a broad energy research policy, which includes wind and solar energy, is recommended. A bibliography of energy research at Oklahoma State University as well as resumes and recent publications of five staff members are included in this document.

119. Hull, A. and L. Pitt. New NOAA Laboratory for Environmental Assessment. Env. Data Serv., May 1974, p. 8-10.

4

Specific objectives of the new NOAA Laboratory for Environmental Assessment are to (1) model the environmental impact on: grain production in major crop regions of the world; energy distribution/demand for electric power, natural gas, fuel oil, and other conventional energy sources; production/yield of fish in oceans and coastal waters; energy production from solar radiation, tides, winds, and geothermal sources; (2) systematically assess large scale climate/weather changes and interpret their impact on energy demand, major grain-producing areas, and fish production; (3) develop new applications of historical data bases to environmental problems; and (4) utilize climatic assessments in the planning and siting of refineries, nuclear and other power and industrial plants to help reduce man-caused accidents.

120. The hydrogen economy--state of the art. Presented at 9th World Energy Conference, Detroit, September 22-27, 1974, p. 5.1-18.

3, 4

The present state of the art of the hydrogen economy is presented. The majority of references are taken from presentations of the Hydrogen Economy Miami Energy Conference held at Miami Beach in March 18-20, 1974. The conference provided a forum for discussions of all aspects of hydrogen technology, which could offer the world an alternative to the fossil fuel economy. Much work is necessary before a fully implemented hydrogen economy is economically and technically feasible. The basic assumption is that the environmental and societal benefits of implementing a full hydrogen economy will be worth the time and effort, and the certain amount of risk involved. Utilization of hydrogen energy in transportation (automotive and aviation), as an appliance fuel, in electrical energy systems, and in other capacities is discussed.

121. International Solar Energy Society. U.S. Section Annual Meeting, August 20-23, 1974, Fort Collins, Colorado. Technical Program and Abstracts. Fort Collins, International Solar Energy Society, 1974.
3, 4

122. Jensen, N.O. Wind power. In: Physics Department Annual Progress Report, 1 January - 31 December 1974. Moeller, H.B. and B. Lebech, eds. Risoe, Denmark, Danish Atomic Energy Commission. Research Establishment, December 1974. NTIS, RISO-320, 1974, p. 82-83.
4

123. Johansson, M. Exploiting wind power for the production of electricity. Translation from the Danish Report TR-152, date unknown. Translation: Kanner Associates, Redwood City, Cal. NTIS, N75-13385, December 1974. 55 p.
6

The economic, energy-economic, and environmental issues involved in any prospective exploitation of wind power intended to cover a minor part (10%) of Denmark's consumption of electricity are discussed. The chief basis for the calculations involved is the 200 kW experimental windmill built at Gedser in 1956-57, which ceased to produce electricity in 1967. However, in exploring the ramifications of making Denmark partially dependent on wind energy power, estimates are made on the basis of projected larger series of mills of the Gedser type. Windmill projects abroad, such as Vattenfall, NSF and NASA, are also discussed, as is Denmark's dependence on power from Sweden and Germany.

124. Johnson, C.C., R.T. Smith and R.K. Swanson. Wind power development and applications. Power Eng. 78(10): 50-53, October 1974.
4, 6

125. Johnson, K.E. Non-conventional systems. Chem. Can. 26(10): 31-33, November 1974.
4

MHD, electrohydrodynamic power generation, piezoelectric generators, ferroelectric generators, thermoelectric generators, fuel cells, wind energy, and geothermal energy are discussed. In Canada, wind energy, fuel cells, and thermoelectric power generation could be researched and developed usefully in the next few years.

1974

126. Jufer, M. The NOAH wind energy plant on Sylt: design, experience, prospects. Seminar Windenergie, Julich, Germany, 12 September 1974. Julich, Germany, Kernforschungsanlage, 1974, p. 27-51. (In German)
3, 6, 7

A detailed account is given, followed by a discussion, of the NOAH wind energy generator project, the 70 kW generator of which was installed on the North Sea Island of Sylt in 1973. Particular attention has been paid in this project, to the study of economic as well as engineering aspects of large-scale wind energy generation.

127. Keller, M.A. Windmill power to the people! Parents Mag. 49: 30-31, 52, December 1974.
4, 8

Henry Clew's wind-powered home is described.

128. Larsen, J. Alternate energy pipe dreams. New York Times 2(7): 30-35, April 5, 1974.
4

Alternate energy sources--windmills, solar battery stations, even barnyard droppings--are a long way from breaking the fossil fuel lock on energy and closing the widening gap between U.S. reserves and needs. While every effort should be made to develop these energy sources to new levels of productivity, billions of dollars will have to be spent in R&D and capital expenses before alternate energies can begin to make a significant contribution.

129. Lean, B. Flywheels. Pasadena, Cal. California Institute of Technology, January 8, 1974. 13 p.
5

130. Lerza, C., et al. How to kick the fossil fuel habit. Env. Action 5(18): 3-11, February 2, 1974.
4

Alternative energy sources to fossil fuels are discussed. The technological potential, economic feasibility, and environmental aspects of solar, wind, geothermal, tidal, thermal sea, fission, fusion, and organic energies are explained in simple language. Pursuit of shale oil and production of synthetic natural gas are also described.

131. Lindsley, E.F. Wind power: how new technology is harnessing an age-old energy source. Pop. Sci. 205(1): 54-9, July 1974.
4, 6

The largest and most costly wind power project to date is NASA/NSF's Mod-Zero 125 foot diameter windmill which is expected to produce 100 kw. A preliminary schematic is shown. The project is in the basic systems analysis phase, where various configurations are first run through a computer to see how they'll perform. Earlier wind power projects started first with the mechanics--and were doomed to failure. The systems approach put men on the moon; it could put the wind to work, too.

132. Love, S. The overconnected society. Futurist 8(6): 293-295, December 1974.

4

Society today is so overconnected that a disturbance in any are may threaten the whole system. To regain stability, people should seek to disconnect themselves--at least to some degree--from the world's heavily centralized systems. The clues to dynamic stability in natural ecosystems are explained. Future communities built around solar and wind power, and complexes of city rooftop food production are described.

133. McKee, J. Rewinding alternators. Alt. Sources Energy, No. 16, 22, December 1974.

12a

The author's experiments adapting an automobile alternator for wind generator use are discussed.

134. MacKillop, A. Low energy area systems. Ecologist 4(8): 298-300, October 1974.

4

The concept of decentralized energy systems is explained. National-scale grids, especially for supplying high-grade electricity, will become more and more difficult to maintain on economic ground. Domestic and local-area scale methods for servicing energy needs will become more important. Greatest use of new energy sources with least environmental damage calls for decentralized supply systems. Wind energy systems are briefly discussed.

135. McNerney, N.C. and T.F.P. Sullivan, eds. Energy reference handbook. Washington, D.C., Government Institutes Inc., 1974. 280 p.

2, 4

136. Magoveny, G.S. and E.J. Forgo. U.S. Patent 3,938,907. June 24, 1974.

9, 17

A horizontal multidirectional windmill is described which comprises a fixed housing and a rotor, the housing being constituted by upper and lower horizontally disposed members and a plurality of vertically disposed vanes extending between the members. The rotor is constituted by upper and lower horizontally disposed members lying in the planes of the housing members. A vertical axle is secured to the rotor members. A vertical axle is secured to the rotor members. Buckets are mounted between the rotor members and extend inwardly from the periphery thereof. Each bucket has a flexible vertically disposed surface portion and supports for the inner and outer edges of the portions. The distance between the supports is varied automatically as a function of rotational speed of the rotor.

137. Maitre, J., J. Girard and R. Plantadis. Les Sources d'energie autonomes dans les telecommunications. [Autonomous power sources in telecommunications.] Commutation Electron 44: 85-96, January 1974. (In French)

8, 15

This paper describes two autonomous power sources directly supplied by nature, i.e., light and wind, which may be utilized for telecommunication systems. It is not the purpose of the article to discuss thoroughly the principles used, for this may be easily found elsewhere; it only explains what can be now expected from the utilization of these power sources.

138. Marine, G. Alternate energy: here comes the sun. Ramparts 12(8): 33-37, March 1974.

6, 8

Throughout the energy crisis, public discussion is being conducted as though energy must come from some large central source. Yet it may be just as efficient and far cheaper for an apartment building or a small group of homes to provide its own energy through a combination of simple methods. In a small town with an imaginative citizenry such power would be easy to produce. Solar, tidal, wind, and human waste energy systems are described.

139. Marshall, O.W., R.T. Morash and R.J. Barber. Independent energy systems for better efficiency. Intersociety Energy Conversion Engineering Conference, 9th, San Francisco, 1974. New York, American Society of Mechanical Engineers, 1974.

3, 4

140. Martin, J. Energy from the wind, tomorrow? Ing. Tech. 291: 25-32, December 1974. (In French)

6, 11

This is a descriptive article about the use of, and possible use of windmills as prime movers in electrical power generation. The total amount of wind energy available has been put at about 2.5×10^{15} kWh per annum over all the world. In France it represents an average of 800 kWh/m^2 of exposed surface and per annum, but can reach 4000 kW/m^2 per annum in some regions such as the Breton or Roussillon coasts. Numerous types of windmills are described with the aid of diagrams and notes on their characteristics. Reference is made to electricity storage, e.g., in secondary batteries and other chemical means, thermal storage, etc.

141. May, T.H. and W.R. Kube. Review of alternate energy sources. University of North Dakota, Engineering Experiment Station. NP-20606. Grand Forks, N.D., 1974. 127 p.

4

142. Meador, R. Future energies. Ann Arbor, Mich., Ann Arbor Science Publ., 1974. 63 p.

2, 4

When fossil and atomic fission fuels are gone, when shortages become permanent, what then? Future energies, including wind, are discussed.

143. Merriam, M.F. Wind energy for human needs. Lawrence Berkeley Lab., California University. NTIS, UCID-3724, November 1974. 100 p.

1, 6

A review of the history of wind utilization is presented. Wind machines that are in use or have been considered are categorized as small when the power output is up to 2 kW; medium, up to 100 kW; and large, when output is over 100 kW. The largest wind machine that ever operated was the 1250-kW Smith-Putnam wind turbine; the largest factory-produced machine today is a 6-kW model. A 100-kW test unit is being erected near Sandusky, Ohio by NASA to be operational in 1975. Environmental and engineering aspects, application areas, and geographical regions of greatest promise are discussed. To fully utilize the intermittent wind energy, an interruptible load, an energy storage system, or a standby source able to respond on demand is required. Examples of these alternatives are: interruptible load (pumping water for livestock or irrigation, driving refrigeration compressor for large-thermal-capacity cold-storage plant); energy-storage system of electrochemical storage batteries, flywheels, or pumping water for later generation of electric power through a hydraulic turbine; or a standby source of hydroelectric power dam, diesel generator, gas or steam turbine. Using wind-generated electricity to electrolyze hydrogen is interruptible load if the hydrogen is used for cooking fuel; it is an energy storage system if the hydrogen is stored to be reconverted to electricity with a fuel cell or an engine generator set. A 5-kW wind-hydro scheme is analyzed for Amarillo, Texas in Appendix A. It is concluded that the system is expensive and cumbersome, requires a large reservoir and a lot of equipment for providing only a small amount of firm power, but provides reliable electric power with zero fuel consumption and minimal maintenance.

144. Metz, W., et al. How to kick the fossil fuel habit. Environ. Action 5(1): 3-11, February 2, 1974.

4, 6

145. Meyer, J.W., W.J. Jones and M.M. Kessler. Energy supply, demand/need and the gaps between. Volume II. Monograph, Working Papers and Appendix Papers. Final Report. NTIS, PB243977, December 1, 1974. 300 p.

4, 6

This report contains a number of working papers and monographs written in non-scientific language for the general public describing the state-of-the-art and possibilities of several alternatives, including wind, for helping in the near- and long-term energy crisis.

146. Morse, F.H. Solar energy as a national energy resource. Presented at the 9th World Energy Conference, Detroit, September 22-27, 1974, p. 3.1-11.

3, 4

The U.S. Solar Energy Panel assessed the potential of solar energy as a national energy resource and found three areas where solar energy could supply significant amounts of the U.S. future energy needs: energy for heating and cooling of buildings, production of fuels, and generation of electrical power. With adequate R&D support, by the year 2020 solar energy could provide at least 35% of the heating and cooling of future buildings, greater than 30% of the methane and hydrogen needed in the U.S., and greater than 20% of the electrical power needs of the U.S. All of this could be done with minimal effect on the environment and substantial savings of nonrenewable fuels. Various solar energy applications are described, and the goals, objectives, and status of the R&D programs for each of these applications is summarized.

147. The Mother Earth News handbook of homemade power. By the Staff of the Mother Earth News. New York, Bantam Books, 1974. 374 p.

2, 4, 8, 12a

This book is packed with information about alternative energy systems, including windpower, which you can put to work right now. Emphasis is on homebuilt small scale systems. Six articles on windpower are included.

148. NSF/NASA Utility Wind Energy Conference, December 17, 1974, Cleveland, Ohio. CONF-741242, 1974.

3, 4

The charts, graphs, data tables, illustrations, and photographs used in the 5 papers on wind turbine generator development programs are presented.

149. Nelson, V. and E. Gilmore. Potential for wind generated power in Texas. Final Report. Prepared in cooperation with Amarillo College Department of Physical Science and West Texas State University. NTIS, PB243349, October 15, 1974. 168 p.

6

General information on wind energy and a summary of current information on wind energy conversion systems are presented. The data from 15 National Weather Services staitons in Texas (1959-1972) and 7 neighboring stations (1964-1973) are analyzed for average energy by month and year, wind speed histograms, wind velocity and power duration curves, and probability of calm periods. Contour maps for energy at 23 ft height and 300 ft (estimated) and probability contours for wind speeds are plotted. Estimations of power possible uses and number of units to be built, estimations of costs, and storage are discussed for wind energy conversion systems. The overall conclusion is that the state should support a program to advance the utilization of wind energy. Recommendations are made for policies, procedures, specific research, and a proof of concept experiment.

150. New look for windmills. Sci. Dig. 75(6): 71, June 1974.

4

The Princeton sailwing windmill is discussed.

151. Other technical concepts are exciting but their roads to power are long. Coal Age 79(4): 106-110, April 1974.

6

Space heating, followed by solar-derived electricity, will be the first widespread use of solar energy. Solar climate control technology, solar generation of electricity, and photovoltaic conversion are described. The concept of MHD is of obvious interest because it has potential to boost thermal efficiency of fossil-fueled power plants by as much as 50% over their best present performances. MHD, which bypasses the need to transform fuel first into mechanical energy for driving turbines, is briefly explained. The Federal government has a small but definite commitment to wind research; NASA is now testing a twin-bladed unit and a large wind machine is being examined at the Lewis Research Center near Cleveland. Unfortunately, governmental expenditures are too low to yield enough information on wind power. Solid waste energy--attractive even though it probably will not account for more than 2% of the nations total energy generation--is a clean, environmentally sound method for urban waste disposal. Synthetic fuel and direct use of waste are briefly discussed.

152. Park, J. Hybrid windmills. Alt. Sources Energy, No. 16: 23, December 1974.

9, 12a

The author's experiments with windmills are described. A "Hybrid" is a vertical axis machine which makes use of aerodynamic lift to produce power.

153. Parr, H., et al. Alternative energy sources. VII. Report from the Norwegian Nature Conservancy Association, Prepared by the Associations's Energy Group. Oslo, Norges Naturvernforbund, 1974. (In Norwegian)

4, 6

154. Passi, R.M. Wind determination using Omega signals. J. Appl. Meteorol. 13: 934-939, December 1974.

6

This paper is from the Omega Windfinding Workshop, Boulder Colorado, September 18, 1974.

155. Pesko, C. Solar Directory. Ann Arbor, Michigan. Ann Arbor Science Publishers, 1974. 650 p.

2, 4

This book includes manufacturers of solar equipment; government agencies, academic institutions, industries, and individuals in solar energy research and development; descriptions of current solar projects; and an annotated bibliography of pertinent literature. Some wind power information is included.

156. Plumlee, R.H. Perspectives in U.S. energy resource development. Environ. Aff. 3(1): 1-45, 1974.

6

157. Powe, R.E., et al. Wind energy conversion system based on the tracked-vehicle airfoil concept. Intersociety Energy Conversion Engineering Conference, 9th, Proceedings, Paper 749010, p. 288-297, 1974.

3, 5

A unique momentum interchange device for extraction of energy from the wind is described in this paper. It is shown that the maximum possible energy extraction with this tracked-vehicle airfoil device is greater than that for a conventional windmill. A comprehensive mathematical model is developed for the device, and this model is programmed for solution on a digital computer. This program is written so that wind spectrum data for any geographic location can be used to determine the monthly energy output for that location. Results from this program indicate that this device could make significant contributions to electrical power requirements.

158. Power from windmills; questions and answers. Electr. Constr. & Maint. 73: 109+, October 1974.

4

159. Program solicitation: research on wind energy conversion systems. Division of Advanced Energy and Research and Technology, National Science Foundation, Washington, D.C. NTIS, NP-20408, July 17, 1974. 15 p.

6

The Research Applications Directorate of the National Science Foundation intends to provide approximately $3,000,000 for research on advanced systems, subsystems and associated problem areas related to advancing the capability of extracting useful energy from the wind. Proposals are being sought in six categories: wind energy mission analysis; applications of wind energy systems; wind characteristics; subsystems and components research and technology; advanced or innovative system concepts; and advanced farm and rural use systems. Information on research categories and requirements for submitting proposals are described.

160. Project Independence Blueprint, Final Task Force Report. Solar Energy. Prepared by Interagency Task Force on Solar Energy under direction of National Science Foundation. U.S. Gov. Printing Office, November 1974. 582 p.

4, 6

Section IV is an 81-page report of the WECS - Wind Energy Conversion Systems - program of Project Independence.

161. Prototype wind generator uses semi-rigid airfoil. Avaiation Week & Space Technol. 100(13): 41, April 1, 1974.

5, 12b

Grumman Aerospace Corporation's new small wind generator, Sailwing, is described. The complete system, weighing only 300 lbs., will sell for as little as $3,500 to $4000. The generator should be on the market by January 1, 1975. The Sailwing airfoil was developed from a high-performance light aircraft wing.

162. Quigg, P.W. Eggbeater windmills. Sat. Rev. World 1: 37-8, June 15, 1974.
4, 9

Vertical axis windmills are discussed.

163. Ramakumar, R. Prospects for tapping solar energy on a large scale. Solar Energy 16(2): 107-115, October 1974.
6

Because of the energy conversion and storage research under way at Oklahoma State University since 1961, several components needed to engineer a continuous-duty energy system operating on replenishable solar energy have been developed to the prototype stage and are being tested. These components are presented and discussed, and how they fit into the solar energy system envisioned for the long-term and immediate future is considered. A simplified economic analysis of solar systems is presented, and the calculated generation costs are compared with those of conventional fuel burning systems for difference fuel costs, load factors, and interest rates. One result of the study is that wind energy systems are found to be competitive with conventional systems.

164. Ramakumar, R., H.J. Allison and W.L. Hughes. Solar energy conversion and storage systems for the future. Energy Sources Conference, Anaheim, Cal., 1974. Proceedings. New York, IEEE, 1974, p. 12-20.
3, 6, 11

The possible utilization of solar energy in its various manifestations such as heat, winds, tides, and ocean thermal gradients is reviewed. Methods of solar energy collection, conversion and utilization are examined, along with the solar energy potential. Special attention is given to various systems for meeting the needs of solar energy storage. The systems considered include: (1) thermal energy storage using hot water or hot rocks; (2) potential energy storage by pumping water to a higher elevation, by compressing air or springs; (3) chemical energy storage using hydorgen or secondary batteries; (4) kinetic energy storage as in flywheels; and (5) energy storage in electromagnetic fields using capacitors or superconducting magnets. It is argued that solar energy must play a significant role in solving the energy problem of the world.

165. Ramakumar, R., W.L. Hughes and H.J. Allison. Economic and technical aspects of wind generation systems. International Conference on Systems, Man and Cybernetics. Proceedings. Dallas, Texas, October 2-4, 1974, p. 88-92. New York, IEEE, 1974.
3, 6

Wind energy systems have the potential to provide a viable alternative to fossil fuels to satisfy the ever increasing energy appetite of the world. A simplified economic analysis of wind energy systems of the type being developed at Oklahoma State University is presented and the calculated generation costs in mils per kWh are compared with those of conventional fuel-burning systems for different fuel costs, load factors and interest rates. The results show that certain aspects of wind energy conversion can, at present, generate energy at costs competitive with conventional systems and that more favorable conditions can be expected in the future as fossil fuels become scarce and fuel costs further go up as predicted.

166. Red Rocker, W. Wind design feedback. Alt. Sources Energy, No. 16: 22-23, December 1974.

12a

The author's experiences in using a wind generator discussed in an earlier issue of A.S.E. are described. (A.S.E. #8, 1973)

167. Reed, J.W. Some notes on wind power climatology. Climatology Conference and Workshop, Asheville, N.C., October 8, 1974. SAND-74-5439. NTIS, CONF-741045-1, 1974. 14 p.

3, 6

The history and states of wind turbines and the meteorological considerations of the wind energy potential in New Mexico are analyzed.

168. Reed, J.W. Wind power climatology. Weatherwise 27(6): 236-242, December 1974.

6

Wind power maps that are primarily useful in determining where wind power projects could be most beneficial are included. Atlanta, Phoenix, or Los Angeles might not be competitive. Array fields in the Texas panhandle or Wyoming are remote from the major energy markets and close to supplies of competitive fossil fuels.

169. Rittelmann, P.R. Using solar energy in residential housing. Constr. Specifier 27(7) 20-25, 27, 29-32, July 1974.

8

The author describes a solar demonstration project house that shows the integration of mechanical systems with contemporary and functional architectural design--a design that responds to the severe energy conservation requirements of a solar system. Mechanical systems include a solar thermal collection system, a photovoltaic conservation system, a wind-driven electrical generation system, and an aerobic composter for organic wastes.

1974

170. Rodgers, W. Research & corruption--the Exxon-Nixxon axis. Nation 218(1): 11-16, January 5, 1974.

4

Taking place under cover of the energy panic is an incestuous merger of economic and political forces represented by the Exxon-Nixxon axis, beneath which remains of an open market are being interred. R&D in wind, solar, and geothermal energy have not been established because Nixon and industrial advisory councils have eliminated worthwhile proposals that failed to offer optimum opportunities to the oil industry.

171. Salieva, R.B. Generalizations of composite studies involving combined use of wind and solar energy. Appl. Solar Energy 10(5-6): 39-42, 1974.

6, 8

Sample calculations were made using the composite method for the situation of water supply to pastures and electrical power supply to radio relay stations; results of these calculations are presented. Wind and solar installations were assumed to operate simultaneously and to have a common electrical accumulator; this accumulator supplies power when neither of the installations is functioning. The advantages of combined utilization of wind-solar energy are demonstrated, particularly in the case of relatively small-scale consumers spread out over an extensive, transportationally rigorous terrain.

172. Salieva, R.B. Principles of a composite study involving combined use of solar and wind energy. Appl. Solar Energy 10(5-6): 35-38, 1974.

6

A theoretical comparison of the productivity of wind and solar power installations, as determined from variations in wind speed and solar radiation intensity, is given. The productivities are represented as regular stochastic processes. The complementary nature of the annual chronological variation patterns of wind and solar energy fluxes suggests combined use of these sources.

173. Savino, J.M. The U.S. wind power program. In: Energy resources and management, Zung, Z.T., ed. Rolla, Mo., University of Missouri-Rolla, 1974, p. 43-45.

4

174. Scala, S.M. and K. Sittel. Considerations regarding a utilization of solar energy. V.D.I. Ber. 224: 93-110, 1974. (In German)

6

The characteristic data regarding solar energy are considered, giving attention to solar radiation intensity at the boundary of the terrestrial atmosphere and at the surface of the earth. Questions of spectral distribution are examined along with aspects of radiation absorption, the latitude dependence of radiation, and temporal variations in radiation intensity. Systems for the utilization of solar energy are discussed, taking into account the current state of development of the available utilization methods and approaches for overcoming existing technical problems. Attention is given to the utilization of solar energy in buildings, the generation of electric power from solar energy, and the use of wind energy.

175. Schultz, W.C. Wind power plant. U.S. Patent 3,930,750. April 8, 1974.

9, 17

A power plant of the windmill type is described comprising: a supporting structure, a propeller unit mounted on the supporting structure for rotation about a vertical axis and including a hub, a plurality of vanes affixed to the hub, each of the vanes having a shell of a generally parabolic cross-section defining a leading edge with a symmetrical air foil configuration and further defining an open trailing edge, and a zig-zag shaped webbing member mounted within the shell to define a series of essentially triangular individual cells extending the length of the shell and exposed to the open trailing edge.

176. Seaborg, G. Finding a new approach to energetics--fast. Sat. Rev. World 2(7): 44-47, December 14, 1974.

4

The foundation of a coherent and realistic national energy policy must be based on equal doses of energy conservation and the development of additional sources. Large reductions in energy use are possible, as high as half of the current 4.5%/yr growth rate. The long-term outlook for solar, geothermal, fusion, and wind energy is good. In the short term, only coal and nuclear energy can make large contributions to domestic energy supplies. Eventually a recycle society, in which virtually all materials will be reused indefinitely, will be necessary.

177. Selected papers on energy research. Stillwater, Oklahoma, Oklahoma State University, 1974.

4

178. Shaheen, E.I. Is the energy crisis fabrication or miscalculation. Env. Sci. Technol. 8(4): 316-20, April 1974.

4

179. Shell platforms utilize wind and sun power. Pet. Eng. 46: 14, September 1974.

8, 15

180. Shell tests windmill generators offshore. Oil Gas J. 72(36): 92, September 9, 1974.

8, 15

Shell Oil Co. is studying installation of windmill generators on nearly 250 unmanned platforms in the Gulf of Mexico to save energy and operational costs. The generators provide power for fog horns and navigational lights. Details of existing trial units are presented.

181. Shoupp, W.E. Involving the oceans in solving energy problems. Marine Technol. Soc. J. 8(2): 18-24, February 1974.

6

182. Shumann, W.A. NASA spurs wind generator program. Aviation Week & Space Technol. 100(13): 41, April 1, 1974.

4, 14

NASA's Lewis Research Center will erect and operate a 100-kw wind turbine generator at its Plum Brook Station. The generator and NASA's plans for it are described.

183. Shupe, J.W. Natural energy systems for Hawaii--and the world. U.N. Non-Government Organization Conference, Nairobi, March 1974. 4 p.

3, 4, 6

The economy of Hawaii is particularly vulnerable to dislocations in the global energy market. This is a travesty, since there are few places in the world so generously endowed with natural energy: geothermal, solar radiation, ocean temperature differential, wind, waves, and ocean currents. Included in the bills recommended for passage in the 1974 state legislature is an act to establish the Hawaii Natural Energy Institute at the University of Hawaii. The Institute would communicate with research organizations throughout the world to hasten replacement of fossil fuel and nuclear fission power plants by nonpolluting renewable natural energy systems. Natural energy systems are briefly explained.

184. Smith, F.G.W. Power from the oceans. Sea Frontiers 20(2): 87-99, March-April 1974.

4

The solar energy cycle heating the ocean surface can be tapped through: wind; hydroelectric power from the water vapor in the form of rain; waves; and thermal ocean currents. Each of these power sources is described and illustrated with simplified drawings. The combination of these energy sources may provide the answer to the search for an unlimited source of clean energy. Geothermal energy is also briefly described.

185. Smith, G.E. Environmental outlines 13. The autonomous house. Dev. Forum. 2(5): 10, June 1974.

4

An autonomous house is largely independent of electricity, fossil fuel, food and sewage disposal. Such a project in the U.K. uses solar heat, batteries for electric storage, and aerobic and anaerobic decomposition for waste disposal. Energy collection, conservation, and storage; water collection and storage; and organic nutrient conservation are described.

186. Smith, R.T., et al. Wind energy utilization. Final report. National Science Foundation Grant GZ-2932, October 1974.

6

187. Snarbach, H.C. Wind powered rotating device. U.S. Patent 3,941,504. August 28, 1974.

17

An omni-directional windmill device is described which consists of a plurality of blades circumferentially symmetrically disposed with respect to each other. Each of the blades has a lower edge and upper edge. Each of the blades has a wind reaction surface being arcuate in transverse cross section and helically formed longitudinally from the lower to the upper edge.

188. Soderholm, L.H. Wind-electric power. ASAE Annual Meeting, 67th, Oklahoma State University, June 23-26, 1974, and Winter Meeting, Chicago, December 10-13, 1974. Paper 74-3503, March 1974. 12 p.

3, 6

Some basic theoretical and practical considerations for the use of wind power as an energy source are discussed. Estimates of available wind energy are given for Des Moines, Iowa from 1973 weather data. The effect of wind velocity measurement interval and transducer response speed on estimating wind power is also considered. Tables, curves, and plate illustrate use.

189. Solar energy and advanced concepts. Washington, D.C. USAEC. NTIS, TID-26752, November 11, 1974. 87 p.

4

The solar energy R and D for FY1975 is presented and an addendum is provided for additional information. The program scope and major components for solar energy, wind energy, and advanced concepts are described. A survey is given on on-going and planned activities for heating and cooling of buildings, solar thermal conversion, photovoltaic conversion, photochemical conversion, bioconversion, ocean thermal conversion, wind energy conversion, and advanced concepts. A summary of the budget breakdown by Agency for each activity is given. Additional data are provided on the R and D programs, with emphasis on the role of ERDA in the solar energy program.

190. Solar energy research and development. Joint Committee on Atomic Energy. Hearings. 93d Congress, 2d Session, May 7-8, 1974. Hearing Transcript. 850 p.

4, 6

Hearings were held to consider two bills, S. 2819 and S. 3234, that would establish an office of solar energy research. The first bill introduced, S. 2819, would authorize a five-year $600 million program of solar energy research within AEC. The present status and prospects for solar energy utilization and technology by the government and industry in the U.S. and throughout the world are investigated. The second bill, S. 3234, would concentrate solar energy research within ERDA, if and when that office is established. Witnesses included: congressmen; officials from NASA, AEC, NBS, ANL, and NSF; and representatives from Sandia Labs., the General Electric Corp., the Ford Foundation Energy Policy Project, the Arthur D. Little Co., the Mitre Corp., and other private firms. Statements and studies by NSF, the Mitre Corp., UNESCO, NASA, NSF/NASA, and the Lawrence Livermore Lab. are transcribed.

191. Spaulding, J. Solar energy now. Sierra Club Bull. 59(5): 4-9, May 1974.

4, 6

The NSF's $13 million research program for solar energy has begun. Trials of solar heating in schools in Maryland, Massachusetts, Minnesota, and Virginia have started. RCA and NASA propose incorporating solar heating and cooling into buildings. Burgeoning government programs are the most obvious sign that the economic climate for solar energy is improving. Lack of codes, standards, practices, manufacturers, designers, and builders skilled in solar energy must be overcome before solar energy is used for heating on a large scale. Some solar energy techniques are explained.

192. Status report: Energy resources and technology. Atomic Industrial Forum, Inc., New York. 1974.

4, 6

193. A study of wind energy conversion for Oahu. Prepared by the Center for Engineering Research, University of Hawaii, for the City and County of Honolulu, October 15, 1974.

6

194. Szczelkun, S.A. Survival scrapbook #3 - Energy. N.Y., Schocken Books, 1974. 57 p.

2, 4

This is an idea book which ranges more widely than most, even getting into mental energy. No one topic is covered in much detail.

195. Texas energy resources, final draft. Texas Governor's Energy Advisory Council, Austin, Texas, 1974. 31 p.

4, 6

A summary of the energy resources including lignite, coal, geothermal energy, uranium ores, and petroleum and the potentiality of solar, solid waste, and wind energy is presented. It is indicated that Texas has about 146 billion barrels of oil-in-place. As of January 1, 1973, Texas had 94.9 trillion cu ft remaining reserve of natural gas that is being used faster than new finds are made. It is estimated that Texas has over 6 billion tons of bituminous coal resources and that there are about 20 billion tons of lignite within surface minable depths and over 100 billion tons of deep basin lignite resources. Three areas for potential geothermal resources are the Rio Grande Rift System, the Trans-Pecos Hot Rocks, and the Gulf Coast Geothermal Sands. The solid waste generation rates for agricultural and municipal-industrial sources are estimated. Generation of electrical energy from wind is of great potential in the Texas Panhandle. Texas qualifies as a potential area for the utilization of solar energy according to the isopleths of mean daily direct solar radiation. Texas has significant quantities of uranium, and more than six nuclear power plants are in the planning stage for the state.

196. Thomas, R.L. Utilization of solar energy to help meet our nation's energy needs. Energy Crisis Symposium, Albuquerque, N.M., May 3, 1973. Socorro, N.M., New Mexico Bureau of Mines and Mineral Resources, 1974.

3, 4

197. Thomas, R.L. Wind energy conversion. In: Energy, Environment, Productivity; Proceedings of the First Symposium on RANN: Research Applied to National Needs, Washington, D.C., November 18-20, 1973. Washington, D.C., G.P.O., 1974, p. 39-41. (See also entry 1973: 29)

3, 6

Wind generators are technically feasible as illustrated by the description of several moderate sized machines that have been built and tested in the past. Some reasons why wind machines have not been used more freely are listed, and possible solutions to the problems are advanced. Aspects of research programs aimed at wind power as an energy source are listed, and the part of the NSF Solar Energy Program aimed at wind conversion is discussed. The planned experiment to be carried out in Puerto Rico in 1975 as a part of the NSF program is described briefly. Some conclusions relevant to the use of wind energy as a source to help meet the energy needs are drawn.

198. Thresher, R.W. Structural aspects of wind machines. Oregon State University, Report No. PUD 74-2B, August 1974. Second Progress Report. (Part II) Corvallis, Oregon, Oregon State University, 1974. 42 p.

5

This report presents a collection of papers which consider the structural aspects of wind machines. Part I, on Wind Power potential in selected areas of Oregon, is listed under E. W. Hewson.

199. Thring, J.B. and G.E. Smith. Integrated power, water, waste, and nutrient system. Intersociety Energy Conversion Engineering Conference, 9th, Proceedings. New York, American Society of Mechanical Engineers, 1974.

3, 13

200. Transcript of third public hearing, Boston, Massachusetts, August 26-29, 1974. Appendix. FEA Project Independence Blueprint. 243 p.

4, 6

Testimony, definitions, and statements submitted for the record at a public hearing in Boston on project independence and its implications are presented. The meeting provided a forum for representatives of the public and private sector, consumer and environmental groups, the business community, and private citizens to express their views on energy alternatives. Subjects include: solar energy, air pollution control equipment, the nuclear power controversy, energy consumption, urban development patterns, U.S. energy independence, siting of offshore energy facilities, electric power generation in Vermont, oil allocation programs, energy conservation design guidelines for office buildings, conservation of utilities, and energy for New England.

201. Troll, J.H. Wind power conversion system. U.S. Patent No. 3,944,840. August 7, 1974.

5, 17

A wind to electric system is described which comprises a wind collecting structure having an entrance and exit opening, a means for varying the areas of the entrance and exit openings relative to one another, means for sensing the velocity of an incoming wind, means coupled to the sensing means for adjusting the ratio between the areas of the entrance and exit openings in accordance with the sensed velocity, and a wind-driven blade set disposed at the exit opening to receive the wind. A flywheel is coupled to the wind-driven blade set. A clutch for decoupling the flywheel and blade set is provided and an A.C. generator is coupled to the flywheel.

202. Twine, J. Synerjy, a directory of energy alternatives. N.Y., Synerjy, 1974.

2, 4

203. Utilities in the 80's: an overview. Power Eng. 58(6): 40-50, June 1974.

4, 6

204. Vargo, D.J. Wind energy developments in the 20th century. Annual Regulatory Information Systems Conference, 4th, St. Louis, September 10-12, 1974. 28 p.

3, 4, 6

Wind turbine systems for generating electrical power have been tested in many countries. Representative examples of turbines which have produced from 100 to 1250 kW are described. The advantages of wind energy consist of its being a nondepleting, nonpolluting, and free fuel source. Its disadvantages relate to the variability of wind and the high installation cost per kilowatt of capacity of wind turbines when compared to other methods of electric-power generation. High fuel costs and potential resource scarcity have led to a five-year joint NASA-NSF program to study wind energy. The program will study wind energy conversion and storage systems with respect to cost effectiveness, and will attempt to estimate national wind-energy potential and develop techniques for generator site selection. The studies concern a small-systems (50-250 kW) project, a megawatt-systems (500-3000 kW) project, supporting research and technology, and energy storage. Preliminary economic analyses indicate that wind-energy conversion can be competitive in high-average-wind areas.

205. Vermeulen, H. The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao. Translated from the Netherlands reports/TW-555 and GCV-R-128, date unknown. Translation: Kanner Associates, Redwood City, California. NTIS, N75-10587, October 1974. 64 p.

6

It is shown to be economically feasible to harness the wind for electricity supply in the Netherlands in terms of power and production costs. Different wind power plants are discussed in detail. An abridged account of a Danish proposal to harness wind power, and calculation of the efficiency Danish aeromotor are included. Comparisons are made with the power need situation in Curacao, and it is determined that a similar wind power conversion capability recommended for the Netherlands is feasible for the West Indies as well.

206. Vertical axis wind turbine assembly. Albuquerque, N.M., Sandia Labs., August 15, 1974.
5

Drawings are given for a vertical axis turbine designed to harness the wind to create electric power. Details of the alternator mount, air foil, and strut are included.

207. Villecco, M. Wind power. Archit. Plus 2(3): 64-77, May-June 1974.
5

Electric generation is a relatively new role for windmills. Wind turns a propeller attached to a shaft that rotates and, either directly or through a system of gears and couplings, spins the rotor of a power generator. The generator feeds electric current into a transmission line or storage unit for eventual consumption. Ideally, a windmill extracts 59.3% of an airstream's energy. This is the theoretical maximum, but modern devices generally obtain only 70% of that, with some exceptions. Windmills are expensive to build and their power yield, like the wind that fuels them, is often intermittent.

208. Von Arx, W.S. Energy: natural limits and abundances. Am. Geophys. Union EOS Trans. 55(9): 828-832, September 1974.
4

The power available from "natural" systems, including hydroelectricity, solar and geothermal energy, wind, thermal sea differentials, and photosynthesis, is evaluated. These power sources are discussed in terms of loops in the uses of materials, food, and energy. Energy management will not only present an engineering challenge in the future, but will also require fundamental readjustment of economic and political decision-making processes.

209. Von Arx, W.S. Energy: Natural limits and abundances. Oceanus 17: 2-12, Summer 1974.
4

The energy of the sunshine reaching the earth is some 1017 watts. The present power demand of world civilization is close to 1013 watts. The heat production from human use of power disturbs the solar-terrestrial heat balance by only 0.01%, seemingly a tolerable level. Were power production to be increased to 1014 (0.1% of the heat balance) or 1015 watts by adding heat to the solar-terrestrial balance, climate could be significantly altered. Wind energy, thermal sea power, hydroelectric power, photosynthesis, and solid waste energy from organic sewage are discussed as ways to produce more power without adversely influencing the earth's heat balance.

210. Voss, A., et al. Other primary energy resources. V.D.I. Ber. 224: 117-125, 1974. (In German)
6

Discussed is a way to use the temperature difference between the water at the surface of the sea and the water at a greater depth as a basis to supply power. It is pointed out that in general a utilization of the indicated energy resources will require the solution of problems related to the transportation of energy to the power consumer locations. It is concluded that the energy resources examined will in the near future not provide a solution to the current energy crisis.

211. Wade, G. Homegrown energy - power for the home and homestead. Willits, Cal., Oliver Press, 1974. 86 p.
2, 4

This is a directory to the hundreds of available products involved in the production of power from water, solar, wind, and steam.

212. Walters, S. Power from wind. Mech. Eng. 96(4): 55-65, April 1974.
4, 9

NASA's vertical-axis windmill at Langley Research Center is described.

213. Walton, J. Water-mills, windmills and horse-mills of South Africa. Cape Town and Johannesburg, C. Struik Publ., 1974. 224 p.
1, 2

This is the first comprehensive account of the hand-mills, water-mills, windmills and horse-mills of South Africa. Their history is traced from the mid-17th century to today. The author is well known for his pioneer studies in vernacular architecture of many countries in Africa, Europe, and the Far East.

214. Wellesley-Miller, S. Bio shelter. Archit. Plus 2(6): 90-93, November-December 1974.
4

Technological limitations have inhibited the realization of two energy saving housing schemes: enclosures built to maintain a stable interior microclimate without mechanical heating or cooling; and buildings designed to provide shelter from the weather, liquid and solid waste disposal, space heating and cooling, power for cooking and refrigeration, and electricity for communications, lighting, and household appliances.

215. Wendler, C. Conversion of wind energy to mechanical energy. U.S. Patent 3,957,397. December 30, 1974.
5, 17

An apparatus for converting wind motion to mechanical motion is described which consists of an endless track means defining an endless path, carriage means on the track means, and an omnidirectional windmill means carried by the carriage means. The windmill is connected to the traction wheel. An energy transducer is driven by movement of the carriage means about its endless path.

216. Williams, J.R. Solar energy technology and applications. Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc., 1974. 120 p.
2, 4

Chapter 14 is entitled "Power from the wind."

217. Wilson, R. and W.J. Jones. Energy, ecology, and the environment. New York, Academic Press, 1974. 353 p.
2, 4

218. Wilson, R.E. and P.B.S. Lissaman. Applied aerodynamics of wind power machines. NTIS, PB-238595, July 1974. 116 p.
5

Aerodynamics of various types of wind power machines and advantages and disadvantages of various schemes for obtaining power from the wind are reviewed. Simple, one-dimensional models for various power-producing machines are given along with their performance characteristics and presented as a function of their elementary aerodynamic and kinematic characteristics. Propeller-type wind-turbine theory is reviewed to level or strip theory, including both induced axial and tangential velocities.

219. Wind energy. In: World Energy Conference. Survey of energy resources. 1974. N.Y., United States National Committee of the World Energy Conference, 1974, p. 236-239.
3, 6

The historical and potential of wind power are discussed briefly.

220. Wind energy. Hearing before Subcommittee on Energy of Committee on Science and Astronautics. 93d Congress, 2d. Session, No. 49. May 21, 1974. Washington, G.P.O., 1974. 393 p.

6

Wind energy as a resource base was investigated in a Congressional hearing whose purpose was to ascertain the amount of power available from wind, the maximum amount recoverable, and the relationship between the maximum amount recoverable and the present capacity of U.S. electric power generating systems. Basic information on the economic factors associated with the generation of energy from wind in commercial quantities is provided. Such concerns as implementation costs, environmental impacts, land use and water requirements, visual and noise effects, social acceptability, and institutional constraints are also discussed, and several demonstration projects are proposed.

221. Wind energy studies started by NASA. Aviat. Week 101(23): 49, December 9, 1974.

4

222. Wind power. Public Interest Report, 1974. 2 p.

6

Self-renewing, nonpolluting, abundant wind energy is capable of producing harnessable power that could contribute significantly to future energy needs. The basic pursuit now is to design windmills that are efficient and that operate at low cost. Some advances toward harnessing wind energy are briefly discussed.

223. Wind power: how new technology is harnessing an age-old energy source. Pop. Sci. 205(1): 54-61, July 1974.

4, 6

The major stumbling block to wind power utilization is cost-producing a wind generator that does not cost more per kwh than a coal-steam or nuclear plant. Three trends are noted: single site, power production with battery storage (1-6 kw outputs); multimode commercial power combining electrolysis of water to make hydrogen and possibly fuel cells, or a turbine to convert back to electricity or mechanical power; and megawatt-size wind turbines feeding ac directly to the main power bus. Several systems are described.

224. Wolf, M. Solar energy utilization by physical methods. Science 184(4134): 382-386, April 19, 1974.

4

Wind power, ocean thermal gradient power, solar heat, and solar-to-electric power conversion are considered as means of solar energy utilization by physical methods. An evaluation is made of total solar energy delivery on the projected U.S. energy economy. It is estimated that the potential sales in photovoltaic arrays alone can exceed $400 million by 1980 to meet the projected capacity buildup.

225. Wolff, B. Wind energy bibliography. 2d ed. Wukwonago, Wisconsin, Windworks, 1974. 70 p.
2, 16

This extensive bibliography includes references on wind, windmills, aerodynamics, electrical, towers and storage.

226. Blake, S.R. Interim report to Karl J. Bea Associates. Brace Research Institute, November 1974.
6

An exploratory site analysis for a fifty foot diameter wind turbine system proposed for Saskatchewan by Ultramar Oil Company of the United Kingdom is described. The report provides access to the workings of the Department of Transport, Meteorological Branch-Environment Canada and the procedures for accessing wind data from them.

227. Blake, S.R. Site analyses for locating wind energy conversion systems. Unpublished Master's Thesis. University of Kansas, Lawrence, 1974.
6

228. Davidson, B. Sites for wind power installations. World Meteorological Organization. WMO Tech. Note No. 63, 1974.
6

This is a comprehensive overview of siting techniques and information, considering all aspects of siting. The paper is aimed at large installations and assumes that the availability of wind power is the major factor in determining the location of a wind power installation. He concludes that sites must be analyzed individually and that no rules of thumb with respect to topographic influences on wind or to wind profiles may be applied out of hand. This paper synthesizes the work of other research and field work and is not based solely on the author's research in the field.

229. Energy development. IEEE Power Engineering Society Papers. N.Y., IEEE, 1974. 104 p.
2

Sixteen papers review the energy options, including hydrogen, solar and wind power.

1973

50. Abrahamson, D. Energy technology: status and needs. Ambio 2(6): 186-195, 1973.

4, 6

51. Aiken, R. Solar and wind power as alternatives to fossil fuels. Sci. Forum 6(5): 7-11, October 1973.

4

52. Allen, R. Solar Heating and Cooling for Buildings Workshop, Washington, D.C., March 21-23, 1973. Proceedings. Part I. Technical sessions. NTIS, PB 223536, July 1973. 231 p.

3, 4

The Proceedings contain thirty-six technical papers on solar energy for U.S. building applications areas; namely, solar collectors, energy storage, domestic hot water heating, energy conservation and insolation, solar air-conditioning, and systems for solar heating and cooling. Some foreign activities are also reviewed. Each technical paper is a report on: Proposed research, on-going research, proposed systems, or operating systems. Questions and answers from the discussion periods are included, as in an agenda and list of attendees.

53. Allison, H.J. Electrical generator with a variable speed input: constant frequency output. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB 231341, December 1973, p. 115-120.

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54. Bergey, K.H. Wind power demonstration and siting problems. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB 231341, December 1973, p. 41-45.

3, 6, 15

Technical and economic feasibility studies on a small windmill to provide overnight charging for an electrically driven car are discussed. Optimization of a windmill/storage system requires detailed wind velocity information which permits rational siting of wind power system stations.

55. Bettignies, C. Wind energy - its utilization in isolated and arctic regions (1/4 to 100 kW). Northern Eng. 5(4): 13-17, Winter 1973-1974.

4, 6, 8

This article discusses the possible uses of small and medium sized modern wind power plants. Due to the remoteness of most sites in arctic regions, and the resultant high costs of fuels, modern aerogenerators can provide a viable non-polluting alternative to local power needs in the North.

56. Bettignies, C. Wind energy - its utilization in isolated regions of the Americas. Presented at an Inter-American Meeting organized by the American Association for the Advancement of Science and the Mexico National Council for Science and Technology. Science and Man in the Americas: Session on Non-Nuclear Energy for Development, Mexico City, June 20 - July 4, 1973.

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57. Champly, R. Wind motors: theory, construction, assembly and use in drawing water and generating electricity. Translation into English of book "Theorie, construction, montage, utilisation au puisage de l'eau a la production de l'electricite," Paris, Dunod Publ, 1973. 270 p. Translation: Kanner Associates, Redwood City, Cal. NTIS, N75-19821, April 1975. 253 p.

2, 5, 6

A brief history of windmills is given. Various models are described, with discussions of their pros and cons, especially in regard to number of blades and method of orientation to the wind. Systems for transmission of power from the wind motor to a pump, generator, or other type of equipment are described. A method for computing the tension and compression stresses on the wind motor pylon is given and the construction of pylons and water tanks is discussed. Foundation and anchoring systems are described, as are several methods for assembling and raising the wind motor on its pylon. Systems using wind motors to draw and elevate water by means of pumps and systems using wind motors in conjunction with generators, storage batteries, etc., to generate electricity are described. Efficiency tables and comparative cost price tables are provided for each of these applications.

58. Chang, H.H. Bucket rotor wind-driven generator. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB 231341, December 1973, p. 107-108.

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59. Clark, W. Interest in wind is picking up as fuels dwindle. Smithsonian 4(8): 70-77, November 1973.

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60. Clews, H.M. Wind power systems for individual applications. National Aeronautics and Space Adminstration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB 231341, December 1973, p. 165-169.

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61. DeKorne, J.B. The answer is blowin' in the wind. Mother Earth News, No. 24: 67-75, November 1973.
4, 12a

This is a good introduction to the technology and feasibility of home-built wind power generators.

62. Devlin, J.C. Engineers look again to wind as answer to ship fuel crisis. New York Times, April 22, 1973, section 1, page 52.
4, 15

West German engineers and the Federal Maritime Administration are working on replacing fuel-driven ships with wind-driven ships. This effort is a response to the growing fuel shortage and scientists' opinions that atomic energy is not the solution people had hoped it would be.

63. Divone, L.V. Wind energy technology. Am. Nucl. Soc. Trans. 21: 143, June 1973.
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64. Dodge, R. Economic considerations of utilizing small wind generators. National Aeronautics and Space Administration, Lewis Research Center, Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 170-174.
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65. Duffett, J.W. Energy crisis: revision in U.S. policy to preserve national security. Army War College, Carlisle Barracks, Pa. NTIS, AD778886, October 22, 1973.
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66. Eggers, A.J. Solar energy program. Subpanel Report IX used in preparing the AEC chairman's energy report to the President. Washington, D.C., National Science Foundation. NTIS, WASH-1281-9, November 13, 1973. 223 p.
4, 6

The goal of the Solar Energy Program is to develop and demonstrate economically competitive and environmentally acceptable solar energy systems at the earliest practical time. For each of the six subprograms, (1) heating and cooling of buildings, (2) solar-thermal conversion, (3) wind energy conversion, (4) ocean thermal conversion, (5) bioconversion, and (6) photovoltaic conversion, the objective is to develop proof-of-concept experiments and demonstration projects that will allow industry and user agencies to begin aggressive commercialization of each of these technologies, thus assuring its widespread application. Funding for the five-year program is distributed among the six subprograms to permit the earliest proof-of-concept experimentation to be carried out. This will allow program management to concentrate at an early date on those technologies that show the most promise toward providing the Nation's energy requirements. The objectives that will have been accomplished by 1979 in each of the six subprograms are specifically delineated. Each of the six subprograms is analyzed under the following headings: (1) subprogram summary, (2) status of technology, (3) rationale for federal involvement and institutional arrangements for implementation, (4) criteria and priorities, (5) alternative R and D programs, and (6) implementation. Finally, in an appendix, research project titles and submitting organization of the proposals considered by the panel are listed.

67. Energy research and development and space technology. Hearings before Subcommittee on Space Science and Applications and Subcommittee on Energy, House Committee on Science and Astronautics, 93d Congress, 1st Session, May 7-24, 1973. Washington, G.P.O., 1973. 570 p.
4, 6

68. Federal Power Commission. Staff Report on Wind Power. Annual Report, January - December 1973. NTIS, PB231955, September 1973. 13 p.
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69. George, D.W. Alternative energy sources: a research challenge. Sydney University, Sydney, Australia. NTIS, CONF-730560-1, 1973. 21 p.
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This is a paper from the Symposium on the Energy Crisis: Implications for Secondary Industry. Sydney, Australia, May 23, 1973.

70. Green, R., et al. Energy. Presented at NSF RANN Symposium, Wash., November 18-20, 1973, p. 3-59.
3, 4, 6

There is an urgent need of strengthened innovation and imagination in the search for alternative resources to meet U.S. energy requirements, and to conserve its existing non-renewable resources. Research concerning energy systems, conservation programs, energy under the oceans, improved techniques for gasifying coal, and energy conversion and storage technology is reported. Also presented is research concerning energy transmission systems, geothermal and solar energy, wind energy conversion, and solar heating and cooling of buildings. Economic factors and problems of commercialization are considered.

71. Herwig, L.O. Current research and development in solar energy applications. New Resources from the Sun. Proceedings of the 34th Annual Conference, Washington, D.C. November 1-2, 1973. New York, Chemurgic Council, 1973, p. 1-17
3, 4

Wind energy conversion is discussed along with other solar energy applications.

72. Herwig, L.O. U.S. solar energy research program. Presented at International Solar Energy Society Meeting, October 3, 1973. 65 p.
3, 4

NSF has been designated as the lead federal agency in coordinating solar energy research and technology. Elements of NSF's solar energy program, objectives and plans, and special issues that may provide increased understanding of the operation of the federal program are viewed. NSF program grants and objectives for solar energy R&D are listed.

73. Hewson, E.W. Wind power research at Oregon State University. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 53-61.
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74. Hughes, W.L. Energy storage using high-pressure electrolysis and methods for reconversion. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 123-136.
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75. Hütter, U. Past developments of large wind generators in Europe. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 19-22.
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76. Johnson, D.E. Environmental energy sources: their use and storage. Energy, environment, and engineering. Stillwater, Oklahoma, Oklahoma State University, 1973, p. 6.1-6.17.
3, 4

This selection is from the Proceedings on Frontiers of Power Technology in Stillwater, Oklahoma, October 10, 1973.

77. Lawand, T.A. Review of the windpower activities at the Brace Research Institute. National Aeronautics and Space Adminsitration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 159-164.
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78. McCaull, J. Oil drum technology. Environment 15(7): 13-15, September 1973.
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Ways to use inexpensive technology without massive social and environmental disruption are under study at the Brace Research Institute of McGill University, Canada. Projects are intended for arid sections of the world, where solar energy can be utilized by relatively simple devices.

79. Nelson, V. and E. Gilmore. Need for a national wind survey. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 33-40.
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80. Noel, J.M. French wind generator systems. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 186-196.
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81. Oman, R.A. and K.M. Foreman. Advantages of the diffuser-augmented wind turbine. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 103-106.
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82. Ormiston, R.A. Rotor dynamic considerations for large wind power generator systems. National Aeronautics and Space Administration, Lewis Research Center. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 80-88.
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83. O'Rourke, J.J. Clean energy--how soon. Let's Live 41(12): 51-57, December 1973.
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Clean energy from the sun, wind, sea, and inner earth is available if money is provided for necessary R&D. Nuclear energy should account for 21% of the nation's total power by 1980. Hydrogen fuels and laser beams can provide electrical energy for the same price as crude oil. Solar energy devices, by utilizing 14% of the nation's desert area, could meet energy needs until the year 2000.

84. Pings, W.B. Energy crisis and coal gasification. Colo. Sch. Mines Miner. Ind. Bull. 16(4): 1-20, July 1973.
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85. The Plowboy interview; Marcellus Jacobs. Mother Earth News, No. 24: 52-58, November 1973.
4, 12a

A wind power pioneer-manufacturer discusses his career, and windplants and what he sees in the future for wind power.

86. Rabenhorst, D.W. Superflywheel energy storage system. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 137-146.
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87. Ray, D.L. The Nation's energy future. Report to Richard M. Nixon, President of the United States of America. December 1, 1973. Washington, D.C., G.P.O., 1973. 171 p.
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88. Reitan, D.K. Wind-powered asynchronous AC/DC/AC converter system. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 109-114.
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89. Rittleman, R. Solar demonstration residence. Proceedings of the solar heating and cooling for buildings workshop, Washington, D.C. NTIS, PB223536, March 21, 1973, p. 171-9.
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90. Sabin, R.J. Survey of non-polluting energy sources. Las Cruces, N.M., New Mexico State University, 1973.
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91. Sbarra, N.H. Historia de las aguadas y el molino. Buenos Aires, Argentina, Editorial Universitaria de Buenos Aires, 1973. (In Spanish)
1, 2

92. Schumacher, E.F. Western Europe's energy crisis: a problem of life styles. Ambio 2(6): 228-232, 1973.
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93. Schwartz, H.J. Batteries for storage of wind-generated energy. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 146-151.
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94. Seaborg, G.T., J.L. Bloom and E.L. Nelson. Nuclear and other energy. N.Y. Acad. Sci. Ann. 216: 79-88, 1973.

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Fossil fuels now supply over 95 percent of the U.S. commercial energy, and, even with a maximum effort to develop alternatives, the bulk of our cumulative requirements between now and the end of the century will have to be met from oil, gas, and coal resources. Nuclear, geothermal, and most other alternative forms of energy are restricted to a few specific uses, such as the generation of electricity. Consequently, fossil fuels cannot be replaced in many uses even after we have developed practical technologies to produce energy from other sources.

95. Section 4 - Wind energy conversion. In: Solar Energy Program. Subpanel Report IX. Solar and other Energy Sources. Eggers, A.J., Chairman. Washington, National Science Foundation, November 13, 1973. NTIS, WASH-1281-9, 1973, p. 4-1 - 4-25.

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Progress of the subprogram on wind energy conversion is discussed, including research and other objectives of the program.

96. Sherman, M.M. Sail wind windmill and its adaptation for use in rural India. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 75-80.

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97. A short update on Henry Clew's miraculous wind-powered homestead (and brand new business). Mother Earth News, No. 24: 82, November 1973.

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H. Clew's 50 acre farm is run on power from a 2,000 watt, 120 volt Quirk windplant from Australia. (See entry 1972:2)

98. Smith, G. The economics of solar collectors, heat pumps and wind generators. University of Cambridge, Department of Agriculture. Working Paper 3, April 1973.

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99. Solar energy proof of concept experiments. Final report. McLean, Va., Mitre Corp. NTIS, PB231143, December 1973. 106 p.

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Critical experiments to prove the technical feasibility and socioeconomic desirability of specific applications or techniques for the widespread utilization of solar energy are

described. The following experimental areas are covered: heating and cooling of buildings, process heat, solar-thermal-electric energy, photovoltaics, ocean thermal power, wind energy, organic materials, and common applications. Each experiment is described, and costs for two levels of funding are estimated: a moderate risk "minimum program," and a low risk, "accelerated program."

100. South, P. and R.S. Rangi. The performance and economics of the vertical axis wind turbine. National Research Council of Canada, October 1973. 20 p.
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101. Stodhart, A.H. Wind data for wind driven plant. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 62-63.
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102. Summers, C.M. Ultimate energy, the ultimate fuel, and the hydrogen link in the electrical energy system. In: Energy, environment, and engineering. Stillwater, Oklahoma, Oklahoma State University, 1973, p. 5.1-5.19.
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103. Sweeney, T.E. The Princeton windmill program. Princeton University Department of Aerospace and Mechanical Sciences. AMS Report No. 1093, March 1973.
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104. Systems analysis of solar energy programs. NSF RANN Report NSF-RA-N-73-111A. December 1973. 328 p.
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Seven major solar energy applications are analyzed according to the costs and benefits expected to accrue from their implementation. Three applications--heating and cooling of buildings, wind energy systems, and utilization of organic materials--appear most capable of achieving commercial application within a few years. The other four-process heat, solar thermal systems, photovoltaics, and ocean thermal gradient systems-need continued federal support with different funding levels and extending in varying lengths of time beyond the initial NSF five-year program for solar energy systems.

105. Systems analysis of solar energy programs. Appendix. Research tasks. Final report. McLean, Va., Mitre Corp. NTIS, PB231145, December 1973. 150 p.
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106. Szczelkun, S.A. Energy. Survival Scrapbook #3. New York, Shocken Books, 1973. 112 p.

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This book includes a collection of basic ways to make solar, wind, tidal, bio-gas and animal power, including how-to-do-it, illustrations, a good windmill construction section and more.

107. Szego, G.C. Energy storage by compressed air. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 152-158.

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108. Tompkin, J. Introduction to Voight's wind power plant. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 23-26.

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109. Tompkin, J. Voight variable speed drive. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 121-122.

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110. Van Sant, J.H. Wind utilization in remote regions: an economic study. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 174-176.

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111. Vance, W. Vertical axis wind rotors, status and potential. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 96-102.

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112. Wentink, T. Surface wind characteristics of some Aleutian Islands. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 46-52.

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113. Wentink, T. Wind pov r for Alaska? Northern Eng. 5(4): 8-12, Winter 1973-1974.

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The utility of the wind in Alaska is unquestionable. Windmills are the result of an old and high developed technology, and

Alaskan winds permit the exploitation of this technology over wide areas.

114. Wiesner, W. Effect of aerodynamic parameters on power output of windmills. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 89-95.
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115. Wilson, R.E. Oregon State University wind studies. National Aeronautics and Space Administration, Lewis Research Center. Savino, J.M., ed. Wind energy conversion systems, workshop proceedings. NTIS, PB231341, December 1973, p. 180-185.
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116. Wind generators more effective than solar cells. Electr. Rev. 192(22): 782-783, June 1, 1973.
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117. Windworks. Wind energy bibliography. Mukwonago, Wisconsin, Windworks, October 1973.
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118. Frost, W. Review of data and prediction techniques for wind profiles around man-made surface obstructions. In: AGARD Conference Proceedings No. 140, Flight in Turbulence, Woburn Abbey, Bedfordshire, England, May 1973.
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119. Tattelman, P. and I. Gringorten. Estimated glaze ice and wind loads at the earth's surface for the contiguous United States. Technical Report 73-0646. Bedford, Mass., Air Force Cambridge Research Laboratory, L.G. Hanscom Field, October 1973.
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39. Anderson, R.J. Promise of unconventional energy sources. Battelle Res. Outlook 4(1): 22-25, 1972.
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40. Barbour, E.H. Windmills of the 1890's. Water Well J. 26(2): 30-31, February 1972.
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A photographic history of older windmills is provided.

41. Clark, P. The natural energy workbook. Berkeley, Village One, Zygote Graphics, June 1972. 44 p.
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42. Fetters, J. Windmills, phenomena in the atomic age. Water Well J. 26(2): 27-29, February 1972.
1, 4

A brief review of the American windmill is provided.

43. Jopp, M. Energy from the winds. United Power News. Elk River, Minn., United Power Association, 1972.
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44. Life Support Technics Conference. Proceedings. Albuquerque, N.M., Biotechnic Press, 1972.
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45. Ortega, A., et al. The ecol operation. Montreal, Canada, McGill University, 1972.
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Predictions are made concerning the production, transmission, and consumption of energy during the period from 1975 to 2000 A.D. The subjects discussed include: getting energy to the user; methods for reducing energy consumption; advancements in energy storage; unconventional energy sources, including wind; and the development of power reactors.

47. Smith, G. List of windmill manufacturers and other publications. Cambridge, Eng., Cambridge University, 1972. 8 p.
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48. Thring, M.W. Fuel and power in the 21st century. Electron. Pow. 18: 3-4, January 1972.
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49. Windmill with no arms, new source of power. Sci. Dimen. 4(5): 22-25, October 1972. 4

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25. Apparatus for obtaining useful work from natural or induced fluid flows. British Patent Specification No. 1231581, filed 26 January 1967, complete specification published 12 May 1971. 6 p.

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26. Fedotov, V. and V.P. Kharitonov. Standardized wind electric power unit. Mekh. Elek. (USSR), No. 7: 43-44, 1971. Translation: Army Foreign Science and Technology Center, Charlottesville, Va. NTIS, AD783764, May 9, 1974. 6 p.

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The standardized UVEU-(1-4) 6 wind electric power unit is discussed. The unit is suitable for operation at small sites which are distant from power networks and do not have a high power demand. Output and engineering characteristics of the unit are given.

27. Lynch, K. Site planning. Cambridge, Mass., MIT Press, 1971.

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28. Strong, C.L. The amateur scientist. Experiments with wind: a pendulum anemometer and miniature tornadoes. Sci. Amer. 225(4): 108-112, October 1971.

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How strong is the wind? The question is readily answered with an anemometer. Experiments in building anemometers by amateurs are described.

29. Wailes, R. Horizontal windmills. Trans. Newcomen Soc., 1967-1968, 40: 125-245, 1971.

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At the higher forward speeds desired in the next generation of helicopters, regions of separated flow exist within the rotor disk. The influence of these growing regions begins to reduce significantly rotor lift-drag capability beyond an advance ratio of 0.4. As advance ratio increases, such factors as compressibility, reverse flow, three-dimensional flow, and blade stall, increase both rotor torque and blade flapping motion. To provide a suitable aerodynamic theory with which to calculate this degradation in performance, the theory must include the effects of unsteady aerodynamics, three-dimensional flow, and blade aeroelasticity. This paper illustrates the improvement to aerodynamic theory achieved after incorporating these above effects. Test and theory correlation is shown in the regions of flight associated with the next generation of turbine power helicopters. A performance theory is demonstrated that is accurate, even when the rotor is heavily stalled. Figure 1 correlates this theory with recently acquired 16-ft diam rotor data at an advance ratio of 0.4.

19. Power. Wind plant information. Mother Earth News No. 6: 60-61, November 1970.

12b

Information on the LeJay Manufacturing Co. wind plant is provided in response to a call for information in M.E.N. No. 5, p. 42, September 1970.

20. Venkateshwaran, S.P. Machinery according to motive, force, or power. Indian Nat. Sci. Acad. Bull. 43: 169-182, 1970.

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21. White, L. Medieval uses of air. Sci. Amer. 223(2): 92-100, August 1970.

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Technology came before science in the invention of the blast furnace, the windmill and the suction pump. A windmill designed in the first century after Christ is described, as well as others from 10th, 12th, and 15th centuries.

12. Solomon, J. Salt water desalting using wind energy. L'Eau 55(5): 225-227, May 1968. (In French)
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13. Lantagne, M. Wind power study of the St. Lawrence lowlands, survey of available wind data. Brace Research Institute, Internal Report No. I-52, October 1968.
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14. Garrison, J.A. and J.E. Cermak. San Bruno Mountain wind investigation - a wind tunnel model study. Colorado State University, CER67-68JEC-JAG58, 1968.
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14. McCollom, K.A. Use of energy storage with unconventional energy sources to aid development countries. Advances in energy conversion engineering. Papers presented at 1967 Intersociety Energy Conversion Engineering Conference. New York, American Society of Mechanical Engineers, 1967, p. 813-19.
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The development of an energy storage system using electrolysis of water to produce hydrogen and oxygen has led to an investigation of the use of unconventional energy sources in assisting developing countries. A family of power systems is proposed to convert the stored gases into electrical, mechanical, and thermal energy forms. Computer simulation models provide for both the component design requirements and for a detailed economic analysis to allow for optimization of the system design.

15. Overseas survey: windpower. Mech. Eng. 89: 54, February 1967.
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12. Prunieras, J. Contribution to the development of aerogenerators for navigation aids. Mechanique-Electricite, No. 198: 49-60, April 1966. (In French)
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13. Seventeenth century windmill to work again. Engineering 202: 275, August 12, 1966.
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14. Vance, W.S. and W.C. Yengst. Development of vertical axis wind rotors. LaJolla, Cal., Science Applications, Inc., December 1966. 86 p.
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12. The evolution of the western mill. In: Forbes, R.J. Studies in ancient technology. 2d rev. ed. Leiden, Netherlands, E.J. Brill, 1965. Vol. 2, p. 120-125.
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How windmills, an eastern development, came and were adapted for western needs is described.

13. The windmills of the east. In: Forbes, R.J. Studies in ancient technology. 2d rev. ed. Leiden, Netherlands, E.J. Brill, 1965. Vol. 2, p. 115-119.
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An historical account of eastern windmills is provided.

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22. Argand, A. Mesure de paramètres caractéristiques de l'énergie éolienne en vue du choix des sites favorables a l'installation d'aéromoteurs. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 21-47; English summary: Measurement of the characteristic parameters of wind power for the selection of favourable sites for wind-driven generators, p. 47-48.

3, 6

Time constants of Robinson, Papillon, and Ailleret anemometers are considered as well as the Best-Romani type. Variation among these suggest that standards be established for presenting wind power data. World-wide wind power potential is discussed, a standard anemometer height above 20 meters is suggested, and projections with respect to the direction of wind power development in Europe and in developing countries are offered.

23. Armbrust, S. Regulating and control system of an experimental 100-kw wind electric plant operating parallel with an AC network. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 201-205.

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24. Arnfred, J.T. Developments and potential improvements in wind power utilization. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 376-381; French summary, 381.

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25. Askegaard, V. Testing of the Gedser wind power plant. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 272-277; French summary, 277.

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26. Ballester, M. Speculative methods in wind surveying. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 49-59; French summary, 59-60.

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This paper assumes the site can be selected and is not predetermined by the load center. Discusses field procedures and statistical procedure for comparing sites. Three sites in Spain were instrumented and statistically compared. The author suggests that site analysis is in its exploratory stage and that a mixture of subjective evaluation and rigorous scientific method must of necessity be used in site selection.

27. Barasoain, J.A. and L. Fontán. Prospecting for wind power with a view to its utilization. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 61-73; French summary, 73-74.

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This paper analyzes methods used in compiling statistics for use in studies of wind power utilization from the data furnished by meteorological services and the results obtained from specific wind prospecting networks. Pertinent results based on all available data are given in relationship to mainland Spain, and the most important wind basins are outlined and described. A general study of the winds prevailing in the region which embraces the Canary Islands and the coastline of the Sahara Desert is included and includes results from forty stations in this area and subsequent analyses of the wind.

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methods applied to the Andreau-Enfield 100 kw wind-driven generator at Grand Vent, p. 292-293.
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Starting in 1953, Frenkiel undertook the study of wind power potential in Israel. He instrumented two types of peaks: 1) a mountain ridge athwart the prevailing wind direction with a steep leeward side; 2) an isolated peak in a valley in the general direction of prevailing winds. He concludes that criteria for a good wind power site emerges from his investigations, namely that the mean wind vertical gradient for the height interval from 10 to 40 m above the ground be: 1) less than five percent for optimal sites; 2) five to ten percent for very good sites; 3) ten to fifteen percent for good sites; 4) a mean power law exponent of no greater than .14 for fair sites. Further, he concludes that the slope of the hill determines this mean wind vertical gradient and relates to the above conditions as follows: 1) results from slopes of 1 in 3 1/2; 2) results from smooth, regular slopes of about 1 in 6; 3) results from smooth regular shallow slopes of about 1 in 10, or fairly rough but regular slopes of about 1 in 6; 4) results from a variety of topographic conditions such as low-level coastal sites, smooth aerodynamically very shallow slopes of about 1 in 20, very rough aerodynamically but regular steep slopes of about 1 in 6, and very steep slopes with gradual slope gradient within a radius of about 50 m from the hilltop. These statements of Frenkiel's are rare in the literature of topographic affects on wind power sites.

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42. Hütter, U. Recent developments and potential improvements in wind power utilization. United Nations Conference on New Sources of Energy. Proceedings. New York, United Nations, 1964. Vol. 7. Wind Power, p. 307-313; French translation, 314-321; Rapporteur's summation, 322-323; Résumé du rapporteur, 324-325.
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Using wind run data from nearly 150 recording stations and hourly wind speeds for nearly 25 stations, the wind power potential of India is considered by the authors. Velocity duration curves of eight stations are derived. The use of water pumping equipment at a selected station is also included.

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The errors in cup anemometers due to their non-linearity of indication and the influence of atmospheric turbulence is discussed. Windmill anemometers not affected by turbulence are described and the over-estimation of wind speed by both cup and windmill type anemometers is considered. Site selection for wind measurement is considered as well as instrumentation technique. The presentation is constructed to point up the difficulties in comparing wind data taken with different equipment and in changing equipment at an existing station.

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This paper reviews the various types of anemometers and examines their suitability for different kinds of wind measurement. An outline scheme is given for the investigation of wind flow over an area. Comments are made on the installation of anemometers. The use which can be made of existing wind data is considered in relation to the wind measurements actually carried out. Two specially developed wind speed recorders are illustrated and described. A method is shown for comparing the value of one site with another in terms of specific output. Mention is made of several methods of recording extreme wind speeds for design purposes.

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Wind-generated electricity was studied at an experimental mill and at wind measuring stations which consisted of a measuring cylinder mounted on a steel mast at elevations of 25 and 50 m. The mill is evaluated in terms of its cost and performance and is compared to other experimental mills in these terms. A system of economic models is presented which compares the costs for wind- and steam-generated electricity, with the conclusion that a wind power plant such as the one studied is unable to compete with a steam power plant. Wind power is held to be useful as a replacement for imported fuel and as a power reserve. Supplementary material on effect calculations and performance characteristics is also provided.

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The historical development of the windmill is sketched and photographs of modern types are shown. The problems of design, of storage of energy, regulation, interconnection with networks, effects on wind velocities, are discussed, and the special importance wind power stations might have as introducing electric power in regions beyond the extensions of a network is considered. The characteristics of wind over the area of the Republic are described and illustrated by maps. An intensive study of the question is advocated.

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Engineers dream on a grand scale and their concepts frequently go beyond what is presently possible in our mundane world. About half this book is devoted to energy. While this book is somewhat dated now, it's exciting to see how many of these once far-out ideas are becoming reality.

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This is the standard reference on airfoil design. It includes the aerodynamic characteristics, geometry, and associated theory for the NACA wing sections that continue to be the ones most commonly used for aircraft, helicopter rotor blades, propeller blades and fans. Sample chapter titles are: The significance of wing section characteristics, theory of thin wing sections, the effects of viscosity, basic thickness forms, and airfoil ordinates. The publisher states: "Math has been kept to a minimum, but it is assumed that the reader has a knowledge of differential and integral calculus and elementary mechanics."

20. Fateev, E.M. Wind power installations. Present condition and possible lines of development. Translation into English of Vetrosilovyye Ustanovki Sosttoyaniye i puti Razvitiya, Moscow, 1959. 80 p. Translation: Kanner Associates, Redwood City, Cal. N75-21796. NTIS, March 1975. 80 p. [NTIS has author's name Fateyev, Y.M.]
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Wind power is discussed as a source of energy, past, present and future. A brief summary of the history and development of windmills is presented. Tables of average wind velocity are included for different zones in the U.S.S.R. compiled from meteorological stations over a period of years. It is shown that the development of highly efficient wind power theory and engineering has led to the development of highly efficient wind-driven motors which use up to 42% of wind energy. The agricultural uses of wind-driven motors are also discussed. The matching of piston and centrifugal use of millstones with wind-driven motors are included. The use of free and unlimited wind energy is concluded to be efficient, particularly in agricultural and rural areas.

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Aerogenerators with light alloy propellers of the Electricité de France company are described, as well as two French generator installations.

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25. Vashkevich, K.P. Recherches sur un rotor d'éolienne en courant oblique. Institut Central Aérohydrodynamique (ZAGI), Moscow, Misc. No. 8, 1957. (In French)
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Optimum design methods for wind driven electrical generating plants are presented, based on yearly permanent wind level lines for selected erection sites. Wind conditions at any site are divided by five classes, of which only a few can be exploited by a given system. General purpose design curves are given.

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37. Hütter, U. Wind power machines. From book "Huette, des Ingenieurs Taschenbuch." Berlin, Wilhelm Ernst and Son, 1954. Translation of p. 1030-1044: Kanner Associates, Redwood City, California. N75-17786. NTIS, February 1975. 26 p.
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Basic aerodynamic features of wind power and wind wheels are discussed. The adaption of wind power to running machinery is described. Developments in wind power are illustrated, and operating properties are briefly outlined.

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Two years of data have been processed to show relationships between wind gustiness and other meteorological parameters. The gustiness classification used at Brookhaven National Laboratory is defined by the range and appearance of the horizontal wind direction trace. The seasonal and diurnal variations are presented. Gustiness is closely related to lapse rate and solar radiation, while its association with wind speed and Sutton's index of turbulence is not as distinct.

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30. Power from the wind. Engineer 193(5016): 387, March 14, 1952.
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31. Rosenbrock, H.H. An extension of the momentum theory of wind turbines. Aircr. Eng. 24: 226-227, August 1952.
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32. Sanuki, M. Experiments on the start and stop of windmill- and cup-anemometers with particular reference to their over-estimation factors. Pap. Meteorol. Geophys. 3: 41-53, 1952.
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33. Satakopan, V. Wind power in the semi-arid zones of Peninsular India. Paper read at the Symposium on the Semi-Arid Tracts of Peninsular India and Their Development, Poona, August 1952.
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A form of wind turbine is described, using a 3-bladed propeller with a hollow helix. Various sizes have been made; two described are of 8•5 and 55 m respectively, the latter having a peripheral speed of 800 Km/h. For electrical drive, methods have been devised to maintain the speed constant at 750 r.p.m., but many drives are direct, such as for pumping, etc. One form comprises a d.c. generator which electrolyses water; the resulting hydrogen is used for driving other engines. The oxygen is sold for other purposes. Several such installations are in use and are claimed to give entire satisfaction.

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22. Instruction pour la recherche des sites favorables à l'installation d'aérogénérateurs. Comité Technique de l'Energie des Vents, Paris, May 1950. (In French)
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23. Power plants on stilts. Pop. Sci. 156: 157, April 1950.
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25. Weinig, F. Aerodynamik der Luftschraube. Springer, Berlin, 1950. (In German)
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26. Preat, L. L'énergie éolienne. Revue des élèves des écoles spéciales. (Université Catholique, Louvain, Belgique), No. 2 (1949/50). (In French)
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27. Report on the utilization of wind-power in the Netherlands. United Nations Scientific Conference on the Conservation and Utilization of Resources, Proceedings. Lake Success, 1949, Vol. III, p. 319.
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20. Dory, B. Wind power for electrification of villages. Electrotechnika 40: 132-6, June 1948.
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22. Power from the wind. Engineering 166(4320): 469-470, November 12, 1948.
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10. New wind-power unit planned for Vermont. Electr. World 125(8): 7-8, February 23, 1946.

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The project at Grandpa's Knob, Vermont, is briefly described.

11. New wind-power unit planned for Vermont. Power 90(4): 130, 162, April 1946.

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14. Wind-turbines seen cheap power source. Eng. News Rec. 137(6): 72, August 8, 1946.

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This is a report on model studies by the Federal Power Commission of the most desirable erection procedure for building a 6500-kw aerogenerator mounted on a steel tower 475 feet high. Power will be developed by two 200-ft diameter impellers each with three fixed blades.

15. Winged wheel turns into power. Pop. Sci. 149: 114, November 1946.

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4. Basiaux-Defrance, P. L'energie du vent dans l'Aude. La Nature (Paris), No. 3099: 321-3, November 1, 1945. (In French)
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This article discusses wind power in the Department of Aude, France, characteristics of wind power, and includes a brief description of its use in a section of Southern France where meteorological conditions are particularly favorable for exploitation of wind power.

5. Burne, E.L., J. Russel, and R. Wailes. Windmill sails. Paper read at a meeting of the Newcomen Society held in London on March 28, 1945. Summary in Engineering 160: 277-280, October 5, 1945.
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This article describes various kinds of sails used on windmills and includes pictures of many of them.

6. Cranston, M.M. Rhode Island windmills. Christ. Sci. Mon. Mag., September 22, 1945, p. 6.
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7. Huge wind turbine is designed by F.P.C. Eng. News Rec. 134(22): 58, May 31, 1945.
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Percy H. Thomas' design is described.

8. LeJay manual. Belle Plaine, Minn., LeJay Manufacturing Co., 1945.
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This vintage classic describes the processes of rewinding automotive generators for use in direct-drive wind machines and other applications. How to make arc welders, soldering irons, an electric scooter, electric fence, small wind generators, an insect-zapper, transformers and an armature-growler, all from salvaged materials, is described.

9. Putnam, P.C. Wind turbine power plant will be rebuilt. Power 89(6): 363-4, June 1945.
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This paper describes what happened when one blade, 65 feet long and weighing 15,300 lbs., came off the wind turbine power plant atop a 110-ft structural steel tower at Grandpa's Knob, Vt. The performance of the turbine prior to the accident, causes of failure, and rebuilding are discussed.

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12. Einsatz von Windkraft in den Ostgebieten. Reichsarbeitsgemeindschaft "Windkraft," Berlin, Denkschrift 4, 1943, p. 36-44. Abstract, p. 44. (In German)
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13. Just, W. Windmotor mit vertikaler Achse bei Auftriebsausnutzung. Reichsarbeitsgemeindschaft "Windkraft," Berling, Denkschrift 7, July 12, 1943. (In German)
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14. Monney, C.R. Le problème des aéromoteurs. Son importance économique en France. Principes concernant l'étude et l'emploi des aéromoteurs. Soc. Ing. Civ. Fr. Bull. No. 1/2, 1943. (In French)
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15. Stein, D. Windkraftanlagen in Dänemark. Reichsarbeitsgemeindschaft "Windkraft," Berlin, Denkschrift 4: 1-35, 1943. (In German)
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16. Ueber die Arbeiten der Reichsarbeitsgemeindschaft "Windkraft" im Geschäftsjahr, 1942-1943. Berlin, Denkschrift 7, 1943, p. 3-10. (In German)
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17. Wall, T.F. Large wind-driven synchronous generators. Engineering 155(4037): 421-423, May 28, 1943.
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Data related to wind currents, economics of wind power installations and problems of construction are discussed.

18. Wall, T.F. Large wind-driven synchronous generators. Engineering 155(4039): 461-3, June 11, 1943.
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The running of synchronous 3-phase generators and an investigation applied to the consideration of design data prepared by Maschinenfabrik Augsburg-Nurnburg in cooperation with the Mannheim firm of Brown, Boveri are covered.

19. Wall, T.F. Large wind-driven synchronous generators. Engineering 155(4041): 501-3, June 25, 1943.
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Wind driven asynchronous generators are compared with synchronous generators.

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16. Lush, C.K. Flying bird windmill. Ind. Arts Voc. Ed. 31: 255-6, June 1942.
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17. Miller, A. Holland puts its windmills back to work. Travel 78: 18-19+, January 1942.
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18. Noetzlin, U. Die strömungstechischen Grundlagen der Windkraftmaschinen. 2. Aufl. Berlin, Reichsarbeitsgemeindschaft "Windkraft," Denkschrift 2: 28, 1942. (In German)
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19. Ueber die Arbeiten der Rechsarbeitsgemeindschaft "Windkraft" in Geschäftsjahr 1941-1942, Berlin, Denkschrift 5, 1942, p. 3-10. (In German)
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20. Wind-power plant continues operation. Power Plant Eng. 46(10): 78-79, October 1942.
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A 1000 kw wind-power plant at Grandpa's Knob, Vermont, in operation since October 1941, has been considered generally satisfactory by the engineers of the project. Preliminary experience points to the probability of obtaining power from the unit at least 50% of the time, with full rated output available about 25% of the time.

21. Wind-power plant operations going on. (Abstract) Franklin Inst. J. 234(3): 308, September 1942.
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This is a brief summary of an article in Electrical World, Vol. 118, No. 6, about the Grandpa's Knob project.

1941

11. Big windmill; great experiment on Grandpa's Knob, Vermont. Fortune 24: 84-5, November 1941.
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12. Harnessing the wind; Vermont's mountain winds harnessed to generate electricity. Time 38: 50, September 8, 1941.
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13. Kleimann, W. Für und wider Windmühlen. Reichsarbeitsgemeindschaft "Windkraft," Berlin, Denkschrift 3: 29-46, 1941. (In German)
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14. Lykkegaard, H. Winden og dens uduyttelee. Maaneds-Meddelslse, Copenhagen, Denmark, March 1941. (In Danish)
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15. Mountain-top windmill to feed Vermont electric lines. Pop. Sci. 139: 114-17, July 1941.
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16. The Smith-Putnam 100 kW wind-turbine. Mech. Eng. 63(6): 473-4, June 1941.
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17. Ueber die Arbeiten der Reichsarbeitsgemeindschaft "Windkraft" im Geschäftsjahr 1940-1941, Berlin, Denkschrift 3 : 51, 1941. (In German)
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18. Wind-electric plant to operate soon. Power 85(5): 87, May 1941.
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The Grandpa's Knob wind-driven electric-power generating plant is described. Photos of the blades are included.

19. Windmill on a Vermont mountain top. Bus. Week: 22, May 10, 1941.
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20. World's largest wind-turbine plant nears completion. Power 86(6): 56-9, June 1941.
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5. Ueber die Arbeiten der Reichsarbeitsgemeindschaft "Windkraft" im Geschäftsjahr 1939-1940, Berlin, Denkschrift 1 : 15, 1940. (In German) 4

1939

6. New schemes for harnessing the winds. Pop. Sci. 135: 100-1, August 1939.
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1938

4. Electric plants offer power to everyone. Pop. Mech. 69: 850-2+, June 1938.
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5. Ford, K. Wind driven generator. Pop. Sci. Mo. 133(2): 62-63, 93, August 1938.
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The author built a wind driven generator from a used automobile generator for supplying electric current to his summer home. Directions and diagrams for building the generator are supplied.

6. Hawthorn, F.W. Farm experience with wind electric plants. Agric. Eng. 19: 7-8, January 1938.
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7. Lubinski, K. Language of the mills; for generations the people of the Netherlands have read the news from the sails. Christ. Sci. Mon. Mag.: 6, September 7, 1938.
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9. Windmill power on the phone line. Sci. Am. 158: 358, June 1938.
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6. Carter, B.C. Airscrew blade vibration. 619th Lecture of the Royal Aeronautical Society, March 11, 1937.
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7. Morris, J. Airscrew blade vibration. Aeronautical Research Committee, Reports and Memoranda No. 1835, June 9, 1937.
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8. Windmills come back as protectors of pipeline networks from corrosion. Sci. Am. 156: 344, May 1937.
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9. Windmills return to keep pipelines from corrosion. Sci. Newsl. 31: 169, March 13, 1937.
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10. Zhukovskiy, N.E. Vetryanaya mel'nitsa NEZh. Polnoye sobraniye sochineniy N.E. Zhukovskogo. [The NEZh windmill. Complete Collection of N.E. Zhukovskiy's Works.] Vol. VI, 1937. (In Russian)
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5. Egloff, G. Modern energy supplies. Sci. Mo. 42: 296-7, April 1936. 4

6. Turnbull, W.J. Yacht-race windmill. Pop. Sci. 129: 94, October 1936. 4

1935

5. Cape Cod objects to losing its roving landmark, America's oldest windmill. Newsweek 6: 13, November 23, 1935.
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6. Exit: Spain's windmills. Christ. Sci. Mon. Mag.: 19, November 6, 1935.
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7. Metz, A.W. Dutch windmill; diagrams. Ind. Arts Voc. Ed. 24: 275-7, September 1935.
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1933

4. Champly, R. Les moteurs à vent. Paris, Dunod, 1933. 270 p. (In French) 2, 4

5. Harnessing the winds with rotating towers; Madaras rotor power plant, Burlington, N.J. Lit. Dig. 116: 17, December 30, 1933. 4

6. Wind rotor experiments "decidedly satisfactory." Electr. World 102: 548, October 28, 1933. 4, 6

Results of an experimental wind power plant project at West Burlington, N. J.,are briefly reported.

1932

5. Freeman, H. Wind-driven power plants you can build. Pop. Mech. 57: 1043-5, June 1932.
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6. Honnef, H. Windkraftwerke. Braunschweig, F. Vieweg, 1932. 111 p. (In German)
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7. Metral, A. Origine, nature et utilisation des forces éoliennes. Sci. Ind. 6(218): 99-108, March 1932. (In French)
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After having characterized main air currents this paper defines, in accordance with recent researches, the internal structure of winds. A mathematical theory on air displacements based on the work of Fortant is suggested. Conditions under which wind power can be utilized and wind motors and their theory are also discussed.

8. New kind of windmill. Lit. Dig. 114: 16, September 10, 1932.
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9. Skyscraper windmills to harness air for power. Pop. Sci. 120: 21, June 1932.
4

10. Vetchinkin, V.P. Principles of wind utilization elaborated by A.G. Ufimtsev. Proceedings of the First All-Union Conference on Aerodynamics, Moscow, 1932.
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8. Bach, G. Investigation on Savonius rotors and related fluid flow engines. Forsch. Geb. Ingenieurw. 2(5): 218-231, 1931. Translation: C.A. Henkel. NTIS, SAND-74-6018, 1974.
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9. Hopkins, R.T. Old windmills of England. New York, William Farquhar Payson, 1931. 245 p.
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10. Hopkins, R.T. Windmills. Haywards Heath, Sussex, C. Clarke, 1931. 25 p.
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11. Six large light and power companies back experimental wind rotor plant. Electr. World 98: 574, October 3, 1931.
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This news article describes an experimental wind power project planned for West Burlington, N.J.

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2. Hopkins, R.T. Old watermills and windmills. London, P. Allan & Co., Ltd., 1930. 245 p.
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3. Hughes, A.F. Windmills in Sussex. London, Walker's Galleries, Ltd., 1930.
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4. Sektorov, V.R. Die Arbeiten des Z.A.H.I. auf dem Gebiete der Aushutzung der Windenergie in der U.d.S.S.R. Rapport No. 307 à la 2ème Conférence Mondiale de l'Energie, 1930.(In German)
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5. Wailes, R. Windmills of old times which we should appreciate and help to preserve. House and Gard. 57: 88-9, June 1930.
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1929

1. Aerodynamic windmills. Sci. Am. 140: 5.5, June 1929.
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2. Old favorites in new forms. Pop. Mech. 52: 663-4, October 1929.
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3. Savonius, S.J. Rotor motor drives pump. Mod. Mech. Invent. 1(10): 78, March 1929.
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4. Serragli, G. Studies on the deployment of the self-rotating airscrew. Aerotecnica, June 1929.
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1928

1. Betz, A. Windmills in the light of modern research. U.S. National Advisory Committee for Aeronautics. Tech. Mem. 474, August 1928. 29 p.

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2. Bilau, K. Cost of wind power. Elektrotech. Z. 49: 819-21, May 31, 1928.

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An experimental station has been constructed by the Oxford Institute of Agricultural Engineering for the purpose of studying the application of wind power. The chief difficulty is the intermittent and variable nature of the wind. Estimation of efficiency also introduces considerable difficulty, "propeller" and "turbine" types of prime mover indicating widely different results. The propeller type of motor has the advantage that it operates with lower wind speeds than other types. This allows the use of smaller batteries or reserve plant. Experimental work at Oxford and Göttingen has indicated a cost in pf. per kWh as given by the expression $6 \cdot 65.10^6/v^3h$, where v is the wind velocity in metres per sec and h the number of hours per annum during which the wind is blowing.

3. Browne, L.R. Make this Tim Turner windmill. Pop. Mech. 50: 155-6, July 1928.

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4. Davis, W. Electric windmill. Curr. Hist. 27: 712, February 1928.

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6. Electric current from the wind. Compr. Air Mag. 33(4): 2380, April 1928.

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7. Fales, E.N. A new propeller-type, high-speed windmill for electric generation. ASME Trans. 19: Paper AER-50-6, 1928. 15 p.

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This new improved type of windmill resembles an airplane propeller and is the result of windmill research adopted from aeronautics. The article describes wind tunnel and other tests, empirical coefficients for relating effects of widely ranging winds with steady wind conditions, and study of available energy in wind and selection of a suitable windmill diameter.

8. Jensen, R.J. Modern plants for wind-electric power stations. Rapport No. 193 à la 1ère Conference Mondiale de l'Energie (World Power Conference), 1928. (In French)
3, 4

9. Nerli, N. The important question of wind-driven motors. Aeronautica: June 1928.
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10. Powerful wind motor generates electricity. Sci. Am. 139: 156, August 1928.
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11. Self-governing wind-power wheel. Sci. Am. 138: 566-7, June 1928.
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1927

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2. Hopkins, R.T. Old English mills and inns. London, C. Palmer, 1927.
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3. Levi. R. Teoria e calcolo del motore a vento ad asse orizzontale. Ing. Rev. Tecn. Mengile 6(8 and 9): 272-280, 314-324, 1927. (In Italian)
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1926

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2. Betz, A. Wind-energie und ihre ausnutzung durch Windmühlen. Gottingen, Vandenhoeck and Ruprecht, 1926. 64 p. (In German)
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3. Flettner, A. The story of the rotor. New York, F.O. Willhofft, 1926. 111 p.
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4. Ingalls, A.G. Power from the wind. Sci. Am. 134: 114-15, February 1926.
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5. Roscher, P.A. Windmotor. Swiss patent no. 117,848, December 1, 1926.
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6. Sabinin, G.K. The gyroscopic effect of wind motors and calculation of rotating vanes. Trudy TsAGI [Works of the Central Institute of Aerohydrodynamics imeni N. Ye. Zhukovskiy], Issue 28, Moscow, 1926.
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2. Bilau, K. Rapid wind motors. Elektrotech. Z. 46: 1405, 1925.
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3. Botke, C. Last stand of the windmill in Holland. Scrib. M. 77: 471-9, May 1925.
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4. Church, I.P. Mechanical paradox, or mechanical fact? The wind-locomotive. Sci. Am. 132: 407, June 1925.
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5. Darrieus, G. Théorie élémentaire du moulin à vent. Note publiée, reproduite in extenso dans les "Moteurs à vent" de R. Champly. February 1925. (In French)
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6. Famous German sail-less ship driven by same wind forces that make baseball curve. Sci. Am. 132: 12, January 1925.
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7. Hoelling, J.H. and O. Flamm. New harness for the wind; application of Magnus effect to propulsion of vessels. Liv. Age 324: 7-10, January 3, 1925.
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8. Hullen, H. The economic utilization of wind energy. Z. VDI 69: 132, 1925.
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9. Lubowsky, K. Small wind generation plants for foreign countries. Elektrotech. Z. 46: 949, 1925.
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10. Nottelmann, H. Von. Ein Fortschritt in der Ausnutzung der Windkraft zur Erzeugung elektrischer Energie. Elektrotech. Z. 46(11): 365-368, March 12, 1925. (In German)
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12. Plans for a giant windmill. Science 61 (Suppl. 10): March 27, 1925. 4

13. Sailless sail boat, invented by Flettner. Rev. of Rev. 71: 102-3, January 1925. 15

14. Underwood, A.J.V. The aerodynamo: a new wind power machine. Electr. Rev. 96(2426): 166-167, January 30, 1925. 4

15. Wind-generated electricity. Engineering: March, 1925. 4

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2. New French windmills for electric power. Lit. Dig. 82: 27, September 27, 1924.
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4. Rotor ship. Liv. Age 323: 682-3, December 27, 1924.
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5. Rotor ship moves on baseball curve principle. Lit. Dig. 83: 22-3, December 27, 1924.
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6. Slosson, E.E. Free air. Sci. Mo. 19: 218-21, August 1924.
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2. Waterbury, I.C. Electrically harnessing the winds. Sci. Am. 127: 184-5, September 1922.
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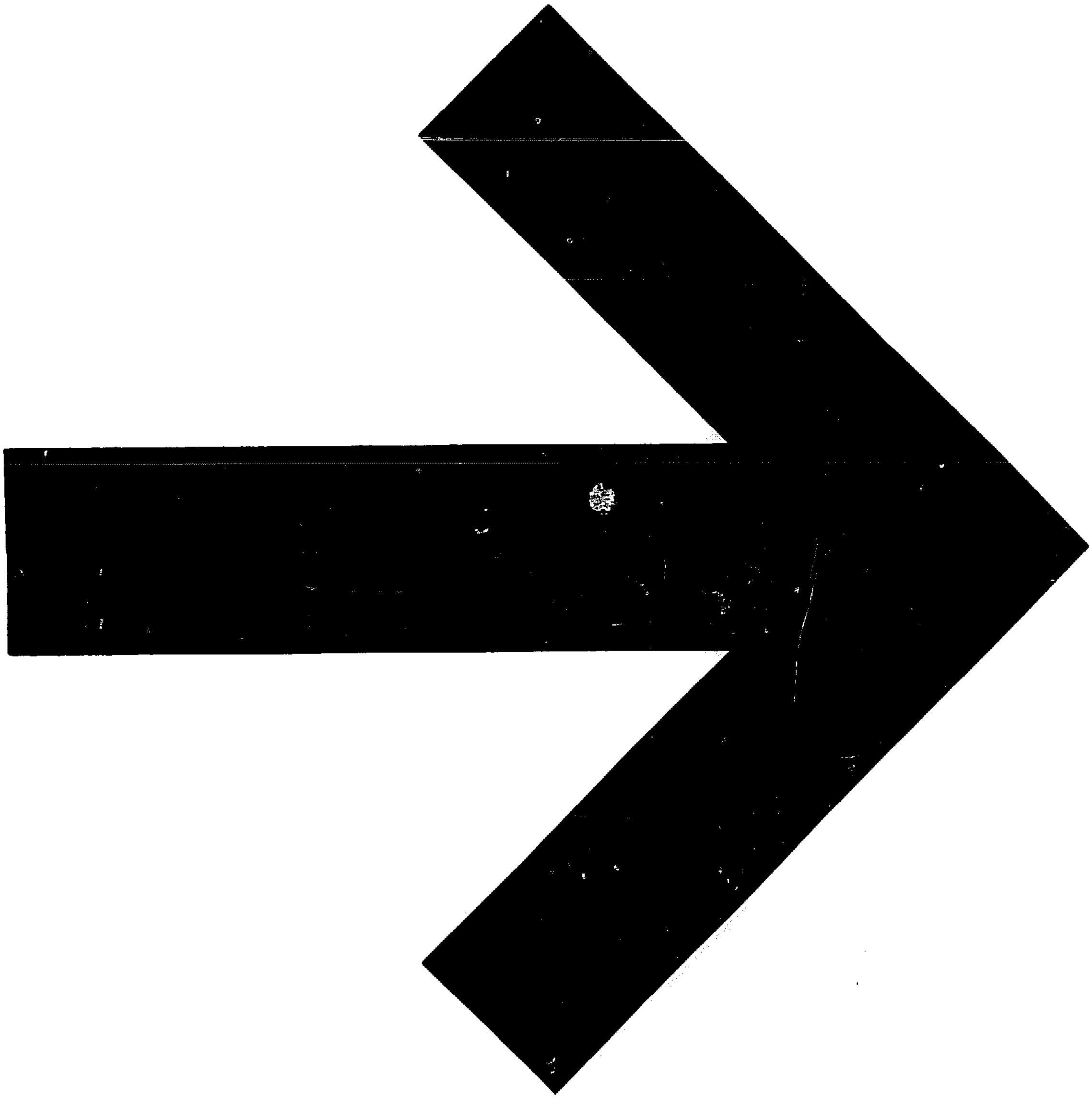

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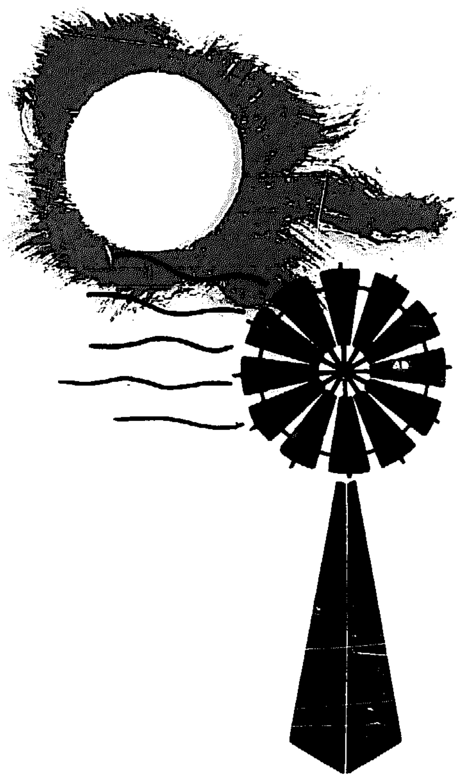

ENERGY FROM THE WIND

Annotated Bibliography

SECOND SUPPLEMENT

Compiled by

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Colorado State University

December 1979

Solar Energy Applications Laboratory
Colorado State University

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ENERGY FROM THE WIND

Annotated Bibliography

SECOND SUPPLEMENT

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INTRODUCTION TO THE SECOND SUPPLEMENT

Something new has been added! This Second Supplement to ENERGY FROM THE WIND, which contains 1942 new references, was produced by computer, as the first phase of a project which will eventually put the retrospective file (Basic Volume and First Supplement) as well as all future supplements on computer.

A computer-produced ENERGY FROM THE WIND offers many advantages over the previously manually produced bibliography. The main ones for you, the user, are:

(1) More and better indexes. A much more detailed subject thesaurus has been developed and used to provide subject indexing in greater depth than the previous "Broad Subject or Type of Material Index." In addition to the subject and author indexes, two new indexes have been included for report number and conference proceedings.

(2) Customized searches. The computer system used to produce ENERGY FROM THE WIND has a search component which allows the running of custom literature searches tailored to the requestor's needs. Keywords can be combined using the Boolean "and" or "or" to produce specialized lists on narrower aspects of wind energy. Any part of the reference can be searched, although combining descriptors from the subject index would be the recommended way to proceed for most topics. Some sample searches are:

All references on "design - small scale" and ("developing countries" or "remote areas)

All references from the Brace Research Institute

All references to "Patents" on "vertical axis" turbines from 1976 to date

A "SEARCH REQUEST FORM" has been included following this introduction for use in requesting a custom search from the ENERGY FROM THE WIND data base.

For information on the search capability, feedback on the new format and indexes, or to provide information on new references or corrections to entries, please contact:

Barbara L. Burke, Associate Professor
Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

Computerization of ENERGY FROM THE WIND was possible through a contract with the Department of Energy, Wind Systems Branch, to whom we express appreciation.

SEARCH REQUEST FORM

Energy from the Wind - Annotated Bibliography

The computer system used to produce ENERGY FROM THE WIND has a search component which allows the running of custom literature searches tailored to the requestor's needs. Keywords can be combined using the Boolean "and" or "or" to produce specialized lists on narrower aspects of wind energy. Any part of the reference can be searched, for actual assigned descriptors, or for free terms.

SAMPLE SEARCHES:

1. All references on "design - small scale" and ("developing countries" or "remote areas").
2. All references from the Brace Research Institute.
3. All references to "Patents" on "vertical axis" turbines from 1976 to date.

****

SUBJECT OF SEARCH:

A. State subject of search in sentence form, using descriptors from subject index when appropriate:

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B. List additional descriptors, free terms, synonyms relevant to the subject:

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C. List any additional requirements, such as years to be covered, type of materials, etc.

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Name ______________________________

Address ____________________________

____

Phone _____________________________

Send request and prepayment* to:

Barbara L. Burke
Engineering Research Center
Colorado State University
Fort Collins, Colorado 80523

*Prepayment of $5.00 is required to cover computer costs, handling, and mailing. An additional fee may be assessed for unusually large or complex searches.

BIBLIOGRAPHY

The bibliography is organized by year, in entry number order. So that the Second Supplement may be merged with the Basic Volume and First Supplement if desired, entry numbers in the Second Supplement are assigned to follow consecutively those entry numbers used in the first two volumes. Therefore in most years entry numbers do not begin with "1", but with a number to immediately follow the last entry number used for that year in the First Supplement.

The Second Supplement may be merged with the first two volumes, or left separate. The indexes in the Second Supplement are for that supplement only, so if the three volumes are merged, the old indexes must be retained and used with the indexes for the Second Supplement. By 1981, when the retrospective file has been added to the computer data base, cumulative indexes will be produced for all volumes.

79-0001 ACCESS CATALOG UPDATE.
WIND POWER DIG. NO. 15: 52-55, SPRING 1979.

79-0002 AKINS R E
FULL-SCALE PERFORMANCE EVALUATION OF WIND TURBINES.
ASCE CONVENTION + EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3530.
16 P.

THE ACCURATE ASSESSMENT OF WIND POWER AS AN ALTERNATIVE SOURCE REQUIRES AN UNDERSTANDING OF BOTH THE WIND RESOURCE AND HOW A PARTICULAR WIND TURBINE PERFORMS IN THIS ENVIRONMENT. THE INABILITY OF ANALYSTS TO INCORPORATE UNSTEADY EFFECTS OF ATMOSPHERIC TURBULENCE ON WIND TURBINE PERFORMANCE INTRODUCES UNCERTAINTY INTO PERFORMANCE PREDICTIONS. IN ORDER TO VERIFY THESE PREDICTIONS FIELD-TESTING OF FULL-SCALE PROTOTYPE WIND TURBINES HAS BEEN UNDERTAKEN BY BOTH THE FEDERAL GOVERNMENT AS A PART OF THE STIMULATION OF THE WIND-POWER INDUSTRY AND BY PRIVATE INDUSTRY AS A PART OF THEIR DEVELOPMENT PROGRAMS. THE RESULTS OF SUCH TESTING MUST BE PRESENTED IN A FORMAT WHICH IS USEFUL TO BOTH A TECHNICAL AUDIENCE AND TO POTENTIAL USERS OF WIND POWER, IN EITHER THE PUBLIC OR PRIVATE SECTOR. A STRAIGHTFORWARD TECHNIQUE TERMED [THE METHOD OF BINS[HAS BEEN DEVELOPED FOR USE IN DETERMINING THE MEAN PERFORMANCE OF WIND TURBINES IN A FIELD ENVIRONMENT. THIS TECHNIQUE IS BRIEFLY OUTLINED AND EXAMPLES OF RESULTS OBTAINED ARE PRESENTED. AN APPROACH IS PROPOSED WHICH ALLOWS THE UTILIZATION OF THESE PERFORMANCE DATA ALONG WITH A DESCRIPTION OF WIND CHARACTERISTICS TO PREDICT THE ANNUAL ENERGY PRODUCED BY A WIND TURBINE AT A PARTICULAR LOCATION.

79-0003 AULD H E, LODDE P F
A STUDY OF FOUNDATION/ANCHOR REQUIREMENTS FOR PROTOTYPE VERTICAL-AXIS WIND TURBINES.
NTIS, FEBRUARY 1979. 94 P.
SAND-78-7046

THE FOUNDATION/ANCHOR REQUIREMENTS FOR A RANGE OF VERTICAL AXIS WIND TURBINES WERE IDENTIFIED. FOUNDATION AND ANCHOR SYSTEMS MEETING THESE REQUIREMENTS WERE DESIGNED AND EVALUATED ON THE BASIS OF THEIR DEPLOYABILITY AND COST-EFFECTIVENESS. OPTIMUM FOUNDATION/ANCHOR SYSTEMS FOR EACH COMBINATION OF TURBINE SIZE AND SOIL CONDITION, AS WELL AS A COMPLETE DETAILED DESIGN FOR A VAWT SYSTEM SITED AT ROCKY FLATS, COLORADO, ARE PRESENTED.

79-0004 BERGESON L
SAIL POWER FOR THE WORLD'S CARGO SHIPS.
TECHNOL. REV. 81(5): 22-36, MARCH-APRIL 1979.

THROUGH THE END OF THE LAST CENTURY, SAILING SHIPS CARRIED A SIGNIFICANT PORTION OF THE WORLD'S TRANS-OCEAN CARGOES. BUT BY THE CLOSE OF WORLD WAR I, THEY HAD BEEN VIRTUALLY DRIVEN FROM THE SEAS BY STEAM SHIPS THAT USED LOW-COST FOSSIL FUELS FOR STEADY POWER AND THEREBY KEPT RELIABLY ON SCHEDULE. RECENT FORECASTS OF WORLD ENERGY CONSUMPTION AND COSTS INDICATE THAT THE PRICE OF MARINE BUNKER OIL, WHICH IS ABOUT $15 PER BARREL AS OF THIS WRITING, MAY DOUBLE OR TRIPLE WITHIN THE NEXT DECADE. SUCH PROJECTIONS ARE OF ENORMOUS CONCERN TO OPERATORS OF THE CARGO SHIPS NOW PLYING THE SEAS; EXPENDITURES FOR FUEL MAKE UP 20 TO 30 PER CENT OF THE TOTAL COST OF OPERATING A MODERN VESSEL. IN THIS CONTEXT IT IS POSSIBLE TO IDENTIFY THE BENEFITS OF EVEN A PARTIAL SWITCH OF THE WORLD'S COMMERCIAL FLEET BACK TO SAIL POWER. SAILS CONSTITUTE AN ELEGANT AND TECHNICALLY FEASIBLE SOLAR ENERGY CONVERSION SYSTEM THAT REMAINS UNEXPLOITED BY ENERGY PLANNERS AND INDUSTRY.

79-0005 BONDI H
ENERGY R AND D IN THE UNITED KINGDOM.
ATOM NO. 268: 40-41, FEBRUARY 1979.

A DISCUSSION ON NUCLEAR ENERGY, NUCLEAR RESOURCES, AND ENERGY R AND D IN THE UK ARE PRESENTED. WAVE, GEOTHERMAL AND WIND ENERGY ARE BRIEFLY COMMENTED ON.

79-0006 BONTIUS G H
IMPLICATIONS OF LARGE SCALE USE OF WIND ENERGY FOR PUBLIC POWER SUPPLY.
ENERGIESPECTRUM 3(4): 98-104, APRIL 1979.

THIS PAPER DISCUSSES THE IMPLICATIONS OF USING WIND DRIVEN GENERATORS TO

INCREASE THE SUPPLY OF ELECTRIC POWER. WIND POWER IS LIKELY TO ACCOUNT FOR ABOUT 3 PERCENT OF THE TOTAL ENERGY PRODUCTION, OR 15 PERCENT OF THE TOTAL PRODUCTION OF ELECTRIC POWER, IN 5000 STATIONS OF 1 MW EACH. LIKELY LOCATIONS AND COSTS ARE DISCUSSED.

79-0007 BOWLES D F, ROLLINS J P, HAWKS R J
PARAMETRIC PERFORMANCE ANALYSIS OF A DARRIEUS WIND TURBINE SYSTEM.
J. ENERGY 3(3): 140-144, MAY-JUNE 1979.

A STEADY-STATE COMPUTER SIMULATION WAS USED TO EVALUATE THE PERFORMANCE OF A SMALL DARRIEUS ROTOR AEROTURBINE LOADED BY SEVERAL DIFFERENT ENERGY CONVERSION DEVICES. FOR CONSTANT SPEED OPERATION IT WAS FOUND THAT THE GENERATOR SIZE MUST BE CAREFULLY MATCHED TO LOCAL WIND CONDITIONS. OVERALL SYSTEM PERFORMANCE CAN BE IMPROVED IF A VARIABLE SPEED LOAD IS USED OR IF VARIABLE ROTOR SPEED CAN BE PROVIDED FOR A CONSTANT SPEED LOAD. FOR A RANGE OF GENERATOR SIZES THE TOTAL POWER OUTPUT VARIES ONLY SLIGHTLY WITH GENERATOR CAPACITY.

79-0008 BRAUNSTEIN L A
WIND ENERGY: THE LONG ROAD TO COMMERCIALIZATION.
ENERGY 4(1): 10-11, WINTER 1979.

THIS ARTICLE REPORTS PRESENT ACTIVITY IN WIND GENERATORS THROUGHOUT THE UNITED STATES. MUCH OF THE ACTIVITY IS SPONSORED BY THE DEPARTMENT OF ENERGY (DOE), BUT A NUMBER OF LARGE AND SMALL INDUSTRIAL FIRMS ARE ALSO WORKING WITHOUT DOE FUNDING. BOTH SMALL AND LARGE WIND MACHINES USING HORIZONTAL OR VERTICAL AXIS ARE UNDER DEVELOPMENT AND TEST. THE DOE-SPONSORED MOD-1 WIND TURBINE, WITH A SET OF 200-FOOT STEEL ROTOR BLADES, IS EXPECTED TO BE COMPLETED BY THE SPRING OF 1979 NEAR BOONE, N.C. IT WILL SUPPLY 2,000 KILOWATTS (TWO MEGAWATTS) OF POWER TO THE LOCAL ELECTRICAL COOPERATIVE, AT 10 OR 11 CENTS PER KWHR. THE COST OF ENERGY WITH TODAY'S SMALL WIND MACHINES IS ABOUT 15 CENTS PER KWHR. IN ORDER TO BECOME ECONOMICALLY COMPETITIVE, DOE PROGRAM MANAGERS SAY, WIND SYSTEMS MUST BE ABLE TO PROVIDE ENERGY AT A VERY LOW COST: TWO TO THREE CENTS PER KWHR. THIS ENERGY COST WOULD MAKE WIND POWER COMPETITIVE WITH THE COST OF FUEL IN CONVENTIONAL POWER GENERATING FACILITIES; IT WOULD LEAVE ROOM FOR THE ADDITIONAL COST OF POWER TRANSMISSION AND DISTRIBUTION (FOR LARGE SYSTEMS), OR UTILITY SURCHARGES (FOR SMALL SYSTEMS). UTILITY SURCHARGES MIGHT BE ADDED TO A WIND SYSTEM OWNER'S BILL TO RECOUP THE COST OF PROVIDING STANDBY SERVICE. UTILITIES THAT DO NOT USE SURCHARGES WOULD BE SUBSIDIZING USE OF WIND SYSTEMS BY SPREADING STANDBY SERVICE COST AMONG THEIR CUSTOMERS. WIND ENERGY IS APPROACHING ECONOMIC COMPETITIVENESS WITH DIESEL-GENERATED POWER (AT NINE TO 21 CENTS PER KWHR), AND APPEARS CAPABLE OF ACHIEVING COMPETITIVE COST GOALS EARLIER THAN SOME OTHER SOLAR TECHNOLOGIES, SUCH AS PHOTOVOLTAICS (CURRENTLY AT 60-80 CENTS PER KWHR), OR SOLAR THERMAL POWER SYSTEMS (AT 40 TO 50 CENTS PER KWHR).

79-0009 BRAUSER B O, BRAUSER S O
WIND DRIVEN ELECTRIC POWER PLANT.
U.S. PATENT NO. 4,134,708, JANUARY 16, 1979.

THIS PATENT IS FOR A WIND TURBINE APPARATUS COMPRISING A VERTICALLY RISING EXOSKELETAL FRAME HAVING AT LEAST TWO VERTICALLY SPACED SETS OF RADIALLY CONVERGING RIBS, MEANS DEFINING AN AXIAL OPENING CONNECTING SAID RIBS, A VERTICAL DRIVE SHAFT DISPOSED IN SAID AXIAL OPENING, A COLLAR CONCENTRICALLY DISPOSED AROUND SAID SHAFT WITHIN SAID AXIAL OPENING, MEANS FOR ROTATABLY SUPPORTING SAID SHAFT AND SAID COLLAR WITHIN SAID AXIAL OPENING; A WIND SHIELD CARRIED BY SAID COLLAR, AND A ROTOR CARRIED BY SAID SHAFT BETWEEN SAID VERTICALLY SPACED SETS OF RADIALLY CONVERGING RIBS.

79-0010 THE CALIFORNIA WIND PROGRAM.
WIND POWER DIG. NO. 15: 6-11, SPRING 1979.

THE WIND ENERGY PROGRAM OF THE CALIFORNIA ENERGY COMMISSION IS DESCRIBED. THE GOALS OF THE PROGRAM ARE (1) TO DEMONSTRATE THE TECHNICAL VIABILITY AND POTENTIAL ECONOMIC ATTRACTIVENESS OF WIND-ELECTRIC CONVERSION SYSTEMS; (2) TO PROVIDE [HANDS ON[OPERATIONAL EXPERIENCE FOR AN ELECTRIC UTILITY OR A COMMERCIAL OR INDUSTRIAL USER OF ELECTRICITY; AND (3) TO PROVIDE PUBLIC VISIBILITY FOR WIND ENERGY.

79-0011 CARPENTER K, WHEELER C, SULLIVAN M

CULTURAL RESOURCE SURVEY AND EVALUATION OF SYSTEM VERIFICATION UNIT SITES, TRANSMISSION LINE AND ACCESS ROAD RIGHTS-OF-WAY; WIND ENERGY PROJECTS, ALBANY AND CARBON COUNTIES, WYOMING.
NTIS, JANUARY 1979. 37 P.
PB-292384

BETWEEN OCTOBER 27 AND OCTOBER 29, 1978, TWO ARCHEOLOGISTS AND A PALEONTOLOGIST AFFILIATED WITH WESTERN CULTURAL RESOURCE MANAGEMENT OF BOULDER, COLORADO, SURVEYED AN AREA AROUND MEDICINE BOW, WYOMING TO LOCATE AND EVALUATE ANY CULTURAL RESOURCES THAT MIGHT BE AFFECTED BY THE BUREAU OF RECLAMATION'S PROPOSED WIND ENERGY PROJECT. ALTHOUGH NO PALEONTOLOGICAL OR HISTORICAL SITES OR REMAINS WERE LOCATED, TWO ARCHEOLOGICAL SITES AND FIFTEEN (15) LOCI OF ISOLATED ARCHEOLOGICAL ARTIFACTS WERE DISCOVERED. SINCE BOTH SITES WERE LOCATED ALONG THE PROPOSED TRANSMISSION LINE RIGHT-OF-WAY FROM ALTERNATE "SITE C" TO THE EXISTING TRANSMISSION LINE ALONG WYOMING HIGHWAY 487, AND NOT ON ANY OF THE SYSTEM VERIFICATION UNIT LOCATIONS, IT IS RECOMMENDED THAT DIRECT SITE IMPACT DURING TRANSMISSION LINE CONSTRUCTION BE AVOIDED. CONSTRUCTION ON ANY OF THE ALTERNATE SYSTEM VERIFICATION UNIT LOCATIONS WILL NOT ADVERSELY AFFECT ANY CULTURAL RESOURCES, EITHER HISTORIC OR ARCHEOLOGICAL.

79-0012 CARTER J
USING WATER-PUMPING WINDMILLS.
WIND POWER DIG. NO. 16: 8-13, SUMMER 1979.

THIS ARTICLE IS ON DESIGNING AND USING LOW-PRESSURE WATER SYSTEMS.

79-0013 CARTER J
USING WATER-PUMPING WINDMILLS. PART II.
WIND POWER DIG. NO. 15: 44-50, SPRING 1979.

79-0014 CHEN J M, TSUE C K
VORTEX GENERATOR AFFECTED BY THE TOWER ASPECT RATIO.
J. IND. AERODYN. 4(2): 101-112, MARCH 1979.

A MATHEMATICAL ANALYSIS OF A VORTEX WHICH IS GENERATED BY A LARGE HOLLOW TOWER IS PRESENTED. THE TOWER ASPECT RATIO (HEIGHT/DIAMETER) IS CONSIDERED, AND IT IS SHOWN THAT THE LOWEST PRESSURE DROP CAN BE OBTAINED FROM THIS TORNADO-TYPE WIND ENERGY SYSTEM WHEN THE ASPECT RATIO IS BETWEEN 3 AND 5.

79-0015 CLIFF W C
WIND DIRECTION CHANGE CRITERIA FOR WIND TURBINE DESIGN.
NTIS, JANUARY 1979. 22 P.
PNL-2531

IN MANY CASES, THE WIND TURBINE DESIGN ENGINEER NEEDS TO KNOW WIND CHARACTERISTICS THAT ENGULF ALL OR PART OF THE TURBINE ROTOR SYSTEM BECAUSE A SPATIAL-FILTERING EFFECT, DEPENDING ON THE SIZE OF THE WIND TURBINE ROTOR SYSTEM, MUST BE ACCOUNTED FOR IN ORDER TO PROVIDE WIND CHARACTERISTIC DESIGN INPUTS. ONE SUCH INPUT IS THE WIND DIRECTION CHANGE WHICH OCCURS OVER TIME. THE DIRECTION CHANGE, WHICH IS ALSO AVERAGED OVER THE SWEPT AREA OF A ROTOR SYSTEM, IS LESS SEVERE THAN THE MAXIMUM DIRECTION CHANGE OCCURRING AT A POINT WITHIN THE SWEPT AREA. THAT IS, WITHIN THE SWEPT AREA OF THE ROTOR, AREAS OF DIRECTION CHANGE GREATER THAN THE AVERAGE DIRECTION CHANGE AS WELL AS AREAS OF LESSER CHANGE OCCUR SIMULTANEOUSLY. THIS PAPER PRESENTS FORMULAS FOR ESTIMATING THE DIRECTION CHANGE ENCOUNTERED OVER THE SWEPT AREA OF THE ROTOR SYSTEM. THE FORMULAS ARE GENERIC AND MAY BE USED FOR ANY SIZE OF WIND TURBINE SYSTEM OPERATING IN STRONG WIND CONDITIONS. A METER-KILOGRAM-SECOND (MKS) SYSTEM OF UNITS IS USED IN THIS REPORT.

79-0016 COIT L
WIND ENERGY: LEGAL ISSUES AND INSTITUTIONAL BARRIERS.
NTIS, JUNE 1979. 28 P.
SERI/TR-62-241

THE IDEA OF HARNESSING THE WIND'S ENERGY IS NOT A NEW ONE. PRIOR TO WORLD WAR II, OVER SIX MILLION SMALL WINDMILLS WERE BUILT IN THE UNITED STATES. UNFORTUNATELY, THE DEVELOPMENT OF CHEAPER FOSSIL FUELS DURING THE POSTWAR INDUSTRIAL BOOM RESULTED IN THE LARGE-SCALE ABANDONMENT OF WIND GENERATION DEVICES. SUDDENLY, HOWEVER, WITH THE PRICE OF FOSSIL

FUELS RISING ALMOST DAILY, WIND ENERGY HAS ONCE AGAIN BECOME AN ATTRACTIVE ENERGY ALTERNATIVE. BEFORE THE POTENTIAL OF WIND ENERGY CAN BE REALIZED, LARGE-SCALE COMMERCIALIZATION WILL HAVE TO OCCUR. STANDING IN THE WAY OF COMMERCIAL DEVELOPMENT ARE VARIOUS INSTITUTIONAL AND LEGAL BARRIERS. THESE INCLUDE(1) POSSIBLE CONFLICTS WITH EXISTING ZONING AND OTHER LAND-USE PLANNING SCHEMES, (2) THE QUESTION OF GUARANTEEING ACCESS TO THE WIND (3) POSSIBLE TORT AND ENVIRONMENTAL ISSUES RAISED BY WECS OPERATION, AND (4) THE CRITICAL PROBLEM OF CREATING FINANCIAL INCENTIVES.

THIS PAPER DISCUSSES THE IMPLICATIONS OF EACH OF THESE ISSUES AND SUGGESTS SOLUTIONS WHERE PRACTICABLE.

79-0017 CYCLOTURBINE TESTED IN N.M.
WIND POWER DIG. NO. 15: 20, SPRING 1979.

79-0018 DOE SOLAR BUDGET GETS $68-MILLION BOOST IN HOUSE SUBCOMMITTEE AUTHORIZATION BILL.
SOL. EN. INTELL. REP. 5(11): 102-103, MARCH 12, 1979.

79-0019 D'ALESSANDRO B
WIND ENERGY: THE SLEEPING GIANT.
SOLAR AGE 4(7): 39-41, JULY 1979.

THIS ARTICLE REVIEWS CURRENT WIND POWER PROJECTS IN THE US, FUNDED BY THE GOVERNMENT.

79-0020 DERRINGTON J A
MARINE STRUCTURES FOR ENERGY CONVERSION.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 152-155.

THIS PAPER DISCUSSES THE PROBLEMS INVOLVED IN THE USE OF MASSIVE OFFSHORE ENGINEERING STRUCTURES DESIGNED TO EXPLOIT EITHER RESERVES OF COAL, OIL, AND GAS FROM BELOW THE SEABED OR THE SO-CALLED BENIGN ENERGY SOURCES RESULTING FROM THE NATURALLY OCCURRING SOLAR, LUNAR OR WIND FORCES. FOR ALL SUCH STRUCTURES, EXPOSED THROUGHOUT THEIR USEFUL LIFE TO THE SEVERE ENVIRONMENTAL EFFECTS OFFSHORE, THE NATURAL CONSTRUCTION MATERIAL IS EITHER REINFORCED OR PRESTRESSED CONCRETE. THE CONSTRUCTIONAL PROCEDURES DISCUSSED INCLUDE THE USE OF CONCRETE CAISSON STRUCTURES, FLOATED INTO THE PLACE AND BALLASTED DOWN ONTO THE SEABED OR ALTERNATIVELY MOORED IN A PERMANENTLY FLOATING MODE, AND THE USE OF METHODS BASED ON CONSTRUCTION INSHORE AND INTEGRATION OF EXTENSIVE MECHANICAL AND ELECTRICAL EQUIPMENT IN SHELTERED WATERS, BEFORE TOWING TO THEIR OFFSHORE LOCATIONS.

79-0021 DESHMUKH R G, RAMAKUMAR R
PROBABILITY MODELS FOR WIND-ELECTRIC CONVERSION SYSTEMS AND THEIR APPLICATION TO RELIABILITY STUDIES.
IEEE POWER ENG. SOC., WINTER MEETING, PREPRINT, NEW YORK, FEBRUARY 4-9, 1979. NEW YORK, IEEE, PAP. A79036-5, 1979. 8 P.

AS THE PENETRATION OF WIND-ELECTRIC CONVERSION SYSTEMS (WECS) INTO COMMERCIAL UTILITY GRIDS INCREASES, THEIR INFLUENCE ON THE OVERALL SYSTEM RELIABILITY ASSUMES IMPORTANCE. THIS PAPER DISCUSSES THE DEVELOPMENT OF A PROBABILISTIC APPROACH FOR MODELING THE LOSS OF WIND GENERATION CAPACITY DUE TO THE INHERENT VARIABILITY OF THE WIND INPUT. IT IS BASED ON READILY AVAILABILE PARAMETERS SUCH AS THE MEAN AND/OR VARIANCE OF THE WIND SPEED. THE MODEL IS THEN APPLIED TO STUDY THE WIND GENERATION AVAILABILITY AND THE RELIABILITY OF WECS OPERATING IN PARALLEL WITH CONVENTIONAL GENERATORS SUPPLYING A COMMON LOAD. THE RESULTS OBTAINED ARE DISCUSSED AND SOME CONCLUSIONS ARE DRAWN REGARDING THE RELIABILITY OF WIND-ASSISTED UTILITY SYSTEMS.

79-0022 DIXON J C
LOAD MATCHING EFFECTS ON WIND ENERGY CONVERTER PERFORMANCE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 418-421.

INVESTIGATED ARE THE CAUSES OF THE LOW EFFICIENCY OF WIND PUMPS AND OUTLINED ARE AREAS FOR DEVELOPMENT. IT IS SUGGESTED THAT THE LOW EFFICIENCY IS LARGELY THE RESULT OF POOR LOAD MATCHING OF THE TYPICAL RECIPROCATING PUMP. IMPROVEMENT OF THIS LOAD MATCHING OFFERS MUCH MORE POTENTIAL FOR IMPROVEMENT IN PERFORMANCE THAN AERODYNAMIC REFINEMENT OF THE ROTOR.

79-0023 DORNBERG J
DANISH AMATEURS BUILD THE WORLD'S BIGGEST WINDMILL.
POP. MECH. 214(1): 80-84, JANUARY 1979.

THE 2000-KW WINDMILL AT TVIND COLLEGE IN DENMARK IS DESCRIBED.

79-0024 DORNER H
WIND ENERGY-EXPERIENCES AND DEVELOPMENTS.
ELEKTROTECH. Z. 100(2): 75-79, JANUARY 1979. (IN GERMAN)

THIS IS A RESUME OF A 1978 CONFERENCE ON THE SUBJECT OF THE UTILISATION OF WIND ENERGY. THE DAILY TASK, FOR THIS 6-DAY CONFERENCE, WAS TO PROVIDE A REVIEW OF RESEARCH ACTIVITIES FOR WIND ENERGY IN WEST GERMANY, TO EXCHANGE EXPERIENCES ON THE UTILISATION OF SUCH ENERGY, TO HIGHLIGHT SPECIFIC PROBLEMS AND TO PUT FORWARD SOLUTIONS FOR SPECIAL AREAS OF UTILISATION.

79-0025 ENERTECH 1500 ON LINE IN MI.
WIND POWER DIG. NO. 5: 22-23, SPRING 1979.

THE ENERTECH 1500, A MACHINE OFFERED BY SOLARGY, DETROIT, MICHIGAN, IS DESCRIBED.

79-0026 EWERS M H
WIND TURBINE APPARATUS.
U.S. PATENT NO. 4,134,707, JANUARY 16, 1979.

79-0027 FARMER E D, NEWMAN V G, ASHMOLE P H
THE INTEGRATION OF A COMPLEX OF WIND-DRIVEN GENERATORS INTO A POWER SYSTEM.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 385-389.

TECHNICAL AND ECONOMIC PROBLEMS, RELATING TO DYNAMICAL RESPONSE, SYSTEM OPERATION AND PLANNING, THAT WOULD REQUIRE EVALUATION IF A SUBSTANTIAL COMPLEX OF WIND-DRIVEN GENERATORS WERE TO BE INTEGRATED INTO A POWER SYSTEM ARE IDENTIFIED. AN ARRAY OF MACHINES IS CONSIDERED WITH A TOTAL OUTPUT IN A RANGE BETWEEN SEVERAL HUNDRED AND A FEW THOUSAND MEGAWATTS. ALTHOUGH THE DECISIVE QUESTIONS WOULD RELATE TO CAPITAL COST, STRUCTURAL INTEGRITY AND AMENITY, THE ECONOMIC VALUE OF THE DERIVED ENERGY WOULD BE SIGNIFICANTLY INFLUENCED BY THE OPERATIONAL REQUIREMENTS OF INCREASED SPARE CAPACITY AND PLANT FLEXIBILITY. THE OPERATIONAL PROBLEMS WOULD DERIVE FROM TWO PRINCIPAL CAUSES, NAMELY, THE VARIABLE AND UNCERTAIN NATURE OF THE WIND AND THE REMOTENESS OF SUITABLE GENERATION SITES FROM THE MAIN CENTRES OF DEMAND.

79-0028 FIELD EVALUATION INITIATED.
WIND POWER DIG. NO. 15: 21, SPRING 1979.

79-0029 FIGARD R L, SCHETZ J A
STUDIES OF THE AERODYNAMIC PERFORMANCE OF A 10 KW HORIZONTAL-AXIS WINDMILL.
J. ENERGY 3(1): 3-7, JANUARY-FEBRUARY, 1979.

THE AERODYNAMIC PERFORMANCE OF A MODERN, HIGH-TIP SPEED, THREE-BLADED WINDMILL RATED AT 10KW AT 30 MPH WAS STUDIED BY THREE METHODS. FIRST, THE RESULTS OF FIELD TESTS OF THE ACTUAL DEVICE WITH BOTH A RESISTIVE AND A BATTERY-CHARGING ELECTRIC LOAD ARE REPORTED. SECOND, THE PREDICTIONS OF A SIMPLE BLADE-ELEMENT ANALYSIS ARE PRESENTED AND COMPARED WITH THE FIELD DATA. AERODYNAMIC BLADE SECTION COEFFICIENTS OF AN ACTUAL BLADE SECTION WERE MEASURED IN A WIND TUNNEL AND USED AS INPUT IN THE ANALYSIS. THIRD, WIND TUNNEL TEST RESULTS FOR A 1/5TH SCALE MODEL ARE GIVEN. REYNOLDS NUMBER SIMULATION FROM MODEL TO PROTOTYPE IS CONSIDERED IN DETAIL. THE RESULTS OF ALL THREE EFFORTS ARE COMPARED, AND GOOD AGREEMENT IS SHOWN.

79-0030 FITZPATRICK E R
CONCENTRATED ALTERNATOR DESIGN.
ALTERN. SOURCES ENERGY NO. 38: 18-19, JULY/AUGUST 1979.

THIS WINDING DESIGN WILL SHOW YOU HOW TO OBTAIN THE GREATEST OUTPUT FOR A GIVEN NUMBER OF STATOR TURNS, FIELD FLUX, AND SPEED. THIS DESIGN HAS MANY ADVANTAGES: 1. EASY TO OBTAIN A SUITABLE FRAME; 2. SIMPLE TO REWIND;

3. HIGH OUTPUT AT LOW RPM; 4. SIMPLE MACHINE-SHOP WORK; AND 5. THREE-PHASE PRINCIPLE FOR HIGH EFFICIENCY.

79-0031 FRERIS L L, BOLTON H, BEUHRING I K, NICODEMOU V C
A LOW COST WIND ENERGY CONVERSION SYSTEM FOR HEATING OF DOMESTIC PREMISES.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 282-285.

AN ATTEMPT IS MADE TO DEMONSTRATE THAT IF A NUMBER OF CONDITIONS ARE FULFILLED AND ON THE BASIS OF CERTAIN ASSUMPTIONS, AN ECONOMICALLY VIABLE CASE CAN BE MADE FOR SMALL SCALE WIND ENERGY EXPLOITATION.

79-0032 FRANK A
FRESH BREEZE IN THE PRIVATE SECTOR.
SOLAR AGE 4(7): 41-42, JULY 1979.

PRIVATE WIND ENERGY RESEARCH IS COVERED.

79-0033 FROST W, TURNER R E
SUMMARY OF ATMOSPHERIC WIND DESIGN CRITERIA FOR WIND ENERGY CONVERSION SYSTEM DEVELOPMENT.
NTIS, JANUARY 1979. 54 P.
NASA-TP-1389

THIS REPORT PRESENTS BASIC DESIGN VALUES OF SIGNIFICANT WIND CRITERIA, IN GRAPHICAL FORMAT, FOR USE IN THE DESIGN AND DEVELOPMENT OF WIND TURBINE GENERATORS FOR ENERGY RESEARCH. IT IS A CONDENSED VERSION OF PORTIONS OF THE "ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT," NASA-TP-1359, 1978.

79-0034 GIPE P
CLOWNING AROUND AT DORNEY PARK; TERRY MEHRKAM INSTALLS HIS FIRST 250 KW WIND MACHINE.
WIND POWER DIG. NO. 15: 39-43, SPRING 1979.

TERRY MEHRKAM INSTALLED A 250 KW WIND MACHINE AT PENNSYLVANIA'S DORNEY PARK. THE MACHINE IS EXPECTED TO SUPPLY 20 PERCENT OF THE AMUSEMENT PARK'S ELECTRICITY NEEDS.

79-0035 GIPE P
DAKOTA SUN + WIND, MAKING A GOOD MACHINE BETTER.
WIND POWER DIG. NO. 15: 13-14, SPRING 1979.

THE SMALL MACHINE BUILT BY DAKOTA SUN + WIND IS DESCRIBED.

79-0036 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD/OA 200-KW WIND TURBINE.
NTIS, 1979. 30 P.
NASA-TM-79084, N79-20494, DOE/NASA/1004-79/1

THE MOD-OA 200 WIND TURBINE WAS DESIGNED AND FABRICATED AS PART OF THE FEDERAL WIND ENERGY PROGRAM. EARLY WIND TURBINE OPERATION AND PERFORMANCE DATA WERE OBTAINED WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. THE MOD-OA WIND TURBINE WAS TURNED OVER TO THE TOWN OF CLAYTON LIGHT AND WATER PLANT, CLAYTON, NM, FOR UTILITY OPERATION AND ON DECEMBER 31, 1978, THE MACHINE HAD COMPLETED TEN MONTHS OF UTILITY OPERATION. THE MACHINE IS DESCRIBED AND THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM IS DOCUMENTED.

79-0037 GUSTAVSON M R
LIMITS TO WIND POWER UTILIZATION.
SCIENCE 204(4388): 13-17, APRIL 6, 1979.

AS WIND ENERGY RECEIVES INCREASING ATTENTION IT IS IMPORTANT TO UNDERSTAND THE NONECONOMIC FACTORS LIMITING THE TOTAL POWER THAT CAN BE EXTRACTED FROM THE WIND. THESE FACTORS ARE EXAMINED HERE WITH A MACROSCOPIC APPROACH. POSSIBLE LEVELS FOR THE CONTINENTAL UNITED STATES ARE DEFINED. SOME GENERAL CONCLUSIONS ARE REACHED REGARDING THE SITES THAT WOULD HAVE TO BE UTILIZED TO ACHIEVE THESE LEVELS. EVEN WITHIN THESE LIMITS, WIND ENERGY IS SEEN TO OFFER A POTENTIAL FAR LARGER THAN

MANY OTHER SELF-RENEWING ENERGY SOURCES.

79-0038 HANLON J
VISITING WINDMILLS IN WALES.
NEW SCI. 76(1075): 216-218, OCTOBER 27, 1979.

EXHIBITS AT THE CENTRE FOR ALTERNATIVE TECHNOLOGY IN WALES INCLUDE: AN ENTIRE LOW ENERGY HOUSE, A SOLAR COLLECTOR, THREE WINDMILLS, FISH CULTURE, ORGANIC GARDENS, AND A DO-IT-YOURSELF COMPOST BIN.

79-0039 HANSEN A C
EFFECTS OF TURBULENCE ON WIND TURBINE PERFORMANCE.
ASCE CONVENTION + EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3537.
17 P.

SMALL WIND TURBINE GENERATOR TESTING AND DESIGN HAVE TRADITIONALLY NEGLECTED UNSTEADINESS IN THE WIND WHENEVER POSSIBLE. PRIMARILY FOR SIMPLIFICATION, STEADY-STATE CONDITIONS HAVE BEEN SOUGHT IN TESTING AND DESIGN ANALYSES HAVE ASSUMED STEADY OR QUASI-STEADY WIND CONDITIONS. THOUGH THIS PATTERN HAS BEEN CHANGING IN THE PAST FEW YEARS TOWARDS RECOGNITION OF THE NEED TO PROPERLY TREAT TURBULENCE EFFECTS, MUCH EFFORT REMAINS IN IDENTIFYING NEEDS AND METHODS IN BOTH TESTING AND DESIGN. SMALL WIND ENERGY CONVERSION SYSTEM (SWECS) RESEARCH ACTIVITIES MANAGED BY ROCKWELL INTERNATIONAL FOR THE DEPARTMENT OF ENERGY ARE ACTIVELY SEEKING TO DETERMINE THE EFFECTS AND IMPORTANCE OF TURBULENCE ON SYSTEM PERFORMANCE AND COSTS. THE PURPOSE OF THIS PAPER IS TO DESCRIBE EFFORTS UNDERWAY AND PRELIMINARY FINDINGS OF THE STUDY OF TURBULENCE EFFECTS. MORE SPECIFICALLY, THE PAPER WILL DESCRIBE RANDOM DATA ANALYSIS METHODS IN USE AT THE WIND SYSTEMS TEST CENTER AND THE EFFECTS OF TURBULENCE ON STRUCTURAL DESIGN IN NINE SUBCONTRACTED PROTOTYPE DEVELOPMENTS.

79-0040 HARLEY R G, BEN-DOV E
WIND ENERGY CONVERSION AND HYDROGEN PRODUCTION A FEASIBILITY STUDY FOR SOUTH AFRICA.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 273-276.

THIS PAPER DESCRIBES A FEASIBILITY STUDY INTO THE USE IN SOUTH AFRICA OF THREE DIFFERENT WIND ENERGY CONVERSION (WEC) SCHEMES: WEC GENERATES AC POWER AND IS SYNCHRONIZED TO AN ELECTRIC UTILITY GRID WHICH HAS ENERGY STORAGE CAPACITY SUCH AS PUMPED WATER STORAGE FOR EXAMPLE; A SCHEME SIMILAR TO SCHEME 1, BUT THE GRID HAS NO STORAGE CAPACITY; WEC GENERATED DC POWER IS USED IN AN ELECTROLYSIS MODE TO GENERATE HYDROGEN.

79-0041 HIGH KW WIND POWER PUT TO TEST.
ENG-NEWS REC. 203(3): 17, JULY 19, 1979.

THIS NEWS ARTICLE DESCRIBES THE 2,000 KW TURBINE CONSTRUCTED BY GE FOR DOE IN BOONE, N.C. ALSO MENTIONED IS A PLANNED 3,000 KW TURBINE TO BE BUILT IN SWEDEN.

79-0042 HINRICHSEN E N
INDUCTION AND SYNCHRONOUS MACHINES FOR VERTICAL AXIS WIND TURBINES. FINAL REPORT.
NTIS, JUNE 1979. 121 P.
SAND-79-7017

THIS REPORT DESCRIBES THE BEHAVIOR OF SYNCHRONOUS AND INDUCTION GENERATORS DRIVEN BY VERTICAL AXIS WIND TURBINES AND ASSESSES THE MERITS OF THE TWO TYPES OF MACHINES. MAJOR ADVANTAGES OF THE SYNCHRONOUS GENERATOR ARE REACTIVE POWER CONTROL AND GENERAL ACCEPTANCE BY UTILITY COMPANIES. THE MAJOR ADVANTAGE OF THE INDUCTION GENERATOR IS EXCELLENT DAMPING OF TORQUE PULSATIONS. THERE IS NO SIGNIFICANT DIFFERENCE IN STARTING ABILITY, EFFICIENCY, OR VOLTAGE RIPPLE.

79-0043 HOWELL Y, BERENY J A
ENGINEER'S GUIDE TO SOLAR ENERGY.
NTIS, FEBRUARY 1979. 330 P.
PB-297043

THE ENGINEER'S GUIDE TO SOLAR ENERGY IS DESIGNED TO ENABLE PROFESSIONALS IN ANY FIELD OF ENGINEERING, ARCHITECTS, BUILDERS, AND TRADESMEN TO DEVELOP A WORKING KNOWLEDGE OF SOLAR HEATING TECHNOLOGY. IT IS ALSO

DESIGNED TO SERVE AS A BASIC TEXTBOOK TO INTRODUCE COLLEGE STUDENTS TO THE FIELD OF SOLAR ENERGY.

79-0044 HSU C T
COMMENT ON "WIND POWER LIMITATIONS ASSOCIATED WITH VORTICES."
J. ENERGY 3(2): 127-128, MARCH-APRIL 1979.

HSU CRITICIZES TWO ARTICLES BY J. L. LOTH APPEARING IN EARLIER ISSUES OF JOURNAL OF ENERGY. LOTH RESPONDS.

79-0045 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, JULY 1979. 316 P.
NTIS/PS-79/0639

CITATIONS TO BIBLIOGRAPHIES, STATE-OF-THE-ART REVIEWS, AND LITERATURE SURVEYS ON VARIOUS ASPECTS OF FOSSIL FUELS, WIND, SOLAR ENERGY, HYDROGEN, GEOTHERMAL ENERGY, NUCLEAR ENERGY, AND BATTERIES ARE PRESENTED. A FEW CITATIONS PERTAIN TO ELECTRIC POWER.

79-0046 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). VOL. 2. 1978-APRIL, 1979.
NTIS, JUNE 1979. 131 P.
NTIS/PS-79/0536

UPDATES 78-0106 (NTIS/PS-78/0417).

79-0047 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). VOL. 1. 1970-1977.
NTIS, JUNE 1979. 225 P.
NTIS/PS-79/0535

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR.

79-0048 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL. 2. 1977-APRIL 1979.
NTIS, JUNE 1979. 282 P.
NTIS/PS-79/0534

SUPERCEDES 78-0108 (NTIS/PS-78/0416). UPDATES 78-0107 (NTIS/PS-78/0415).

79-0049 IGRA O
COST-EFFECTIVENESS OF THE VORTEX-AUGMENTED WIND TURBINE.
ENERGY 4(1): 110-130, FEBRUARY 1979.

COST ESTIMATES FOR THE CONVENTIONAL, HORIZONTAL-AXIS, WIND TURBINE AND FOR THE VORTEX-AUGMENTED WIND TURBINE ARE PRESENTED. FOR THE LATTER, THE VORTEX IS GENERATED BY AN APPROPRIATE DELTA WING. IT IS SHOWN THAT THE VORTEX-AUGMENTED WIND TURBINE COMPETES WELL WITH THE CONVENTIONAL TYPE. ITS ECONOMICAL ADVANTAGE INCREASES WITH INCREASING OUTPUT POWER.

79-0050 IGRA O
WIND DRIVEN ENERGY GENERATING DEVICE.
U.S. PATENT NO. 3,132,499, JANUARY 21, 1979.

THIS PATENT IS FOR A WIND-DRIVEN ENERGY GENERATING DEVICE COMPRISING A TURBINE INCLUDING WIND-DRIVEN ROTOR BLADES, AND A SHROUD ENCLOSING SAME; SAID SHROUD INCLUDING A THROAT WITHIN WHICH THE WIND-DRIVEN ROTOR BLADES ARE MOUNTED FOR ROTATION, AN INTAKE SECTION UPSTREAM OF AND HAVING AN INNER FACE CONVERGING TOWARDS THE THROAT, A DIFFUSER SECTION DOWNSTREAM OF AND HAVING AN INNER FACE DIVERGING AWAY FROM THE THROAT, AND BOUNDARY LAYER CONTROL MEANS TO PREVENT PREMATURE AIR SEPARATION ALONG THE INNER SURFACE OF THE DIFFUSER SECTION; SAID BOUNDARY LAYER CONTROL MEANS INCLUDING A PLURALITY OF AIR CHANNELS FORMED THROUGH THE SHROUD LEADING FROM AN EXTERNAL SURFACE OF THE SHROUD TO THE INTERNAL SURFACE OF ITS DIFFUSER SECTION FOR INJECTING A FLOW OF AIR OF HIGH KINETIC ENERGY FROM THE AIRSTREAM EXTERNAL OF THE SHROUD TO THE BOUNDARY LAYER OF THE AIRSTREAM WITHIN THE DIFFUSER SECTION OF THE SHROUD.

79-0051 AN INFORMAL DIRECTORY OF THE WIND ENERGY INDUSTRY.

MOTHER EARTH NEWS NO. 58: 94-95, JULY/AUGUST 1979.

THIS DIRECTORY WAS COMPILED BY MIKE EVANS OF "WIND POWER DIGEST".

79-0052 INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979.

THE FOLLOWING TOPICS WERE DEALT WITH: RENEWABLE ENERGY RESOURCES; ENERGY STORAGE; WAVE POWER GENERATION; WIND POWER SYSTEMS; WIND TURBINES; FLUIDISED BED COMBUSTION; SOLAR POWER SYSTEMS; TIDAL POWER SYSTEMS; COMPRESSED AIR STORAGE; SECONDARY CELLS; MAGNETOHYDRODYNAMIC GENERATION; COMBINED CYCLE POWER PLANTS; AND ENERGY ECONOMICS. 62 PAPERS WERE PRESENTED, ALL OF WHICH ARE PUBLISHED IN FULL IN THE PRESENT PROCEEDINGS.

79-0053 JOHNSON G T
EVALUATION OF SCHEMES FOR ESTIMATING SURFACE-WIND STRENGTH.
ATMOS. ENVIRON. 13(4): 437-442, 1979.

THREE METHODS OF ESTIMATING LOCAL SURFACE-WIND STRENGTH ON THE BASIS OF REMOTE MEASUREMENTS ARE COMPARED AGAINST ACTUAL MEASUREMENTS AT UP TO 12 PLACES IN THE SYDNEY REGION. THE METHODS INVOLVE (1) ASSUMING A UNIFORM WIND IN THE REGION (EQUAL TO THAT AT OBSERVATORY HILL), (2) SCALAR INTERPOLATION BETWEEN VALUES MEASURED BY THE NEAREST INSTRUMENTS, OR (3) VECTOR INTERPOLATION. FOR EACH METHOD, ADDITIONAL CLIMATOLOGICAL INFORMATION IS THEN PROVIDED IN TERMS OF LINACRE'S CONCEPT OF THE "WINDINESS RATIO", THE LOCAL WIND STRENGTH AS A FRACTION OF THAT AT A REFERENCE STATION. COMPARISONS FOR EACH HOUR OF FOUR SELECTED DAYS SHOW THAT THE ESTIMATES OF EACH METHOD ARE IMPROVED BY USING THIS INFORMATION. THIS SUGGESTS THAT THE WINDINESS CONCEPT MAY BE USEFUL IN SPECIFYING WIND FIELDS, ESPECIALLY IN COMPLICATED TOPOGRAPHY.

79-0054 KABAKER G
THE FUTURE OF OUR ENERGY SUPPLY.
ELEKTROTECH. Z. 100(7-8): 344-345, APRIL 1979. (IN GERMAN)

THE ARTICLE SUMMARISES, FROM THE W. GERMAN POINT OF VIEW, THE NOW COMMONLY HELD OPINION THAT NUCLEAR ENERGY IS THE ONLY PRACTICABLY AVAILABLE LARGE-SCALE ENERGY RESOURCE FOR THE MORE OR LESS IMMEDIATE FUTURE. GASIFICATION OF COAL WILL BECOME IMPORTANT BY THE YEAR 2000. OF ALTERNATIVE SOURCES ONLY METHANE PRODUCTION FROM WASTE AND WIND POWER SEEM LIKELY TO BE OF ANY USE TO W. GERMANY. SOME FIGURES ON ENERGY DENSITY IN VARIOUS ENERGY STORAGE MEDIA ARE GIVEN.

79-0055 KAHN E
RELIABILITY OF DISTRIBUTED WIND GENERATORS.
ELECTR. POWER SYST. RES. 2(1): 1-14, MARCH 1979.

THIS PAPER EXPLORES THE DATA AND MODELS NECESSARY TO EVALUATE THE RELIABILITY OF WIND GENERATORS THAT ARE GEOGRAPHICALLY DISTRIBUTED IN A UTILITY SYSTEM. A CASE STUDY IS CONDUCTED USING CALIFORNIA DATA. RESULTS ON CAPACITY CREDIT ARE FOUND TO DEPEND UPON THE SIZE OF THE REGION, THE RELIABILITY OF THE WIND REGIME, THE EXISTING POWER SYSTEM GENERATOR MIX, AND THE PENETRATION OF THE WIND GENERATORS.

79-0056 KATZENBERG R
WHERE ARE THE DALLAS COWGIRLS WHEN WE NEED THEM?
WIND POWER DIG. NO. 16: 5-7, SUMMER 1979.

THE TECHNOLOGY AND POTENTIAL ARE PROVEN. WHAT WIND ENERGY NEEDS IS A "CHEERLEADER"; SOMEONE, PREFERABLY FROM DOE, WHO WILL STAND UP AND SPEAK FOR IT AS A GOOD BET FOR A COST-EFFECTIVE, NEAR-TERM, LARGE SCALE ENERGY SOURCE.

79-0057 KAZA K R V, JANETZKE D C, SULLIVAN T L
EVALUATION OF MOSTAS COMPUTER CODE FOR PREDICTING DYNAMIC LOADS IN TWO BLADED WIND TURBINES.
NTIS, 1979. 21 P.
NASA-TM-79101, DOE/NASA/1028-72/2, N79-21549

CALCULATED DYNAMIC BLADE LOADS WERE COMPARED WITH MEASURED LOADS OVER A

RANGE OF YAW STIFFNESSES OF THE DOE/NASA MOD-0 WIND TURBINE TO EVALUATE THE PERFORMANCE OF TWO VERSIONS OF THE MOSTAS COMPUTER CODE. THE FIRST VERSION USES A TIME-AVERAGED COEFFICIENT APPROXIMATION IN CONJUNCTION WITH A MULTI-BLADE COORDINATE TRANSFORMATION FOR TWO BLADED ROTORS TO SOLVE THE EQUATIONS OF MOTION BY STANDARD EIGENANALYSIS. THE SECOND VERSION ACCOUNTS FOR PERIODIC COEFFICIENTS WHILE SOLVING THE EQUATIONS BY A TIME HISTORY INTEGRATION. A HYPOTHETICAL THREE-DEGREE OF FREEDOM DYNAMIC MODEL WAS INVESTIGATED. THE EXACT EQUATIONS OF MOTION OF THIS MODEL WERE SOLVED USING THE FLOQUET-LIPUNOV METHOD. THE EQUATIONS WITH TIME-AVERAGED COEFFICIENTS WERE SOLVED BY STANDARD EIGENANALYSIS.

79-0058 KETNER K
WIND CHARGERS: SMALL CAN BE BEAUTIFUL.
ALTERN. SOURCES ENERGY NO. 38: 24-29, JULY/AUGUST 1979.

THE AUTHOR PROVIDES SUGGESTIONS FOR THE "WIND-POWER ROOKIE" WHO IS TRYING TO REJUVENATE ONE OF THE OLDER SMALL WIND MACHINES SO COMMON IN THE 30'S AND 40'S.

79-0059 KNOX J B
LLL WIND ENERGY STUDIES (OAHU).
NTIS, JANUARY 1979. 21 P.
CONF-781239-1, UCRL-82171

THE ROLE IN THE NATIONAL WIND ENERGY PROGRAM ASSIGNED TO LLL IS THE DEVELOPMENT AND VERIFICATION OF A SITE SCREENING METHODOLOGY FOR WIND ENERGY RESOURCES. THE SITE SCREENING METHODOLOGY AND THE OAHU STUDIES OF THE PAST THREE YEARS INCLUDE: (A) 3-DIMENSIONAL, DIAGNOSTIC FLOW SIMULATION OVER COMPLEX TERRAIN, (B) MODERN STATISTICAL TECHNIQUES OF PATTERN RECOGNITION ADAPTED TO REGIONAL WIND FIELDS, AND (C) REMOTE SENSING OF ATMOSPHERIC WIND FIELD BY LASER SCINTILLATION. BY APRIL 1979, THE LLL TEAM WILL PROVIDE THE DOE WITH A SUITABLE SITE SCREENING METHODOLOGY FOR WIND ENERGY, AND A SIGNIFICANT DATA BASE OF TWO YEARS DURATION FOR THE ISLAND OF OAHU INCLUDING SPECIAL WIND STATIONS ON THE KAENA AND KAHUKU SUBAREAS, AND EIGHT STATIONS SELECTED FROM THE UNIVERSITY OF HAWAII STUDIES. SOME OF THE SIGNIFICANT RESULTS OF THESE STUDIES ARE PRESENTED.

79-0060 LEONARD T M
A USER'S MANUAL FOR THE COMPUTER CODE PAREP.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, APRIL 1979. 56 P.
SAND-79-0431

THIS REPORT DISCUSSES PAREP (PARAMETRIC REPRESENTATION), A COMPUTER CODE THAT USES NUMERICAL AND EMPIRICAL DATA TO ESTIMATE THE AERODYNAMIC PERFORMANCE OF DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES. BOTH PROGRAM THEORY AND USAGE ARE DESCRIBED FOR THE CODE. SAMPLE RUNS AND PROGRAM LISTINGS ARE PROVIDED.

79-0061 LET 10,000 WINDMILLS TURN.
SWEDEN NOW 13(3): 33, 1979.

A REPORT BY THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT IS DESCRIBED. THE REPORT IS ON A PROJECT WHICH USES WINDMILLS TO PROVIDE POWER TO BETWEEN 20,000 AND 40,000 ONE-AND ROW-FAMILY DWELLINGS IN SWEDEN LOCATED OUTSIDE DENSELY POPULATED AREAS IN REGIONS HAVING WINDY CONDITIONS.

79-0062 LIEBLEIN S, ROSS R S, FERTIS D G
EVALUATION OF URETHANE FOR FEASIBILITY OF USE IN WIND TURBINE BLADE DESIGN.
NTIS, APRIL 1979. 156 P.
NASA-CR-159530, DOE/NASA/7653-79/1, N79-20497/OST

A PRELIMINARY EVALUATION WAS CONDUCTED OF THE USE OF CAST URETHANE AS A POSSIBLE MATERIAL FOR LOW-COST BLADES FOR WIND TURBINES. SPECIMEN TEST DATA ARE PRESENTED FOR ULTIMATE TENSILE STRENGTH, ELASTIC MODULUS, FLEXURAL STRAIN, CREEP, AND FATIGUE PROPERTIES OF A NUMBER OF URETHANE FORMULATIONS. DATA ARE ALSO INCLUDED FOR A LARGE-SCALE URETHANE BLADE SECTION COMPOSED OF CAST SYMMETRICAL HALF-PROFILES TESTED AS A CANTILEVER BEAM. BASED ON THESE RESULTS, AN ANALYSIS WAS CONDUCTED OF A FULL-SCALE BLADE DESIGN OF CAST URETHANE THAT MEETS THE DESIGN SPECIFICATIONS OF THE ROTOR BLADES FOR THE NASA/DOE EXPERIMENTAL 100-KW MOD-0 WIND TURBINE.

BECAUSE OF THE LOW VALUE OF ELASTIC MODULUS FOR URETHANE (AROUND 457,000 PSI), THE DESIGN LOADS WOULD HAVE TO BE CARRIED BY METAL REINFORCEMENT. CONSIDERATIONS FOR FUTURE EVALUATION ARE NOTED.

79-0063 LITTLER J G F, THOMAS R B
WIND POWER FOR DOMESTIC USE IN THE UNITED KINGDOM.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 313-316.

DISCUSSED IS THE CAMBRIDGE AUTARKIC HOUSING PROJECT ON THE SERVICING OF DWELLINGS WITH LITTLE OR NO NETWORK ENERGY. THE INVESTIGATION HAS REVEALED THE GREAT EXPENSE OF PROVIDING ALL HOUSEHOLD ELECTRICITY WITHOUT RELIANCE ON THE NATIONAL GRID, IN THE CASE OF EITHER ONE HOUSE OR EVEN A GROUP OF HOUSES; HOWEVER, THE COST OF USING WIND POWER FOR SPACE AND WATER HEATING IS CONSIDERABLY LESS. IN ADDITION TO DESCRIBING THE WIND TURBINE TO BE USED AT CAMBRIDGE, THE APPROACH USED IN OPTIMISING THE DIVISION OF EXPENDITURE OF THERMAL STORAGE AND WIND TURBINE SIZE WHEN CONSIDERING THE USE OF WIND POWER FOR SPACE AND WATER HEATING IS SUMMARISED.

79-0064 MCCONNELL R D
GIROMILL OVERVIEW.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, 1979. 12 P.
SERI/TP-35-263

THE GIROMILL IS A VERTICAL AXIS WIND TURBINE HAVING STRAIGHT AIRFOILS WHOSE ANGLES OF ATTACK ARE CONTROLLED SO AS TO MAXIMIZE WIND ENERGY CONVERSION. EACH AIRFOIL IS ROCKED DURING A REVOLUTION IN ORDER TO MAINTAIN A CONSTANT POSITIVE ANGLE OF ATTACK OVER ONE HALF REVOLUTION AND A CONSTANT NEGATIVE VALUE OVER THE OTHER HALF REVOLUTION. MCDONNELL AIRCRAFT COMPANY COMPLETED A FEASIBILITY STUDY OF THE GIROMILL IN 1976. THEIR INITIAL WORK WAS FOLLOWED BY MODEL TESTS IN A WIND TUNNEL IN 1976 AND 1977. PRESENTLY THE PUMP DIVISION OF VALLEY INDUSTRIES, INC., IS COOPERATING WITH MCDONNELL AIRCRAFT TO DESIGN, BUILD, AND DELIVER A 40-KW (8.9-M/S) GIROMILL FOR THE U.S. DEPARTMENT OF ENERGY. DELIVERY TO ROCKY FLATS IS SCHEDULED FOR THE END OF 1979. IN ADDITION TO DESCRIBING THE ABOVE WORK, THIS PAPER PRESENTS AN EVALUATION OF THE GIROMILL CONCEPT IN TERMS OF SOME WIND ENERGY RULES-OF-THUMB.

79-0065 MCDERMOTT J
NYC'S ENERGY TASK FORCE.
ALTERN. SOURCES ENERGY NO. 38: 20-23, JULY/AUGUST 1979.

79-0066 MCGILL S
WIND-POWERED DAIRYING.
FURROW 84(7): 14-15, SEPTEMBER/OCTOBER 1979.

TWO IDEAS THAT COULD SAVE ON ENERGY COSTS AT SOME DAIRY FARMS ARE: (1) USE WIND POWER TO HELP COOL THE MILK AND WARM THE WASH WATER. LET IT GENERATE SUPPLEMENTAL ELECTRIC POWER THAT CAN BE HOOKED INTO EXISTING ELECTRIC CIRCUITS. (2) MAKE USE OF WASTE HEAT FROM THE COOLER'S CONDENSER. ENGINEERS AND DAIRY SCIENTISTS ARE TESTING THESE IDEAS IN THE 120-COW DAIRY AT COLORADO STATE UNIVERSITY.

79-0067 MARIER D
WHAT'S AVAILABLE IN WIND EQUIPMENT.
ALTERN. SOURCES ENERGY NO. 38: 3-8, JULY/AUGUST 1979.

THIS ARTICLE IS A GUIDE TO AVAILABLE EQUIPMENT IN THE WIND ENERGY FIELD, AND DEALS SPECIFICALLY WITH SYNCHRONOUS INVERTERS, INDUCTION GENERATORS, AND SEVERAL COMPANIES: ENERTECH, WIND ENGINEERING, DYNERGY, ASTRAL-WILCON. INCLUDED IS AN EXTENSIVE LIST OF COMMERCIALLY AVAILABLE WIND MACHINES GIVING THE FOLLOWING INFORMATION FOR EACH: SIZE (RATED KW), ROTOR DIAMETER (FEET), NUMBER OF BLADES, RATED SPEED (MPH) AND CUT-IN SPEED (MPH). ALSO INCLUDED IS A LIST OF MANUFACTURERS WITH ADDRESSES.

79-0068 MARSH W D, SCHACHLE C, SCHEFFLER R L, DUNNING R L
WIND ENERGY AND UTILITIES, EXCERPTS FROM THE PROCEEDINGS OF THE NATIONAL AWEA MEETING, AMARILLO, TEXAS.
WIND POWER DIG. NO. 16: 30-36, SUMMER 1979.

EXCERPTS ARE PRESENTED FROM THREE PAPERS: (1) WIND POWER IN ELECTRIC UTILITIES, BY W.D. MARSH; (2) SOUTHERN CALIFORNIA EDISON'S 3 MW WIND

79-0069 MENSFORTH T
WINDPOWER GENERATION ON A LARGE SCALE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 268-272.

A GENERAL DESCRIPTION OF A 10 MW WINDMILL IS PRESENTED, PARTICULAR ATTENTION BEING PAID TO THE ROTOR DESIGN. THE INFLUENCE OF WIND-HEIGHT PROFILES IS DISCUSSED, CONSIDERING VARIOUS TYPES OF SITES, OPTIMAL GROUND CLEARANCE AND ACCURACY OF PERFORMANCE ESTIMATES.

79-0070 MOD-1 TURBINE ON-LINE.
WIND POWER DIG. NO. 16: 15, SUMMER 1979.

COMPLETION OF THE 200 FOOT DIAMETER MOD-1 TURBINE INSTALLED NEAR BOONE, N.C., IS REPORTED.

79-0071 MOORE D J
DEPLETION OF AVAILABLE WIND POWER BY A LARGE NETWORK OF WIND GENERATORS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 302-305.

A ROUGH EMPIRICAL TECHNIQUE IS DEVELOPED TO DETERMINE THE MAGNITUDE OF THE DEPLETION OF THE HUB LEVEL WIND BY THE SHADOWING EFFECT OF UPSTREAM GENERATORS. THE PROBLEMS OF FETCHES OF ORDER TENS OF KILOMETRES IS TACKLED FIRST AND THEN THE PROBLEM OF DEPLETION OVER A DISTANCE SUCH THAT THE MEAN RATE OF POWER EXTRACTION IS NOT SERIOUSLY AFFECTED BY THE UPSTREAM GENERATORS.

79-0072 MUSGROVE P J
OFFSHORE WIND ENERGY SYSTEM FOR THE UK.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 309-312.

THIS PAPER CONSIDERS SOME OF THE MORE IMPORTANT FACTORS AFFECTING THE DESIGN OF OFFSHORE WIND ENERGY SYSTEMS. IT IS CONCLUDED THAT THE POWER DENSITIES IN OFFSHORE WINDS ARE ATTRACTIVELY HIGH, OF THE ORDER 300 KW PER LINEAR METRE (PERPENDICULAR TO THE WIND DIRECTION) OR 1500 W PER SQUARE METRE OF ROTOR SWEPT AREA. SINCE MODERN WIND TURBINES ARE EFFICIENT ENERGY CONCENTRATORS THEY HAVE A VERY SHORT ENERGY RECOVERY PERIOD-ONLY ONE YEAR. THE ECONOMICS OF OFFSHORE OPERATION STRONGLY FAVORS THE USE OF LARGE WIND TURBINES, ABOUT 100 M DIAMETER, AND A LOW RATED WIND SPEED IS ALSO ADVANTAGEOUS. A TYPICAL OFFSHORE WIND ENERGY SYSTEM MIGHT THEREFORE COMPRISE A 10*10 ARRAY OF 100 M DIAMETER WIND TURBINES, TO GIVE A CLUSTER RATING OF 600 MW AND A PLANT FACTOR (AVERAGE OUTPUT RELATIVE TO RATED OUTPUT) OF ABOUT 40 PERCENT.

79-0073 NELSON L L
WIND AND WATER: PARTNERS IN POWER.
RECLAMATION ERA 64(3): 1-7, 1979.

A PROJECT IN WYOMING TO INTEGRATE WIND ENERGY WITH HYDROELECTRIC POWER IS DESCRIBED.

79-0074 NEUSTADTER H E
THE USE OF WIND DATA WITH AN OPERATIONAL WIND TURBINE IN A RESEARCH AND DEVELOPMENT ENVIRONMENT.
NTIS, 1979. 13 P.
NASA-TM-73832

THE NEED TO MEASURE AND COLLECT WIND DATA PERSISTS WELL AFTER A WIND TURBINE IS INITIALLY MADE OPERATIONAL. THIS IS PARTICULARLY THE CASE IN AN R+D PROGRAM SUCH AS THE WIND ENERGY PROJECT BEING CONDUCTED BY LEWIS RESEARCH CENTER FOR THE DEPARTMENT OF ENERGY. THIS REPORT PRESENTS THE STATUS OF OUR USE OF WIND INFORMATION IN FOUR AREAS, NAMELY: OPERATIONAL CONTROL, DESIGN VERFICATION, POWER PERFORMANCE ANALYSIS, AND LIFETIME ESTIMATION. ATTENTION IS ALSO GIVEN TO SOME OF THE IDENTIFIED, BUT AS YET UNMET, WIND INFORMATIONAL NEEDS AND THE STEPS WE PLAN TO TAKE TO MEET THESE NEEDS.

79-0075 NEW ENERGY SAVER HARNESSES WIND.

AGRIC. RES. 27(7): 3-4, JANUARY 1979.

A DARRIEUS TURBINE IS DESCRIBED WHICH IS USED IN A "WIND-ASSISTED SYSTEM" FOR IRRIGATION PUMPING. AT LOW SPEEDS AN ELECTRIC MOTOR SUPPLIES ALL POWER TO THE PUMP. WHEN WIND SPEED EXCEEDS 13 MPH (20.8 KILOMETERS PER HOUR) THE WIND TURBINE SUPPLIES MECHANICAL POWER TO THE PUMP THEREBY REDUCING THE ELECTRICITY COST.

79-0076 NEW STORAGE SYSTEM UNDER DEVELOPMENT.
WIND POWER DIG. 16: 17, SUMMER 1979.

79-0077 NICKOLS W R
DESIGN AND CONSTRUCTION OF THE ALDBOROUGH AEROGENERATOR.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 306-308.

DESCRIBED IS THE ALDBOROUGH HORIZONTAL AXIS MACHINE WHICH IS THE LARGEST AEROGENERATOR OPERATING IN THE UK IN 1978. IT HAS BEEN CONSTRUCTED WITH THE KNOWLEDGE AND EXPERIENCE OF THE WORK CARRIED OUT IN THE FIFTIES.

79-0078 NORTHWEST SEEN HAVING FAVORABLE WEC POTENTIAL.
SOL. ENERGY INTELL. REP. 5(3): 27, JANUARY 15, 1979.

79-0079 OOI B T, DAVID R A
INDUCTION GENERATOR/SYNCHRONOUS CONDENSER SYSTEM FOR WIND TURBINE POWER.
INST. ELECTR. ENG. PROC. 126(1): 69-74, JANUARY 1979.

A NOVEL WIND-TURBINE-DRIVEN ELECTRIC POWER SYSTEM FOR ISOLATED COMMUNITIES IS DESCRIBED. THE SYSTEM CONPONENTS CONSIST OF AN INDUCTION GENERATOR AND A SYNCHRONOUS CONDENSER. THE SYNCHRONOUS CONDENSER SUPPLIES THE MAGNETISATION CURRENT TO THE INDUCTION GENERATOR. BESIDES SUPPLYING THE LOAD POWER, THE INDUCTION GENERATOR FEEDS THE SYNCHRONOUS CONDENSER WITH REAL POWER TO REPLENISH WINDAGE, FRICTION AND I/SUP 2/R LOSSES TO SUSTAIN IT AT SYNCHRONOUS SPEED. THE THEORY OF OPERATION IS GIVEN AND PREDICTIONS BASED ON IT ARE EXPERIMENTALLY VERIFIED. THE CONTROLLERS REQUIRED TO MAINTAIN REGULATED VOLTAGE AND FREQUENCY IN SPITE OF LOAD AND WIND VELOCITY CHANGES ARE INVESTIGATED. SLIP-ENERGY RECOVERY IS INVOLVED, AND PRELIMINARY TEST RESULTS ARE PRESENTED.

79-0080 OSSENBRUGEN P J, PREGENT G P, MEEKER L D
OFFSHORE WIND POWER POTENTIAL.
AMER. SOC. CIV. ENG. ENERGY DIV. J. 105(EY1): 81-92, JANUARY 1979.

THE OFFSHORE REGION HAS BEEN CITED AS A LOCATION TO CONSTRUCT WIND ENERGY CONVERSION SYSTEMS BECAUSE THIS REGION OFFERS REDUCED SURFACE DRAG; THEREFORE, HIGHER WIND SPEEDS AND GREATER WIND POWER MAY BE HARNESSED THAN ON LAND. A RESULT OF A STATISTICAL ANALYSIS OF WIND SPEED RECORDS FOR THE GULF OF MAINE REGION SHOWS THAT SIX SEASONAL WIND GROUPS CAN BE IDENTIFIED AND THAT THE GAMMA DISTRIBUTION ADEQUATELY DESCRIBES THE WIND SPEED FREQUENCY. THE RESULTS SHOW THAT FOR SIX MONTHS OF THE YEAR HIGHER WIND SPEEDS CAN BE OBTAINED OFFSHORE THAN INLAND. THE USE OF THE GAMMA DISTRIBUTION OF WIND SPEED FOR OPERATIONAL CHARACTERISTICS OF WIND TURBINES SHOW THERE IS QUESTIONABLE GAIN IN OPERATING A TURBINE IN AN OFFSHORE ENVIRONMENT. HISTORICAL WIND SPEED RECORDS OF THE BOSTON LOGAN AIRPORT, THE BOSTON LIGHTSHIP, AND DATA COLLECTED ON BOARD SHIPS THAT TRAVERSED THE GULF OF MAINE REGION WERE USED IN THE STUDY.

79-0081 PARASCHIVOIU I, BILGEN E
FREE VORTICES FROM A WING FOR WIND TURBINE SYSTEMS.
J. ENERGY 3(3): 190-192, MAY-JUNE 1979.

79-0082 PERKINS F
SUMMARY OF CURRENTLY USED WIND TURBINE PERFORMANCE PREDICTION COMPUTER CODES.
NTIS, MAY 1979. 25 P.
SERI/TR-35-225

INFORMATION ON CURRENTLY USED WIND TURBINE AERODYNAMIC/ECONOMIC PERFORMANCE PREDICTION CODES IS COMPILED AND PRESENTED. AREAS OF INTEREST TO WIND ENERGY RESEARCHERS THAT ARE NOT INCLUDED IN THE REPORTED CODES ARE IDENTIFIED. AREAS WHICH ARE WEAK IN EXPERIMENTAL SUPPORT ARE ALSO IDENTIFIED.

79-0083 PERSHING B M
PERFORMANCE OF WINDMILLS IN A CLOSELY SPACED ARRAY.
J. ENERGY 3(3): 185-187, MAY-JUNE 1979.

79-0084 PETROUSEK K
ENERGY RESOURCES AND POWER AND HEAT PRODUCTION POSSIBILITIES.
ELEKTROTECHNIK 34(2): 34-38, FEBRUARY 1979. (IN CZECHOSLOVAKIAN)

DESCRIBED IS THE NECESSITY OF DEVELOPING ALTERNATIVE ENERGY RESOURCES DUE TO THE FAST RATE OF DEPLETION OF THE CONVENTIONAL FOSSIL FUELS. THE DEVELOPMENT OF NUCLEAR POWER STATIONS BASED ON THERMAL, FAST AND SYNTHETIC REACTORS IS FIRST DISCUSSED. OTHER POWER GENERATION SCHEMES DISCUSSED ARE MHD GENERATION, GEOTHERMAL PLANTS, WIND PLANTS, OCEAN-THERMAL POWER CONVERSION AND SOLAR POWER CONVERSION.

79-0085 PRITCHARD C
ENGINEERING CONSIDERATIONS IN THE IMPLEMENTATION OF NOVEL ENERGY CONCEPTS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P.398-401.

DISCUSSED ARE THE TECHNICAL AND ECONOMIC ASPECTS OF ADOPTING WATER POWER (WATER MILLS), WIND POWER AND SOLAR POWER GENERATING SCHEMES FOR THE SUPPLY OF REMOTE COMMUNITIES (HIGHLANDS IN SCOTLAND, SOUTHERN PARTS OF SAHARA).

79-0086 RPR'S ISSUED.
WIND POWER DIG. NO. 15: 24, SPRING 1979.

79-0087 GOVINDA RAJU S P, NARASIMHA R
A LOW-COST WATER PUMPING WINDMILL USING A SAIL TYPE SAVONIUS ROTOR.
NTIS, JANUARY 1979. 110 P.
79/FM/2, PB-294413

A WATER PUMPING WINDMILL WHICH CAN BE BUILT LARGELY USING MATERIALS AND SKILLS AVAILABLE IN RURAL AREAS HAS BEEN DESIGNED AND FABRICATED. THE WINDMILL USES A SAVONIUS ROTOR AND INCORPORATES A NOVEL SAIL TYPE CONSTRUCTION. THE PUMP IS OF POSITIVE DISPLACEMENT TYPE USING THE CASING OF A PNEUMATIC TIRE FOR THE PUMPING CHAMBER. TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

79-0088 RAMLER J R, DONOVAN R M
WIND TURBINES FOR ELECTRIC UTILITIES: DEVELOPMENT STATUS AND ECONOMICS.
NTIS, 1979. 19 P.
DOE/NASA/1028-79/23, NASA-TM-79170

THE TECHNOLOGY AND ECONOMICS OF THE LARGE, HORIZONTAL-AXIS WIND TURBINES CURRENTLY IN THE FEDERAL WIND ENERGY PROGRAM ARE PRESENTED. WIND TURBINE TECHNOLOGY ADVANCEMENTS MADE IN THE LAST SEVERAL YEARS ARE DISCUSSED. IT IS SHOWN THAT, BASED ON CURRENT PROJECTIONS OF THE COSTS OF THESE MACHINES WHEN PRODUCED IN QUANTITY, THEY SHOULD BE ATTRACTIVE FOR UTILITY APPLICATION. THE COST OF ELECTRICITY (COE) PRODUCED AT THE BUSBAR IS SHOWN TO BE A STRONG FUNCTION OF THE MEAN WIND SPEED AT THE INSTALLATION SITE. THE BREAKEVEN COE AS A "FUEL SAVER" IS DISCUSSED AND THE COE RANGE THAT WOULD BE GENERALLY ATTRACTIVE TO UTILITIES IS INDICATED.

79-0089 REDDOCH T W, KLEIN J W
NO ILL WINDS FOR NEW MEXICO UTILITY.
IEEE SPECTRUM 16(3): 57-61, MARCH 1979.

PERFORMANCE OF A WIND GENERATOR IN A COMMON POWER SYSTEM IS EXAMINED AFTER MORE THAN A YEAR OF WORK. IT IS FOUND THAT THE GENERATOR SUPPLIES UP TO 200 KW OF OUTPUT POWER, NEARLY 15 PERCENT OF TOTAL POWER LOAD OF ELECTRIC UTILITY SYSTEM. A STUDY CONCLUDED THAT UNDESIRABLE INTERACTIONS BETWEEN DIESEL GENERATORS AND THE WIND-TURBINE'S CONTROL SYSTEM CAN BE AVOIDED IF WIND-TURBINE POWER FLUCTUATIONS CAUSED BY GUSTING STAY WITHIN THE REGULATING CAPABILITY OF THE DIESELS.

79-0090 REED J W
ANALYSIS OF THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, 1979. 24 P.
CONF-790114-1, SAND-78-2099C

THIS PRESENTATION (A) REVIEWS THE FLOW OF SOLAR ENERGY AND WIND, (B) DESCRIBES THE TIME AND SPACE DISTRIBUTION OF USEFUL WIND POWER, (C) CONSIDERS SOME OF THE MODERN MACHINERY THAT HAS BEEN CONCEIVED TO CAPTURE WIND ENERGY, (D) POINTS OUT SOME LIMITATIONS TO PRACTICAL WIND ENERGY EXTRACTION AND USE, AND (E) SUMMARIZES AVAILABLE AND PROJECTED WIND POWER HARDWARE SYSTEMS. IN KEEPING WITH A STATED CENTRAL THEME OF THIS CONFERENCE, MAJOR CONSTRAINTS TO WIND ENERGY EXPLOITATION WILL BE HIGHLIGHTED.

79-0091 REED J W
SOME VARIABILITY STATISTICS OF AVAILABLE WIND POWER.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, MARCH 1979. 51 P.
SAND-78-1735

THE LONG-TERM VARIABILITY OF AVAILABLE WIND POWER HAS BEEN STUDIED IN TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED WEATHER STATIONS. MONTH BY MONTH AND YEAR BY YEAR SUMS OF WIND POWER OCCURRENCES WERE USED TO GENERATE AVERAGE, STANDARD DEVIATION, AND AUTOCORRELATION STATISTICS. THE AMPLITUDE OF THE ANNUAL CYCLE IN AVAILABLE WIND POWER WAS AT LEAST 70 PERCENT OF THE AVERAGE AT ALL LOCATIONS. LONG TERM INTEGRATED POWER PRODUCTION SHOWED MAXIMA AND MINIMA THAT DIFFERED BY 36 - 91 PERCENT FROM AVERAGE ANNUAL PRODUCTION.

79-0092 REED J W
WIND POWER CLIMATOLOGY OF THE UNITED STATES. SUPPLEMENT.
NTIS, APRIL 1979. 98 P.
SAND-78-1620

THIS SUPPLEMENT EXTENDS THE SUMMARIES IN THE EARLIER "WIND POWER CLIMATOLOGY OF THE UNITED STATES" TO INCLUDE MONTHLY AND ANNUAL AVERAGE WIND SPEEDS. STATION HISTORIES THAT ALLOW ADJUSTMENT FOR LOCAL AIR DENSITY, BASED ON STATION PRESSURE-ALTITUDE AND THE ANNUAL TEMPERATURE CYCLE, HAVE BEEN OBTAINED FROM THE NATIONAL CLIMATIC CENTER. THE LOGS OF ANEMOMETER EXPOSURES HAVE BEEN USED TO ADJUST BOTH WIND SPEEDS AND WIND POWERS TO STANDARD HEIGHT, 10 M ABOVE GROUND. EXTRAPOLATIONS FOR SPEED AND POWER AT 20- AND 50-M HEIGHTS HAVE ALSO BEEN PROVIDED. DATA ADJUSTMENTS TO 10-M HEIGHTS HAVE NOT SIGNIFICANTLY CHANGED THE ORIGINAL "ISODYN" CONTOUR MAPS EXCEPT IN THE NORTHEAST AND NORTHWEST COASTAL AREAS.

79-0093 REILLY D H
SAFETY CONSIDERATIONS IN THE DESIGN AND OPERATION OF LARGE WIND TURBINES.
NTIS, JUNE 1979. 36 P.
DOE/NASA/20305-79/3, NASA-TM-79193

THE ENGINEERING AND SAFETY TECHNIQUES USED TO ASSURE THE RELIABLE AND SAFE OPERATION OF LARGE WIND TURBINE GENERATORS UTILIZING THE MOD 2 WIND TURBINE SYSTEM PROGRAM AS AN EXAMPLE IS DESCRIBED. THE TECHNIQUES INVOLVE A CAREFUL DEFINITION OF THE WIND TURBINE'S NATURAL AND OPERATING ENVIRONMENTS, USE OF PROVEN STRUCTURAL DESIGN CRITERIA AND ANALYSIS TECHNIQUES, AN EVALUATION OF POTENTIAL FAILURE MODES AND HAZARDS, AND USE OF A FAIL SAFE AND REDUNDANT COMPONENT ENGINEERING PHILOSOPHY. THE ROLE OF AN EFFECTIVE QUALITY ASSURANCE PROGRAM, TAILORED TO SPECIFIC HARDWARE CRITICALITY, AND THE CHECKOUT AND VALIDATION PROGRAM DEVELOPED TO ASSURE SYSTEM INTEGRITY ARE DESCRIBED.

79-0094 RIDLEY T R
IMPROVING A SMALL WECS.
WIND POWER DIG. NO. 15: 36-37, SPRING 1979.

THE AUTHOR DESCRIBES CHANGES HE MADE TO IMPROVE THE EFFICIENCY OF HIS 200-W WINDGENERATOR.

79-0095 ROBBINS W H, THOMAS R L
LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT.
NTIS, 1979. 14 P.
DOE/NASA/1059-79/2, NASA-TM-79174

ONE FACET OF THE FEDERAL WIND ENERGY PROGRAM, LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT, IS BEING MANAGED BY THE NASA LEWIS RESEARCH CENTER. THESE ACTIVITIES CONSIST OF SEVERAL ONGOING WIND SYSTEM DEVELOPMENTS ORIENTED PRIMARILY TOWARD UTILITY APPLICATION. IN ADDITION, A

COMPREHENSIVE TECHNOLOGY PROGRAM SUPPORTING THE WIND TURBINE PROJECTS IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES. FIRST-GENERATION-TECHNOLOGY LARGE WIND TURBINES (MOD-OA AND MOD-1) HAVE BEEN DESIGNED AND ARE IN OPERATION AT SELECTED UTILITY SITES. SECOND-GENERATION MACHINES (MOD-2) ARE SCHEDULED TO BEGIN OPERATIONS ON UTILITY SITES IN 1980. THESE SECOND GENERATION MACHINES ARE ESTIMATED TO GENERATE ELECTRICITY AT LESS THAN 4 CENTS/KWH WHEN MANUFACTURED AT MODEST PRODUCTION RATES. HOWEVER, TO MAKE A SIGNIFICANT ENERGY IMPACT, COSTS OF 2 TO 3 CENTS/KWH MUST BE ACHIEVED. THE FEDERAL PROGRAM WILL CONTINUE TO FUND THE DEVELOPMENT BY INDUSTRY OF WIND TURBINES WHICH CAN MEET THE COST GOALS OF 2 TO 3 CENTS/KWH. LOWER COSTS WILL BE ACHIEVED THROUGH THE INCORPORATION OF NEW TECHNOLOGY AND INNOVATIVE SYSTEM DESIGN TO REDUCE WEIGHT AND INCREASE ENERGY CAPTURE. THE NATIONAL CHALLENGE, HOWEVER, IS ASSOCIATED WIYH ACCEPTANCE BY THE UTILITIES OF WIND TURBINES AS PART OF THEIR ENERGY GENERATING CAPABILITY AND THE CREATION OF A COMPETITIVE INDUSTRY TO PRODUCE WIND TURBINES EFFICIENTLY. THE PRINCIPALS - GOVERNMENT, INDUSTRY, AND THE UTILITIES - ARE CURRENTLY INVOLVED IN MEETING THIS CHALLENGE.

79-0096 ROCKY FLATS ANNOUNCEMENTS. STUDY OF DYNAMIC STALL AS IT EFFECTS SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) DESIGN. PERFORMANCE MODEL COMPARISON STUDY.
WIND POWER DIG. NO. 16: 16-17, SUMMER 1979.

THIS BRIEF NEWS ITEM DESCRIBES TWO REQUESTS FOR PROPOSAL PLANNED BY DOE FOR THE ROCKY FLATS PROJECT.

79-0097 ROCKY FLATS CONTRACTS.
WIND POWER DIG. NO. 15: 24, SPRING 1979.

79-0098 SRI TO BUILD COMPOSITE BLADES.
WIND POWER DIG. NO. 16: 16, SPRING 1979.

79-0099 SWECS ECONOMICS EXAMINED.
WIND POWER DIG. NO. 15: 22, SPRING 1979.

79-0100 SCOTT D
OFFSHORE WIND POWER: THAR SHE BLOWS.
SWEDEN NOW 13(3): 34, 1979.

THE POTENTIAL OF OFFSHORE WIND POWER INSTALLATIONS IN THE BALTIC SEA, TO PROVIDE UP TO 10 PERCENT OF SWEDEN'S ELECTRICITY NEEDS BY 1995 IS DISCUSSED.

79-0101 SEELEY D, EUSER B, JOYCE C, MORGAN G H, LAITOS J G, ADAMS A
SOLAR ENERGY LEGAL BIBLIOGRAPHY.
NTIS, MARCH 1979. 160 P.
SERI/TR-62-069

THE SOLAR ENERGY LEGAL BIBLIOGRAPHY IS A COMPILATION OF APPROXIMATELY 160 SOLAR PUBLICATIONS ABSTRACTED FOR THEIR LEGAL AND POLICY CONTENT (THROUGH OCTOBER 1978). EMPHASIS IS ON LEGAL BARRIERS AND INCENTIVES TO SOLAR ENERGY DEVELOPMENT. ABSTRACTS ARE ARRANGED UNDER THE FOLLOWING CATEGORIES: ANTITRUST, BIOMASS, BUILDING CODES, CONSUMER PROTECTION, ENVIRONMENTAL ASPECTS, FEDERAL LEGISLATION AND PROGRAMS, FINANCING/INSURANCE, INTERNATIONAL LAW, LABOR, LAND USE (COVENANTS, EASEMENTS, NUISANCE, ZONING), LOCAL LEGISLATION AND PROGRAMS, OCEAN ENERGY, PATENTS AND LICENSES, PHOTOVOLTAICS, SOLAR ACCESS RIGHTS, SOLAR HEATING AND COOLING, SOLAR THERMAL POWER SYSTEMS, STANDARDS, STATE LEGISLATION AND PROGRAMS, TAX LAW, TORT LIABILITY, UTILITIES, WARRANTIES, WIND RESOURCES, AND GENERAL SOLAR LAW.

79-0102 SELECTED REFERENCES ON SMALL WIND ENERGY CONVERSION SYSTEMS.
COMPILED BY THE DOE ROCKY FLATS WIND SYSTEMS PROGRAM, FEBRUARY 1, 1979.

79-0103 SHELLEY J J
A 1000 WATT WINDPLANT YOU CAN BUILD.
WIND POWER DIG. NO. 16. 38-49, SUMMER 1979.

79-0104 SHULTIS J K, POCH L A, ECKHOFF N D
OPTIMUM SELECTION OF A WIND TURBINE GENERATOR SYSTEM.
J. ENERGY 3(3): 145-150, MAY-JUNE 1979.

A METHOD IS DESCRIBED FOR THE SELECTION OF THE OPTIMUM SIZE (I.E., RATED POWER AND SPEED) FOR A WIND TURBINE GENERATING SYSTEM (WTGS) SUCH THAT, FOR GIVEN WIND SPEED CONDITIONS AND FOR GIVEN DEMAND POWER REQUIREMENTS, THE ANNUAL ECONOMIC SAVINGS ARE MAXIMIZED BY USING THE WTGS COMPARED TO PURCHASING ALL POWER FROM A UTILITY. NO STORAGE OF EXCESS GENERATED ELECTRICITY IS CONSIDERED AND ANY DEMAND IN EXCESS OF THAT GENERATED BY THE WTGS IS ASSUMED TO BE SUPPLIED BY THE UTILITY GRID. THE ECONOMIC SAVING REALIZED WITH THE OPTIMUM SIZED WTGS IS EXAMINED FOR VARIOUS PROBLEM VARIABLES SUCH AS THE DEGREE OF VARIABILITY IN THE WIND SPEED AND IN THE DEMAND LOAD THROUGHOUT THE DAY AND FROM SEASON TO SEASON.

79-0105 SMALL WIND SYSTEMS 1979. SWECS REPRESENTATIVES MEET IN BOULDER.
WIND POWER DIG. NO. 15: 25-35, SPRING 1979.

THE "SMALL WIND TURBINE SYSTEMS 1979" WORKSHOP HELD IN BOULDER, FEBRUARY 27 - MARCH 1, 1979, IS COVERED. A NUMBER OF SMALL MACHINES NOW BEING TESTED OR NOW UNDER DEVELOPMENT BY CONTRACT TO ROCKY FLATS WERE THE MAIN FEATURE OF THE WORKSHOP, AND ARE DESCRIBED IN THIS REPORT.

79-0106 SOLAR DIRECTORY AVAILABLE.
WIND POWER DIG. NO. 16: 16, SUMMER 1979.

A DIRECTORY OF SOLAR-RELATED EDUCATIONAL COURSES OFFERED BY POST-SECONDARY INSTITUTIONS HAS BEEN PREPARED BY SERI.

79-0107 STOIAKEN L
WIND SCAN, A REVIEW OF NEW DEVELOPMENTS.
ALTERN. SOURCES ENERGY NO. 38: 11-15, JULY/AUGUST 1979.

A NUMBER OF WIND POWER PROJECTS CURRENTLY UNDERWAY ARE DESCRIBED IN THIS REVIEW ARTICLE: SOUTHERN CALIFORNIA EDISON'S SCHACHLE PROJECT; CALIFORNIA CONSERVATION CORPS SAILWING IRRIGATION PROJECT; NEW YORK UNIVERSITY'S BARNEY BUILDING PROJECT IN NYC; CLARKSON'S FARM WINDMILL PROJECT; THE ROCKY FLATS SMALL WIND SYSTEMS RESEARCH PROGRAM; AND NASA'S PLUM BROOKE PROJECT.

79-0108 SWIFT-HOOK D T, BLACKBURN A J, MILBORROW D J, TAYLOR R H, LAWSON-TANCRED H, NICKOLS W R
PREDICTION AND MEASUREMENT OF AEROGENERATOR PERFORMANCE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 298-301.

THIS PAPER PRESENTS THE RESULTS OF SOME PRELIMINARY FIELD MEASUREMENTS MADE ON THE 30 KW ALDBOROUGH AEROGENERATOR IN MARCH 1978 WHICH HAVE BEEN CARRIED OUT BY THE CEGB WITH THE AIM TO QUANTIFY THE TECHNICAL AND ECONOMIC PROBLEMS OF LARGE SCALE WIND GENERATION AS A POSSIBLE ALTERNATIVE SOURCE OF POWER.

79-0109 SWIFT-HOOK D T, TAYLOR R H
DIRECTIONAL ARRAYS OF WINDMILLS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 290-293.

THIS PAPER DEALS WITH THE PROBLEMS OF CLUSTERING, I.E. OF OPTIMISING THE POSITIONS AND SPACING BETWEEN INDIVIDUAL AEROGENERATORS IN A LARGE ARRAY. IT IS SUGGESTED THAT DIRECTIONAL ARRAYS APPEAR TO HAVE CONSIDERABLE ADVANTAGES OVER ISOTROPIC ARRAYS WITH RESPECT TO ENERGY DENSITY (PERHAPS 2.7 TIMES) AND POWER DENSITY (PERHAPS 4 TIMES). THEIR MAIN DISADVANTAGE (A GENERATION COST PENALTY OF 50 PERCENT OR MORE) MAY BE PARTLY OFF-SET BY REDUCED POWER MARSHALLING AND TRANSMISSION COSTS AND THEIR USE MAY BE DICTATED BY THE LIMITED POWER AVAILABLE FROM THE ATMOSPHERIC BOUNDARY LAYER.

79-0110 TAX CREDITS FOR WIND POWERED SYSTEMS.
ALTERN. SOURCES ENERGY NO. 38: 16-17, JULY/AUGUST 1979.

A HELPFUL TABLE IS PROVIDED GIVING TAX INCENTIVES, RESIDENTIAL USE, FOR WIND POWER APPLICATIONS IN TWENTY-THREE STATES.

79-0111 TRAUDT J
ESTIMATING WECS COSTS.
WIND POWER DIG. NO. 15: 16-18, SPRING 1979.

TABLES ARE PROVIDED TO HELP ESTIMATE THE AVERAGE COST OF ELECTRICITY FROM A WIND TURBINE DURING ITS WORKING LIFE, CONSIDERING INSTALLED COST, DOWN PAYMENT, OPERATING LIFE, LENGTH OF LOAN, INTEREST RATE, OPERATING + MAINTENANCE COSTS, AND INFLATION.

79-0112 A 200-KW WIND TURBINE GENERATOR CONCEPTUAL DESIGN STUDY.
NTIS, JANUARY 1979. 111 P.
NASA-TM-79032, DOE/NASA/1028-79/1, N79-17333

A CONCEPTUAL DESIGN STUDY WAS CONDUCTED TO DEFINE A 200 KW WIND TURBINE POWER SYSTEM CONFIGURATION FOR REMOTE APPLICATIONS. THE GOAL WAS TO ATTAIN AN ENERGY COST OF 1 TO 2 CENTS PER KILOWATT-HOUR AT A 14-MPH SITE (MEAN AVERAGE WIND VELOCITY AT AN ALTITUDE OF 30 FT.) THE COSTS OF THE CLAYTON, NEW MEXICO, MOD-0 (200-KW) WERE USED TO IDENTIFY THE COMPONENTS, SUBSYSTEMS, AND OTHER FACTORS THAT WERE HIGH IN COST AND THUS CONDIDATES FOR COST REDUCTION. EFFORTS DEVOTED TO DEVELOPING COMPONENT AND SUBSYSTEM CONCEPTS AND IDEAS RESULTED IN A MACHINE CONCEPT THAT IS CONSIDERABLY SIMPLER, LIGHTER IN WEIGHT, AND LOWER IN COST THAN THE PRESENT MOD-OA WIND TURBINES. IN THIS REPORT ARE DESCRIBED THE VARIOUS INNOVATIONS THAT CONTRIBUTED TO THE LOWER COST AND LIGHTER WEIGHT DESIGN AS WELL AS THE METHOD USED TO CALCULATE THE COST OF ENERGY.

79-0113 U.S. WIND POWER ASSOCIATES INK CALIFORNIA WIND CONTRACT.
WIND POWER DIG. NO. 16: 1^, SUMMER 1979.

U.S. WIND POWER ASSOCIATES HAS SIGNED A CONTRACT WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES TO SELL WIND-GENERATED ELECTRICITY FROM THE NATION'S FIRST "WIND FARM". THE PROPOSED PROJECT IS DESCRIBED.

79-0114 UTILITIES EYE WIND-POWERED MACHINE.
MECH. ENG. 101(1): 46, JANUARY 1979.

A REVIEW OF THE MP1-200 WIND ENERGY CONVERSION SYSTEM, PRODUCED BY WTG ENERGY SYSTEMS, INC., AND LOCATED ON CUTTYHUNK ISLAND, MASSACHUSETTS, IS PRESENTED.

79-0115 WATSON G R, BAINBRIDGE G R
THE DESIGN CONSTRUCTION AND PROVING OF A LOW COST 5 KW WIND POWERED TURBINE FOR ISOLATED APPLICATIONS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 277-281.

DISCUSSED IS THE DEVELOPMENT OF THE MAXIMILL WIND POWERED TURBINE DESIGNED WITH DARRIEUS AND SAVONIUS TYPE ROTORS ON A VERTICAL AXIS DRIVE SHAFT TO GIVE UP TO 5 KW OF ELECTRICAL OUTPUT. DESIGN ADVANCEMENTS, PARTICULARLY IN RESPECT OF THE AEROFOILS AND BEARINGS ARE DESCRIBED, WITH LOW COST AND RELIABLE OUTPUT AS THE FOREMOST CONSIDERATION.

79-0116 WEIS P
THE STATUS OF INFORMATION FOR CONSUMERS OF SMALL WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1979. 17 P.
SERI/TP-51-158

ALTHOUGH COMPETITION FROM CHEAP FUELS HAS LIMITED THEIR WIDESPREAD USE, WIND ENERGY SYSTEMS ARE A SOLAR TECHNOLOGY THAT HAS PERFORMED SUCCESSFULLY FOR DECADES. RENEWED INTEREST IN THIS SOLAR TECHNOLOGY IN BOTH THE PUBLIC AND PRIVATE SECTOR HAS PRODUCED A WIDE VARIETY OF DESIGNS SUITABLE FOR MANY APPLICATIONS. THIS PAPER SUMMARIZES PAST RESEARCH EFFORTS, EXISTING INFORMATION SOURCES, AND ONGOING WORK TO IMPROVE DATA NECESSARY FOR POTENTIAL CONSUMERS OF SMALL WIND ENERGY CONVERSION SYSTEMS.

79-0117 WILLMER A C
THE AERODYNAMIC DESIGN AND TESTING OF A VERTICAL AXIS WINDMILL.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 286-289.

IN SETTING OUT TO DESIGN A LARGE WINDMILL, IT WAS APPARENT THAT THE EXISTING AERODYNAMIC THEORIES FOR VERTICAL AXIS WINDMILLS WERE IN VARIOUS RESPECTS INADEQUATE. IT WAS THEREFORE DECIDED TO UNDERTAKE SOME WIND TUNNEL TESTS AT AN EARLY STAGE, USING THE RESULTS TO REFINE A MATHEMATICAL MODEL FOR THE DESIGN OF LARGE WINDMILLS. THESE TESTS AND THE DERIVATION OF THE MATHEMATICAL MODEL ARE DESCRIBED.

79-0118 WILSON D J, ZALAY A D, BRASHEARS M R, CRAVEN C E, SHRIDER K R, JORDAN A J
FULL-SCALE WAKE FLOW MEASUREMENTS WITH A MOBILE LASER DOPPLER VELOCIMETER.
J. AIRCR. 16(3): 155-161, MARCH 1979.

WAKE FLOW MEASUREMENTS WERE CONDUCTED WITH A MOBILE LASER DOPPLER VELOCIMETER (LDV). THE MEASUREMENTS INCLUDED SURVEYS OF AIRCRAFT WAKE VORTICES BEHIND A B-747 AIRCRAFT, AIRCRAFT CARRIER WAKE MEASUREMENTS FROM ABOARD THE U. S. S. NIMITZ, AND TOWER WAKE MEASUREMENTS FOR A 100-KW WIND TURBINE. RESULTS OF THESE TESTS DEMONSTRATED THAT A MOBILE GROUND-BASED LDV IS A VERSATILE AND USEFUL TOOL FOR THE MEASUREMENT OF FULL-SCALE-THREE-DIMENSIONAL WAKE FLOWS. THE POTENTIAL IS DEMONSTRATED FOR UTILIZATION OF THIS SYSTEM TO STUDY COMPLEX WAKES FOR A VARIETY OF APPLICATIONS.

79-0119 WIND ENERGY BUDGET SHOWS DOE UNDERRATES THE RESOURCE.
SOL. EN. INTELL. REP. 5(4): 35, JANUARY 22, 1979.

DOE FUNDING INCREASES ARE SEEN AS INADEQUATE FOR FULL DEVELOPMENT OF WIND ENERGY RESOURCES IN 1979 AND 1980.

79-0120 WIND POWER FOR CITY DWELLERS.
WIND POWER DIG. NO. 16: 18-28, SUMMER 1979.

THE DESIGN + INSTALLATION OF AN URBAN WINDMILL IN NEW YORK CITY IS DESCRIBED.

79-0121 WIND SLIDE-SHOW PLANNED.
WIND POWER DIG. NO. 16: 14, SUMMER 1979.

A SLIDE-SHOW IS PLANNED BY SERI TO COVER THE HISTORY, CURRENT RESEARCH, AND POTENTIAL OF WIND ENERGY SYSTEMS.

79-0122 WIND-WHEEL ELECTRIC-POWER GENERATOR.
MECH. ENG. 101(1): 46, JANUARY 1979.

THIS WIND-WHEEL ELECTRIC POWER GENERATOR MAXIMIZES USE OF AVAILABLE WIND, USING A NUMBER OF DUCTS. WIND CURRENTS CAPTURED BY DUCTS ARE DIRECTED AGAINST WHEEL BLADES. SYSTEM ROTATES AROUND ITS SUPPORTING COLUMN TO FACE THE PREVAILING WINDS.

79-0123 WINDMILL MYSTERY IN TEXAS.
WIND POWER DIG. NO. 15: 21, SPRING 1979.

79-0124 WINEMILLER J R, SULLIVAN T L, SIZEMORE R L, YEE S T
DESIGN, FABRICATION, AND INITIAL TEST OF A FIXTURE FOR REDUCING THE NATURAL FREQUENCY OF THE MOD-0 WIND TURBINE TOWER.
NTIS, JULY 1979. 20 P.
DOE/NASA/1028-79/24

IT WAS DESIRED TO OBSERVE THE BEHAVIOR OF A TWO BLADED WIND TURBINE WHERE THE TOWER FIRST BENDING NATURAL FREQUENCY IS LESS THAN TWICE THE ROTOR SPEED. THE SYSTEM THEN PASSES THROUGH RESONANCE WHEN ACCELERATING TO OPERATING SPEED. THE FREQUENCY OF THE ORIGINAL MOD-0 TOWER WAS REDUCED BY PLACING IT ON A SPRING FIXTURE. THE FIXTURE IS ADJUSTABLE TO PROVIDE A RANGE OF TOWER BENDING FREQUENCIES. FIXTURE DESIGN DETAILS ARE GIVEN AND BEHAVIOR DURING INITIAL OPERATION IS DESCRIBED.

79-0125 WORSTELL M H
AERODYNAMIC PERFORMANCE OF THE 17-METRE-DIAMETER DARRIEUS WIND TURBINE.
NTIS, JANUARY 1979. 65 P.

A TWO-BLADED 17-METRE DARRIEUS VERTICAL-AXIS WIND TURBINE WAS FIELD-TESTED AT THE SANDIA LABORATORIES WIND-TURBINE SITE. PERFORMANCE RESULTS FOR SEVEN CONSTANT OPERATING SPEEDS ARE PRESENTED ALONG WITH A DISCUSSION OF THE TRENDS. PREDICTED PERFORMANCE AND EXPERIMENTAL TEST DATA FOR TWO CONSTANT SPEEDS ARE ALSO COMPARED.

79-0126 WORTHINGTON P J
MATERIALS FOR WINDMILL BLADES.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 294-297.

THIS PAPER DISCUSSES MATERIAL PROPERTY REQUIREMENTS AND DESIGN ASPECTS OF THE BLADES FOR LARGE WINDMILLS, CAPABLE OF GENERATING MORE THAN 1 MW OF POWER. IT IS CONCLUDED THAT COMPOSITE MATERIALS OFFER A NUMBER OF ATTRACTIONS AS WINDMILL BLADE MATERIAL. TITANIUM ALLOY ALSO HAS SOME ATTRACTIVE PROPERTIES. FOR LONG TERM OPERATION MORE WORK IS REQUIRED TO DETERMINE THE EFFECT OF TIME AND ENVIRONMENT ON MATERIAL PROPERTY BEHAVIOUR.

79-0127 WYMAN P R, PEACHEY C J
TIDAL CURRENT ENERGY CONVERSION.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P.164-166.

THE CONCEPT CONSIDERED IS THE EXTRACTION OF ENERGY FROM TIDAL CURRENTS BY MEANS OF IMMERSED ROTORS. THE ANALOGY WITH WINDMILLS CAN BE DRAWN, WITH THE DIFFERENCE THAT THE TIDAL CURRENTS ARE PREDOMINANTLY BIDIRECTIONAL, SO AN AXIAL FLOW ROTOR WHICH COULD ACCEPT REVERSAL COULD BE PRE-ALIGNED, AND THE CROSS-FLOW ROTOR (DARRIEUS TYPE) WOULD THUS LOSE ONE OF ITS IMPORTANT ADVANTAGES. THE ADVANTAGES OF "TIDE MILLS" COMPARED WITH A TIDAL BARRAGE ARE LOWER CAPITAL EXPENDITURE, AND SMALLER ENVIRONMENTAL IMPACT.

79-0128 YEN J T
WIND ENERGY: POTENTIAL, PROBLEMS AND POSSIBLE SOLUTIONS.
ASCE CONVENTION EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3532. 29 P.

THE AUTHOR DISCUSSES THE POTENTIAL OF WIND ENERGY, DIFFICULTIES ENCOUNTERED WITH CONVENTIONAL MACHINES, SOME INNOVATIVE SYSTEMS, AND PROVIDES A BASIS FOR HIS PREFERENCE FOR A "TORNADO-TYPE SYSTEM."

79-0129 YOUR WIND LIBRARY.
ATERN. SOURCES ENERGY NO. 38: 9-10, JULY/AUGUST 1979.

A FEW GENERAL BOOKS, AND THOSE FOR DO-IT-YOURSELFERS, ARE LISTED AND DESCRIBED.

78-0001 AFTER 1,000 HOURS OF SUCCESSFUL OPERATION, NASA, LOCKHEED TO INSPECT CLAYTON WINDMILL.
SOL. ENERGY INT'L. REP. 4(23): 168, JUNE 5, 1978.

78-0002 AKINS R E
WIND CHARACTERISTICS AT THE VAWT TEST FACILITY.
NTIS, 1978. 45P.
SAND-78-0760

A LIMITED PROGRAM OF FIELD MEASUREMENTS WAS UNDERTAKEN IN ORDER TO DEFINE THE WIND CHARACTERISTICS OF THE DOE/SANDIA VERTICAL AXIS WIND TURBINE TEST FACILITY. BECAUSE MICROMETEOROLOGICAL CONDITIONS UNDER WHICH A PARTICULAR WIND TURBINE IS TESTED MAY HAVE AN EFFECT ON THE PERFORMANCE OF THAT TURBINE, IT IS IMPORTANT THAT THESE CONDITIONS BE PROPERLY DOCUMENTED. THE MEAN VELOCITY PROFILE, LONGITUDINAL AND LATERAL TURBULENCE INTENSITIES, LONGITUDINAL VELOCITY SPECTRA, AND CROSSCORRELATIONS BETWEEN THE VELOCITIES AT SELECT LOCATIONS WERE MEASURED FOR A REPRESENTATIVE SAMPLE OF INCIDENT WINDS. THESE MEASUREMENTS ARE SUMMARIZED IN A FORM WHICH SHOULD FACILITATE COMPARISON WITH OTHER SITES.

78-0003 AKINS R E
PERFORMANCE EVALUATION OF WIND ENERGY CONVERSION SYSTEMS USING THE METHOD OF BINS-CURRENT STATUS.
NTIS, MARCH 1978. 24P.
SAND-77-1375

A DETAILED DESCRIPTION OF THE METHOD OF BINS, A TECHNIQUE OF DATA COLLECTION AND REDUCTION FOR FIELD PERFORMANCE EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), IS PROVIDED. THE METHOD OF BINS IS A STRAIGHTFORWARD YET USEFUL APPROACH TO THE COMPLEX PROBLEM OF RELATING THE RESPONSE OF A WECS TO A VARIABLE WIND FIELD. EXAMPLES OF TYPICAL RESULTS OBTAINED USING THE METHOD OF BINS ARE PRESENTED. METHODS OF DETERMINING THAT THE MEASURE OF PERFORMANCE OF A WECS OBTAINED IS CORRECT ARE OUTLINED. AREAS IN WHICH FURTHER MODIFICATIONS TO THE TECHNIQUE MAY BE APPROPRIATE ARE ALSO DISCUSSED.

78-0004 ALTERNATE ENERGY SYSTEMS SEMINAR , PASADENA, CALIFORNIA, 30 MARCH, 1978. PROCEEDINGS.
NTIS, 1978. 184P.
ALTERNATE ENERGY SYSTEMS SEMINAR, PASADENA, CALIFORNIA, 30 MARCH, 1978.
N78-27522, NASA-CR-157255

THE ALTERNATIVE ENERGY SYSTEMS SEMINAR WAS HELD ON MARCH 30, 1978, AND WAS SPONSORED JOINTLY BY THE SOUTHWEST DISTRICT OFFICE OF THE U.S. DEPARTMENT OF ENERGY AND JPL. THE SEMINAR WAS AN EXPERIMENT IN INFORMATION EXCHANGE WITH THE AIM OF PRESENTING, IN A SINGLE DAY, STATUS AND PROSPECTS FOR A NUMBER OF ADVANCED ENERGY SYSTEMS TO A DIVERSE, LARGELY NONTECHNICAL AUDIENCE, AND TO SOLICIT POST-SEMINAR RESPONSES FROM THAT AUDIENCE AS TO THE SEMINAR'S USEFULNESS. THE MAJOR SYSTEMS PRESENTED ARE: (1) SOLAR PHOTOVOLTAIC (2) GEOTHERMAL (3) COGENERATION POWER (4) SOLAR THERMAL (5) SOLAR HEATING AND COOLING (6) WIND ENERGY, AND (7) SYSTEMS CONSIDERATIONS.

78-0005 ALEXANDER A J, HOLOWNIA B P
WIND TUNNEL TESTS ON A SAVONIUS ROTOR.
J. IND. AERODYN. 3:343-351, 1978.

TESTS HAVE BEEN MADE IN A WIND TUNNEL ON A NUMBER OF SAVONIUS ROTOR CONFIGURATIONS IN WIND SPEEDS OF 6-9 M/S. THE VARIABLES TESTED WERE BLADE ASPECT RATIO, BLADE OVERLAP AND GAP AND THE EFFECTS OF ADDING END EXTENSIONS, END PLATES AND SHIELDING. FOR LOW ASPECT RATIOS (APPROX.1) WITH NO ADDITIONS THE EFFICIENCY WAS LOW (APPROX.0.065) BUT FOR HIGHER ASPECT RATIOS (APPROX.5) WITH OPTIMUM BLADE CONFIGURATION AND SHIELDING A MAXIMUM VALUE OF EFFICIENCY OF 0.25 WAS OBTAINED. TESTS WITH THREE AND FOUR BLADED CONFIGURATIONS GAVE APPRECIABLY LOWER VALUES OF EFFICIENCY. A SPECIAL STUDY WAS MADE OF WIND TUNNEL CORRECTIONS FOR BLOCKAGE RATIOS UP TO 0.3.

78-0006 ANDREWS J S
FATIGUE LOAD SPECTRA FOR UPWIND AND DOWNWIND ROTORS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978.

P.219-225.
CONF-771148

THE EFFECT OF BOTH ALTERNATING AND MEAN LOAD ON THE FATIGUE LIFE OF AN UPWIND AND DOWNWIND MOD-2 WIND TURBINE SYSTEM IS PRESENTED. IT WAS SHOWN THAT THE FATIGUE DAMAGE VARIES AS THE PRODUCT OF THE STRESS RANGE CUBED AND THE MAXIMUM STRESS. HENCE, THE ALTERNATING FLAPWISE LOAD CAUSED BY TOWER SHADOW AND WIND GRADIENT IS AN IMPORTANT FACTOR IN DETERMINING ROTOR BLADE LIFE.

78-0007 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOLUME 1. STUDY SUMMARY AND CONCEPT SCREENING.
FINAL REPORT.
NTIS, JANUARY 1978. 227P.
HCP/T22221-01/1

THIS STUDY WAS DIRECTED AT A REVIEW OF STORAGE TECHNOLOGIES, AND PARTICULARLY THOSE WHICH MIGHT BE BEST SUITED FOR USE IN CONJUNCTION WITH WIND AND PHOTOVOLTAICS. THE POTENTIAL "WORTH" ADDED BY INCORPORATING STORAGE WAS EXTENSIVELY ANALYZED FOR BOTH WIND AND PHOTOVOLTAICS. ENERGY STORAGE CONCEPTS STUDIED INCLUDE (1) ABOVE GROUND PUMPED HYDRO STORAGE, (2) UNDERGROUND PUMPED HYDRO STORAGE, (3) THERMAL STORAGE-OIL, (4) THERMAL STORAGE-STEAM, (5) UNDERGROUND COMPRESSED AIR STORAGE, (6) PNEUMATIC STORAGE, (7) LEAD-ACID BATTERIES, (8) ADVANCED BATTERIES, (9) INERTIAL STORAGE (FLYWHEEL), (10) HYDROGEN GENERATION AND STORAGE, AND (11) SUPERCONDUCTING MAGNETIC ENERGY STORAGE. THE INVESTIGATIONS PERFORMED AND THE MAJOR RESULTS, CONCLUSIONS, AND RECOMMENDATIONS ARE PRESENTED IN THIS VOLUME.

78-0008 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOLUME III. WIND CONVERSION SYSTEMS WITH ENERGY STORAGE. FINAL REPORT.
NTIS, JANUARY 1978. 330P.
HCP/T22221-01/3

THE VARIABILITY OF ENERGY OUTPUT INHERENT IN WIND ENERGY CONVERSION SYSTEMS (WECS) HAS LED TO THE INVESTIGATION OF ENERGY STORAGE AS A MEANS OF MANAGING THE AVAILABLE ENERGY WHEN IMMEDIATE, DIRECT USE IS NOT POSSIBLE OR DESIRABLE. THIS PORTION OF THE GENERAL ELECTRIC STUDY WAS DIRECTED AT AN EVALUATION OF THOSE ENERGY STORAGE TECHNOLOGIES DEEMED BEST SUITED FOR USE IN CONJUNCTION WITH A WIND ENERGY CONVERSION SYSTEM IN UTILITY, RESIDENTIAL AND INTERMEDIATE APPLICATIONS. BREAK-EVEN COST GOALS ARE DEVELOPED FOR SEVERAL STORAGE TECHNOLOGIES IN EACH APPLICATION. THESE BREAK-EVEN COSTS ARE THEN COMPARED WITH COST PROJECTIONS PRESENTED IN VOLUME I OF THIS REPORT TO SHOW TECHNOLOGIES AND TIME FRAMES OF POTENTIAL ECONOMIC VIABILITY. THE REPORT SUMMARIZES THE INVESTIGATIONS PERFORMED AND PRESENTS THE RESULTS, CONCLUSIONS AND RECOMMENDATIONS PERTAINING TO USE OF ENERGY STORAGE WITH WIND ENERGY CONVERSION SYSTEMS.

78-0009 ASHLEY H
SOME CONTRIBUTIONS TO AERODYNAMIC THEORY FOR VERTICAL-AXIS WIND TURBINES.
J. ENERGY 2(2): 113-119, MARCH-APRIL 1978.

A REVIEW AND MODEST EXTENSIONS ARE DESCRIBED OF QUASISTEADY AERODYNAMIC THEORY FOR PERFORMANCE PREDICTION ON DARRIEUS-TYPE TURBINES. RESULTS ARE GIVEN FOR BOTH PARALLEL-AXIS AND CURVED-BLADE CONFIGURATIONS. BLADE STALL AND VARIABLE INFLOW ARE NEGLECTED; IT IS HYPOTHESIZED THAT UNSTEADY EFFECTS SUPPORT THE FORMER APPROXIMATION DOWN TO LOWER VALUES OF TIP-SPEED RATIO THAN HITHERTO BELIEVED. BOTH PROFILE AND INDUCED DRAG ARE INCLUDED, AND THEIR INFLUENCES ON POWER AND DOWNWIND FORCE ARE EXPRESSED IN TERMS OF ELLIPTIC INTEGRALS. COMPARISONS ARE PRESENTED WITH POWER DATA FROM THE SANDIA 2-M TURBINE. FINALLY, A LINEARIZED ANALYSIS OF UNSTEADY FLOW EFFECTS ON PERFORMANCE IS SUMMARIZED. CALCULATIONS SUGGEST THAT THEY MAY BE LARGER THAN MIGHT BE EXPECTED IN VIEW OF THE LOW OPERATING REDUCED FREQUENCIES OF THESE MACHINES.

78-0010 ASHLEY H
USE OF ASYMPTOTIC METHODS IN VIBRATION ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978.
P.39-52.
CONF-771148

TWO SUBJECTS ARE DISCUSSED, WHICH ARE BELIEVED RELEVANT TO THE STRUCTURAL ANALYSIS OF VERTICAL-AXIS WIND TURBINES. THE FIRST INVOLVES THE DERIVATION OF DYNAMIC DIFFERENTIAL EQUATIONS, SUITABLE FOR STUDYING THE VIBRATIONS OF ROTATING, CURVED, SLENDER STRUCTURES. THE HAMILTONIAN PROCEDURE IS ADVOCATED FOR THIS PURPOSE. VARIOUS REDUCTIONS OF THE FULL SYSTEM ARE DISPLAYED, WHICH GOVERN THE VIBRATING TROPOSKIEN WHEN VARIOUS ORDER-OF-MAGNITUDE RESTRICTIONS ARE PLACED ON IMPORTANT PARAMETERS. THE FINAL SECTION DISCUSSES THE POSSIBLE ADVANTAGES OF THE WKB ASYMPTOTIC METHOD FOR SOLVING THESE CLASSES OF PROBLEMS. A SPECIAL CASE OF THIS METHOD IS USED ILLUSTRATIVELY TO CALCULATE EIGENVALUES AND EIGENFUNCTIONS FOR A "FLAT" TURBINE BLADE WITH SMALL FLEXURAL STIFFNESS.

78-0011 ASTLEY R J, BOWEN A J, LINDLEY D, PEARSE J
THE EFFECT OF SOME HILL SHAPES ON THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.93-108.

THE MODIFICATIONS TO THE VELOCITY-HEIGHT PROFILE AND THE TURBULENCE CHARACTERISTICS OF THE SURFACE WIND FLOW BY A SERIES OF TWO-DIMENSIONAL FORWARD-FACING ESCARPMENTS AND A SMOOTH SYMMETRICAL HILL ARE REPORTED. THESE TESTS ARE PART OF AN INVESTIGATION OF THE EFFECTS OF UNEVEN TERRAIN ON THE ATMOSPHERIC BOUNDARY-LAYER TO ASSIST IN THE PREDICTION OF STRUCTURAL WIND LOADING AND IN THE OPTIMUM SITING OF WIND TURBINES ON EXPOSED SITES. MODEL TEST RESULTS AND A LIMITED NUMBER OF FIELD RESULTS ARE PRESENTED AND COMPARED WITH THOSE OBTAINED FROM A FINITE-ELEMENT THEORETICAL SOLUTION USING A FROZEN VORTICITY ASSUMPTION. THE COMPUTED RESULTS COMPARE WELL WITH THE MEASURED DATA FROM THE MODEL AND FIELD TESTS.

78-0012 ASMUSSEN J, KRAUSS O, PARK G L, LINVILLE D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. FINAL REPORT.
NTIS, JANUARY 1978. 250P.
COO/2992-78/1

TO DETERMINE THE FEASIBILITY OF WIND ELECTRIC SYSTEMS, SIX GENERATION EXPANSION ALTERNATIVES WERE EXAMINED FOR HART, MICHIGAN - A CITY OF 2,500 LOCATED NEAR LAKE MICHIGAN WHERE THE AVERAGE COASTAL WIND VELOCITIES RANGE FROM 5 TO 7 M/S. FIVE OF THE ALTERNATIVES INCLUDED COMBINATIONS OF 500 AND 1500 KW WIND TURBINES (1975 GE PARAMETERS) AND A 1 MW HYDRO PLANT WHILE THE LAST WAS A 3600 KW DIESEL GENERATOR. WIND VELOCITY WAS ESTIMATED USING DATA FROM US COAST GUARD STATIONS ALONG THE SHORE AND VERIFIED BY A TWO YEAR MEASUREMENT PROGRAM. THE HART ELECTRICAL SYSTEM WAS REPRESENTED BY AN HOURLY PRODUCTION COST PROGRAM AND THE TOTAL COST CALCULATIONS FOLLOWED THE ERDA/EPRI STANDARD FOR SOLAR ENERGY EVALUATION.

78-0013 BAIN D
AN ASSESSMENT OF THE AGRICULTURAL WIND POWER MARKET.
WIND POWER DIG. NO. 11:42-47, WINTER 1977-1978.

78-0014 BAIN D
WIND ENERGY: NET ENERGY + JOBS.
RAIN IV(7): 14-17, MAY 1978. ALSO WIND POWER DIG. NO.12:46-48, SPRING-SUMMER 1978.

78-0015 FRY C M
WIND DRIVEN HIGH ALTITUDE POWER APPARATUS.
US PATENT NO. 4,084,102, APRIL 11, 1978. 10P.

WIND DRIVEN ROTORS ARE AFFIXED ALONG THE LENGTH OF A FLEXIBLE POWER SHAFT, AND THE SHAFT IS SUSPENDED AT A GREAT HEIGHT ABOVE THE EARTH BY MEANS OF A SWIVEL. THE LOWERMOST END OF THE SHAFT IS CONNECTED TO ROTATE A GROUND SUPPORTED ENERGY CONVERSION DEVICE. THE WINDS ALOFT IMPART ROTATIONAL MOTION INTO THE WIND ROTORS, WHEREUPON THE ROTATIONAL ENERGY OF THE SHAFT IS CONVERTED INTO ELECTRICAL POWER OR OTHER FORM OF POWER BY THE CONVERSION DEVICE. THE SWIVEL ENABLES THE ROTATING SHAFT TO BE AFFIXED TO A NONROTATING LIFTING OR SUSPENSION DEVICE. THE LIFTING DEVICE INCLUDES LIGHTER-THAN-AIR LIFTING BODIES, AERODYNAMIC LIFTING BODIES, AS WELL AS A COMBINATION THEREOF.

78-0016 BARDEKOFF A

WIND POWERED ELECTRICAL GENERATING PLANT.
U.S. PATENT NO. 4,068,132, JANUARY 10,1978. 4P.

A MULTI-LEVEL SUPPORT STRUCTURE IS DESCRIBED WHICH CONTAINS PLURAL POWER DRIVEN TURNTABLES ON EACH LEVEL AND EACH TURNTABLE CARRIES A PLURALITY OF WIND POWERED ELECTRICAL GENERATOR UNITS WHICH ARE PIVOTALLY SECURED TO THE TURNTABLE AND ELECTRICALLY COUPLED IN A POWER DISTRIBUTION SYSTEM THROUGH SLIP RING ELEMENTS. EACH GENERATOR UNIT HAS A RUDDER OR WIND VANE CAUSING THE DRIVING BLADES TO FACE THE WIND. THE GENERATING UNITS ARE READILY REMOVABLE FROM THEIR TURNTABLE SUPPORTS FOR REPAIR AND REPLACEMENT BY FUNCTIONING UNITS. THE PLANT MAY BE SIZED FOR COMMERCIAL OR HOME APPLICATION.

78-0017 BARTON R S
MOD-1 WIND TURBINE GENERATOR ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15,1977. PROCEEDINGS. NTIS, 1978. P. 167-178.
CONF-771148

A GENERAL SUMMARY OF THE MOD-1 WIND TURBINE GENERATOR CONTROL SYSTEM AND SIMULATION IS PRESENTED. MECHANICAL AND SPEED STABILIZATION CONTROL MEANS TO ADD DRIVE TRAIN DAMPING ARE MENTIONED AND MOD-1 SIMULATION RESULTS SHOWING THE EFFECTS OF SPEED STABILIZATION ARE DISPLAYED.

78-0018 CHENEY M C, SPIERINGS P A M
WIND TURBINE WITH AUTOMATIC PITCH AND YAW CONTROL.
U.S. PATENT NO. 4,083,651, APRIL 11, 1978. 12P.

A WIND TURBINE IS DESCRIBED WHICH HAS A FLEXIBLE CENTRAL BEAM MEMBER SUPPORTING AERODYNAMIC BLADES AT OPPOSITE ENDS THEREOF AND FABRICATED OF UNI-DIRECTIONAL HIGH TENSILE STRENGTH MATERIAL BONDED TOGETHER INTO BEAM FORM SO THAT THE BEAM IS LIGHTWEIGHT. THE MATERIAL HAS HIGH TENSILE STRENGTH TO CARRY THE BLADE CENTRIFUGAL LOADS, LOW SHEAR MODULUS TO PERMIT TORSIONAL TWISTING THEREOF FOR TURBINE SPEED CONTROL PURPOSES, AND ADEQUATE BENDING STIFFNESS TO PERMIT OUT-OF-PLANE DEFLECTION THEREOF FOR TURBINE YARD CONTROL PURPOSES. A SELECTIVELY OFF-SET WEIGHTED PENDULUM MEMBER IS PIVOTALLY CONNECTED TO THE TURBINE AND CONNECTED TO THE BEAM OR BLADES SO AS TO CAUSE TORSIONAL TWISTING THEREOF IN RESPONSE TO CENTRIFUGAL LOADING OF THE PENDULUM MEMBER FOR TURBINE SPEED CONTROL PURPOSES.

78-0019 BIG WIND TURBINE STARTS UP IN N.M.
SOLAR OUTLOOK, JANUARY 23, 1978. P.8.

A 200 KW WIND TURBINE BUILT BY NASA IN CLAYTON, N.M. IS DESCRIBED. THE TURBINE SHOULD GENERATE ENOUGH ELECTRIC POWER TO SUPPLY THE NEEDS OF 60 HOMES WHEN WINDS ARE 19 MILES AN HOUR OR MORE.

78-0020 BIG WINDS IN CA.
WIND POWER DIG. NO. 12:26-27, SPRING-SUMMER 1978.

MEASUREMENT OF CALIFORNIA WINDS TO ASSESS POTENTIAL FOR WIND POWER IS DISCUSSED.

78-0021 BINGHAM C E, JAYADEV T S
CORRELATION OF SOLAR AND WIND RESOURCES FOR HYBRID SYSTEMS APPLICATIONS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 729-735.

SOLAR RADIATION AND WIND RESOURCE DATA ARE USED TO CORRELATE POWER AVAILABLE FROM EACH SOURCE. FOUR LOCATIONS: BISMARCK, NORTH DAKOTA, DODGE CITY, KANSAS, ALBUQUERQUE, NEW MEXICO, AND SANTA MARIA, CALIFORNIA, ARE STUDIED. THE CORRELATION OF WIND AND SOLAR POWER IS EXAMINED ON AN HOURLY, DAILY, AND MONTHLY TIME FRAME. ON THE BASIS OF THE CORRELATIONS, EVIDENCE OF THE COMPLEMENTARY NATURE OF WIND AND SOLAR RESOURCES IS SEEN IN THREE OF THE FOUR SITES. SIMPLE SYSTEM MODELS ARE USED TO CONVERT ENERGY AVAILABLE TO ENERGY OUTPUT. THIS PRELIMINARY ANALYSIS SHOWS THAT BOTH THE ENERGY AVAILABLE AND ELECTRICAL POWER OUTPUT FROM SOLAR AND WIND SOURCES ARE MOST COMPLEMENTARY ON A DAILY BASIS.

78-0022 WITWER J G, ALICH J A, KOHAN S M, LEVINE M D, MEAGHER P C, PICKERING E E, SCHOOLEY F A, SLEMMONS A J, THOMPSON T E
COMPARATIVE EVALUATION OF SOLAR ALTERNATIVES: IMPLICATIONS FOR FEDERAL RD+D.
NTIS, JANUARY 1978. 2 VOLS: 158P.,295P.
TID-28533/1, TID-28533/2

EACH OF THE SEVEN SOLAR ENERGY TECHNOLOGIES IS ASSESSED: PHOTOVOLTAIC DEVICES, SOLAR THERMAL POWER SYSTEMS, WIND ENERGY SYSTEMS, SOLAR HEATING AND COOLING SYSTEMS, AGRICULTURAL AND INDUSTRIAL HEAT PROCESSES, BIOMASS CONVERSION TECHNOLOGIES, AND OCEAN THERMAL ENERGY CONVERSION SYSTEMS. A BRIEF TECHNICAL OVERVIEW OF STORAGE FOR SOLAR ELECTRIC TECHNOLOGIES IS PRESENTED AND SOME PRINCIPLES ARE DISCUSSED CONCERNING HOW DIFFERENT LEVELS OF SUCCESS ON ELECTRICAL STORAGE CAN AFFECT THE COMMERCIAL VIABILITY OF SOLAR ELECTRIC OPTIONS. THE SOLAR MARKET PENETRATION MODEL THAT WAS DEVELOPED AND APPLIED AS AN ANALYTICAL TOOL IN THE STUDY IS DESCRIBED. THE SEVEN SECTIONS TREATING THE SOLAR ENERGY TECHNOLOGIES CONTAIN DISCUSSIONS IN EACH OF SIX SUBJECT AREAS: DESCRIPTION OF THE TECHNOLOGY; ECONOMIC PROJECTIONS; THE POTENTIAL CONTRIBUTION OF THE TECHNOLOGY IN DIFFERENT MARKETPLACES; ENVIRONMENTAL CONSIDERATIONS; INTERNATIONAL POTENTIAL; AND THE PRESENT AND POSSIBLE FUTURE EMPHASIS WITHIN THE RD AND D PROGRAM.

78-0023 BLOCK ISLAND WINDMILL MAY BE SCRAPPED, OUT OF ORDER SINCE OCTOBER 1977.
SOL. ENERGY INTELL. REP. 4(16): 113, APRIL 17, 1978.

78-0024 BOEING TO BUILD WORLD'S LARGEST WIND TURBINE.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0025 BRAASCH C H, BRANDVOLD G E
VERTICAL AXIS WIND TURBINE STATUS.
NTIS, 1978. 12P.
SAND-78-0397C

RESEARCH AND DEVELOPMENT ACTIVITIES ON THE DARRIEUS WIND TURBINE AT SANDIA LABORATORIES ARE DESCRIBED.

78-0026 BRADLEY E F
AN EXPERIMENTAL STUDY OF THE PROFILES OF WIND SPEED, SHEARING STRESS AND TURBULENCE AT THE CREST OF A LARGE HILL.
CRANBERRA, AUSTRALIA, CSIRO, 1978. 60P.

DETAILED MEASUREMENTS HAVE BEEN MADE OF THE MEAN AND TURBULENT NEUTRAL VELOCITY PROFILES ON A 100M TV TOWER AT THE CREST OF A HILL OF HEIGHT H=170M, AND THE RESULTS COMPARED WITH SEVERAL PUBLISHED THEORIES.

78-0027 BRAGG G M, SCHMIDT W L
DETERMINATION OF OPTIMUM ARRAYS OF WIND ENERGY CONVERSION DEVICES.
J. ENERGY 2(3): 155-159, MAY-JUNE 1978.

THIS PAPER DISCUSSES THE USE OF LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS CONSISTING OF ARRAYS OF INDIVIDUAL WIND MACHINES. THE ARRAYS HAVE BEEN ANALYZED IN SOME DETAIL WITH THE AID OF A ROUGH BOUNDARY-LAYER VELOCITY PROFILE MODEL. THE ANALYSIS INDICATES INTERMACHINE SPACINGS THAT WILL PROVIDE FOR MAXIMUM OUTPUT FROM EITHER THE TOTAL ARRAY OR INDIVIDUAL MACHINES WITHIN THE ARRAY. THESE ARRANGEMENTS ARE NOT COINCIDENT. USING THE RESULTS OBTAINED DETAILED OPTIMIZATION AND ECONOMIC ANALYSES MAY BE MADE FOR LARGE-SCALE WIND SYSTEMS.

78-0028 BRITAIN TO TEST "WINDWALL" CONCEPT.
WINDLETTER, P.8, FEBRUARY 1978.

78-0029 CALIFORNIA MAY ALLOCATE 15 MIL FOR STATE WIND PROGRAM.
WIND POWER DIG. NO. 11: 29, WINTER 1977-1978.

78-0030 CALVERT N G
THE CHARACTERISTICS OF A SAIL MILL.
J. IND. AERODYN. 3: 79-84, 1978.

THIS SHORT ARTICLE REVIEWS CURRENT STATUS OF RESEARCH ON THE SAIL MILL.

78-0031 CARTER J
DOE FUNDS 13 WIND PROJECTS.

WIND POWER DIG. NO.12: 32-33, SPRING 1978.

IN FALL, 1977 DOE INITIATED AN "APPROPRIATE ENERGY TECHNOLOGY" PILOT PROGRAM THAT MADE SMALL GRANTS (UP TO $50,000) AVAILABLE TO SMALL BUSINESSES, COMMUNITY GROUPS, INDIAN TRIBES AND INDIVIDUALS IN CALIFORNIA, NEVADA, HAWAII, ARIZONA AND PACIFIC TRUST TERRITORIES. OF OVER 1100 APPLICATIONS, 108 PROPOSALS WERE FUNDED, INCLUDING 13 PROJECTS TOTALLING OVER $140,000 IN THE AREA OF WIND POWER OR TO PROJECTS THAT HAVE A WIND POWER COMPONENT. THE PROJECTS ARE DESCRIBED.

78-0032 CARTER J
THE MILLVILLE WINDMILL COMPANY.
WIND POWER DIG. NO. 11: 39-41, WINTER 1977-1978.

78-0033 CARTER J
WATER-PUMPING IN INDIA.
WIND POWER DIG. NO.12: 44-45, SPRING-SUMMER 1978.

78-0034 CARTER J
WIND ENERGY IN THE SOUTHWEST.
WIND POWER DIG. NO. 12: 16-19, SPRING-SUMMER 1978.

PROGRAMS IN THE SOUTHWEST, PRIMARILY TEXAS, ARE DESCRIBED.

78-0035 CHAJES A, COSTA A, KAMINSKY F C, KIRCHOFF R H, CROMACK C E
INVESTIGATION OF THE FEASIBILITY OF USING WINDPOWER FOR SPACE HEATING IN COLDER CLIMATES.
NTIS, 1978.
PB-284552

78-0036 CHARWAT A F
PERFORMANCE OF COUNTER- AND COROTATING ARRAYS OF SAVONIUS TURBINES.
J. ENERGY 2(1): 61-63, JANUARY-FEBRUARY, 1978.

THE EXPERIMENTS DESCRIBED IN THIS PAPER WERE CONDUCTED TO EXPLORE THE EFFECTS OF MUTUAL INTERACTION BETWEEN TWO CLOSELY SPACED COROTATING AND COUNTERROTATING SAVONIUS ROTORS.

78-0037 CHASTEAU V A L
METEOROLOGICAL INFORMATION REQUIRED FOR THE DETAILED OPERATION OF A LARGE WIND-TURBINE PLANT.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 33-42.

THE SPECTRUM OF WINDSPEED PRESENTED BY VAN DER HOVEN IS A CONVENIENT STARTING POINT FOR COMMENTING ON WINDSPEED INFORMATION RELEVANT TO WIND ENERGY CONVERSION SYSTEMS. THE REQUIREMENTS FOR ASSESSING THE PRIMARY POTENTIAL OF THE RESOURCE AND FOR DETERMINING ITS ROLE IN CONTRIBUTING TO AN ELECTRICAL GRID ARE DIFFERENT TO THOSE FOR ACTUALLY DESIGNING SUCCESSFUL HARDWARE. THE FORMER REQUIREMENTS CAN LARGELY BE MET BY ANALYSING EXISTING METEOROLOGICAL RECORDS, OR RECORDS STILL TO BE TAKEN BY EXTENDING THE COVERAGE OF CONVENTIONAL METEOROLOGICAL STATIONS. THE LATTER REQUIREMENTS INVOLVE WINDSPEED INFORMATION TYPICAL OF PERIODS OF SEVERAL MINUTES DOWN TO FRACTIONS OF A SECOND.

78-0038 CHEN J M
VORTEX AFFECTED BY THE CONICAL SHAPE OF GENERATOR IN TORNADO-TYPE WIND ENERGY SYSTEM.
J. INDUST. AERODYN. 3: 307-313, 1978.

A MATHEMATICAL ANALYSIS OF A VORTEX WHICH IS GENERATED BY A STATIONARY TOWER WITH A PARTIALLY OPENING TOP AND DIRECTED BY VERTICAL VANES IS PRESENTED. WITH THE CONICAL-SHAPE GENERATOR TOWER CONSIDERED, A CONCENTRATED VORTEX AND HIGHER PRESSURE DROP CAN BE OBTAINED FROM THIS TORNADO-TYPE WIND-ENERGY SYSTEM.

78-0039 CHENEY M C, BIELAWA R L
COMPARISON OF BLADE LOADS OF FIXED AND FREE YAWING WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978, P. 237-242.
CONF-771148

THE UTRC SELF REGULATING COMPOSITE BEARLINGLESS WIND TURBINE UTILIZES AN AUTOMATIC PITCH CONTROL CONCEPT AND A COMPLETELY UNRESTRAINED YAWING DEGREE OF FREEDOM. AERODYNAMIC MOMENTS CAUSED BY SKEWED FLOW PROVIDE THE CONTROL TO ALIGN THE WIND TURBINE WITH THE WIND. MODEL TESTS HAVE DEMONSTRATED THE FEASIBILITY OF THE CONCEPT AND ANALYTICAL STUDIES HAVE SHOWN THE FREE SYSTEM TO EXPERIENCE LOWER BLADE LOADS COMPARED TO THE FIXED SYSTEM.

78-0040 CHEREMISINOFF N P
FUNDAMENTALS OF WIND ENERGY.
ANN ARBOR, MICH., ANN ARBOR SCIENCE PUBL., 1978. 175P.

THIS BOOK IS PRESENTED AS AN OVERVIEW OF THE POTENTIALS OF WIND AS AN ENERGY SOURCE. IT IS INTENDED AS A DOCUMENTARY OFFERING A LOOK AT THE PAST AS WELL AS AT THE PRESENT AND FUTURE POSSIBILITIES.

78-0041 CHERRY N J
WIND ENERGY IN NEW ZEALAND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 15-32.

THE NEW ZEALAND METEOROLOGICAL SERVICE HAS A LARGE ARCHIVE OF WIND DATA. ANALYSIS OF SOME OF THIS DATA AS PART OF THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND GIVES AN INITIAL INDICATION OF THE WIND ENERGY RESOURCE NEW ZEALAND POSSESSES. THE ANALYSES BEING UNDERTAKEN ARE OUTLINED. THE DATA BASE IS BEING EXTENDED WITH OBSERVATIONS BEING MADE BY THIS PROJECT. A DESCRIPTION OF THE PROGRAMME AND A REVIEW OF THE LONG TERM PROSPECTS FOR WIND ENERGY UTILISATION IN NEW ZEALAND ARE PRESENTED.

78-0042 CHEVALIER H L, MILBURN R T
A NEW WIND ENERGY CONVERSION DEVICE.
TEX. ENG. EXP. STA. BULL. NO. 78-1: 11-18, JANUARY 1978.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF A HORIZONTAL-AXIS WIND ENERGY CONVERSION DEVICE UTILIZING STRAIGHT BLADES AS THE FORCE-PRODUCING SURFACES WAS CONDUCTED. THE INHERENT ADVANTAGES OF THE DEVICE OVER OTHER SYSTEMS SUCH AS THE SELF-STARTING CHARACTERISTICS, THE ABILITY TO OPERATE OVER A WIDE RANGE OF TIP SPEED RATIOS, AND THE ADAPTABILITY TO LARGE-SCALE APPLICATIONS MAKE THE HORIZONTAL-AXIS WIND TURBINE A DESIRABLE CONCEPT FOR THE CONVERSION OF WIND ENERGY. A THEORETICAL PERFORMANCE PREDICTION MODEL BASED ON MOMENTUM THEORY WAS ALSO DEVELOPED AND APPLIED TO THE WIND TURBINE. THE THEORY PREDICTED THE PERFORMANCE OF THE TURBINE WELL; HOWEVER, FURTHER REFINEMENTS IN THE THEORY WOULD REDUCE SIGNIFICANTLY THE DIFFERENCE BETWEEN THE THEORETICAL PREDICTIONS AND THE EXPERIMENTAL DATA.

78-0043 CHILCOTT R E, SMYTH V G
ENERGY CONVERSION PERFORMANCE PARAMETERS FOR WIND TURBINES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.133-170.

THE ENERGY CONVERSION PERFORMANCE OF AN ORIENTING WIND TURBINE IN VARIOUS WEIBULL WIND REGIMES HAS BEEN DETERMINED AND IS PRESENTED IN PARAMETRIC FORM. THE ANALYTICAL RESULTS ARE COMPARED WITH PERFORMANCE PREDICTIONS BASED ON LONG TERM WIND RECORDS FOR CHRISTCHURCH INTERNATIONAL AIRPORT. THE ENERGY CONVERSION PERFORMANCE OF A FIXED ORIENTATION BIAXIAL WIND TURBINE IN WIND REGIMES WITH AXISYMMETRIC DIRECTIONAL CHARACTERISTICS HAS BEEN ANALYSED. UNDER THE ASSUMED CONDITIONS, BY ALIGNING THE BIAXIAL WIND TURBINE WITH THE PREVAILING WIND DIRECTION, THE ENERGY CONVERTED IS TYPICALLY ABOUT 75% OF THAT CONVERTED BY A FULLY ORIENTING WIND TURBINE. ESTIMATES OF THE ENERGY CONVERSION PERFORMANCE OF A FIXED ORIENTATION BIAXIAL WIND TURBINE IN THE CHRISTCHURCH AIRPORT WIND REGIME INDICATE THAT FOR MAXIMUM CAPACITY FACTOR THE ORIENTATION ANGLE SHOULD BE ABOUT 50 DEGREES EAST OF NORTH. THIS ORIENTATION GIVES GOOD EXPOSURE TO NORTHEAST AND SOUTHWEST WINDS. THE RESULTS ARE INTENDED TO ALLOW THE OPTIMISATION OF LONG TERM ENERGY CONVERSION PERFORMANCE OF WIND TURBINES IN ISOTROPIC AND DIRECTIONAL WIND REGIMES. FOR EXAMPLE THE CHRISTCHURCH AIRPORT CASE STUDY INDICATES THAT FOR MAXIMUM ENERGY CONVERSION EFFICIENCY LOCAL AEROGENERATORS SHOULD BE RATED AT ABOUT TWICE THE AVERAGE WIND SPEED OBTAINED BY EXCLUDING CALMS.

78-0044 CLAYTON MILL DEDICATED.
WIND POWER DIG. NO. 11: 27, WINTER 1977-1978.

78-0045 CLAYTON TURNS TO WIND POWER.
NEW SCI. 17(1090): 415, FEBRUARY 16, 1978.

THE 200KW WIND TURBINE AT CLAYTON, NEW MEXICO, IS DESCRIBED.

78-0046 CLIFF W C, JUSTUS C G, ELDERKIN C E
SIMULATION OF THE HOURLY WIND SPEEDS FOR RANDOMLY DISPERSED SITES.
NTIS, MAY 1978. 46P.
PNL-2523

A TECHNIQUE IS PRESENTED WHICH SIMULATES THE HOURLY WIND SPEEDS AT ANY NUMBER OF DISPERSED SITES WITHIN A REGION. THE REQUIRED INPUT FOR THE SIMULATION IS AN HOURLY WIND SPEED RECORD FROM A SINGLE "REPRESENTATIVE SITE" AND AN ESTIMATION OF THE SIZE OF THE REGION IN WHICH THE SITES WILL BE LOCATED. THIS TECHNIQUE IS NOT INTENDED FOR USE AT ANY SPECIFIC LOCATION BUT RATHER INTENDED TO BE USED FOR GENERIC MISSION ANALYSIS TYPE STUDIES. A "REPRESENTATIVE SITE" FOR THIS STUDY IS A SITE WHICH HAS AN ANNUAL MEAN WIND SPEED REPRESENTATIVE OF THE ANNUAL MEAN WIND SPEED AT ALL SITES UNDER CONSIDERATION. WITH THIS INFORMATION, A PROBABILITY DENSITY DISTRIBUTION FOR THE WIND SPEED AVERAGED OVER ALL THE SITES WITHIN THE REGION IS CONSTRUCTED. THE TIME HISTORY OF THE HOURLY MEAN WIND SPEEDS FROM THE REPRESENTATIVE SITE IS THEN USED WITH A FREQUENCY-MATCHING TECHNIQUE TO ESTABLISH THE HOURLY SEQUENCE OF REGIONAL AVERAGE WIND SPEEDS (REGIONAL AVERAGE BEING THE AVERAGE WIND SPEED FROM A VERY LARGE NUMBER OF POTENTIAL SITES WITHIN A REGION). A MONTE CARLO TECHNIQUE IS THEN USED TO DEVELOP THE HOURLY MEAN WIND SPEEDS AT ANY NUMBER OF DESIRED SITES, WHICH ARE ASSUMED TO BE RANDOMLY DISTRIBUTED THROUGHOUT THE AREA. THESE SIMULATED WIND HISTORIES MAY THEN BE USED TO SIMULATE THE HOURLY TIME HISTORY OF THE POWER OUTPUT OF A NETWORK OF WIND TURBINES LOCATED AT THESE RANDOM SITES, BY ASSUMING THE DESIRED NUMBER AND SIZE OF WIND TURBINES TO BE PLACED AT EACH SITE. USING THE SIMULATED WIND SPEED AT EACH SITE IN CONJUNCTION WITH THE WIND TURBINE'S OPERATING CHARACTERISTICS, THE HOURLY POWER FOR EACH SITE IS CALCULATED AND THE CALCULATED POWER FOR ALL SITES IS THEN SUMMED TO YIELD THE TOTAL POWER PRODUCED BY THE WIND TURBINES FOR THAT HOUR. THE POWER PRODUCED AT EACH CONSECUTIVE HOUR IS COMPUTED IN THE SAME MANNER, YIELDING A SIMULATED TIME HISTORY OF THE POWER PRODUCED BY THE WIND TURBINES.

78-0047 CLIFF W C, FICHTL G H
WIND VELOCITY-CHANGE (GUST RISE) CRITERIA FOR WIND TURBINE DESIGN.
NTIS, JULY 1978. 31 P.
PNL-2526

THIS PAPER DERIVES A CLOSED-FORM EQUATION FOR ROOT MEAN SQUARE (RMS) VALUE OF VELOCITY CHANGE (GUST RISE) THAT OCCURS OVER THE SWEPT AREA OF WIND TURBINE ROTOR SYSTEMS AND AN EQUATION FOR RMS VALUE OF VELOCITY CHANGE THAT OCCURS AT A SINGLE POINT IN SPACE. THESE FORMULAS CONFIRM THE INTUITIVE ASSUMPTION THAT A LARGE SYSTEM WILL ENCOUNTER A LESS SEVERE ENVIRONMENT THAN A SMALL SYSTEM WHEN BOTH ARE PLACED AT THE SAME LOCATION. THAT IS, BECAUSE OF A SPATIAL-AVERAGING EFFECT THE WIND CHARACTERISTICS THAT ENGULF A LARGE SYSTEM ARE LESS SEVERE THAN THOSE FOR A SMALL SYSTEM. ASSUMING A NORMAL PROBABILITY DENSITY FUNCTION FOR THE VELOCITY DIFFERENCES, AN EQUATION IS GIVEN FOR CALCULATING THE EXPECTED NUMBER OF VELOCITY DIFFERENCES THAT WILL OCCUR IN 1 HR AND WILL BE LARGER THAN AN ARBITRARY VALUE. A FORMULA IS PRESENTED THAT GIVES THE EXPECTED NUMBER OF VELOCITY DIFFERENCES LARGER THAN AN ARBITRARY VALUE THAT WILL BE ENCOUNTERED DURING THE DESIGN LIFE OF A WIND TURBINE. IN ADDITION, A METHOD FOR CALCULATING THE LARGEST VELOCITY DIFFERENCE EXPECTED DURING THE LIFE OF A TURBINE AND A FORMULA FOR ESTIMATING THE RISK OF EXCEEDING A GIVEN VELOCITY DIFFERENCE DURING THE LIFE OF THE STRUCTURE ARE GIVEN. THE EQUATIONS PRESENTED ARE BASED UPON GENERAL ATMOSPHERIC BOUNDARY-LAYER CONDITIONS AND DO NOT INCLUDE INFORMATION REGARDING EVENTS SUCH AS TORNADOS, HURRICANES, ETC.

78-0048 CLIFF W C, VERHOLEK M G
FLOW FIELD ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 71-76.
CONF-771148

THE AVERAGE MEAN WIND SPEED INTEGRATED OVER A DISK IS SHOWN TO BE EXTREMELY CLOSE TO THE MEAN VALUE OF WIND SPEED WHICH WOULD BE MEASURED AT THE CENTER OF A DISK FOR MOST GEOMETRIES IN WHICH A WECS (WIND ENERGY CONVERSION SYSTEM) WOULD OPERATE. FIELD TEST RESULTS ARE PRESENTED WHICH COMPARE INSTANTANEOUS RECORDS OF WIND SPEED INTEGRATED OVER A DISK WITH THE WIND SPEED MEASURED AT THE CENTER OF THE DISK. THE WIND FIELD THAT A ROTATING ELEMENT WOULD EXPERIENCE IS PRESENTED WHICH HAS BEEN SYNTHESIZED FROM THE OUTPUTS OF AN ARRAY OF ANEMOMETERS.

78-0049 COATES V T
A HANDBOOK OF TECHNOLOGY ASSESSMENT. FINAL REPORT. VOL. 1.
NTIS, MARCH 1978. 108P.
TID-28503

PROCUREMENT PROCEDURES, PREPARATION OF REQUESTS FOR PROPOSALS, DEVELOPMENT OF WORK STATEMENTS, AND PROJECT MONITORING PROCEDURES CAN BE CRITICAL IN ACHIEVING SUCCESSFUL TECHNOLOGY ASSESSMENT. SOME GENERAL GUIDELINES ARE OFFERED IN THIS HANDBOOK.

78-0050 COROTIS R B
STATISTICAL ANALYSIS OF WIND POWER SITING REQUIREMENTS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC.
PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978.
NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 741-745.

WIND RECORDS PRIMARILY FROM THE NATIONAL CLIMATIC CENTER ARE USED TO DEVELOP STATISTICAL MODELS FOR WIND POWER SITING. BROADLY GENERAL RESULTS INDICATE THAT ONE YEAR IS SUFFICIENT TO PREDICT THE LONG TERM MEAN SPEED FOR EACH SEASON WITHIN AN ACCURACY OF 10% WITH A CONFIDENCE OF ABOUT 90%. SIMILAR STATISTICS FOR THE SEASONAL MEAN POWER REQUIRE SIGNIFICANTLY MORE DATA COLLECTION. THE HOURLY VARIANCE DUE TO THE DIURNAL CYCLE IS COMPARED TO THE TOTAL INHERENT HOURLY VARIANCE, AND THE FORMER IS FOUND TO CONTRIBUTE ONLY ABOUT TEN PERCENT. AN ANALYSIS OF THE ANNUAL CYCLE SHOWS THE RELATIVELY HOMOGENEOUS NATURE OF THE CYCLE WITHIN A GIVEN REGION. AUTOCORRELATION ANALYSIS OF THE RECORDS PRODUCE AN EXPONENTIAL-TYPE FUNCTION WITH TWO TO THREE EQUIVALENT INDEPENDENT HOURLY READINGS PER DAY. HIGH CROSS-CORRELATION VALUES ARE DETERMINED BETWEEN SITES IN RELATIVELY SMOOTH TERRAIN FOR SEPARATIONS UP TO 100 KM.

78-0051 CROMACK D E
UMASS WIND FURNACE BLADE DESIGN.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 265-268.
CONF-771148

A BRIEF DESCRIPTION OF THE UMASS WIND FURNACE CONCEPT IS PRESENTED ALONG WITH SOME PRELIMINARY PERFORMANCE DATA. PARTICULAR EMPHASIS IS PLACED ON THE DESIGN, CONSTRUCTION, AND MANUFACTURING PROCEDURE FOR THE 32.5 FOOT DIAMETER GRP BLADES.

78-0052 CULEBRA ISLAND 200-KWE WINDMILL DEDICATED; CLAYTON MILL USING PLUM BROOK BLADES.
SOL. ENERGY INTELL. REP. 4(31): 231, JULY 31, 1978.

78-0053 DOE ANNOUNCES SEVEN AWARDS FOR SMALL WIND MACHINES.
SOL. ENERGY INTELL. REP. 4(13): 86, MARCH 27, 1978.

CONTRACTS TOTALING $2.2- MILLION HAVE BEEN ISSUED TO SEVEN COMPANIES TO DEVELOP PROTOTYPE SMALL WIND TURBINE GENERATORS (1-AND 8-KW RANGE) OVER A 20-24 MONTH PERIOD. THE TURBINES WILL THEN BE TESTED AT ROCKY FLATS, COLORADO.

78-0054 DOE AWARDS SMALL WEC CONTRACTS TO MCDONNELL, KAMAN AEROSPACE.
SOL. ENERGY INTELL. REP. 4(45): 344, NOVEMBER 6, 1978.

78-0055 DOE CONTRACT ANNOUNCED.
WIND POWER DIG. NO. 12: 28, SPRING 1978.

78-0056 DOE CONTRACTS AWARDED.
WIND POWER DIG. NO. 11:26-27, WINTER 1977-1978.

78-0057 DANIELS P A
EUROPEAN WIND ENERGY RESEARCH AND RECOMMENDATIONS FOR HAWAII.
NTIS, AUGUST 1978. 44P.
HCP/T1617-01

THE REPORT SUMMARIZES IMPRESSIONS OF WIND POWER RESEARCH IN SWEDEN, DENMARK AND WEST GERMANY AT THE END OF 1977. SPECIAL EMPHASIS IS PLACED ON METEOROLOGICAL ASPECTS. AFTER A LIST OF CURRENT WIND RESEARCH ACTIVITIES THE FOLLOWING SPECIFIC AREAS ARE TREATED: NUMERICAL MODEL DEVELOPMENT, WIND ENERGY FORECASTING, VISUAL IMPACT OF WINDMILLS, STATISTICS FOR WINDMILL DESIGN, WINDMILLS IN EUROPE, METEOROLOGICAL INSTRUMENTATION, WIND ENERGY MEASUREMENT PROGRAMS AND A REAL ASSESSMENT OF POTENTIAL WIND POWER. WIND POWER RESEARCH WHICH HAS BEEN GOING ON IN HAWAII FOR SEVERAL YEARS HAS ENCOUNTERED MUCH THE SAME PROBLEMS AS THOSE FOUND IN EUROPE. ONE OF THE REASONS FOR THE AUTHOR'S VISIT TO EUROPE WAS TO COMPARE HAWAII'S APPROACH AND RESULTS IN THIS FIELD WITH THEIRS IN ORDER TO MAKE RECOMMENDATIONS FOR FURTHER WORK IN HAWAII. EACH SECTION ENDS WITH RECOMMENDATIONS FOR HAWAII.

78-0058 DAVITIAN H
WIND POWER AND ELECTRIC UTILITIES: A REVIEW OF THE PROBLEMS AND PROSPECTS.
NTIS, APRIL 1978. 57 P.
BNL-50849

ELECTRIC UTILITIES COMPRISE THE LARGEST POTENTIAL MARKET FOR WIND MACHINES IN THE MEGAWATT POWER RANGE. AMONG THE TOPICS INCLUDED IN THIS PAPER ARE THE PROBLEMS UTILITIES ENCOUNTER USING WIND POWER, ECONOMIC CONSIDERATIONS, AND CONSIDERATION OF FAVORABLE LOCATIONS.

78-0059 DAWBER K R
WINTER WIND ENERGY RESOURCES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.85-92.

ELECTRICITY SUPPLY AUTHORITIES IN NEW ZEALAND HAVE MORE DIFFICULTY IN MEETING LOAD DEMANDS IN LATE WINTER AND EARLY SPRING THAN AT OTHER TIMES IN THE YEAR. THUS AEROGENERATION ON A LARGE SCALE WILL BE OF MOST VALUE IF IT CAN PROVIDE A RELIABLE SOURCE DURING THIS PERIOD. OF COURSE IT IS UNREALISTIC TO EXPECT TO BE ABLE TO PROVIDE A FULL-TIME BASE LOAD FROM THE AREA COVERED BY THE OTAGO SURVEY, MEASURING APPROXIMATELY 150 KM BY 100 KM, BUT WHEN SIMILAR STUDIES BECOME AVAILABLE FROM OTHER PARTS OF NEW ZEALAND THEN THE ABILITY OF WIND ENERGY TO PROVIDE WINTER BASE LOAD CAN BE ASSESSED. SIX SPECIAL ASPECTS OF WINTER WINDS IN OTAGO ARE EXAMINED IN THIS REPORT.

78-0060 DODD C W, SULLIVAN W N
THE BRAKE SYSTEM FOR THE 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1978. 25P.
SAND-77-1331

THIS REPORT DESCRIBES THE HYDRAULIC BRAKE SYSTEM ON THE 17-METER VERTICAL AXIS WIND TURBINE, VAWT, LOCATED AT SANDIA LABORATORIES. A DISCUSSION OF THE DESIGN PHILOSOPHY AND OPERATING PROCEDURE IS GIVEN. DESIGN DETAILS AND A FUNCTIONAL DESCRIPTION OF SYSTEM COMPONENTS ARE INCLUDED IN THIS REPORT.

78-0061 DORAN J C, VERHOLEK M G
NOTE ON VERTICAL EXTRAPOLATION FORMULAS FOR WEIBULL VELOCITY DISTRIBUTION PARAMETERS.
J. APPL. METEOROL. 17(3): 410-412, MARCH 1978.

THE ADEQUACY OF A VERTICAL EXTRAPOLATION SCHEME FOR WEIBULL WIND SPEED DISTRIBUTION PARAMETERS PROPOSED BY JUSTUS AND MIKHAIL IS EXAMINED. WHILE USEFUL FOR ENSEMBLE AVERAGES, THE TECHNIQUE CAN LEAD TO SIGNIFICANT ERRORS IN INDIVIDUAL CASES.

78-0062 DRAKE W
A NATIONAL WIND DEMONSTRATION PROGRAM.
WIND POWER DIG. NO. 12: 13-15, SPRING 1978.

78-0063 DREIER M E

PLANS FOR WIND ENERGY SYSTEM SIMULATION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 261-264.
CONF-771148

TWO NEW ANALYSIS TOOLS, ONE A DIGITAL COMPUTER CODE AND THE OTHER A SPECIAL PURPOSE HYBRID COMPUTER, ARE INTRODUCED. THE DIGITAL COMPUTER PROGRAM, THE ROOT PERTURBATION METHOD OR RPM, IS A NEW IMPLEMENTATION OF THE CLASSIC FLOQUET PROCEDURE WHICH CIRCUMVENTS NUMERICAL PROBLEMS ASSOCIATED WITH THE EXTRACTION OF FLOQUET ROOTS. THE HYBRID COMPUTER, THE WIND ENERGY SYSTEM TIME-DOMAIN SIMULATOR (WEST), YIELDS REAL-TIME LOADS AND DEFORMATION INFORMATION ESSENTIAL TO DESIGN AND SYSTEM STABILITY INVESTIGATIONS.

78-0064 DUGUNDJI J
AEROELASTIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 53-60.
CONF-771148

AN AEROELASTIC INVESTIGATION OF HORIZONTAL AXIS WIND TURBINES IS DESCRIBED. THE STUDY IS DIVIDED INTO TWO SIMPLER AREAS, NAMELY, THE AEROELASTIC STABILITY OF A SINGLE BLADE ON A RIGID TOWER, AND THE MECHANICAL VIBRATIONS OF THE ROTOR SYSTEM ON A FLEXIBLE TOWER. SOME RESULTING INSTABILITIES AND FORCED VIBRATION BEHAVIOR ARE DESCRIBED.

78-0065 EDWARDS P J, DAWBER K R, HURST R B, ROXBURGH A J
AEROGENERATOR PERFORMANCE AT REPRESENTATIVE OTAGO SITES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 69-84.

IN THIS PAPER WE HAVE INDICATED BY SEVERAL EXAMPLES HOW SINGLE POINT HIGH RESOLUTION WIND SPEED DATA, MAY WITH A NUMBER OF REASONABLE ASSUMPTIONS, BE USED TO MODEL THE PERFORMANCE OF STATE OF THE ART AEROGENERATORS. THE RESULTS FOR OTAGO ARE ENCOURAGING AS MIGHT BE ANTICIPATED FROM CONSIDERATION OF THE HIGH ANNUAL MEAN WIND SPEEDS AND LOW TURBULENCE.

78-0066 EKSTROM P A, VERHOLEK M G
A WIND PROSPECTOR'S INSTRUMENT.
NTIS, APRIL 1978. 13 P.
PNL-2514

IN THE INITIAL EVALUATION OF A PROSPECTIVE WIND TURBINE SITE, WIND MEASUREMENTS MUST BE MADE AT THAT SITE. THIS REPORT DESCRIBES AN INEXPENSIVE DATA COLLECTION DEVICE THAT CAN BE USED TO RECORD SUCH MEASUREMENTS, PRODUCING STATISTICAL SUMMARIES OF WIND BEHAVIOR AT THE SITE. PROSPECTORS HAVE OFTEN USED ANALOGOUS DEVICES TO LOCATE DEPOSITS OF MINERAL RESOURCES; THUS, WE CALL THIS DEVICE A WIND PROSPECTOR'S INSTRUMENT.

78-0067 ELDERKIN C E, WENDELL L L
SEMI-ANNUAL REPORT FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD JULY 1977 THROUGH DECEMBER 1977.
NTIS, JANUARY 1978. 98P.
PNL-2519

WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS A SERVICE ELEMENT ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR THE INSTALLATION OF WECS, AND THE OPERATION OF WECS. THE PROGRAM CONTRIBUTIONS ARE TO CONSIST OF RELIABLE ESTIMATES OF WIND CHARACTERISTICS PERTINENT TO WECS DESIGN, EFFECTIVE ANALYSES AND METHODS FOR THE DETERMINATION OF WIND ENERGY POTENTIAL OVER LARGE AREAS, DEPENDABLE AND COST-EFFECTIVE METHODOLOGIES FOR THE SITING OF WECS, AND DESCRIPTIONS OF THE DAY-TO-DAY VARIABILITY AND PREDICTABILITY OF WIND ENERGY FOR WECS OPERATIONS. TO ACCOMPLISH THESE GOALS, THE WCPE HAS BEEN DIVIDED INTO FOUR TECHNICAL PROGRAM AREAS: WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE EVALUATION; MESOSCALE WIND CHARACTERISTICS; DEVELOPMENT OF SITING METHODOLOGIES; AND WIND

CHARACTERISTICS FOR WECS OPERATIONS.

78-0068 THE 11TH STREET MOVEMENT.
ALTERN. SOURCES ENERGY NO. 30:31, FEBRUARY 1978.

THE SOLAR AND WIND ENERGY APPLICATION OF A COOP APARTMENT HOUSE IN NEW YORK CITY IS DESCRIBED.

78-0069 ENERGY FROM THE OCEAN.
REPORT OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, 95TH. CONGRESS, 2D. SESSION BY THE SCIENCE POLICY RESEARCH DIVISION, CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS. WASHINGTON, D.C., GOV. PRINT. OFF., 1978. 445 P.

IN THE AREA OF RENEWABLE SOURCES OF ENERGY FROM THE OCEAN, THE REPORT INCLUDES CHAPTERS ON OCEAN THERMAL ENERGY CONVERSION; ENERGY FROM OCEAN WAVES; ENERGY FROM OCEAN CURRENTS; ENERGY FROM TIDES; ENERGY FROM OCEANIC WINDS; ENERGY FROM SALINITY GRADIENTS; AND ENERGY FROM OCEANIC BIOCONVERSION. ALSO COVERED ARE THE NONRENEWABLE SOURCES OF ENERGY FROM THE OCEAN WITH CHAPTERS ON DEEP OCEAN OIL AND GAS; OFFSHORE GEOTHERMAL ENERGY; AND OFFSHORE HARD MINERAL ENERGY RESOURCES. THE REPORT CONCLUDES WITH A BIBLIOGRAPHY AND A SELECTION OF CURRENT ARTICLES ON THE GENERAL SUBJECT OF THE ENERGY POTENTIAL OF THE OCEANS.

78-0070 ENVIRONMENTAL DEVELOPMENT PLAN (EDP): WIND ENERGY CONVERSION, 1977.
NTIS, MARCH 1978. 36P.
DOE/EDP-0007

THIS ENVIRONMENTAL DEVELOPMENT PLAN FOR THE ERDA WIND ENERGY CONVERSION PROGRAM BRIEFLY DESCRIBES THE PRESENT STATUS, PROGRAM GOALS, AND POTENTIAL APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS) AND IDENTIFIES POTENTIAL AREAS OF CONCERN RELEVANT TO THEIR USE. AMONG THOSE CONCERNS ARE OCCUPATIONAL OR PUBLIC EXPOSURE TO HEALTH AND SAFETY HAZARDS, ENVIRONMENTAL EFFECTS, AND SOCIOECONOMIC IMPACTS. IDENTIFICATION AND SCREENING OF POSSIBLE IMPACTS RESULTS IN DELINEATION OF THOSE OF THE MOST SERIOUS, IRREVERSIBLE, AND CUMULATIVE NATURE, THOSE HAVING NEAR-TERM IMPORTANCE TO THE PROGRAM, AND THOSE FOR WHICH CURRENT KNOWLEDGE OF EFFECTS AND CONTROL TECHNOLOGIES ARE INADEQUATE. IN LIGHT OF THESE FACTORS AND THE LENGTH OF TIME NECESSARY TO COMPLETE APPLICABLE RESEARCH PROGRAMS, THE EDP SUGGESTS APPROPRIATE AND NECESSARY RESEARCH AREAS AND COORDINATES THESE STUDIES WITH THE EXPECTED SCHEDULES OF TECHNOLOGY DEVELOPMENT AND WIDESPREAD PUBLIC UTILIZATION OF WECS.

78-0071 ERDMAN A G, FROHRIB D A, CARLSON T P, HAGEN D L, GARRARD W L
DESIGN OF A WIND ENERGY STORAGE SYSTEM WITH A CELLULOSIC FLYWHEEL.
FLYWHEEL TECHNOLOGY SYMPOSIUM, SAN FRANCISCO, 5 OCTOBER 1977.
PROCEEDINGS. NTIS, MARCH 1978. P. 201-212.
CONF-771053

THE DESIGN OF A WIND ENERGY STORAGE SYSTEM IS DISCUSSED. THE DESIGN AND CONSTRUCTION, IN PROGRESS, OF A SMALL DEMONSTRATION MODEL IS DESCRIBED. SUGGESTIONS FOR FURTHER STUDY AND DEVELOPMENT ARE PRESENTED. THE DEVELOPMENT OF A COMPLETE ENERGY STORAGE SYSTEM WHICH IS COST COMPETITIVE WITH OTHER MEANS OF ENERGY STORAGE IS ADDRESSED. EMPHASIS IS PLACED ON THE DEVELOPMENT OF A FLYWHEEL OF A CELLULOSIC MATERIAL, SUCH AS WOOD OR WOOD PRODUCTS, AND ON THE IMPLEMENTATION OF MECHANICAL TRANSMISSIONS FOR THE INPUT AND RETRIEVAL OF ENERGY.

78-0072 ENVIRONMENTAL SAFETY HAZARDS SEEN FOR SOME SOLAR ENERGY TECHNOLOGIES.
SOL. ENERGY INTELL. REP. 4(48): 368, NOVEMBER 27, 1978.

THE CITIZEN'S ENERGY PROJECT HAS RELEASED A REPORT REFUTING THE CLAIMS OF MANY SOLAR ADVOCATES THAT SOLAR TECHNOLOGIES ARE "ENVIRONMENTALLY BENIGN," ARGUING THAT MANY ENVIRONMENTAL AND SAFETY PROBLEMS ARE ASSOCIATED WITH SOLAR SYSTEMS.

78-0073 FEDERAL PROGRAM SEES WECS COMPETING WITH PEAK-LOAD PLANTS IN 30 YEARS.
SOLAR ENERGY INTELL. REP. 4(12): 74-75, MARCH 20, 1978.

78-0074 FEDERAL WIND ENERGY PROGRAM. PROGRAM SUMMARY.
NTIS, JANUARY 1978. 78P.
DOE/ET-0023/1

THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS AND ENABLE THE EARLIEST POSSIBLE COMMERCIALIZATION OF WIND POWER. TO ACHIEVE THIS OBJECTIVE FOR SMALL AND LARGE WIND SYSTEMS REQUIRES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE, AND ADDRESSING THE NON-TECHNOLOGICAL ISSUES WHICH COULD DETER THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 1977 TOWARD THE ACHIEVEMENT OF THESE GOALS. IT ALSO OUTLINES THE PROGRAM'S GENERAL ORGANIZATION AND SPECIFIC PROGRAM ELEMENTS.

78-0075 FENN D B, VITERNA L A
FIXED PITCH WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 243-254.
CONF-771148

WIND TURBINES DESIGNED FOR FIXED PITCH OPERATION OFFER POTENTIAL REDUCTIONS IN THE COST OF THE MACHINE BY ELIMINATING MANY COSTLY COMPONENTS. STUDIES HAVE SHOWN THAT A ROTOR CAN BE DESIGNED WHICH PRODUCES THE SAME ENERGY ANNUALLY AS MOD-0 BUT WHICH REGULATES ITS POWER AUTOMATICALLY BY PROGESSIVELY STALLING THE BLADES AS WIND SPEED INCREASES. EFFECTS OF BLADE TWIST, TAPER, ROOT CUTOUT, AND AIRFOIL SHAPE ON PERFORMANCE ARE DISCUSSED. UNFORTUNATELY, FIXED PITCH ROTORS ARE NOT SELF-STARTING WHEN THE PITCH IS SET TO MAXIMIZE ENERGY PRODUCTION PER YEAR. VARIOUS STARTING TECHNIQUES ARE DISCUSSED.

78-0076 FERTIS D G, ROSS R S
RESEARCH OF LOW COST WIND GENERATOR ROTORS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 257-260.
CONF-771148

THIS FEASIBILITY PROGRAM DETERMINED THAT IT WOULD BE POSSIBLE TO SIGNIFICANTLY REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTORS BY MAKING THEM OF CAST URETHANE. GOODYEAR DEVELOPED SEVERAL HIGH MODULUS URETHANES WHICH WERE STRUCTURALLY TESTED AT THE UNIVERSITY OF AKRON. A SECTION OF ROTOR WAS ALSO CAST AND TESTED SHOWING THE EXCELLENT AERODYNAMICS SURFACE WHICH RESULTS. A DESIGN ANALYSIS INDICATED THAT A COST REDUCTION OF ALMOST TEN TO ONE CAN BE ACHIEVED WITH A SMALL WEIGHT INCREASE TO ACHIEVE THE SAME STRUCTURAL INTEGRITY AS EXPECTED OF CURRENT ROTOR SYSTEMS.

78-0077 FIGARD R L, SCHETZ J Z
EXPERIMENTAL AND ANALYTICAL STUDIES OF THE AERODYNAMIC PERFORMANCE OF WINDMILLS.
NEW YORK, AIAA, PAPER NO. 78-277, 1978. 7P.

THE AERODYNAMIC PERFORMANCE OF A MODERN, HIGH TIP SPEED, THREE-BLADED WINDMILL RATED AT 10KW AT 30 MPH WAS STUDIED BY THREE METHODS. FIRST, THE RESULTS OF FIELD TESTS OF THE ACTUAL DEVICE WITH BOTH A RESISTIVE AND A BATTERY-CHARGING ELECTRIC LOAD ARE REPORTED. SECOND, THE PREDICTIONS OF A SIMPLE BLADE-ELEMENT ANALYSIS ARE PRESENTED AND COMPARED WITH THE FIELD DATA. AERODYNAMIC BLADE SECTION COEFFICIENTS OF AN ACTUAL BLADE SECTION WERE MEASURED IN A WIND TUNNEL AND USED AS INPUT IN THE ANALYSIS. THIRD, WIND TUNNEL TEST RESULTS FOR A 1/5TH SCALE MODEL ARE GIVEN. REYNOLDS NUMBER SIMULATION FROM MODEL TO PROTOTYPE IS CONSIDERED IN DETAIL. FINALLY, THE RESULTS OF ALL THREE EFFORTS ARE COMPARED.

78-0078 FLAY R G J, LINDLEY D, BOWEN A J
FIELD MEASUREMENTS OF THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.109-132.

ACCURATE FIELD MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND WIND SPEED PROFILES NEAR THE GROUND ARE ESSENTIAL FOR THE OPTIMUM SITING OF WIND TURBINES AND IN THE INVESTIGATION OF THEIR PERFORMANCE AT A TEST SITE. A FIELD LABORATORY UNIT APPROPRIATE FOR THIS APPLICATION HAS BEEN DEVELOPED BY THE UNIVERSITY OF CANTERBURY MECHANICAL ENGINEERING DEPARTMENT FOR THE PURPOSE OF RECORDING TURBULENCE DATA FROM THE ATMOSPHERIC BOUNDARY LAYER. WIND VELOCITY COUNTS AT SCAN RATES OF 7.5 HZ

AND ABOVE CAN BE OBTAINED FROM UP TO TWELVE ORTHOGONAL ARRAYS OF FAST RESPONSE PROPELLER ANEMOMETERS AND RECORDED ON MAGNETIC TAPE FOR LAYER ANALYSIS. THE TECHNIQUES EMPLOYED IN THE HANDLING AND SUBSEQUENT PROCESSING OF THE DATA ARE DESCRIBED AND SOME RESULTS FROM PRELIMINARY MEASUREMENTS IN THE FIRST TWENTY METRES OF A RURAL BOUNDARY LAYER ARE DISCUSSED.

78-0079 RANGI R S, SOUTH P
OVERSPEED SPOILERS FOR VERTICAL AXIS WIND TURBINES.
U.S. PATENT NO. 4,082,479, APRIL 4, 1978. 4P.

AN OVERSPEED SPOILER IS DESCRIBED FOR VERTICAL AXIS WIND TURBINES OF THE TYPE HAVING STRAIGHT OR CURVED AIRFOIL BLADES ATTACHED TO A VERTICAL SHAFT FORMED BY A RELATIVELY THIN FLAT BLADE SHAPED SPOILER ELEMENT HINGE MOUNTED ON THE TRAILING EDGE, LEADING EDGE, OR AT A CENTRAL POSITION OF A PORTION OF THE AIRFOIL SECTION. THE ELEMENT HAS TWO PORTIONS ONE OF WHICH IS HELD FLUSH OR AGAINST A SURFACE BY SPRING MEANS WITH A SURFACE OF THE BLADE TOWARDS THE TURBINE ROTOR AXIS AND THE OTHER LIES SUBSTANTIALLY PARALLEL TO THE CHORDLINE OF THE AIRFOIL. THE WEIGHT AND CONFIGURATION OF THE ELEMENT IS SUCH THAT AT A PREDETERMINED TURBINE ROTOR SPEED THE ELEMENT ROTATES AGAINST THE SPRING FORCE BECAUSE OF CENTRIFUGAL ACTION AND TAKES UP A POSITION GENERALLY TRANSVERSE TO THE AIR FLOW DIRECTION SUCH AS TO CAUSE MUCH INCREASED DRAG AND CONTROL OVERSPEEDING OF THE ROTOR.

78-0080 GEMINI SYNCHRONOUS INVERTER SYSTEMS.
MUKWONAGO, WISC., WINDWORKS, INC., 1978. 12P.

THIS BROCHURE COVERS HOW TO CONVERT DC TO AC POWER AND FEED IT BACK INTO YOUR UTILITY'S ELECTRIC GRID, USING WIND TURBINES, SOLAR CELLS, SOLAR THERMAL ELECTRIC SYSTEMS AND SMALL HYDRO-DAMS.

78-0081 GIANSANTE N
DRIVE TRAIN DYNAMIC ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 157-166.
CONF-771148

A METHOD FOR PARAMETRIC VARIATIONS IN DRIVE TRAIN DYNAMIC ANALYSIS IS DESCRIBED. THE METHOD MODELS THE INDIVIDUAL COMPONENTS OF A DRIVE SYSTEM, FORMS THE APPROPRIATE SYSTEM INTERFACE COORDINATES AND CALCULATES THE SYSTEM DYNAMIC RESPONSE AT PARTICULAR FREQUENCIES. APPLICATION OF THE METHOD FOR PREDICTION OF THE DYNAMIC RESPONSE CHARACTERISTICS OF A HELICOPTER TRANSMISSION AND A COMPARISON OF RESULTS WITH TEST DATA IS ALSO INCLUDED.

78-0082 GILBERT L J
TRANSIENT RESPONSE TO THREE-PHASE FAULTS ON A WIND TURBINE GENERATOR.
NTIS, JUNE 1978. 146P.
NASA-TM-78902, E-9638, N78-26542

IN ORDER TO OBTAIN A MEASURE OF ITS RESPONSES TO SHORT CIRCUITS A LARGE HORIZONTAL AXIS WIND TURBINE GENERATOR WAS MODELED AND ITS PERFORMANCE WAS SIMULATED ON A DIGITAL COMPUTER. SIMULATION OF SHORT CIRCUIT FAULTS ON THE SYNCHRONOUS ALTERNATOR OF A WIND TURBINE GENERATOR, WITHOUT RESORT TO THE CLASSICAL ASSUMPTIONS GENERALLY MADE FOR THAT ANALYSIS, INDICATES THAT MAXIMUM CLEARING TIMES FOR THE SYSTEM TIED TO AN INFINITE BUS ARE LONGER THAN THE TYPICAL CLEARING TIMES FOR EQUIVALENT CAPACITY CONVENTIONAL MACHINES. ALSO, MAXIMUM CLEARING TIMES ARE INDEPENDENT OF TOWER SHADOW AND WIND SHEAR. VARIATION OF CIRCUIT CONDITIONS PRODUCE THE MODIFICATIONS IN THE TRANSIENT RESPONSE PREDICTED BY ANALYSIS.

78-0083 GIPE P
WIND OVER THE BRITISH ISLES.
WIND POWER DIG. NO. 12: 4-11, SPRING 1978.

A REVIEW OF WIND POWER RESEARCH CURRENTLY UNDERWAY IN THE BRITISH ISLES IS PRESENTED.

78-0084 GLASGOW J C
DOE/NASA MOD-0 100 KW WIND TURBINE: TEST RESULTS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS

CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 117-150.
CONF-771148

THE MOD-O 100KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY TO ASSESS TECHNOLOGY REQUIREMENTS AND ENGINEERING PROBLEMS OF LARGE WIND TURBINES. DATA WHICH IS ASSOCIATED WITH ROTOR AND MACHINE DYNAMICS PROBLEMS ENCOUNTERED AND THE MACHINE MODIFICATIONS INCORPORATED AS A SOLUTION ARE PRESENTED. THESE INCLUDE HIGH BLADE LOADS DUE TO TOWER SHADOW, EXCESSIVE NACELLE YAWING MOTION, AND POWER OSCILLATIONS. THE RESULTS OF EFFORTS TO CORRELATE MEASURED WIND VELOCITY WITH POWER OUTPUT AND WIND TURBINE LOADS ARE ALSO DISCUSSED.

78-0085 GLASGOW J C, BIRCHENOUGH A G
DESIGN AND OPERATING EXPERIENCE ON THE U.S. DEPARTMENT OF ENERGY EXPERIMENTAL MOD-O 100KW WIND TURBINE.
NTIS, 1978. 16P.
N78-26552, NASA-TM-78915

THE MOD-O 100KW EXPERIMENTAL WIND TURBINE WAS DESIGNED AND FABRICATED BY NASA, AS PART OF THE FEDERAL WIND ENERGY PROGRAM, TO ASSESS TECHNOLOGY REQUIREMENTS AND ENGINEERING PROBLEMS OF LARGE WIND TURBINES. THE MACHINE BECAME OPERATIONAL IN OCTOBER 1975 AND HAS DEMONSTRATED SUCCESSFUL OPERATION IN ALL OF ITS DESIGN MODES. DURING THE COURSE OF ITS OPERATIONS THE MACHINE HAS GENERATED A WEALTH OF EXPERIMENTAL DATA AND HAS SERVED AS A PROTOTYPE DEVELOPMENTAL TEST BED FOR THE MOD-OA OPERATIONAL WIND TURBINES WHICH ARE CURRENTLY USED ON UTILITY NETWORKS. THIS PAPER DESCRIBES THE MECHANICAL AND CONTROL SYSTEMS AS THEY EVOLVED IN OPERATIONAL TESTS AND DESCRIBES SOME OF THE EXPERIENCE WITH VARIOUS SYSTEMS IN THE DOWNWIND ROTOR CONFIGURATION.

78-0086 GOLD H
METHODS OF ATTENUATING WIND TURBINE AC GENERATOR OUTPUT VARIATIONS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 179-186.
CONF-771148

WIND SPEED VARIATION, TOWER BLOCKAGE AND STRUCTURAL AND INERTIAL FACTORS PRODUCE UNSTEADY TORQUE IN WIND TURBINES. METHODS FOR MODIFYING THE TURBINE TORQUE SO THAT STEADY TORQUE IS DELIVERED TO THE COUPLED AC GENERATOR ARE DISCUSSED. THE METHOD THAT MAY EVOLVE WILL BE INFLUENCED BY THE POWER USE THAT DEVELOPS AND THE TRADE-OFFS OF COST, WEIGHT AND COMPLEXITY.

78-0087 GOWDA B H L, SWAMY N V C
AERODYNAMIC CHARACTERISTICS OF A CYLINDRICAL TYPE OF WIND TURBINE WITH INCLINED BLADES.
J. ENERGY 2(2): 122-124, MARCH-APRIL 1978.

78-0088 GRUNBAUM R
ALTERNATIVE ENERGY SOURCES IN THE USSR.
AMBIO 7(2): 49-55, 1978.

ALTERNATIVE ENERGY SOURCES ARE FILLING IMPORTANT GAPS IN THE SOVIET UNION'S ENERGY PROFILE. THE RUSSIAN VIEW IS THAT RENEWABLE ENERGY SOURCES CAN HAVE A SIGNIFICANT IMPACT IN MEETING LOCAL ENERGY DEMANDS, ESPECIALLY IN REGIONS WHERE MORE CONVENTIONAL FORMS ARE TOO EXPENSIVE OR INCONVENIENT. DESPITE THE DIFFICULTY IN OBTAINING RELIABLE INFORMATION, THE AUTHOR, AS AN OUTSIDE OBSERVER, PRESENTS AN OVERALL PICTURE OF THE SOVIET ALTERNATIVE ENERGY PROGRAM. THE COUNTRY IS RAPIDLY DEVELOPING WIND POWER AGGREGATES RANGING FROM A FEW KILOWATTS UP TO ONE HUNDRED KILOWATTS FOR DEPLOYMENT IN THE THINLY POPULATED REGIONS OF SIBERIA, THE FAR NORTH AND THE FAR EAST. SOME OF THESE AGGREGATES WILL BE USED TO PUMP WATER FOR GRAZING ANIMALS. SOLAR ENERGY IS BEING UTILIZED TO DESALINATE GROUNDWATER AND SEAWATER. SOLAR PANELS ARE WARMING HOUSES IN THE UZBEK REPUBLIC AND INEXPENSIVE PORTABLE SOLAR WATER HEATERS HAVE BEEN PRODUCED IN TASHKENT. POWER PLANTS USING TIDAL AND GEOTHERMAL ENERGY ARE BEING BUILT, MAINLY IN AREAS WHERE FOSSIL FUEL PLANTS ARE PROHIBITIVELY EXPENSIVE.

78-0089 A GUIDE TO COMMERCIALLY AVAILABLE WIND MACHINES.

ROCKY FLATS, COLORADO, ROCKWELL INTERNATIONAL, 3 APRIL 1978. 125P.

THIS REPORT DESCRIBES IN DETAIL WIND ENERGY CONVERSION SYSTEMS (WECS) COMMERCIALLY AVAILABLE IN THE U.S. THE TERMS USED TO DESCRIBE THESE WIND SYSTEMS ARE DEFINED AND THEIR SIGNIFICANCE DISCUSSED. LISTS OF MANUFACTURERS AND DISTRIBUTERS, SUBSYSTEM COMPONENTS AND SUPPLIERS, AND REFERENCES ARE PROVIDED.

78-0090 GUIDE TO SOLAR ENERGY PROGRAMS.
NTIS, MARCH 1978. 72P.
DOE/ET-0036/1

THE MISSION AND OBJECTIVES OF THE U.S. DEPARTMENT OF ENERGY (DOE) ARE OUTLINED. AN OVERVIEW OF DOE'S SOLAR ENERGY PROGRAMS IS GIVEN, INCLUDING: (1) THE SOLAR THERMAL POWER SYSTEMS PROGRAM; (2) THE PHOTOVOLTAIC SYSTEMS PROGRAM; (3) THE FUELS FROM BIOMASS PROGRAM; (4) THE OCEAN THERMAL SYSTEMS PROGRAM; AND (5) THE WIND ENERGY SYSTEMS PROGRAM. ALSO, THE ENVIRONMENTAL AND RESOURCE ASSESSMENT PROGRAM AND THE SATELLITE POWER SYSTEM PROGRAM ARE DESCRIBED. SOLAR ENERGY PROGRAMS NOW FUNCTIONING UNDER THE DIVISION OF CONSERVATION AND SOLAR APPLICATIONS ARE DESCRIBED, INCLUDING THE SOLAR TECHNOLOGY TRANSFER PROGRAM AND THE THERMAL APPLICATIONS PROGRAM. METHODS OF PROCUREMENT AND GUIDES FOR PROPOSAL PREPARATION AND SOURCES OF SOLAR ENERGY INFORMATION AND ACTIVITIES SUPPORTING THE SOLAR ENERGY PROGRAM ARE DISCUSSED.

78-0091 GUIDE TO SOLAR ENERGY PROGRAMS.
NTIS, REVISED JUNE 1978. 76P.
DOE/ET-0036/1

THE MISSION AND OBJECTIVES OF THE U.S. DEPARTMENT OF ENERGY (DOE) ARE OUTLINED. AN OVERVIEW OF DOE'S SOLAR ENERGY PROGRAMS IS GIVEN, INCLUDING: (1) THE SOLAR THERMAL POWER SYSTEMS PROGRAM; (2) THE PHOTOVOLTAIC SYSTEMS PROGRAM; (3) THE FUELS FROM BIOMASS PROGRAM; (4) THE OCEAN THERMAL SYSTEMS PROGRAM; AND (5) THE WIND ENERGY SYSTEMS PROGRAM. ALSO, THE ENVIRONMENTAL AND RESOURCE ASSESSMENT PROGRAM AND THE SATELLITE POWER SYSTEM PROGRAM ARE DESCRIBED. SOLAR ENERGY PROGRAMS NOW FUNCTIONING UNDER THE DIVISION OF CONSERVATION AND SOLAR APPLICATIONS ARE DESCRIBED, INCLUDING THE SOLAR TECHNOLOGY TRANSFER PROGRAM AND THE THERMAL APPLICATIONS PROGRAM. METHODS OF PROCUREMENT AND GUIDES FOR PROPOSAL PREPARATION AND SOURCES OF SOLAR ENERGY INFORMATION AND ACTIVITIES SUPPORTING THE SOLAR ENERGY PROGRAM ARE DISCUSSED.

78-0092 HAM N D
FLUTTER OF DARRIEUS WIND TURBINE BLADES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 77-93.
CONF-771148

THE TESTING OF DARRIEUS WIND TURBINES HAS INDICATED THAT UNDER CERTAIN CONDITIONS, SERIOUS VIBRATIONS OF THE BLADES CAN OCCUR, INVOLVING FLATWISE BENDING, TORSION, AND CHORDWISE BENDING. A THEORETICAL METHOD OF PREDICTING THE AEROELASTIC STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF SUCH BLADES IS PRESENTED WITH A VIEW TO DETERMINING THE CAUSE OF THESE VIBRATIONS AND A MEANS OF SUPPRESSING THEM.

78-0093 HANLON J
NOT JUST ANOTHER WINDMILL.
NEW SCI. 79(1120): 756-758, SEPTEMBER 14, 1978.

THE ARUSHA APPROPRIATE TECHNOLOGY PROJECT IN TANZANIA IS DESCRIBED.

78-0094 HARDY D M
REGIONAL WIND ENERGY DEVELOPMENT.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 16-18, 1978. GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, 1978. 19P.

REGIONAL WIND ENERGY DEVELOPMENT IS REVIEWED WITH EMPHASIS ON WIND RESOURCES AND APPLICATIONS IN THE WESTERN UNITED STATES. THE CONCLUSIONS OF EXISTING MAJOR STUDIES ARE NOTED TO INDICATE THE IMPORTANCE OF WIND ENERGY AS A MAJOR ENERGY SOURCE, ITS RELATIVE PLACE AMONG THE OTHER SOLAR TECHNOLOGIES AND EXPECTED SOCIAL BENEFITS. PROBLEMS OF WIND RESOURCE ASSESSMENT OF SPECIAL IMPORTANCE TO THE WEST ARE DESCRIBED AND PREVIOUS

WORK ON WIND ENERGY, HYDRO-ELECTRIC POWER, AND WATER RESOURCES ARE SUMMARIZED. ROLES OF THE REGIONAL SOLAR CENTERS AND THE NATIONAL SOLAR ENERGY RESEARCH INSTITUTE ARE DISCUSSED AND POSSIBLE AREAS OF INTERACTION IN THE WESTERN REGION ARE INDICATED. FURTHER ACTIVITIES IN THE DEVELOPMENT OF WIND ENERGY TECHNOLOGY AND ITS UTILIZATION ARE ALSO DESCRIBED.

78-0095 HARDY D M
WIND ENERGY ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 713-718.

WIND ENERGY PROJECT ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE ARE COLLECTIVELY REVIEWED. OVERALL OBJECTIVES OF EACH MAJOR ACTIVITY AREA ARE DISCUSSED IN RELATION TO THE BROADER OBJECTIVES OF THE INSTITUTE IN FURTHERING WIND ENERGY UTILIZATION. ALSO DISCUSSED IS SERI'S ROLE IN SUPPORTING THE NATIONAL DEPARTMENT OF ENERGY PROGRAM INTERACTIONS WITH THE PRIVATE SECTOR IN WIND ENERGY DEVELOPMENT, AND EFFORTS TO PROMOTE INFORMATION TRANSFER THROUGHOUT THE WIND ENERGY COMMUNITY. OPPORTUNITIES FOR COOPERATIVE PROJECTS WITH UNIVERSITIES; WITH NATIONAL LABORATORIES AND OTHER RESEARCH CENTERS; AND WITH EXISTING OR FUTURE BUSINESS, MANUFACTURING, AND INDUSTRIAL CAPABILITIES ARE ALSO INDICATED.

78-0096 HAWAII FUNDS WIND.
WIND POWER DIG. NO. 12: 30, SPRING 1978.

78-0097 HELICOPTER TECHNOLOGY APPLIED TO WIND TURBINES.
WINDLETTER, P. 9, FEBRUARY 1978.

78-0098 HINRICHSEN D
SPIN-OFF FROM THE WORLD'S BIGGEST WINDMILL COULD CHANGE DENMARK'S ENERGY PROGRAMME.
NEW SCI. 77(1086): 140, JANUARY 19, 1978.

78-0099 HIRSHBERG G, BARNHART E, CASHMAN T, SHEPERDSON B
WIND + SOLAR AT NEW ALCHEMY.
WIND POWER DIG. NO. 11: 16-25, WINTER 1977-1978.

THE NEW ALCHEMY INSTITUTES' WIND POWER ACTIVITIES ARE DESCRIBED.

78-0100 AMERICAN WIND ENERGY ASSOCIATION. NATIONAL CONFERENCE. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, A.E.I., 1978. 183P.
AMERICAN WIND ENERGY ASSOCIATION. NATIONAL CONFERENCE. AMARILLO, TEXAS, MARCH 1-5, 1978.

TECHNICAL PAPERS COVER SEVERAL OF THE CURRENT DOE SUPPORTED WIND DESIGNS BEING WORKED ON. A REPORT IS INCLUDED ON THE TESTING OF VARIOUS WIND GENERATORS AT THE ROCKY FLATS TESTING SITE AND THE PROBLEMS THAT HAVE BEEN ENCOUNTERED.

78-0101 HOFFERT M I, MATLOFF G L, RUGG B A
THE LEBOST WIND TURBINE: LABORATORY TESTS AND DATA ANALYSIS.
J. ENERGY 2(3): 175-181, MAY-JUNE 1978.

PRELIMINARY AERODYNAMIC TORQUE AND POWER MEASUREMENTS AND DATA ANALYSIS ARE PRESENTED FOR THE LEBOST WIND TURBINE - A RECENTLY PATENTED VERTICAL-AXIS WIND ENERGY MACHINE INCORPORATING FLOW-FOCUSING INLETS FIXED TO A HOUSING SHROUD SURROUNDING BLADES ROTATING NORMAL TO THE FLOW. TWO LABORATORY-SCALE MODELS WERE CONSTRUCTED, INSTRUMENTED, AND TESTED IN A SPECIALLY MODIFIED SECTION OF THE NYU 30-M WIND TUNNEL.

78-0102 HOHENEMSER K H
SOME ALTERNATIVE DYNAMIC DESIGN CONFIGURATIONS FOR LARGE HORIZONTAL AXIS WECS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 195-218.
CONF-771148

THE PRESENT U.S. DEVELOPMENT EFFORT TOWARD LARGE HORIZONTAL AXIS WECS CONCENTRATES ON THE CONFIGURATION WITH TWO RIGID BLADES WITH COLLECTIVE

PITCH VARIATION AND A YAW GEAR DRIVE. ALTERNATIVE CONFIGURATIONS WITHOUT YAW GEAR DRIVE ARE CONSIDERED WHERE THE ROTOR IS EITHER SELF-CENTERING OR WHERE THE YAW ANGLE IS CONTROLLED BY BLADE CYCLIC PITCH INPUTS. A PRELIMINARY EVALUATION OF THE DYNAMIC CHARACTERISTICS FOR THESE ALTERNATIVE DESIGN CONFIGURATIONS IS PRESENTED.

78-0103 SZOEKE J
WIND POWERED ROTARY ELECTRIC GENERATOR.
U.S. PATENT NO. 4,086,498, APRIL 25, 1978. 8P.

A MACHINE AND METHOD ARE DESCRIBED FOR CONVERTING THE WIND'S LINEAR FORCE TO ELECTRICITY. THE DEVICE CONSISTS OF A ROTOR, WALLED AT BOTH INNER AND PERIPHERY RADIUSES, ENCIRCLED BY A PERIPHERY DEFLECTOR AND ITS INNER RADIUS COVERED WITH A CORE DEFLECTOR. TAPPING MEANS ATTACHED TO THE BACK PLANAR BASE OF ITS PLURALITY OF ROTOR VANES AND ROTABLY ASSOCIATED WITH PLURALITY OF RECIPROCATING GENERATORS. ROTATION SPEED AND GENERATING ELECTRICITY REGULATED BY OPERATING MEANS, MOUNTED TO ITS AXIS.

78-0104 PAL D, HUANG K T, SMITH M N
AUTOMATIC ELECTRICAL LOAD MATCHING DEVICE FOR WIND GENERATORS.
NTIS, MARCH 1978. 16P.
PAT-APPL-884 075, AD-D005056/7

AN AUTOMATIC ELECTRICAL LOAD MATCHING DEVICE IS DESCRIBED FOR APPLYING LOADS TO WIND DRIVEN GENERATORS. THE DEVICE SWITCHES FIVE DIFFERENT LOADS TO THE OUTPUT OF A WIND DRIVEN GENERATOR. EACH LOAD CORRESPONDS TO A RANGE OF SPEEDS OF THE WIND DRIVEN GENERATOR'S ROTOR.

78-0105 HUDSON G E
WIND POWER CONVERTER.
U.S. PATENT NO. 4,074,951, FEBRUARY 21, 1978. 8P.

A WIND POWER CONVERTER IS DESCRIBED WHICH COMPRISES A PAIR OF ROTATABLE TURBINES WITH ELONGATED CURVED BLADES DISPOSED WITHIN A ROTATABLE HOUSING ON AXIALLY PARALLEL SHAFTS, THE CURVATURE OF THE BLADES OF ONE TURBINE BEING OPPOSITE TO THE CURVATURE OF THE BLADES OF THE SECOND TURBINE TO THAT WIND PASSING BETWEEN THE TURBINES WILL ROTATE THE TURBINES IN OPPOSITE DIRECTIONS; THE HOUSING COMPRISING SHAFT-SUPPORTING SECTIONS AT THE ENDS OF THE TURBINES, LATERAL SECTIONS CONNECTING THE END SECTIONS, A PAIR OF WIND DEFLECTORS DISPOSED BETWEEN THE END SECTIONS AND EXTENDING FROM ADJACENT EDGES OF THE LATERAL SECTIONS TOWARD THE MIDPOINT BETWEEN THE TURBINES AND TERMINATING APPROXIMATELY THE SAME DISTANCE FROM EACH OTHER AS THE DISTANCE BETWEEN THE TURBINE SHAFTS, AND A PIVOTALLY MOUNTED VERTICALLY DISPOSED VANE EXTENDING FROM A PORTION OF THE HOUSING OPPOSITE TO THE WIND DEFLECTORS.

78-0106 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). 1970- APRIL 1978.
NTIS, MAY 1978. 238P.
NTIS/PS-78/0417/2GA

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR. WINDMILL AND WIND POWER FEASIBILITY, USE, AND ENGINEERING ARE DISCUSSED IN THESE CITATIONS OF WORLDWIDE RESEARCH. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH THE USE OF WIND POWER IN DEVELOPING COUNTRIES AND COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE STUDIES ON ENERGY STORAGE SYSTEMS.

78-0107 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL. 1. 1964-1976.
NTIS, MAY 1978. 206P.
NTIS/PS-78/0415

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR. THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

78-0108 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL.2. 1977- APRIL 1978.
NTIS, MAY 1978. 158P.
NTIS/PS-78/0416/4GA

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR. THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

78-0109 HURST R B, EDWARDS P J, ROXBURGH A J
CHARACTERISATION OF WIND ENERGY SITES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 57-68.

THE OTAGO UNIVERSITY PHYSICS DEPARTMENT, AS PART OF ITS INVOLVEMENT IN A NATIONAL SURVEY OF WIND ENERGY RESOURCES, HAS LOGGED A LARGE QUANTITY (APPROXIMATELY 10 LOGGER-YEARS) OF WIND SPEED DATA ON MAGNETIC TAPE FROM A SELECTION OF OTAGO SITES. THE BLOCKS OF DATA ARE CONTINUOUS AND UP TO 30 DAYS IN LENGTH. THE RECORDING FORMAT ALLOWS DIGITISATION WITH A TIME RESOLUTION CHOSEN WHEN THE TAPE IS READ OUT. TIME RESOLUTIONS OF 28 SECONDS AND 112 SECONDS HAVE OFTEN BEEN USED, TO GIVE CONVENIENT SPEED RESOLUTIONS OF 0.1 OR 0.2 MS-1 (DEPENDING ON THE VARIETY OF LOGGER). HOWEVER, RESOLUTION DOWN TO A FEW SECONDS IS ATTAINABLE. ACCESS TO COMPUTING FACILITIES IS AVAILABLE DIRECTLY (PDP 11) OR VIA PUNCHED PAPER TAPE. THIS PAPER DESCRIBES SOME OF THE ANALYSIS CARRIED OUT TO DATE ON THIS DATA TO EXTRACT STATISTICAL INFORMATION RELEVANT TO WIND POWER GENERATION.

78-0110 HWANG H H, MOZEICO H V, GUO T
EMPLOYING STATIC EXCITATION CONTROL AND TIE LINE REACTANCE TO STABILIZE WIND TURBINE GENERATORS.
NTIS, APRIL 1978. 74P.
N78-20603

THIS STUDY PRESENTS AN ANALYTICAL REPRESENTATION OF A WIND TURBINE GENERATOR WHICH EMPLOYS BLADE PITCH ANGLE FEEDBACK CONTROL. A MATHEMATICAL MODEL IS FORMULATED. WITH THE FUNCTIONING MOD-0 WIND TURBINE SERVING AS A PRACTICAL CASE STUDY, RESULTS OF COMPUTER SIMULATIONS OF THE MODEL AS APPLIED TO THE PROBLEM OF DYNAMIC STABILITY AT RATED LOAD ARE PRESENTED. THE EFFECT OF THE TOWER SHADOW IS INCLUDED IN THE INPUT TO THE SYSTEM. DIFFERENT CONFIGURATIONS OF THE DRIVE TRAIN, AND OPTIMAL VALUES OF THE TIE LINE IN REACTANCE ARE USED IN THE SIMULATIONS. COMPUTER RESULTS REVEAL THAT A STATIC EXCITATION CONTROL SYSTEM COUPLED WITH THE OPTIMAL VALUES OF THE TIE LINE REACTANCE WILL EFFECTIVELY REDUCE OSCILLATIONS OF THE POWER OUTPUT, WITHOUT THE USE OF A SLIP CLUTCH.

78-0111 HWANG H H, GILBERT L J
SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
NTIS, 1978. 16P.
NASA-TM-X-73613, CONF-770384-1

THIS PAPER WAS PRESENTED AT THE CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION SPONSORED BY THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, COLLEGE STATION, TEXAS, MARCH 14-16, 1977. THE SYNCHRONIZING OF A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS. EXPERIMENTS HAVE BEEN RECENTLY PERFORMED ON THE ERDA-NASA 100 KW WIND TURBINE. EXPERIMENTAL RESULTS MATCHED COMPUTER STUDY RESULTS VERY CLOSELY AND CONFIRMED THAT THE SYNCHRONIZATION CAN BE ACCOMPLISHED BY MEANS OF THE EXISTING SPEED CONTROL SYSTEM AND AN AUTOMATIC SYNCHRONIZER.

78-0112 IN THE WIND.

SOLAR AGE 3(6): 6-7, JUNE 1978.

A LIST OF WIND SYSTEM MANUFACTURERS IS PROVIDED.

78-0113 AN INDEX OF MANUFACTURERS, RESEARCHERS, AND DISTRIBUTORS CURRENTLY INVOLVED IN THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, FEBRUARY 1978. 72P.
DOE/RF/3533-78/1

THIS INDEX WAS PREPARED BY THE AMERICAN WIND ENERGY ASSOCIATION (AWEA). THE INDEX IS ORGANIZED INTO TWO SECTIONS: (1) INDIVIDUALS AND ORGANIZATIONS BY CATEGORY OF INTEREST AND (2) ALPHABETICAL ENTRIES BY ORGANIZATION OR INDIVIDUAL, GIVING COMPLETE INFORMATION SUPPLIED BY RESPONDENTS.

78-0114 INTERIOR REPORT GIVES BOOST TO WIND.
WINDLETTER, P.8, FEBRUARY 1978.

78-0115 INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. 496P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976.

78-0116 INTERVIEW WITH COB BURANDT, WIND POWER INVENTOR.
WIND POWER DIG. NO. 11: 4-12, WINTER 1977-1978.

78-0117 JACOBS M L, JACOBS P R
WIND ELECTRIC PLANT.
U.S. PATENT NO. 4,068,131, JANUARY 10, 1978. 12P.

A MULTIBLADE, WIND-DRIVEN, VARIABLE PITCH PROPELLER IS USED IN A WIND ELECTRIC PLANT FOR THE GENERATION OF ELECTRICAL POWER FROM WIND FORCES, AND THE PROPELLER IS ROTATABLE IN A PLANE AT AN ANGLE TO THE TOWER AXIS, ENABLING LARGER PROPELLERS TO BE USED WITHOUT PROPELLER-TOWER INTERFERENCE AND ALSO REDUCING THE DISTANCE BETWEEN THE PROPELLER AND GEAR CASE. A SNUBBER ARRANGEMENT IS PROVIDED ON THE PROPELLER BLADE RETURN SPRINGS TO SLOW THE GOVERNOR ACTION AND PREVENT ABRUPT PITCH CHANGES AND DAMAGING FLUTTER OF THE BLADES, AND A SELF-CENTERING, DOUBLE-ACTING PIVOT WASHER IS PROVIDED BETWEEN THE PROPELLER BLADES AND THE RETURN SPRINGS TO ENSURE FREE PIVOTING AND LONG LIFE OF THE SPRING CONNECTING BOLTS. ADJUSTABLE POSITIVE BLADE STOP BOLTS ARE ENGAGED DIRECTLY BETWEEN THE HUB AND THE PROPELLER BLADES TO LIMIT RETURN MOVEMENT THEREOF.

78-0118 JAMISON A
DEMOCRATIZING TECHNOLOGY.
ENVIRONMENT 20(1): 25-28, JANUARY-FEBRUARY 1978.

THE TVIND POWER-PLANT IN DENMARK IS DESCRIBED.

78-0119 JOHNSON L
DOE, DEPARTMENT OF SOLAR EVASION.
WIND POWER DIG. NO. 12: 14-15, SPRING 1978.

LEE JOHNSON REPORTS ON A MEETING BETWEEN DOE AND ALTERNATIVE TECHNOLOGY PEOPLE.

78-0120 JOHNSON L
ROLL ON, COLUMBIA.
RAIN IV(9): 15-16, JULY 1978.

78-0121 JOHNSON L
WIND'S UP--LET'S GO!
RAIN 4(4): 15, JANUARY 1978.

THIS IS A REPORT ON THE THIRD WIND ENERGY CONVERSION SYSTEMS CONFERENCE, HELD IN WASHINGTON, D.C., SEPTEMBER 1977.

78-0122 JOHNSON L, MERRIAM M F
SMALL GROUPS, BIG WINDMILLS.
WIND POWER DIG. NO.11: 30-32, WINTER 1977-1978.

DESCRIBED ARE SEVERAL LARGE SCALE WIND PROJECTS: (1) 2-MEGAWATT TVIND WIND TURBINE IN DENMARK, (2) 200-KW AMERICANIZED GEDSER MILL ON THE ISLAND OF CUTTYHUNK, MASSACHUSETTS, (3) NASA-DOE MOD-OA WIND TURBINE ON BLOCK ISLAND, R.I. AND (4) 140 KW HYDRAULIC WIND GENERATOR BUILT BY CHARLES SCHACHLE IN WASHINGTON.

78-0123 JONES R
ANALYTICAL TESTING TECHNIQUES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 95-101.
CONF-771148

STRUCTURAL DYNAMIC ANALYTICAL TESTING TECHNIQUES CAN BE A TOOL TO DETERMINE THE SOURCE OF STRUCTURAL DYNAMIC PROBLEMS AND THE SOLUTION TO THESE PROBLEMS. ANALYTICAL TESTING TECHNIQUES ARE BASED UPON NEW AND UNIQUE DYNAMIC TESTING METHODS AND ANALYSIS OF TEST RESULTS. THUS, THESE METHODS APPLY PRIMARILY TO CONSTRUCTED WIND TURBINE SYSTEMS. THIS PAPER GIVES A SUMMARY OF THESE METHODS.

78-0124 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 30: 38-40, JANUARY 1978; NO. 31: 46, APRIL 1978 ; NO. 32: 38-39, JUNE 1978; NO. 33: 34-36, AUGUST 1978; NO. 34: 30, OCTOBER 1978; NO. 35: 39-40, DECEMBER 1978.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WIND GENERATORS.

78-0125 JUSTUS C G
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (NEW ENGLAND AND CENTRAL U. S. REGIONS).
SOLAR ENERGY 20: 379-386, 1978.

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500-1500 KW WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO THE NEW ENGLAND OR CENTRAL U.S. UTILITY DISTRIBUTION GRIDS. THESE STUDIES, BASED ON DESIGN POWER PERFORMANCE CURVES, INDICATE THAT IN GOOD WIND ENVIRONMENTS THE 500 KW GENERATORS CAN AVERAGE (ON AN ANNUAL BASIS) UP TO 240 KW MEAN POWER OUTPUT, AND THE 1500 KW GENERATORS CAN AVERAGE UP TO 350 KW MEAN POWER OUTPUT. HIGHER MEAN POWER OUTPUT (AVERAGING UP TO 470 KW) IS INDICATED, HOWEVER FROM A HYPOTHETICAL 1125 KW RATED POWER UNIT DESIGNED TO OPERATE AT WIND SPEEDS NEAR THOSE OBSERVED THROUGHOUT THE STUDY AREA, RATHER THAN THE HIGHER DESIGN OPERATING WIND SPEED OF THE 1500 KW UNIT. THE BENEFICIAL EFFECT OF OPERATING LARGE DISPERSE ARRAYS OF WIND TURBINES IS THAT AVAILABLE POWER OUTPUT CAN BE INCREASED -- IF WINDS ARE NOT BLOWING OVER ONE PART OF THE ARRAY, CHANCES ARE THEY WILL OVER SOME OTHER PART OF THE ARRAY. THESE STUDIES INDICATE THAT WIND POWER AVAILABILITY LEVELS OF 200 KW PER 1125 KW GENERATOR WERE 77-93 PERCENT, DEPENDING ON SEASON. REASONABLY STEADY HIGH WIND POWER IN WINTER AND HIGH AFTERNOON PEAK WIND POWER IN SUMMER (CORRESPONDING TO PEAK AIR CONDITIONING LOAD) MEANS THAT SIGNIFICANT PEAK LOAD DISPLACEMENT CAN BE ACHIEVED WITHOUT THE USE OF STORAGE.

78-0126 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (GREAT LAKES AND PACIFIC COAST REGIONS). ANNUAL PROGRESS REPORT, MAY 1, 1976 - APRIL 30, 1977.
NTIS, JANUARY 1978. 124P.
RLO/2439-77/2

THIS REPORT EXAMINES ARRAYS OF SIMULATED 0.5 MW, 1.5 MW, AND 2.0 MW WIND TURBINES IN THE GREAT LAKES AND PACIFIC COAST REGIONS. THE PARAMETERS ANALYZED ARE: BASIC WIND STATISTICS, TIME AND SPATIAL CORRELATIONS, MEAN WIND POWER OUTPUT, WIND POWER FREQUENCY (AVAILABILITY WITHOUT STORAGE), AND RUN DURATION OF WIND SPEED AND ARRAY POWER (PROBABILITIES OF WIND AND POWER LULLS OF VARIOUS DURATION, WITHOUT STORAGE). ALSO INCLUDED ARE EVALUATION OF DIURNAL AS WELL AS SEASONAL VARIATIONS OF WIND AND WIND POWER, INCLUSION OF DENSITY, WIND SHEAR, WIND GUSTS, AND OTHER FACTORS IN THE MODEL POWER OUTPUT CURVE SIMULATION, STUDY OF THE POSSIBLE RELATION BETWEEN WIND SPEED AND DEGREE DAYS (KNOWN TO AFFECT A PORTION OF UTILITY DEMAND) AND DEVELOPMENT AND VERIFICATION OF SIMPLIFIED ARRAY SIMULATION MODEL.

78-0127 JUSTUS C G, MIKHAIL A
GENERIC POWER PERFORMANCE ESTIMATES FOR WIND TURBINES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC.
PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978.
NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL 2.2, P. 719-723.

THE OUTPUT POWER CURVES FOR A VERY WIDE RANGE OF WIND TURBINE DESIGNS CAN BE REPRESENTED BY TWO SIMPLE EXPRESSIONS -- ONE FOR CONSTANT RPM MACHINES, ONE FOR VARIABLE RPM MACHINES. A SET OF WIND TURBINES COVERING A WIDE RANGE OF DESIGN PARAMETER VALUES HAVE BEEN RUN THROUGH REFERENCE WIND DISTRIBUTIONS TO EVALUATE MEAN POWER OUTPUT.

78-0128 KADLEC E G
DOE/SANDIA DARRIEUS PROGRAM STATUS.
NTIS, 1978. 2P.
SAND-78-0851C

AS A DEPARTMENT OF ENERGY LABORATORY, SANDIA IS EXPLORING THE CAPABILITIES OF THE VERTICAL-AXIS WIND TURBINE (VAWT) AS AN ALTERNATIVE ENERGY SOURCE. INVESTIGATION OF THIS WIND SYSTEM TAKES SEVERAL PATHS. DETAILED COMPUTER MODELING AND ANALYSIS, CONDUCTED ALONG WITH ACTUAL DESIGN AND OPERATION OF PROTOTYPE TURBINES, WILL SEEK TO ESTABLISH THE MECHANICAL PRACTICALITY. OTHER RESEARCH IS AIMED AT DEFINING THE POTENTIAL APPLICATIONS, ECONOMICS, AND BEST GEOGRAPHIC LOCATIONS FOR THE VAWT SYSTEMS.

78-0129 KAHN E
RELIABILITY OF WINDPOWER FROM DISPERSED SITES: A PRELIMINARY ASSESSMENT.
NTIS, APRIL 1978. 47P.
LBL-6889

THE RELIABILITY BENEFIT OF GEOGRAPHICALLY DISPERSED WIND TURBINE GENERATORS IS ANALYZED. ELECTRICITY PRODUCED FROM WIND MACHINES EXPERIENCES WIDE FLUCTUATIONS OF OUTPUT AT A GIVEN SITE. YET THE VALUE OF ELECTRICITY IS A FUNCTION OF ITS RELIABILITY. PRICING SCHEDULES HAVE TRADITIONALLY VALUED FIRM POWER, THAT IS, RELIABLY AVAILABLE POWER, MUCH MORE HIGHLY THAN "DUMP POWER"; THAT IS, POWER WHICH IS AVAILABLE INTERMITTENTLY ON AN "IF AND WHEN" BASIS. THE CONVENTIONAL WISDOM ON WIND POWER SUGGESTS THAT IT IS UNREALISTIC TO EXPECT THAT WIND GENERATION WILL BE SUFFICIENTLY RELIABLE TO DISPLACE CONVENTIONAL CAPACITY. WHILE SUCH CONCLUSIONS MAY BE VALID FOR ANALYSIS OF INDIVIDUAL SITES, THE MAIN THESIS OF THIS PAPER IS THAT GEOGRAPHICAL DISPERSAL IMPROVES AGGREGATE RELIABILITY.

78-0130 KATZENBERG R
IN THE WIND.
SOLAR AGE 3(11):10,35, NOVEMBER 1978.

THE AUTHOR IDENTIFIES MISTAKES OF THE WIND ENERGY INDUSTRY, AT BOTH THE FEDERAL AND COMPANY LEVELS.

78-0131 KATZENBERG R
IN THE WIND.
SOLAR AGE 3(4): 42-43, APRIL 1978.

78-0132 KATZENBERG R
PLUGGING IN THE WIND; UTILITIES ARE WILLING. IS IT US AGAINST THEM?
SOLAR AGE 3(6): 23, JUNE 1978.

78-0133 KAUFMAN J W
WIND WHEEL ELECTRIC POWER GENERATOR. PATENT APPLICATION.
NTIS, FEBRUARY 24, 1978. 16P.
N78-22469, PAT-APPL-SN-880-726/6A

AN ELECTRIC GENERATOR DRIVEN BY THE WIND IS DESCRIBED. PRIMARY AND AUXILIARY FUNNEL-TYPE, VENTURI DUCTS ARE MOUNTED UPON A HOUSING FOR CAPTURING WIND CURRENTS AND CONDUCTING THE CURRENTS TO A BLADED WHEEL CONNECTED TO GENERATOR APPARATUS. ADDITIONAL AIR FLOWS ARE ALSO CONDUCTED ONTO THE BLADED WHEEL, ROTATING THE WHEEL. THE AUXILIARY DUCTS ARE DISPOSED AT AN ACUTE ANGLE WITH RESPECT TO THE LONGITUDINAL AXIS OF THE HOUSING, AND TOGETHER WITH THE ROTATABILITY OF THE HOUSING AND THE DUCTS, PERMITS CAPTURE OF WIND CURRENTS WITHIN A VARIABLE DIRECTIONAL

RANGE.

78-0134 KAZA K R V
AEROELASTIC STABILITY OF WIND TURBINE BLADES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 61-69.
CONF-771148

THE SECOND-DEGREE NONLINEAR AEROELASTIC EQUATIONS FOR A FLEXIBLE, TWISTED, NON-UNIFORM WIND TURBINE BLADE ARE DEVELOPED USING HAMILTON'S PRINCIPLE. THE DERIVATION OF THESE EQUATIONS HAS ITS BASIS IN THE GEOMETRIC NONLINEAR THEORY OF ELASTICITY. THESE EQUATIONS WITH PERIODIC COEFFICIENTS ARE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY AND RESPONSE OF LARGE WIND TURBINE BLADES. METHODS FOR SOLVING THESE EQUATIONS ARE DISCUSSED.

78-0135 KEN HARRIS' WINDMILL. SYMBOL OF YESTERDAY.
WIND POWER DIG. NO. 12: 34-36, SPRING 1978.

78-0136 KILLAM J
LOOKING BACK.
WIND POWER DIG. NO. 12: 24-25, SPRING 1978.

78-0137 KLIMAS P C, SHELDAHL R E
FOUR AERODYNAMIC PREDICTION SCHEMES FOR VERTICAL-AXIS WIND TURBINES: A COMPENDIUM.
NTIS, JUNE 1978.
SAND-78-0014

FOUR AERODYNAMIC MODELS/DESIGN TOOLS USED TO PREDICT THE PERFORMANCE FOR THE VERTICAL-AXIS WIND TURBINE (VAWT) ARE DESCRIBED. THESE MODELS ARE ALL BASED UPON THE CONSERVATION OF MOMENTUM, AND ARE EITHER CURRENTLY BEING USED AT SANDIA LABORATORIES OR HAVE BEEN RECENTLY USED THERE. A NUMBER OF COMPARISONS BOTH WITH THE EXPERIMENTS AND BETWEEN THE MATHEMATICAL TREATMENTS IS MADE.

78-0138 KLING A
WIND DRIVEN POWER PLANT.
U.S. PATENT NO. 4,073,516, FEBRUARY 14, 1978. 12P.

A TETHERED WIND-DRIVEN FLOATING POWER PLANT IS DESCRIBED WHICH INCLUDES A SUPPORT BODY CARRYING AT LEAST ONE ROTOR ASSEMBLY, A CURRENT GENERATOR COUPLED TO THE ROTOR AND ALIGNMENT ASSEMBLY FOR ALIGNING THE ROTOR TO FACE INTO THE WIND, A GROUND ANCHOR AND AT LEAST ONE CAPTIVATING STAY CONNECTING THE FLOATING POWER PLANT TO THE ANCHOR. THE SUPPORT BODY IS HOLLOW AND GAS-FILLED TO CARRY ITS OWN WEIGHT AS WELL AS THE WEIGHT OF THE ROTOR ASSEMBLY, CURRENT GENERATOR AND ALIGNMENT ASSEMBLY. THE SUPPORT BODY IS CONNECTED TO THE CAPTIVATING STAY THROUGH A JOINT CONNECTION HAVING THREE DEGREES OF FREEDOM. THE ROTORS ARE GIMBAL-MOUNTED, AT A VARIABLE RELATIVE POSITION WITH RESPECT TO THE SUPPORT BODY BUT IN FIXED POSITIONS RELATIVE TO ONE ANOTHER.

78-0139 KNECHT J
HARNESSING THE WIND. A NEW APPROACH.
WIND POWER DIG. NO. 12: 49-53, SPRING 1978.

THIS STUDY IS A DESCRIPTION OF A NEW APPROACH TO THE CONVERSION, STORAGE, AND USE OF WIND ENERGY. IT PROMISES TO MAKE A MAJOR CHANGE IN WINDPOWER SYSTEM COSTS. THIS NEW SYSTEM IS CALLED A "KINETIC NATURAL ENERGY CONVERSION AND HEAT TRANSFER" SYSTEM USING THE ACRONYM KNECHT, PRONOUNCED "CONNECT".

78-0140 KOCIVAR B
LIFTING FOILS: TAP ENERGY OF FLOWING AIR OR WATER.
POP. SCI. 212(2): 71-73, 168, FEBRUARY 1978.

EXTRACTING POWER FROM FLOW WATER OR SURFACE WIND IS ACCOMPLISHED BY USING A SERIES OF INTERCONNECTED FOILS. DIFFERENT CONFIGURATIONS AND APPLICATIONS ARE DISCUSSED.

78-0141 KOIDE G T, TAKAHASHI P K
UPDATE ON SOLAR AND WIND ENERGY APPLICATIONS IN HAWAII.

AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC.
PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978.
NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 724-728.

THE STUDY ON SOLAR AND WIND ENERGY APPLICATIONS IS A FACET OF THE TOTAL STATE OF HAWAII SOLAR ASSESSMENT PROGRAM. ENGINEERING CONSULTANTS, GOVERNMENTAL AUTHORITIES FROM THE DEPARTMENT OF ENERGY, STATE OF HAWAII, AND COUNTIES, TECHNOLOGY ASSESSMENT SPECIALISTS, AND BUSINESSMEN WERE CONTACTED FOR INPUT INTO THIS PAPER. THIS SURVEY IS A BROAD IMPLEMENTATION PLAN HIGHLIGHTING SEVEN TYPICAL APPLICATIONS -- THREE SOLAR, THREE WIND AND ONE COMBINATION. IN VARYING DEGREES, EACH PROJECT IS RECOMMENDED EITHER FOR FURTHER STUDY OR IMMEDIATE IMPLEMENTATION. ALTHOUGH UNECONOMICAL IN SOME ASPECTS WITHOUT APPROPRIATE GOVERNMENTAL AID OR INCENTIVES, THESE PILOT PROJECTS COULD SERVE TO IMPROVE ECONOMY OF SCALE, SPUR ASSOCIATED DEVELOPMENTS, AND IN THE LONG RUN, IMPROVE HAWAII'S BALANCE OF TRADE.

78-0142 KOLBE H
BUILD YOUR OWN BUDGET WINDCHARGER.
MECH. ILLUS. 74(597): 56-60, FEBRUARY 1978.

78-0143 LARSEN R
WHIRRING WINDMILLS PROMISE POWER.
IRR. AGE 12(5): 47,50, FEBRUARY 1978.

WIND TURBINES ARE BEING DEVELOPED FOR RURAL POWER APPLICATIONS IN THE 10 TO 200 KW POWER RANGE. A WIND TURBINE HAVING A RADIUS OF 11.3 METERS AT THE MIDDLE AND STANDING 16.8 M HIGH PRODUCES A POWER RATING OF 40 KW AT 11.2 M/SEC WIND SPEEDS AT A TEST FACILITY OF THE USDA SOUTHWEST GREAT PLAINS RESEARCH CENTER AT BUSHLAND, TEXAS. THE TURBINE DELIVERS POWER THROUGH AN 18:1 SPEED INCREASER, A RIGHT-ANGLE DRIVE, AND AN OVER-RUNNING CLUTCH TO A VERTICAL TURBINE PUMP. A WIND-SPEED SENSOR CONTROLS THE STARTER MOTOR AND BRAKE, WHILE AN ELECTRIC MOTOR SUPPLEMENTS WIND POWER. THE SYSTEM CAN PUMP APPROXIMATELY 47 LITERS/SECOND AGAINST A TOTAL DYNAMIC HEAD OF 80 METERS. DOE MAINTAINS A SIMILAR TEST FACILITY AT ROCKY FLATS, COL., IN WHICH A TURBINE MOUNTED ON A 40-FOOT TOWER AND HAVING A 3-BLADE, 12-FOOT ROTOR PRODUCES A POWER RATING OF 2000 WATTS AT A WIND SPEED OF 25 MPH. A SECOND FACILITY, IN THE CONTRACT STAGE, WILL HOUSE A 2.5 MEGAWATT ELECTRICAL GENERATING SYSTEM. THE SYSTEM, WHICH WILL HAVE A 300-FOOT ROTOR, IS DESIGNED FOR A SITE HAVING A MEAN ANNUAL WIND SPEED OF 14 MPH. IT WILL ECLIPSE GENERAL ELECTRIC'S BOONE, NORTH CAROLINA FACILITY, WHICH CURRENTLY GENERATES 2 MEGAWATTS OF POWER AT 24 MPH WIND SPEEDS. ENERGY OFFICIALS FEEL THAT WIND POWER MAY OFFER AN ECONOMICAL ALTERNATIVE ENERGY RESOURCE IF SYSTEM COSTS CAN BE REDUCED AND STORAGE BATTERY PROBLEMS CAN BE SOLVED.

78-0144 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT. JULY 1975-AUGUST 1976. EXECUTIVE SUMMARY.
NTIS, 1978. 23P.
COO/2618-1(SUMM.)

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD 1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND 2) DEFINING THE TECHNICIAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS AS AN ENERGY ALTERNATE.

78-0145 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT. JULY 1975-AUGUST 1976.
NTIS, 1978. 350P.
COO/2618-1

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY

ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD (1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND (2) DEFINING THE TECHNICAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS AS AN ENERGY ALTERNATE.

78-0146 LINSCOTT B S, GLASGOW J C, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
NTIS, JANUARY 1978. 19P.
N78-19642, NASA-TM-73883, DOE/NASA/1028-78/15

VARIOUS STUDIES HAVE INDICATED THAT WIND ENERGY HAS THE POTENTIAL TO MAKE SIGNIFICANT CONTRIBUTIONS TO THE NATION'S ENERGY NEEDS. THE LEVEL OF CONTRIBUTION DEPENDS ON THE INITIAL AND OPERATING COSTS OF THE MACHINES WHICH CAN CONVERT WIND ENERGY TO ELECTRICITY OR OTHER FORMS OF ENERGY USEFUL TO THE PUBLIC. PART OF THE COOPERATIVE EFFORT BETWEEN NASA AND THE ENERGY RESEARCH AND DEVELOPMENT AGENCY (ERDA) HAS BEEN THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER. THIS 100 KW TURBINE, DESIGNATED THE MOD-0, IS LOCATED AT THE NASA PLUM BROOK SITE NEAR SANDUSKY, OHIO. EXPERIMENTAL TEST DATA HAVE BEEN CORRELATED WITH ANALYSES OF TURBINE LOADS AND COMPLETE SYSTEM BEHAVIOR OF THE ERDA-NASA 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

78-0147 SCHULTZ L
THE ENERGY ADVENTURES OF ERNIE AN' BUD: BUILD A WIND GENERATOR.
BILLINGS, MONTANA, AERO, 1978. 6P.

THIS "CUT AND COLOR BOOK", WRITTEN FOR CHILDREN, CONTAINS SOME BASIC INFORMATION ON BUILDING YOUR OWN WINDMILL. CUTOUTS ENABLE YOU TO BUILD A PAPER MODEL OF A HOUSE, GARAGE, WINDMILL AND TREES.

78-0148 LITTLE ENVIRONMENTAL EFFECT SEEN FOR WINDMILLS: BATTELLE.
SOL. ENERGY INTELL. REP. 4(48): 366, NOVEMBER 2, 1978.

78-0149 LOIS L
APPARATUS FOR EXTRACTING ENERGY FROM WINDS AT SIGNIFICANT HEIGHT ABOVE THE SURFACE.
U.S. PATENT NO. 4,076,190, FEBRUARY 28, 1978. 6P.

A BUOYANT SAIL OR WING TETHERED TO A LINE AN APPRECIABLE DISTANCE ABOVE THE SURFACE WHERE THE WINDS ARE AT HIGHER SPEED THAN AT GROUND LEVEL IS PROVIDED WITH WIND VELOCITY GRADIENT SENSING MEMBERS TO GUIDE MOVEMENT OF THE BUOYANT SAIL TO THE ELEVATION OF GREATEST WIND VELOCITY, THE OTHER END OF THE LINE IS ATTACHED TO AN ELECTRIC GENERATOR. A SERIES OF SAILS ARE UTILIZED WITH ONE BEING RETRACTED WHILE AT LEAST ONE OTHER SAIL IS POSITIONED TO CATCH THE WIND AWAY FROM THE GENERATOR. THE WINGS MAY HAVE DIVIDERS TO INCREASE THE AMOUNT OF FLOW DISRUPTION OF THE WIND AND INCREASE THE DRAG COEFFICIENT AND HENCE THE AMOUNT OF ENERGY EXTRACTED, AND A PULLEY SYSTEM MAY BE UTILIZED IN LIEU OF A SINGLE PASS TETHER LINE.

78-0150 LOTH J L
WIND POWER LIMITATIONS ASSOCIATED WITH VORTICES.
J. ENERGY 2(4): 216-222, JULY-AUGUST 1978.

THE TOTAL PRESSURE DISSIPATION INSIDE VORTICES DUE TO VISCOUS SHEAR HAS BEEN ANALYZED. THE REDUCED LEVEL OF THE TOTAL PRESSURE FLUX OF THE FLOW INSIDE A VORTEX HAS AN ADVERSE EFFECT ON ALL VORTEX-INGESTING WIND MACHINES. THE BETZ LIMIT OF WIND TURBINES INGESTING THE VORTEX GENERATED BY AN AIRFOIL HAS BEEN COMPUTED AND IS NONDIMENSIONALIZED USING THE AREA OF THE VORTEX GENERATOR. THE VACUUM-PUMPING ABILITY OF VORTICES IS ALSO LIMITED. THE BETZ-TYPE LIMIT FOR WIND EXHAUSTING INTO THE CORE OF A VORTEX HAS BEEN COMPUTED FOR BOTH WINGTIP AND TORNADO-TOWER-TYPE VORTEX GENERATORS. THE ENERGY REQUIRED TO ELIMINATE A TORNADO HAS BEEN COMPUTED.

78-0151 MCGEORGE J

JOHN'S WORKSHOP: LOW POWER WINDMILL.
ALTERN. SOURCES ENERGY NO. 30: 50-53, FEBRUARY 1978.

78-0152 MCGUIGAN D
HARNESSING THE WIND FOR HOME ENERGY.
CHARLOTTE, VT., GARDEN WAY PUBLISHING, 1978. 134P.

78-0153 MCNEESE W C
WIND MOTOR.
U.S. PATENT NO. 4,080,100, MARCH 21, 1978. 8P.

A WIND MOTOR IS DESCRIBED WHICH HAS A DOUBLE SET OF ROTOR BLADES OF SPECIAL CONFIGURATION MOUNTED BETWEEN A CENTRAL HUB AND AN OUTER RIM. THE FRONT ROTOR HAS AN EXTENDING SHROUD PROTRUDING WELL IN FRONT OF THE BLADES FOR CAPTURING THE PREVAILING WIND. THE CENTER OF THE ROTOR IS SOLID WITH THE BLADES AT THE CENTER BEING CONFIGURED SO AS TO BE SUBSTANTIALLY AT RIGHT ANGLES TO THE WIND FLOW AND THUS FORM A SUBSTANTIALLY SOLID AREA AT THE CENTER OF THE ROTOR. THE SPECIALLY CONFIGURED BLADES ANGLE AWAY FROM THE CENTER HUB WITH A BACKWARD TILT OF APPROXIMATE 10 DEGS. ALSO, THE BLADES TWIST SO THAT THE PORTION ATTACHED TO THE RIM OR SHROUD OF THE DEVICE PRESENT AN AIR FOIL EFFECT WITH TIP STRUCTURE FOR THE LEADING EDGE BEING APPROXIMATELY 45 DEGS. FROM THE AXIS WHILE THE TRAILING EDGE IS SIMILARLY AT APPROXIMATELY A 45 DEG. ANGLE IN THE OPPOSITE PLANE. THE SECOND ROTOR STRUCTURE HAS SIMILARLY CONFIGURED BLADE STRUCTURE WITH ONE EMBODIMENT OF THE DEVICE PROVIDING THE SECOND ROTOR ON THE SAME SHAFT AS THE FIRST ROTOR, WHILE ANOTHER EMBODIMENT HAS THE SECOND ROTOR MOUNTED ON ANOTHER TUBULAR MEMBER FROM THE SHAFT ON WHICH THE FIRST ROTOR IS MOUNTED AND ALSO PROVIDED FOR ROTATION COUNTER IN DIRECTION TO THE ROTATION OF THE FIRST ROTOR.

78-0154 MARRS R, KOPRIVA S
REGIONS OF THE CONTINENTAL UNITED STATES SUSCEPTIBLE TO EOLIAN ACTION. SPECIAL REPORT.
NTIS, MAY 1978. 15P.
RLO-2343-78/2

WITHIN THE 48 CONTERMINOUS UNITED STATES, APPROXIMATELY ONE THIRD OF THE SURFACE AREA (32%) IS SUFFICIENTLY ARID TO ALLOW DEVELOPMENT OF EOLIAN LANDFORMS. THROUGHOUT THESE BROAD ARID REGIONS, THE STRONGEST WIND REGIMES LEAVE THEIR RECORD IN EOLIAN LANDFORMS. SOME EOLIAN LANDFORMS OCCUR IN SMALL ISOLATED PATCHES; OTHERS COVER VAST STRETCHES OF THE WIND-SWEPT SURFACE. WHEREVER THEY OCCUR, EOLIAN LANDFORMS CAN BE INTERPRETED AS A LONGTERM CLIMATIIC RECORD. IN ARID AREAS WHERE EOLIAN LANDFORMS ARE ABSENT, ONLY TWO EXPLANATIONS ARE POSSIBLE: 1) EITHER THE SURFACE IS TOO RESISTANT TO PERMIT WIND EROSION OR 2) THE WINDS ARE NOT SUFFICIENTLY STRONG TO INFLUENCE THE SURFACE MORPHOLOGY. ONLY BROAD REGIONS OF CONTINUOUS ROCK OUTCROP, WATER, OR AREAS OF HIGH PRECIPITATION AND LUSH VEGETATION DEFY THE EROSIVE ACTION OF HIGH WINDS. MOST AREAS ARE AT LEAST PARTIALLY SUSCEPTIBLE TO EOLIAN ACTION AND WILL DEVELOP EOLIAN LANDFORMS IF THE WINDS ARE SUFFICIENTLY STRONG AND PERSISTENT. CONSEQUENTLY, THE IDENTIFICATION AND INTERPRETATION OF EOLIAN LANDFORMS IS A VERY USEFUL TOOL FOR WIND ENERGY ASSESSMENTS IN THE WESTERN UNITED STATES. IN EASTERN UNITED STATES, THERE ARE ONLY A FEW SCATTERED AREAS OF ARID LAND LARGE ENOUGH TO PROVIDE DATA ADEQUATE FOR A REGIONAL ASSESSMENT. HOWEVER MANY SMALL PATCHES OF BARREN LAND, WHICH WERE NOT IDENTIFIED IN THIS BRIEF SURVEY, MAY PROVIDE INFORMATION FOR LOCAL SURVEYS OR ANCILLARY INPUT TO REGIONAL WIND ENERGY ASSESSMENTS.

78-0155 MARTINEZ-SANCHEZ M
DYNAMICS OF DRIVE SYSTEMS FOR WIND ENERGY CONVERSION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 187-193.
CONF-771148

CALCULATIONS ARE PERFORMED TO DETERMINE THE DYNAMIC EFFECTS OF MECHANICAL POWER TRANSMISSION FROM THE NACELLE OF A HORIZONTAL AXIS WIND MACHINE TO THE GROUND OR TO AN INTERMEDIATE LEVEL. IT IS FOUND THAT RESONANCES ARE LIKELY AT 2 OR 4/REV, BUT THEY OCCUR AT LOW POWER ONLY, AND SEEM EASILY CORRECTABLE. LARGE REDUCTIONS ARE FOUND IN THE HARMONIC TORQUE INPUTS TO THE GENERATOR AT POWERS NEAR RATED.

78-0156 MASON P J, SYKES R I

THREE-DIMENSIONAL NUMERICAL INTEGRATIONS OF THE NAVIER-STOKES EQUATIONS FOR FLOW OVER SURFACE-MOUNTED OBSTACLES.
BRACKNELL, G.B., METEOROLOGICAL OFFICE, 1978.

NUMERICAL INTEGRATIONS OF THE NAVIER-STOKES EQUATIONS FOR FLOW PAST A SMOOTH THREE-DIMENSIONAL, SURFACE-MOUNTED OBSTACLE ARE PRESENTED. THE VARIATION OF THE FLOW WITH REYNOLDS NUMBER, AND WITH GEOMETRIC RATIOS SUCH AS THE MAXIMUM SLOPE OF THE OBSTACLE, ARE INVESTIGATED. THE SEPARATED FLOW IS INVESTIGATED USING VISUALIZATIONS OF THE SURFACE STRESS PATTERNS, AND ALSO PARTICLE TRAJECTORIES THROUGH THE FLOW.

78-0157 MAYER D
THE DEVELOPMENT OF THE AWEA.
WINDLETTER, P.1, 6, FEBRUARY 1978.

78-0158 MEADOR R
FUTURE ENERGY ALTERNATIVES; LONG-RANGE PROSPECTS FOR AMERICA AND THE WORLD.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBL., 1978. 206P.

THIS BOOK COVERS ENERGIES OF THE FUTURE THAT MAN MUST RELY ON TO KEEP HIS TECHNOLOGICAL CIVILIZATION GOING: FUSION ENERGY, SOLAR ENERGY, COAL AND HYDROGEN, NUCLEAR FISSION, WIND, OCEAN-THERMAL, GEOTHERMAL, TIDAL AND WATER.

78-0159 MERONEY R N
PROSPECTING FOR WIND ENERGY.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978.
NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 736-740.

PHYSICAL MODELING OF WIND REGIMES IN THE RAKAIA GORGE REGION, SOUTHERN ALPS, NEW ZEALAND, WAS UTILIZED TO EVALUATE THE WIND ENERGY POTENTIAL. WIND TUNNEL MEASUREMENTS WERE COMBINED WITH LOCAL CLIMATOLOGICAL MEASUREMENTS AND A MOBILE FIELD PROGRAM TO ASSESS SITE LOCATIONS FOR WIND ENERGY CONVERSION SYSTEMS.

78-0160 HINKLEY L G, APOSTOLAKIS G C, BONELLO A H
ALTERNATIVE ENERGY SOURCES FOR FEDERAL AVIATION ADMINISTRATION FACILITIES. FINAL REPORT. MAY 1976 - JANUARY 1978.
NTIS, AUGUST 1978. 121P.
FAA-NA-77-17, FAA/RD-78-87

A LITERATURE AND INDUSTRY/GOVERNMENT SEARCH WAS MADE ON ALTERNATIVE ENERGY SOURCES. THIS ENERGY INVESTIGATION EFFORT CONCENTRATED ON PHOTOVOLTAICS, WIND, FUEL CELLS AND THERMOELECTRIC/THERMIONIC GENERATORS THAT WOULD PRODUCE ELECTRICAL ENERGY AND APPEARED FEASIBLE FOR USE AT FEDERAL AVIATION ADMINISTRATION (FAA) FACILITIES. AS AN AID TO IDENTIFY POTENTIAL FAA FACILITIES WHERE IT MIGHT BE FEASIBLE TO USE AN ALTERNATIVE ENERGY SYSTEM, TWO QUESTIONNAIRES WERE DEVELOPED AND DISTRIBUTED WITH THE INTENT THAT A FURTHER IN-DEPTH INVESTIGATION INTO A FEW SELECTED SITES WOULD FOLLOW. DATA FROM THESE QUESTIONNAIRES WERE RECEIVED AND TABULATED. AS A RESULT OF THIS INVESTIGATION, IT WAS RECOMMENDED THAT THE FAA PROCEED TO ESTABLISH ALTERNATIVE ENERGY DEMONSTRATION SITES IN ORDER TO GAIN EXPERIENCE IN THE DESIGN, IMPLEMENTATION, AND OPERATION OF SUCH SYSTEMS. IN ADDITION IT WAS RECOMMENDED THAT DUE TO THE CONSTANTLY CHANGING AND FAST ADVANCING NATURE OF ENERGY CONVERSION SYSTEMS, THE FAA SHOULD EXPEND SOME LEVEL OF EFFORT IN CONTINUING THE LITERATURE/INDUSTRY/GOVERNMENT SEARCH INITIATED UNDER THIS PROJECT IN ORDER TO REMAIN CURRENT ON THE SUBJECT. ALSO THE FAA SHOULD ESTABLISH A CENTRALIZED DATA COLLECTION AND TABULATION POINT FOR ENERGY REQUIREMENTS/CONSUMPTION/COST DATA ON A FACILITY BASIS.

78-0161 MERONEY R N
JOUSTING WITH THE WIND - A GENERAL REVIEW OF THE WIND ENERGY PROBLEM.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.1-14.

THE WINDMILL, THAT FAMILIAR IF NOT ALWAYS RELIABLE WORKHORSE OF RURAL MANKIND, SEEMS HEADED BACK INTO THE WHIRL AGAIN. VISIONS OF WIND-DRIVEN POWER SOURCES HAVE TANTALISED MANKIND FOR CENTURIES. THE HISTORY OF WIND

GENERATED ELECTRICITY WILL BE SURVEYED, TOGETHER WITH VARIOUS INGENIOUS DEVICES TO PRODUCE ELECTRIC POWER FROM THE WIND. METEOROLOGICAL CONSTRAINTS ON WIND GENERATED ELECTRICITY WILL BE SUMMARISED. THE U.S. METEOROLOGICAL PROGRAMME AS IT RELATES TO WIND ENERGY RESEARCH OVER THE NEXT FEW YEARS WILL BE DISCUSSED.

78-0162 MERONEY R N
REVIEW OF SESSION I: WIND ENERGY.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 181-182.

THE 11 PAPERS ON WIND ENERGY GIVEN AT THIS CONFERENCE ARE SUMMARIZED.

78-0163 MERRIAM M F
THE GEDSER MILL REVITALIZED.
WIND POWER DIG. NO. 11: 34-38, WINTER 1977-1978.

THE 200 KW AEROGENERATOR AT GEDSER, DENMARK, WAS REHABILITATED IN 1977 AND IS TURNING AGAIN AFTER 10 YEARS.

78-0164 MERRIAM M F
THE TVINDMILL.
RAIN 4(4): 13-14, JANUARY 1978.

THE WORLD'S LARGEST WINDMILL, BUILT AT THE TVIND SCHOOLS IN DENMARK, IS DESCRIBED. IT IS HORIZONTAL AXIS, 3-BLADE, WITH A 54 METER DIAMETER SWEEP. THE HUB IS 50 METERS ABOVE THE GROUND. THE GENERATOR IS RATED AT 2000 KW, 3000 VOLTS.

78-0165 SOLAR ENERGY INFORMATION DATA BANK. READING LIST.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, MAY 1978. 3P.

THIS IS A READING LIST CITING REFERENCES ON WIND ENERGY.

78-0166 MILLER D R
SUMMARY OF STATIC LOAD TEST OF THE MOD-0 BLADE.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE, STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 109-116.
CONF-771148

A STATIC LOAD TEST WAS PERFORMED ON THE SPARE MOD-0 WINDTURBINE BLADE TO DEFINE LOAD TRANSFER AT THE ROOT END OF THE BLADE, AND TO VALIDATE STRESS ANALYSIS OF THIS PARTICULAR TYPE OF BLADE CONSTRUCTION (FRAME AND STRINGER). ANALYSIS OF THE LOAD TRANSFER FROM THE AIRFOIL SKIN TO THE SHANK TUBE PREDICTED A STEP CHANGE IN SPANWISE STRESS IN THE AIRFOIL SKIN AT STATION 81.5 INCHES (STA 81.5). FOR FLATWISE BENDING A 40 PERCENT REDUCTION IN SPANWISE STRESS WAS PREDICTED, AND FOR EDGEWISE BENDING A 6 PERCENT REDUCTION. EXPERIMENTAL RESULTS VERIFIED THE 40 PERCENT REDUCTION FOR FLATWISE BENDING, BUT INDICATED ABOUT A 30 PERCENT REDUCTION FOR EDGEWISE BENDING.

78-0167 MILLER D R
WIND TURBINE STRUCTURAL DYNAMICS.
NTIS, 1978. 280P.
WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977.
N78-19616, NASA-CP-2034, DOE-CONF-771148

A WORKSHOP ON WIND TURBINE STRUCTURAL DYNAMICS WAS HELD TO REVIEW AND DOCUMENT CURRENT UNITED STATES WORK ON THE DYNAMIC BEHAVIOR OF LARGER WIND TURBINES, PRIMARILY OF THE HORIZONTAL-AXIS TYPE, AND TO IDENTIFY AND DISCUSS OTHER WIND TURBINE CONFIGURATIONS THAT MAY HAVE LOWER COST AND WEIGHT. INFORMATION WAS EXCHANGED ON THE FOLLOWING TOPICS: (1) METHODS FOR CALCULATING DYNAMIC LOADS; (2) AEROELASTICITY STABILITY; (3) WIND LOADS, BOTH STEADY AND TRANSIENT; (4) CRITICAL DESIGN CONDITIONS; (5) DRIVE TRAIN DYNAMICS; AND (6) BEHAVIOR OF OPERATING WIND TURBINES.

78-0168 MOD-0 TESTED UP-WIND.
WIND POWER DIG. NO. 12: 29, SPRING 1978.

78-0169 JAMES A H

SAFETY ASPECTS OF WIND ENERGY CONVERSION SYSTEMS: A REVIEW AND BIBLIOGRAPHY.
NTIS, AUGUST 1978. 25P.
ORNL/ICES-4

EFFORTS ARE BEING MADE TO HARNESS THE POWER OF THE WINDS FOR THE GENERATION OF ELECTRICITY AND OTHER FORMS OF ENERGY. THE WIND ENERGY CONVERSION (WEC) SYSTEMS THAT ARE THE PRODUCTS OF THESE EFFORTS ARE REVIEWED FROM THE SAFETY VIEWPOINT. ROTOR FAILURES, TOWER INTEGRITY, HAZARDS TO AVIATION, AND PUBLIC ACCESS TO SITES ARE REVIEWED AS PUBLIC SAFETY CONSIDERATIONS. OCCUPATIONAL SAFETY CONSIDERATIONS ARE ALSO REVIEWED. THE CONCLUSIONS REACHED INDICATE THAT NO UNUSUAL HAZARD POTENTIAL IS PRESENTED BY WEC SYSTEMS. THE BIBLIOGRAPHY INCLUDES ARTICLES AND REPORTS ON VARIOUS ASPECTS OF WEC SYSTEMS DEVELOPMENT, DESIGN, AND OPERATION WHICH RELATE TO SAFETY EITHER DIRECTLY OR INDIRECTLY. REPORTS ADDRESSING SOME OF THE ENVIRONMENTAL AND LEGAL ASPECTS ARE ALSO INCLUDED. THIS REPORT IS ONE OF A SERIES PREPARED BY THE INFORMATION CENTER FOR ENERGY SAFETY (ICES) AT THE OAK RIDGE NATIONAL LABORATORY.

78-0170 MORE ON SMALL WIND GENERATORS.
WINDLETTER, P.9, FEBRUARY 1978.

78-0171 ENGINEERING FOR ENERGY DEVELOPMENT.
SEAHORSE 10(3): 5, DECEMBER 1978.

A DESCRIPTION OF WIND ENERGY PROJECTS BY TETRA TECH, INC., IS PRESENTED.

78-0172 NEW STUDY RECOMMENDS FUNDING FOR WIND ENERGY.
WIND POWER DIG. NO. 11: 29, WINTER 1977-1978.

78-0173 OCKERT C E
DEVICE FOR EXTRACTING ENERGY, FRESH WATER, AND POLLUTION FROM MOIST AIR.
U.S. PATENT NO. 4,080,186, MARCH 21, 1978. 6P.

A DEVICE IS DESCRIBED WHICH EXTRACTS USEFUL ENERGY AND FRESH WATER FROM MOIST AIR, WITH AN ASSOCIATED REMOVAL OF POLLUTANT PARTICLES ENTRAINED IN THE EXTRACTED WATER. THE DEVICE COMPRISES AN ENCLOSURE WITH A TALL STACK AND AN EXTENDED BASE WHICH HAS MEANS FOR THE CREATION AND UTILIZATION OF A CONTAINED TORNADO WHICH IS POWERED BY THE ENERGY RELEASE ASSOCIATED WITH THE RAPID CONDENSATION OF WATER FROM THE INCOMING MOIST AIR.

78-0174 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. A BIBLIOGRAPHY WITH ABSTRACTS. FINAL REPORT. 1964--MAY 1978.
NTIS, JUNE 1978. 219P.
N78-31586

THIS UPDATED BIBLIOGRAPHY CONTAINS 214 ABSTRACTS. CITATIONS TO BIBLIOGRAPHIES, STATE-OF-THE-ART REVIEWS, AND LITERATURE SURVEYS ON VARIOUS ASPECTS OF FOSSIL FUELS, WIND, SOLAR ENERGY, HYDROGEN, GEOTHERMAL ENERGY, NUCLEAR ENERGY AND BATTERIES ARE PRESENTED. A FEW CITATIONS PERTAIN TO ELECTRIC POWER.

78-0175 PETERSON E W, HENNESSEY J P
ON THE USE OF POWER LAWS FOR ESTIMATES OF WIND POWER POTENTIAL.
J. APPL. METEOROL. 17(3): 390-394, MARCH 1978.

THE EVALUATION OF WIND POWER POTENTIAL AT A PROPOSED AEROGENERATOR SITE BY EXTRAPOLATION FROM MEASURED WINDS AT A REFERENCE LEVEL IS INVESTIGATED. IT IS SHOWN THAT THE TOTAL WIND POWER DENSITY IS NOT PARTICULARLY SENSITIVE TO THE SELECTION OF ROUGHNESS LENGTH OR POWER LAW EXPONENT; OVER THE ENTIRE LIKELY RANGE OF THESE PARAMETERS THE WIND POWER IN THE MEAN FLOW AT TYPICAL AEROGENERATOR HUB HEIGHTS IS WITHIN 1.4-4 TIMES THE POWER AT A REFERENCE HEIGHT OF ABOUT 10 M. IN LIEU OF IN SITU PROFILE MEASUREMENTS, IT IS SUGGESTED THAT A POWER LAW EXPONENT OF 1/7 IS ADEQUATE FOR REALISTIC BUT CONSERVATIVE ESTIMATES OF THE AVAILABLE WIND POWER EXCEPT AT EXTREMELY ROUGH SITES WHERE THE ESTIMATES MAY ONLY BE CONSERVATIVE.

78-0176 PETERSON J, HEWSON E W
PACIFIC NORTHWEST REGIONAL WIND ENERGY STUDY, CRT-39.
WALLA WALLA, WASHINGTON, WALLA WALLA DISTRICT CORPS OF ENGINEERS, MARCH

1978. 212P.

ALTHOUGH THIS STUDY FOCUSES ON VARIOUS COMBINATIONS OF WINDPOWER AND PUMPED STORAGE IN BOONEVILLE POWER ADMINISTRATION TERRITORY, THE INTERPRETATION OF DATA MAKE IT A MODEL FOR OTHER WIND REGIONS TO EMULATE. OF PARTICULAR INTEREST ARE EQUATIONS THAT ALLOW THE CALCULATION OF THE NUMBER OF LARGE WIND GENERATORS THAT A GIVEN HYDRO-STORAGE CAPACITY, IN DAMS OR PUMPED STORAGE, CAN ACCOMODATE IN ORDER TO SMOOTH (I.E. LOAD-LEVEL) THEIR VARIABLE OUTPUT. ALSO, PNW WIND DATA IS ANALYZED TO SHOW THE INTERACTION OF A NUMBER OF WIND FARMS WORKING TOGETHER TO PRODUCE POWER.

78-0177 PIERSON R E
TECHNICIANS AND EXPERIMENTERS GUIDE TO USING SUN, WIND, AND WATER POWER.
WEST NYACK, N.Y., PARKER PUBLISHING CO., 1978. 270P.

78-0178 "PIONEER" WIND TURBINE DEDICATION AT CLAYTON, NEW MEXICO.
WINDLETTER, P.8, FEBRUARY 1978.

78-0179 PLUGGED-IN WINDMILL.
NEW SCI. 77(1094): 709, MARCH 16, 1978.

78-0180 SEIDEL R C, GOLD H, WENZEL L M
POWER TRAIN ANALYSIS FOR THE DOE/NASA 100-KW WIND TURBINE GENERATOR.
NTIS, OCTOBER 1978. 58P.
NASA-TM-78997, DOE/NASA/1028-78/19, N79-16355

PROGRESS IN EXPLAINING VARIATIONS OF POWER EXPERIENCED IN THE ON-LINE OPERATION OF A 100-KW EXPERIMENTAL WIND TURBINE-GENERATOR IS REPORTED. DATA ARE PRESENTED THAT SHOW THE OSCILLATIONS TEND TO BE CHARACTERISTIC OF A WIND-DRIVEN SYNCHRONOUS GENERATOR BECAUSE OF LOW TORSIONAL DAMPING IN THE POWER TRAIN, RESONANCES OF ITS LARGE STRUCTURE, AND EXCITATION BY UNSTEADY AND NONUNIFORM WIND FLOW. THE REPORT INCLUDES A DYNAMIC ANALYSIS OF THE DRIVE-TRAIN TORSION, THE GENERATOR, PASSIVE DRIVELINE DAMPING, AND ACTIVE PITCH CONTROL AS WELL AS CORRELATION WITH EXPERIMENTAL RECORDINGS. EXPERIMENTAL MEASUREMENTS OF THE SYSTEM TRANSFER FUNCTION WERE MADE BY DISTURBING THE BLADE PITCH ANGLE. THEY COMPARED WELL WITH THE MODEL DYNAMICS UP THROUGH THE FREQUENCY OF THE FIRST MODE. OSCILLATIONS OF POWER WERE EXPERIENCED NEAR THE FIRST-MODE FREQUENCY AND ARE EXPLAINED AS RESULTING FROM THE FIRST-MODE RESONANCE AMPLIFYING DISTURBANCES FROM, FOR EXAMPLE, BLADE ASYMMETRIES. CONTROL OF POWER ABOUT A SET POINT USED PROPORTIONAL-PLUS-INTEGRAL FEEDBACK TO THE PITCH ACTUATOR, AND CONTROL GAINS WERE FORMULATED FOR REDUCING DISTURBANCES UP TO FREQUENCIES LESS THAN THE FIRST-MODE. A FLUID COUPLING INSTALLED IN THE HIGH-SPEED SHAFT IS ONE SOLUTION DEMONSTRATED FOR REDUCING THE FIRST-MODE RESONANT AMPLIFICATION. A PREDICTED SECOND-MODE RESONANCE AT 3.5 HERTZ IN THE POWER TRAIN WAS NOT OBSERVED EXPERIMENTALLY. A SMALL EFFECT OF TOWER MOTION WITHIN THE POWER TRAIN DYNAMICS (AN INTERACTION NOT MODELLED) WAS OBSERVED EXPERIMENTALLY. EXPERIMENTALLY OBSERVED VARIATIONS IN POWER AT THE TWO-PER-ROTOR-REVOLUTION (2P) FREQUENCY WERE MORE THAN PREDICTED. THE LARGER 2P VARIATION IS SUSPECTED TO BE THE IMPACT OF LOCAL TURBULENCES NOT MODELLED. A WIND FEED-FORWARD CONTROL SCHEME WAS EMPLOYED, BUT FAILED TO ATTENUATE WIND-SPEED-CHANGE EFFECTS AS WELL AS PREDICTED BECAUSE THE ANEMOMETER MEASUREMENT OF WIND SPEED USED IN THE CONTROL WAS NOT WELL CORRELATED WITH THE WIND SPEED AT THE ROTOR.

78-0181 PROGNOSIS FOR 1978: OPTIMISM FOR THE WIND INDUSTRY.
WINDLETTER, P.1-2, FEBRUARY 1978.

AN INTERVIEW WITH RICK KATZENBERG, AMERICAN WIND ENERGY ASSOCIATION PRESIDENT, IS PRESENTED.

78-0182 RAMSDELL J V
ESTIMATES OF THE NUMBER OF LARGE AMPLITUDE GUSTS.
NTIS, MARCH 1978. 55P.
PNL-2508

THE PURPOSE OF THIS REPORT IS TO PRESENT PRELIMINARY ESTIMATES OF THE NUMBER OF OCCURRENCES OF LARGE AMPLITUDE GUSTS FOR USE IN THE DESIGN OF WIND ENERGY CONVERSION SYSTEMS. EXISTING TURBULENCE INFORMATION HAS BEEN COMBINED WITH AN ASSUMED WIND SPEED DISTRIBUTION TO ARRIVE AT THE ESTIMATES. THE NUMBER OF LARGE AMPLITUDE GUSTS PER YEAR IS TREATED AS A

FUNCTION OF THE ANNUAL MEAN WIND SPEED AND TERRAIN ROUGHNESS. THIS TREATMENT IS BASED UPON THE ASSUMPTIONS THAT THE ATMOSPHERE HAS NEUTRAL STABILITY DURING HIGH WINDS AND THAT THE GUSTINESS IS INDUCED BY FLOW OVER SURFACE ROUGHNESS ELEMENTS. LARGE GUSTS DURING THUNDERSTORMS AND OTHER SEVERE WEATHER PHENOMENA ARE NOT TREATED. THE RESULTS OF THE STUDY ARE PRESENTED IN TABULAR FORM AS A FUNCTION OF GUST AMPLITUDE AND HOURLY AVERAGE WIND SPEED. TABLES OF ESTIMATES ARE GIVEN FOR TERRAIN VARYING IN ROUGHNESS FROM OPEN WATER TO HIGH MOUNTAINS, AND FOR ANNUAL MEAN WIND SPEEDS BETWEEN 4 AND 12 MS-1. POSITIVE AND NEGATIVE GUSTS ARE TREATED SEPARATELY.

78-0183 REDDOCH T W
GENERATOR COSTS FOR WIND POWER APPLICATION.
NTIS, APRIL 1978. 18P.
TID-28678

THIS ANALYSIS HAS ATTEMPTED TO EVALUATE THE COSTS OF THE THREE CONVENTIONAL MEANS OF ELECTROMECHANICAL ENERGY CONVERSION. IN GENERAL, THE LEAST EXPENSIVE FORM OF GENERATION APPEARS TO BE THE INDUCTION GENERATOR, WHILE THE MOST EXPENSIVE IS THE D.C. GENERATOR. ALL COSTING IS BASED ON TRADITIONAL MATERIALS AVAILABLE FROM COMMERCIAL OUTLETS BASED ON 1977 PRICES FOR 10 UNITS. SINCE MOST SMALL POWER GENERATION SYSTEMS REQUIRE D.C. AND THE SYNCHRONOUS GENERATOR PROVIDES ITS OWN SOURCES OF REACTIVE POWER, THE SYNCHRONOUS GENERATOR IS THE MOST POPULAR ON THE MARKET. FROM THE SUMMARY CURVES IT IS CLEAR THAT THE D.C. SYSTEM IS NOT COMPETITIVE IN THE A.C. PRODUCTION MODE. THE INDUCTION GENERATOR SYSTEM SHOWS SOME EDGE OVER THE SYNCHRONOUS SYSTEM IN COSTS, HOWEVER AS MACHINE SIZE INCREASES THE DIFFERENCE IS LESS. ON A WEIGHT BASIS THE INDUCTION SYSTEM IS THE LEAST, THE D.C. SYSTEM IS THE HEAVIEST. THE WEIGHT DIFFERENCE BETWEEN SYSTEMS IS NOT SIGNIFICANT.

78-0184 REED J W
WIND SPEED DISTRIBUTION CHANGES WITH HEIGHT AT SELECTED WEATHER STATIONS.
NTIS, AUGUST 1978. 54P.
SAND-76-0714

TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS AT 15 SELECTED WEATHER STATIONS HAVE BEEN SMOOTHED TO CORRECT FOR OBSERVER BIAS. RECORDS WERE ADJUSTED TO A CONSTANT, FINAL ANEMOMETER HEIGHT OVER LEVEL AIRFIELD TERRAIN AT NINE STATIONS WHERE THE ANEMOMETER WAS MOVED DURING THE PERIOD OF RECORD. THE ANEMOMETER ADJUSTMENT SCHEME IS DESCRIBED FOR EACH LOCATION, SINCE THE ANEMOMETER EXPOSURE CHANGE AND DATE OF CHANGE WERE UNIQUE FOR EACH LOCATION. FINALLY, WIND SPEED DISTRIBUTION CURVES AND TABLES OF SYNTHESIZED TIME SERIES AT FINAL ANEMOMETER HEIGHT AND AT 10 M, 20 M, AND 50 M ABOVE GROUND HAVE BEEN PREPARED. THESE HOMOGENIZED SERIES SHOULD BE USEFUL FOR VARIOUS ANALYSES OF WIND POWER SYSTEMS.

78-0185 REID S J
JOINT FREQUENCIES OF SUN AND WIND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 191-202.

USING CLIMATOLOGICAL DATA FOR THE YEARS 1972 TO 1976 INCLUSIVE, THE FREQUENCY OF OCCURRENCE OF DAYS WITH AND WITHOUT GUSTS GREATER THAN 22 KT AND DAYS WITH AND WITHOUT SUNSHINE EXCEEDING 5 HOURS IS INVESTIGATED. THERE IS A SMALL NEGATIVE CORRELATION BETWEEN THE OCCURRENCES OF SUN AND WIND. SUNNY, WINDY DAYS ARE THE PREDOMINANT WEATHER TYPE AT MOST STATIONS. SUNNY, CALM DAYS PREDOMINATE AT HOKITIKA, NELSON, AND TAURANGA AND CLOUDY, WINDY DAYS AT DUNEDIN AND INVERCARGILL.

78-0186 REUTER R C, WORSTELL M H
TORQUE RIPPLE IN A VERTICAL AXIS WIND TURBINE.
NTIS, APRIL 1978. 45P.
SAND-78-0577

TORQUE RIPPLE IS A NAME GIVEN TO TIME VARIATIONS IN TORQUE WHICH ARE PROPAGATED THROUGH THE DRIVE TRAIN OF WIND ENERGY CONVERSION SYSTEMS. THIS PAPER COVERS AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF TORQUE RIPPLE IN A DARRIEUS VERTICAL AXIS WIND TURBINE. AN ANALYTICAL MODEL OF THE TURBINE IS DESCRIBED AND NUMERICAL RESULTS FROM A SOLUTION TO THE EQUATIONS OF THIS MODEL ARE COMPARED TO EXPERIMENTAL RESULTS OBTAINED FROM THE EXISTING DOE/SANDIA 17 METER VERTICAL AXIS WIND TURBINE.

DISCUSSIONS ON THE SOURCES OF TORQUE RIPPLE, THEORETICAL AND EXPERIMENTAL CORRELATION, AND MEANS OF SUPPRESSING ITS MAGNITUDE ARE INCLUDED.

78-0187 RICH E
WECS/UTILITY INTERFACE.
WIND POWER DIG. NO. 12: 12, SPRING 1978.

78-0188 RICHARDS T R, NEUSTADTER H E
DOE/NASA MOD-OA WIND TURBINE PERFORMANCE.
NTIS, 1978. 9P.
NASA-TM-78916, DOE/NASA/1004-78/13, CONF-780801-23, N78-26553, E-9654

AS PART OF THE NATIONAL WIND ENERGY PROGRAM UNDER THE DIRECTION OF THE DEPARTMENT OF ENERGY, THE NASA-LEWIS RESEARCH CENTER HAS DESIGNED AND BUILT, AND IS NOW OPERATING, A LARGE WIND TURBINE AT CLAYTON, NEW MEXICO. DESIGNATED THE MOD-OA-1, THIS IS THE FIRST OF THREE IDENTICAL 200 KW WIND TURBINES TO BE OPERATED ON ELECTRIC UTILITY NETWORKS. THIS MACHINE WAS INSTALLED AT CLAYTON, NEW MEXICO, IN NOVEMBER 1977. THIS PAPER PRESENTS A COMPARISION BETWEEN ITS PREDICTED AND MEASURED POWER VERSUS WIND SPEED PERFORMANCE.

78-0189 ROWE D R
ROWLAND MORGAN SAYS: YOU, TOO, MAY BE ABLE TO SELL POWER TO THE ELECTRIC COMPANY.
MOTHER EARTH NEWS NO. 49: 88-89, JANUARY-FEBRUARY 1978.

78-0190 ROXBURGH A J, EDWARDS P J, HURST R B
ACQUISITION AND ANALYSIS OF OTAGO WIND ENERGY DATA.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 47-56.

THIS PAPER DESCRIBES THE ACQUISITION AND ANALYSIS OF WIND DATA BY THE UNIVERSITY OF OTAGO AS PART OF THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND. FIELD OPERATION OF BOTH WIND-RUN AND WIND-SPEED ANEMOMETERS IS DETAILED TOGETHER WITH CALIBRATION DATA. THE OTAGO UNIVERSITY, PHYSICS DEPARTMENT WIND SPEED RECORDING SYSTEM IS DESCRIBED WITH PARTICULAR REFERENCE TO THE CONTINUOUS DATA FORMAT USED. THE FORMAT ALLOWS FLEXIBLE READOUT IN COMPUTER COMPATIBLE FORM, IN ANALOG AND NUMERIC PRINTER CHART FORM, OR ALLOWS DIRECT ANALYSIS OF THE RECOVERED ANALOG WIND-SPEED VARIABLE USING SPECIAL HARDWARE.

78-0191 SRI STUDY FAVORS WIND.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0192 SANDIA REPORTS ON DARRIEUS TESTING.
WIND POWER DIG. NO. 11: 28, WINTER 1977-1978.

78-0193 SAVINO J M, WAGNER L H, NASH M
WAKE CHARACTERISTICS OF A TOWER FOR THE DOE/NASA MOD-1 WIND TURBINE.
NTIS, APRIL 1978. 74P.
NASA-TM-78853, N78-23558, DOE/NASA/1028-78/17

A 1/40TH-SCALE MODEL OF A TOWER CONCEPT DESIGNED FOR THE DOE-NASA-MOD-1 WIND POWER TURBINE WAS TESTED IN A LOW-SPEED WIND TUNNEL. WAKE WIND SPEED PROFILES WERE MEASURED, AND FROM THESE WERE DETERMINED LOCAL VALUES OF WAKE MINIMUM VELOCITY RATIO, AVERAGE VELOCITY RATIO, AND WIDTH OVER A RANGE OF TOWER ELEVATIONS AND WIND APPROACH ANGLES. COMPARISON WITH RESULTS FROM TWO OTHER ALL-TUBULAR MODELS (MOD-0 AND EIGHT-LEG DESIGNS) TESTED EARLIER IN THE SAME TUNNEL INDICATED THAT WAKE WIDTH AND FLOW BLOCKAGE AT THE ROTOR PLANE OF ROTATION WERE SLIGHTLY LARGER FOR THE MOD-1 TOWER THAN FOR THE OTHER TWO MODELS. THE DIFFERENCES IN WAKE CHARACTERISTICS WERE ATTRIBUTED TO DIFFERENCES IN TOWER GEOMETRY AND MEMBER DIMENSIONS.

78-0194 SEALE J
HOW A WINDMILL TECHNOLOGY FOR AQUACULTURE MAY EVOLVE.
COMMER. FISH FARMER AQUACULT. NEWS 4(6): 11-14, SEPTEMBER 1978.

78-0195 SEIDEL R C
POWER OSCILLATION OF THE MOD-O WIND TURBINE.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P.

151-156.
CONF-771148

THE MOD-O POWER HAS NOISE COMPONENTS WITH VARYING FREQUENCY PATTERNS. MAGNITUDES REACH MORE THAN FORTY PERCENT POWER AT THE FREQUENCY OF TWICE PER ROTOR REVOLUTION. ANALYSIS OF A SIMPLE TORSIONAL MODEL OF THE POWER TRAIN PREDICTS LESS THAN HALF OF THE OBSERVED MAGNITUDE AND DOES NOT EXPLAIN THE SHIFTING FREQUENCIES OF THE NOISE PATTERNS.

78-0196 SHELDAHL R E, BLACKWELL B F, FELTZ L V
WIND TUNNEL PERFORMANCE DATA FOR TWO- AND THREE-BUCKET SAVONIUS ROTORS.
J. ENERGY 2(3): 160-164, MAY-JUNE 1978.

FIFTEEN CONFIGURATIONS OF A SAVONIUS ROTOR WIND TURBINE WERE TESTED IN THE VOUGHT CORPORATION SYSTEMS DIVISION 4.9- X 6.1-M LOW SPEED WIND TUNNEL TO DETERMINE AERODYNAMIC PERFORMANCE. PARAMETERS CONSIDERED WERE NUMBER OF BUCKETS, NOMINAL FREESTREAM VELOCITY, REYNOLDS NUMBER PER METER, ROTOR HEIGHT, ROTOR DIAMETER, AND BUCKET OVERLAP. THE MEASURED TEST VARIABLES WERE TORQUE, ROTATIONAL SPEED, AND TUNNEL CONDITIONS. IT IS CONCLUDED THAT INCREASING REYNOLDS NUMBER AND/OR ASPECT RATIO IMPROVES PERFORMANCE. THE RECOMMENDED CONFIGURATION CONSISTS OF TWO SETS OF TWO-BUCKET ROTORS, ROTATED 90 DEGS. APART, WITH EACH ROTOR HAVING A DIMENSIONLESS GAP WIDTH OF 0.1-0.15.

78-0197 SIMMS D
ESTIMATING WIND ENERGY.
ALTERN. SOURCES ENERGY NO. 30: 27-31, FEBRUARY 1978.

ESTIMATING WIND ENERGY IN QUEBEC IS DISCUSSED.

78-0198 SIVASEGARAM S
EXPERIMENTAL INVESTIGATION OF A CLASS OF RESISTANCE-TYPE, DIRECTION-INDEPENDENT WIND TURBINES.
ENERGY 3(1): 23-30, FEBRUARY 1978.

THE RESISTANCE-TYPE, DIRECTION-INDEPENDENT WIND TURBINE IS SUITABLE FOR THE GENERATION OF POWER ON A SMALL SCALE IN DEVELOPING COUNTRIES. SO FAR, ALL WORK ON THIS CLASS OF WIND TURBINE SEEMS TO BE RESTRICTED TO THE SAVONIUS ROTOR. THE FINDINGS OF AN EXPERIMENTAL INVESTIGATION OF AN ENTIRE CLASS OF WIND TURBINES, WHICH INCLUDES THE CONVENTIONAL SAVONIUS ROTOR, ARE PRESENTED. THE INFLUENCE OF FOUR ROTOR-GEOMETRY PARAMETERS (I.E., NUMBER OF BLADES, BLADE ANGLE, BLADE LOCATION AND ANGLE OF SETTING OF THE BLADE) IS STUDIED AND DISCUSSED ON THE BASIS OF TWO PERFORMANCE CRITERIA (I.E., TURBINE EFFICIENCY AND PERFORMANCE ON THE BASIS OF BLADE AREA). THE EXISTENCE OF OPTIMUM, DESIGN PARAMETERS IS ESTABLISHED AND THE POSSIBILITY OF IMPROVING SUBSTANTIALLY ON THE PERFORMANCE OF THE SAVONIUS ROTOR IS DEMONSTRATED. SOME POSSIBLE APPLICATIONS OF THE PRESENT CLASS OF TURBINES ARE BRIEFLY COMMENTED ON.

78-0199 SMALL FARM PROJECT.
WIND POWER DIG. NO. 12: 27, SPRING 1978.

78-0200 SMALL GROUPS, BIG WINDMILLS.
RAIN 4(4): 12, JANUARY 1978.

SEE ENTRY 78-0122

78-0201 SO R M C
ON VORTEX WIND POWER.
A.S.M.E. PAPER 77-WA/FE-20, 1978. 5P.

AN INFINITE VISCOUS LAMINAR VORTEX WITH NO REVERSE FLOW REGION IN THE EXIT PLANE, BUT WITH AXIAL INFLOW AT THE BASE, IS ANALYZED. THE AXIAL INFLOW IS ASSUMED TO BE FINITE EVERYWHERE. FROM THE ANALYSIS, THE MAXIMUM WIND POWER THAT CAN BE OBTAINED FROM SUCH A VORTEX IS CALCULATED. THE RESULTS SHOW THAT THE POWER DEVELOPED DEPENDS ON THE CIRCULATION AT INFINITY AND ON THE VISCOUS RADIUS OF THE CORE OF THE VORTEX. THE SIGNIFICANCE OF THIS RESULT, AS IT RELATES TO THE RECENTLY PROPOSED VORTEX WIND ENERGY SYSTEM, IS DISCUSSED.

78-0202 SO R M C
VORTEX WIND POWER.
J. FLUIDS ENG. 100(1): 79-82, MARCH 1978.

AN INFINITE VISCOUS LAMINAR VORTEX WITH NO REVERSE FLOW REGION IN THE EXIT PLANE, BUT WITH AXIAL INFLOW AT THE BASE, IS ANALYZED. THE AXIAL INFLOW IS ASSUMED TO BE FINITE EVERYWHERE. FROM THE ANALYSIS, THE MAXIMUM WIND POWER THAT CAN BE OBTAINED FROM SUCH A VORTEX IS CALCULATED. THE RESULTS SHOW THAT THE POWER DEVELOPED DEPENDS ON THE CIRCULATION AT INFINITY AND ON THE VISCOUS RADIUS OF THE CORE OF THE VORTEX. THE SIGNIFICANCE OF THIS RESULT, AS IT RELATES TO THE RECENTLY PROPOSED VORTEX WIND ENERGY SYSTEM, IS DISCUSSED.

78-0203 SOLAR ENERGY, A STATUS REPORT.
WASHINGTON, D.C., U.S. GOV'T. PRINTING OFFICE, JUNE 1978. 59P. ALSO NTIS, JUNE 1978. 59P.
DOE/ET-0062

WIND ENERGY SYSTEMS ARE DISCUSSED IN THIS OVERALL REPORT ON THE STATUS OF SOLAR ENERGY RESEARCH.

78-0204 SOLAR ENERGY DIRECTORY, 1978-79 EDITION.
PHOENIX, ARIZONA, CENTERLINE COMPANY, 1978. 215P.

THIS DIRECTORY HAS OVER 1400 LISTINGS IN 11 SECTIONS, INCLUDING ARCHITECTS, ASSOCIATIONS, CONTRACTORS, EDUCATION, GOVERNMENT AGENCIES, MANUFACTURING, MARKETING, NEWSLETTERS, RESEARCH, WIND ALTERNATIVES, AND INTERNATIONAL.

78-0205 SOLAR ENERGY RESEARCH AND DEVELOPMENT: PROGRAM BALANCE. ANNEX. VOLS. I AND II.
NTIS, FEBRUARY 1978. VOL. I, 158P. VOL. II, 285P.
HCP/M2693-01, HCP/M2693-02

SEVEN SOLAR ENERGY TECHNOLOGIES ARE ASSESSED IN THIS 2 VOLUME REPORT, INCLUDING WIND ENERGY SYSTEMS.

78-0206 GNECCO A J, WHITEHEAD G T
MICROPROCESSOR CONTROL OF A WIND TURBINE GENERATOR.
NTIS, MARCH 1978. 16P.
NASA-TM-79021, DOE/NASA/1028-78/20

THIS PAPER DESCRIBES A MICROPROCESSOR BASED SYSTEM USED TO CONTROL THE UNATTENDED OPERATION OF A WIND TURBINE GENERATOR. THE TURBINE AND ITS MICROCOMPUTER SYSTEM ARE FULLY DESCRIBED WITH SPECIAL EMPHASIS ON THE WIDE VARIETY OF TASKS PERFORMED BY THE MICROPROCESSOR FOR THE SAFE AND EFFICIENT OPERATION OF THE TURBINE. THE FLEXIBILITY, COST AND RELIABILITY OF THE MICROPROCESSOR WERE MAJOR FACTORS IN ITS SELECTION.

78-0207 SOUTHERN CALIFORNIA EDISON TO ANNOUNCE PURCHASE OF A 3-MWE SCHACHLE WINDMILL.
SOLAR ENERGY INTELL. REP. 4(18): 127, MAY 1, 1978.

78-0208 SOUTHWEST - SMALL WIND SYSTEMS FOR TEXAS.
WIND POWER DIG. NO. 12: 20-21, SPRING 1978.

78-0209 SOVIET WIND PROGRAM.
WIND POWER DIG. NO. 12: 11, SPRING 1978.

TSIKLON, THE SOVIET ASSOCIATION FOR THE USE OF WIND ENERGY, HAS ANNOUNCED AN AMBITIOUS PROGRAM FOR THE CONSTRUCTION OF A COUNTRY-WIDE WIND ENERGY GRID SYSTEM, WHICH IS DESCRIBED.

78-0210 SPERA D A
COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 1-13.
CONF-771148

THE DEVELOPMENT OF AT LEAST SEVEN CODES BY NASA AND ITS CONTRACTORS IS DESCRIBED. AS MIGHT BE EXPECTED IN AN AREA OF NEW TECHNOLOGY, THESE CODES DIFFER CONSIDERABLY IN APPROACH AND TECHNIQUE. BECAUSE OF THE GENERALLY COMPLICATED NATURE OF ANY STRUCTURAL DYNAMICS ANALYSIS, A DETAILED COMPARISON OF SEVEN COMPUTER CODES IS EXTREMELY DIFFICULT.

THEREFORE, THE OBJECTIVES OF THIS STUDY HAVE BEEN LIMITED TO THE FOLLOWING: TO PRESENT A BRIEF OVERVIEW OF EACH CODE AND IDENTIFY SOURCES FOR FURTHER DETAILED INFORMATION, AND TO COMPARE THE PERFORMANCE OF EACH CODE AGAINST TWO SETS OF TEST DATA MEASURED ON THE 100 KW MOD-0 WIND TURBINE, AN EXPERIMENTAL MACHINE IN OPERATION AT NASA'S PLUM BROOK STATION NEAR SANDUSKY, OHIO. COMPARISON ON THE BASIS OF CYCLIC LOADS, PEAK LOADS, AND HARMONIC CONTENTS WAS SELECTED.

78-0211 SPERA D A, JANETZKE D C
EFFECTS OF ROTOR LOCATION, CONING, AND TILT ON CRITICAL LOADS IN LARGE WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 227-236.
CONF-771148

THREE LARGE (1500 KW) HORIZONTAL ROTOR CONFIGURATIONS WERE ANALYZED TO DETERMINE THE EFFECTS ON DYNAMIC LOADS OF UPWARD AND DOWNWIND ROTOR LOCATIONS, CONED AND RADIAL BLADE POSITIONS, AND TILTED AND HORIZONTAL ROTOR AXIS POSITIONS. LOADS WERE CALCULATED FOR A RANGE OF WIND VELOCITIES AT THREE LOCATIONS IN THE STRUCTURE: THE BLADE SHANK, THE HUB SHAFT, AND THE YAW DRIVE. BLADE AXIS CONING AND ROTOR AXIS TILT WERE FOUND TO HAVE MINOR EFFECTS ON LOADS. HOWEVER, LOCATING THE ROTOR UPWIND OF THE TOWER SIGNIFICANTLY REDUCED LOADS AT ALL LOCATIONS ANALYZED.

78-0212 STAHLE C V
MOD-1 WTG DYNAMIC ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 15-29.
CONF-771148

THE DYNAMIC ANALYSIS IS PRESENTED OF THE MOD-1 2000 KW HORIZONTAL-AXIS WIND TURBINE. AFTER BRIEFLY DESCRIBING THE MOD-1 DESIGN, THE DYNAMIC ANALYSIS USED TO EVALUATE THE DYNAMIC LOADS AND STRUCTURAL INTERACTIONS IS DISCUSSED. THE RESONANT FREQUENCY PLACEMENT, THE TREATMENT OF UNSTEADY WIND LOADING AND THE DYNAMIC LOAD SENSITIVITY TO FREQUENCY SHIFTS ARE REVIEWED FOR THE DESIGN.

78-0213 STANDARDS FOR WIND SYSTEMS.
WINDLETTER, P. 4-5, FEBRUARY 1978.

78-0214 STEWART H J
WIND ENERGY SYSTEMS.
ALTERNATE ENERGY SYSTEMS SEMINAR. PROCEEDINGS. MARCH 30, 1978. NTIS, 1978. P. 150-170.
N78-27528

A DISCUSSION ON WIND ENERGY SYSTEMS INVOLVED WITH THE DOE WIND ENERGY PROGRAM IS PRESENTED. SOME OF THE PROBLEMS ASSOCIATED WITH WIND ENERGY SYSTEMS ARE DISCUSSED. THE COST, EFFICIENCY, AND STRUCTURAL DESIGN OF WIND ENERGY SYSTEMS ARE ANALYZED.

78-0215 STIEFELD B
WIND TURBINE DATA ACQUISITION AND ANALYSIS SYSTEM.
NTIS, JULY 1978. 50P.
SAND-77-1164

UNDER DEPARTMENT OF ENERGY (DOE) SPONSORSHIP, SANDIA LABORATORIES HAS IMPLEMENTED A PROGRAM TO DEVELOP VERTICAL-AXIS WIND TURBINE (VAWT) SYSTEMS. ONE ASPECT OF THIS PROGRAM HAS BEEN THE DEVELOPMENT OF AN INSTRUMENTED TEST SITE ADJACENT TO SANDIA LABORATORIES' TECHNICAL AREA I ON KIRTLAND AIR FORCE BASE. THREE VAWTS ARE NOW IN OPERATION ON THIS TEST SITE. THIS PAPER DESCRIBES THE DATA ACQUISITION AND ANALYSES SYSTEM DEVELOPED TO MEET THE NEEDS OF THE VAWT TEST SITE. THE SYSTEM EMPLOYS A 16-BIT WORK-LENGTH MINICOMPUTER AS THE MAJOR ELEMENT IN A STAND-ALONE CONFIGURATION. A VARIETY OF PERIPHERAL DEVICES PERFORM THE REQUIRED DATA ACQUISITION FUNCTIONS AND PROVIDE FOR DATA DISPLAY AND ANALYSIS. INCLUDED IS A DISK-BASED SOFTWARE OPERATING SYSTEM THAT SUPPORTS A MASS STORAGE-FILE SYSTEM, HIGH-LEVEL LANGUAGE, AND AUXILIARY SOFTWARE PROCEDURES.

78-0216 STIEFELD B, TOMLINSON R N

DATA ACQUISITION AND SIGNAL PROCESSING FOR A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM.
NTIS, 1978. 8P.
SAND-78-1000C

THE DATA ACQUISITION AND ANALYSES SYSTEM DEVELOPED TO MEET THE NEEDS OF THE 17-METER VAWT IS DESCRIBED. THE SYSTEM EMPLOYS A MINICOMPUTER-BASED DATA ACQUISITION SYSTEM WITH SPECIAL PERIPHERAL EQUIPMENT. STATISTICAL METHODS WILL BE DESCRIBED THAT ARE EMPLOYED TO EVALUATE THE PERFORMANCE OF THE SYSTEM FROM BOTH A STRUCTURAL AND PERFORMANCE VIEWPOINT.

78-0217 STIEFELD B, TOMLINSON R
MINICOMPUTER BASED DATA ACQUISITION AND ANALYSIS SYSTEMS FOR VERTICAL AXIS WIND TURBINE TESTING.
NTIS, 1978. 10P.
SAND-78-0187C

THE COMPUTER BASED DATA ACQUISITION SYSTEM AND INSTRUMENTATION USED TO ACQUIRE ENVIRONMENTAL, STRUCTURAL, AND PERFORMANCE DATA FROM THE VAWT COMPLEX ARE DESCRIBED. AN AIRBORNE TYPE PCM ENCODER MOUNTED ON THE TURBINE SHAFT IS USED TO DIGITIZE MUCH OF THE DATA, PARTICULARLY THE LOW-LEVEL STRAIN INFORMATION FROM THE TURBINE BLADES AND SUPPORTING STRUCTURE. THE DATA SYSTEM IS AN EXTENSION OF RECENTLY COMPLETED WORK ON A SIMILAR SYSTEM FOR A LARGE, 8.8 METER (25 FOOT) CENTRIFUGE FACILITY.

COMPUTER SOFTWARE WHICH PROVIDES NEAR REAL TIME GRAPHIC AND ANALYTIC CAPABILITIES WILL ALSO BE DESCRIBED.

78-0218 CARLSON A, FULLER D, REYER R, MALLNER C, FOGELSON S
USAF TERRESTRIAL ENERGY STUDY. VOLUME 111. PART 2. ENERGY CONVERSION SYSTEMS HANDBOOK.
NTIS, MAY 1978. 483P.

AD-A057252

THIS REPORT WAS PREPARED BY BURNS AND ROE, INC. TO SERVE AS A GUIDE FOR THE U.S. AIR FORCE IN SELECTING TYPES OF ENERGY CONVERSION SYSTEMS TO MEET THEIR FUTURE GROUND POWER REQUIREMENTS. THE ELECTRIC POWER REQUIREMENTS INCLUDED IN THIS REPORT RANGE FROM 10 KILOWATTS TO 50 MEGAWATTS. TWENTY-ONE TYPES OF SYSTEMS, CONVENTIONAL AS WELL AS ADVANCED, ARE CONSIDERED. THESE INCLUDE 19 TYPES OF ENERGY CONVERSION SYSTEMS WHICH UTILIZE EITHER CHEMICAL FUEL, NUCLEAR FUEL, SOLAR ENERGY OR WIND ENERGY AND TWO TYPES OF ENERGY STORAGE SYSTEMS WHICH UTILIZE ELECTRIC POWER FOR RECHARGING. EACH SYSTEM IS CHARACTERIZED IN TERMS OF A SET OF ECONOMIC, PHYSICAL AND PERFORMANCE PARAMETERS INCLUDING ACQUISITION COSTS, LIFE CYCLE COSTS, SIZE, EFFICIENCY AND ENVIRONMENTAL CONSTRAINTS. A TOTAL OF EIGHTEEN SUCH PARAMETERS ARE PRESENTED FOR EACH TYPE OF SYSTEM FOR SEVERAL SETS OF REQUIREMENTS. THE REQUIREMENTS ARE DEFINED IN TERMS OF ELECTRIC POWER LEVEL, FREQUENCY AND DURATION OF OPERATION CORRESPONDING TO TYPICAL U.S. AIR FORCE GROUND APPLICATIONS.

78-0219 SULLIVAN T L
SIMPLIFIED MODELING FOR WIND TURBINE MODAL ANALYSIS USING NASTRAN.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 31-37.
CONF-771148

A SIMPLIFIED FINITE ELEMENT MODEL OF THE MOD-0 WIND TURBINE TOWER IS DESCRIBED. USE OF THIS MODEL GREATLY REDUCES THE COMPUTER TIME REQUIRED FOR MODAL ANALYSIS. THE MODEL PROVIDES GOOD ACCURACY IN PREDICTING TOWER FREQUENCIES AND MODE SHAPES AS LONG AS THE TOWER BENDING MODE SHAPE RESEMBLES THE FIRST BENDING MODE SHAPE OF A CANTILEVER BEAM. SEVERAL APPLICATIONS WHERE THE SIMPLIFIED MODEL WAS USED FOR MODAL ANALYSIS ARE DESCRIBED.

78-0220 SULLIVAN W N
STRUCTURAL PERFORMANCE OF THE DOE/SANDIA 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, 1978. 7P.
SAND-78-0880C

THE DOE/SANDIA 17 METER DARRIEUS VERTICAL AXIS WIND TURBINE HAS BEEN OPERATED SINCE APRIL 1977 FOR THE PURPOSE OF GATHERING ENGINEERING DATA. THIS REPORT CONSIDERS ONE ASPECT OF THAT TEST PROGRAM, THE MEASUREMENT OF

BLADE STRUCTURAL RESPONSE.

78-0221 SURBROOK T C
WIND POWER.
MICHIGAN STATE UNIVERSITY COOPERATIVE EXTENSION SERVICE. ENERGY FACT SHEET NO. 2, EXTENSION BULLETIN E-112, JANUARY 1978. 8P.

78-0222 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. REPORT NO. BPA77-2
SUBMITTED TO BONNEVILLE POWER ADMINISTRATION.
CORVALLIS, OREGON, OREGON STATE UNIVERSITY, JANUARY 1978. 164P.

78-0223 SYMPOSIUM ON METEOROLOGY AND ENERGY, PROCEEDINGS.
WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. 370P.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977.

INCLUDED IN THIS PROCEEDINGS ARE 14 PAPERS ON WIND ENERGY.

78-0224 TAKLE E S, BROWN J M, DAVIS W M
CHARACTERISTICS OF WIND AND WIND ENERGY IN IOWA.
IOWA STATE J. RES. 52(3): 313-339, FEBRUARY 1978.

A HYBRID WEIBULL DISTRIBUTION IS FOUND TO CHARACTERIZE SATISFACTORILY IOWA WIND-SPEED DATA FROM AN INSTRUMENTED TOWER AND FROM THE NATIONAL CLIMATIC CENTER. AVERAGE WIND SPEED (ALSO AVAILABLE WIND ENERGY) IS LEAST IN JULY AND AUGUST, INCREASES GENERALLY THROUGH THE FALL AND WINTER TO A MAXIMUM IN APRIL, THENCE DECREASES TO THE SUMMER MINIMUM. ANNUAL TOTALS OF WIND POWER CAN DIFFER BY 20 PERCENT IN ADJACENT YEARS. A POWER-LAW RELATIONSHIP IS USED TO CHARACTERIZE WIND VARIATION WITH HEIGHT, WITH THE INCREASE WITH HEIGHT BEING GREATEST (LEAST) DURING NIGHTTIME (DAYLIGHT) HOURS WHEN WIND SPEEDS ARE LEAST (GREATEST). ANNUAL AVERAGE WIND SPEEDS ARE SLIGHTLY HIGHER IN WESTERN AND NORTHWESTERN SECTIONS OF IOWA THAN ELSEWHERE. A WIND-POWER ROSE INDICATES THAT MOST WIND POWER IS ASSOCIATED WITH WINDS FROM THE SE THROUGH SW AND WNW THROUGH NNW. POWER OUTPUT CHARACTERISTICS OF A 100 KW AND A 6 KW GENERATOR ARE COMBINED WITH WIND-SPEED DISTRIBUTIONS TO MODEL ENERGY PRODUCTION OF THESE MACHINES IN IOWA.

78-0225 TAMANINI R J
WINDMILL WITH RADIAL VANES.
U.S. PATENT NO. 4,086,026, APRIL 1978. 4P.

AN ELONGATED CYLINDRICAL BODY IS PROVIDED FOR A GREATER LENGTH THAN ITS DIAMETER AND INCLUDING A CYLINDRICAL SIDE WALL. THE BODY IS OPEN AT ITS OPPOSITE ENDS AND JOURNALED FOR ROTATION ABOUT AN AXIS GENERALLY COINCIDING WITH THE CENTER AXIS OF THE BODY. THE BODY INCLUDES A PLURALITY OF CIRCUMFERENTIALLY SPACED LONGITUDINALLY EXTENDING SLOTS SIMILARLY SLIGHTLY INCLINED RELATIVE TO RADIAL PLANES OF THE BODY PASSING THROUGH THE SLOTS. ONE SET OF CORRESPONDING EDGE PORTIONS OF THE CYLINDRICAL SIDE WALL DEFINING CORRESPONDING LONGITUDINAL EDGES OF THE SLOTS INCLUDE INTEGRAL OUTWARDLY PROJECTING SUBSTANTIALLY RECTANGULAR VANES EXTENDING ALONG THE SLOTS AND THE VANES COMPRISE OUTWARDLY DEFLECTED INTEGRAL POSITIONS OF THE CYLINDRICAL SIDE WALL OF THE BODY.

78-0226 ENERGY FROM THE WINDS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1978. 9P.
DOE-OPA-0013R, E1.25:0013R

THIS SMALL PAMPHLET SUMMARIZES BRIEFLY THE CURRENT STATUS OF WIND POWER RESEARCH IN THE U.S.

78-0227 TEWARI S K
ECONOMICS OF WIND ENERGY USE FOR IRRIGATION IN INDIA.
SCIENCE 202(4367): 481-486, NOVEMBER 3, 1978.

THE PRODUCTION OF ENERGY FROM WINDMILLS DESIGNED SPECIFICALLY TO OPERATE IN THE LOW WIND VELOCITIES THAT USUALLY PREVAIL IN INDIA DURING THE MAIN IRRIGATION SEASON IS ESTIMATED TO BE REASONABLY ECONOMICAL FOR IRRIGATING SMALL FARMS FROM OPEN WELLS. THE ECONOMICS WOULD IMPROVE IF IRRIGATION WAS PRACTICED ALL YEAR ROUND, EVEN IN THE HOT SUMMER SEASON. THE CALCULATIONS MADE HERE ARE EXPECTED TO BE VALID FOR THE WINDIER 10

PERCENT OF THE LOCATIONS IDENTIFIED FROM AVAILABLE WIND SPEED RECORDS. OTHER, WINDIER LOCATIONS ARE EXPECTED TO BE IDENTIFIED WHEN MORE WIND SPEED DATA ARE COLLECTED IN THE FUTURE. GOVERNMENTAL POLICIES ALONG LINES SIMILAR TO THOSE FOR RURAL ELECTRIFICATION MAY BE NEEDED TO SUPPORT RESEARCH AND DEVELOPMENT EFFORTS TO OPTIMIZE THE DESIGNS OF WINDMILLS AND TO PROMOTE THEIR USE IN RURAL AREAS.

78-0228 3 MW WIND TURBINE SLATED FOR SOUTHERN CALIFORNIA.
WIND POWER DIG. NO. 12: 26, SPRING 1978.

78-0229 THOMAS R L, DONOVON R M
LARGE WIND TURBINE GENERATORS.
NTIS, MARCH 1978. 37P.
N78-29575, NASA-TM-73767, DOE/NASA/1059-78-1

THE DEVELOPMENT ASSOCIATED WITH LARGE WIND TURBINE SYSTEMS IS BRIEFLY DESCRIBED. THE SCOPE OF THIS ACTIVITY INCLUDES THE DEVELOPMENT OF SEVERAL LARGE WIND TURBINES RANGING IN SIZE FROM 100 KW TO SEVERAL MEGAWATT LEVELS. A DESCRIPTION OF THE WIND TURBINE SYSTEMS, THEIR PROGRAMATIC STATUS AND A SUMMARY OF THEIR POTENTIAL COSTS IS INCLUDED.

78-0230 THOMSON T A
THE THEORETICAL PERFORMANCE OF A STRAIGHT-BLADED, VERTICAL AXIS WIND TURBINE.
NTIS, JANUARY 1978. 42P.
N78-26561

EQUATIONS PREDICTING THE PERFORMANCE, UNDER UNSTALLED OPERATING CONDITIONS OF THE BLADING, OF STRAIGHT-BLADED, VERTICAL AXIS WIND TURBINE ROTORS ARE DERIVED ANALYTICALLY. PERFORMANCE CHARACTERISTICS OF ROTORS OF THIS TYPE ARE EVALUATED AND DISCUSSED.

78-0231 TODD J H
WINDMILLS: AN APPROPRIATE TECHNOLOGY FOR AQUACULTURE.
COMMER. FISH FARMER AQUACULT. NEWS 4(6): 8-10, SEPTEMBER 1978.

78-0232 TOMLINSON A I
THE WIND PROGRAMME OF THE NEW ZEALAND METEOROLOGICAL SERVICE.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS, WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 43-47.

78-0233 TUERPE D R, GRESHO P M, SANI R L
VARIATIONAL WIND FIELD ADJUSTMENT OVER COMPLEX TERRAIN USING FINITE ELEMENT TECHNIQUES.
CONFERENCE ON THE SIERRA NEVADA METEOROLOGY, SOUTH LAKE TAHOE, NEVADA, 19 JUNE 1978. NTIS, 1978. 5P.
UCRL-80531

A FINITE DIFFERENCE COMPUTER CODE (MATHEW) FOR ENSURING MASS-CONSISTENCY IN WIND FIELDS, DEVELOPED BY SHERMAN (1978), HAS PROVEN SUCCESSFUL IN PROVIDING INPUT FOR ADPIC, A PARTICLE-IN-CELL ADVECTION-DIFFUSION CODE USED IN POLLUTION TRANSPORT STUDIES. AN ANALOG OF MATHEW IS DESCRIBED TO BE USED IN FINITE ELEMENT ADVECTION-DIFFUSION CODES, FINITE ELEMENT PLANETARY BOUNDARY MODELS, AND FOR WIND ENERGY ASSESSMENT STUDIES IN COMPLEX TERRAIN.

78-0234 "TVINDMILL" PERFORMS WELL IN TEST RUNS; NASA STARTS CONSTRUCTION ON BOONE MILL.
SOL. ENERGY INTELL. REP. 4(31): 230, JULY 31, 1978.

78-0235 THE 200-KILOWATT WIND TURBINE PROJECT.
NTIS, JANUARY 1978. 17P.
N78-29583, NASA-TM-79757

THE THREE 200 KILOWATT WIND TURBINES DESCRIBED COMPOSE THE FIRST OF THREE SEPARATE SYSTEMS. PROPOSED WIND TURBINES OF THE TWO OTHER SYSTEMS, ALTHOUGH SIMILAR IN DESIGN, ARE LARGER IN BOTH PHYSICAL SIZE AND RATED POWER GENERATION. THE OVERALL OBJECTIVE OF THE PROJECT IS TO OBTAIN EARLY OPERATION AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL-AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. SEVERAL OF THE KEY ISSUES ADDRESSED INCLUDE THE FOLLOWING: (1) IMPACT OF THE VARIABLE POWER OUTPUT (DUE TO VARYING WIND SPEEDS) ON

THE UTILITY GRID (2) COMPATIBILITY WITH UTILITY REQUIREMENTS (VOLTAGE AND FREQUENCY CONTROL OF GENERATED POWER) (3) DEMONSTRATION OF UNATTENDED, FAIL-SAFE OPERATION (4) RELIABILITY OF THE WIND TURBINE SYSTEM (5) REQUIRED MAINTENANCE AND (6) INITIAL PUBLIC REACTION AND ACCEPTANCE.

78-0236 GARSTANG M, ASPLIDEN C I, NNAJI S, PIELKE R A
COASTAL ZONE WIND ENERGY. PART I. SYNTHESIS AND RESULTS. FINAL REPORT.
NTIS, JANUARY 1978. 56P.
RLO-2344-76/77-5

THIS REPORT CONTAINS THE MAJOR RESULTS FROM THE CLIMATOLOGICAL STUDY AND PRESENTS THE NUMERICAL MODEL EXPERIMENTS AND RESULTS IN SOME DETAIL.

78-0237 GARSTANG M, ASPLIDEN C I, NNAJI S, PIELKE R A
COASTAL ZONE WIND ENERGY. PART II. CLIMATOLOGY. FINAL REPORT.
NTIS, JANUARY 1978. 192P.
RLO-2344-76/77-6

THIS REPORT CONTAINS A DESCRIPTION OF THE DATA USED AND THE DETAILED TABULATIONS AND GRAPHICAL PRESENTATIONS OF THE COASTAL WIND AND WIND ENERGY CLIMATOLOGY.

78-0238 USDA TO SOLICIT PROPOSALS.
WINDLETTER, P.7, FEBRUARY 1978.

78-0239 UPDATE ON TERRY MEHRKHAM.
WIND POWER DIG. NO. 12: 30, SPRING 1978.

78-0240 USHIYAMA I
THE DEVELOPMENT OF WIND POWER UTILIZATION IN JAPAN.
TECHNOCRAT 11(4): 23-32, APRIL 1978.

78-0241 ENVIRONMENTAL READINESS DOCUMENT, LARGE AND SMALL WIND SYSTEMS.
COMMERCIALIZATION PHASE III PLANNING.
NTIS, SEPTEMBER 1978. 31P.
DOE/ERD-0006

ENVIRONMENTAL READINESS DOCUMENTS ARE PREPARED PERIODICALLY TO REVIEW AND EVALUATE THE ENVIRONMENTAL STATUS OF ANY ENERGY TECHNOLOGY DURING THE SEVERAL PHASES OF DEVELOPMENT OF THAT TECHNOLOGY. THIS ENVIRONMENTAL READINESS DOCUMENT WAS PREPARED TO ASSIST THE DOE COMMERCIALIZATION TASK FORCE ON LARGE AND SMALL WIND SYSTEMS TO EVALUATE THE COMMERCIAL READINESS OF THIS TECHNOLOGY WITH RESPECT TO ENVIRONMENTAL ISSUES. AN EFFORT HAS BEEN MADE TO IDENTIFY POTENTIAL ENVIRONMENTAL PROBLEMS THAT MAY BE ENCOUNTERED BASED UPON CURRENT KNOWLEDGE, PROPOSED AND POSSIBLE NEW ENVIRONMENTAL REGULATIONS, AND THE UNCERTAINTIES INHERENT IN PLANNED ENVIRONMENTAL RESEARCH.

78-0242 VERHOLEK M G
A MEASUREMENT PROGRAM TO CHARACTERIZE THE WIND AT A POTENTIAL WECS SITE.
NTIS, MARCH 1978. 25P.
PNL-2516

HAVING IDENTIFIED A POTENTIAL WIND TURBINE INSTALLATION SITE, THE INSTALLATION DECISION PROCESS INVOLVES TWO OPTIONS: A) DETERMINING IF THE SITE IS SUITABLE FOR THE INTENDED MACHINE DESIGN, OR B) DETERMINING AN APPROPRIATE MACHINE FOR THE INTENDED SITE. EITHER OPTION REQUIRES THAT ONSITE WIND CHARACTERISTICS BE COMPARED TO MACHINE CHARACTERISTICS TO DETERMINE THE PROPER SITE-MACHINE MATCH. THIS PAPER DESCRIBES AN ONSITE METEOROLOGICAL MEASUREMENT PROGRAM TO CHARACTERIZE THE WIND AT A POTENTIAL WIND TURBINE INSTALLATION SITE. THE BASIC INFORMATIONAL REQUIREMENTS HAVE BEEN POSTULATED, THE ANALYSIS DESCRIBED, AND AN APPROPRIATE MEASUREMENT PROGRAM HAS BEEN DEVISED. THIS PHASE OF SITING MEASUREMENTS PROVIDES THE INFORMATION FOR THE FINAL INSTALLATION DECISION PROCESS - WHICH WECS TO PUT AT WHICH SITE.

78-0243 VERHOLEK M G
PRELIMINARY RESULTS OF A FIELD EXPERIMENT TO CHARACTERIZE WIND FLOW THROUGH A VERTICAL PLANE.
NTIS, APRIL 1978. 42P.
PNL-2518

THIS REPORT CONTAINS PRELIMINARY RESULTS OF A FIELD EXPERIMENT TO STUDY

THE TURBULENT STRUCTURE IN THE WIND FLOW THROUGH A SIMULATED DISC OF ROTATION OF A LARGE, HORIZONTAL-AXIS WIND TURBINE BLADE. THE WIND FLOW IMPINGING ON THE HYPOTHETICAL TURBINE BLADE WAS SIMULATED BY A NINE-ELEMENT CIRCULAR ARRAY OF THREE COMPONENT ANEMOMETERS IN A SINGLE VERTICAL PLANE. THE WIND DATA WERE ANALYZED AS: A SINGLE POINT, BUT HEIGHT MEASUREMENT (AT THE CENTER OF THE ARRAY); AN ARITHMETIC AVERAGE OF ALL SENSORS; AND A SYNTHESIS OF THE DATA RECORDS ASSUMED TO REPRESENT MEASUREMENT LOCATIONS ON A HYPOTHETICAL, ROTATING TURBINE BLADE. THE EFFECTS OF AREAL AVERAGING WERE EXAMINED BY ARITHMETICALLY AVERAGING OPPOSING DATA POINTS REPRESENTING THE AIR FLOW PAST THE ROTATING BLADE. WIND FLOW THROUGH HYPOTHETICAL, ROTATING TURBINE BLADES WAS SIMULATED BY SAMPLING THE ANEMOMETER RECORDS IN A SEQUENCE AROUND THE ARRAY AS IF A SENSOR WERE ON A TURBINE BLADE ROTATING IN THE PLANE OF THE ARRAY. THE SYNTHESIZED WIND RECORDS WERE USED TO SIMULATE THE FLOW INTO A SOFT, FLEXIBLE BLADE LOADED BY THE ACTUAL NONUNIFORM WIND FIELD, AND A STIFF, NON-FLEXIBLE BLADE THAT AVERAGED THE FLOW OVER THE ENTIRE ROTOR. THE DIFFERENCES IN THE ANALYTICAL RESULTS OBTAINED IN THIS STUDY ILLUSTRATE SOME OF THE DIFFERENCES THAT CAN RESULT FROM USING VARIOUS ATMOSPHERIC FLOW FIELD ASSUMPTIONS WHEN DESIGNING WIND TURBINES. THIS STUDY DOES NOT ATTEMPT TO DETERMINE THE APPLICABILITY OF GIVEN ASSUMPTIONS; DIFFERENCES ARE POINTED OUT TO AID DESIGNERS IN DECIDING WHICH ASSUMPTIONS ARE MOST APPROPRIATE.

78-0244 VERHOLEK M G
REMOTE WIND MEASUREMENTS WITH A NEW MICROPROCESSOR-BASED ACCUMULATOR DEVICE.
NTIS, APRIL 1978. 21P.
PNL-2515

WIND MEASUREMENTS USING MICROPROCESSOR-BASED INSTRUMENTS ARE AN INEXPENSIVE WAY TO OBTAIN STATISTICAL SUMMARIES OF BASIC WIND DATA FOR THE WIND TURBINE SITING DECISION PROCESS. THE MEASUREMENTS PROVIDE DATA FOR STATISTICAL SUMMARIES OF JOINT FREQUENCY DISTRIBUTIONS OF SPEED AND DIRECTION, WIND POWER ESTIMATES, SEASONAL AND DIURNAL VARIATIONS, TURBULENCE CHARACTERISTICS (OPTIONAL), AND RUN DURATION OR PERSISTENCE (OPTIONAL). THE INSTRUMENT HAS THE DESIRABLE QUALITIES OF BEING INEXPENSIVE, SIMPLE, VERSATILE, RUGGED AND PORTABLE.

78-0245 WTG'S CUTTYHAWK WINDMILL BEGINS UNATTENDED FULL OPERATION.
SOL. ENERGY INTELL. REP. 4(43): 334, OCTOBER 30, 1978.

THE 200-KW THREE-BLADED TURBINE DEVELOPED BY WTG ENERGY SYSTEMS INC., FOR CUTTYHAWK ISLAND OFF MARTHA'S VINEYARD IS DISCUSSED.

78-0246 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF WIND POWER POTENTIAL.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 753-756.

A TECHNIQUE HAS BEEN DEVELOPED TO SPEED THE PROCESS OF SELECTING SITES WITH GOOD WIND POWER POTENTIAL IN MOUNTAINOUS TERRAIN. THIS TECHNIQUE CALLED "BIOLOGICAL WIND PROSPECTING" USES TREE DEFORMATION AS AN INDICATOR OF THE PREVAILING WIND DIRECTION AND ANNUAL MEAN WIND SPEED. DURING THE FIRST TWO YEARS OF THE STUDY FIVE INDICES OF WIND EFFECTS ON CONIFEROUS TREES WERE DEVELOPED. THREE INDICES HAVE BEEN CALIBRATED WITH RESPECT TO THE ANNUAL MEAN WIND SPEED. WIND DATA AND MEASUREMENTS OF TREE DEFORMATION HAVE BEEN COLLECTED FOR MORE THAN A YEAR AT 24 LOCATIONS IN THE PACIFIC NORTHWEST. THE RESULTS INDICATE THAT THE ANNUAL MEAN WIND SPEED CAN BE PREDICTED WITH AN ACCURACY OF PLUS OR MINUS 17 PERCENT.

78-0247 JUSTUS C G, HARGRAVES W R, MIKHAIL A, GRABER D
METHODS FOR ESTIMATING WIND SPEED FREQUENCY DISTRIBUTIONS.
J. APPL. METEOROL. 17(3): 350-353, MARCH 1978.

THE WEIBULL FUNCTION IS DISCUSSED FOR REPRESENTATION OF THE WIND SPEED FREQUENCY DISTRIBUTION. METHODS ARE PRESENTED FOR ESTIMATING THE TWO WEIBULL PARAMETERS (SCALE FACTOR C AND SHAPE FACTOR K) FROM SIMPLE WIND STATISTICS. COMPARISON IS MADE WITH A RECENTLY PROPOSED METHOD BASED ON THE "SQUARE-ROOT-NORMAL" DISTRIBUTION WITH MEAN WIND SPEED AND FASTEST MILE DATA AS INPUT STATISTICS. THE WEIBULL DISTRIBUTION IS SHOWN TO GIVE SMALLER ROOT-MEAN-SQUARE ERRORS THAN THE SQUARE-ROOT-NORMAL DISTRIBUTION

WHEN FITTING ACTUAL DISTRIBUTIONS OF OBSERVED WIND SPEED. ANOTHER ADVANTAGE OF THE WEIBULL DISTRIBUTION IS THE AVAILABLE METHODOLOGY FOR PROJECTING TO ANOTHER HEIGHT THE OBSERVED WEIBULL DISTRIBUTION PARAMETERS AT ANEMOMETER HEIGHT.

78-0248 WEGLEY H L, ORGILL M M, DRAKE R L
A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, MAY 1978. 118P.
PNL-2521

THIS HANDBOOK WAS WRITTEN TO SERVE AS A SITING GUIDE FOR INDIVIDUALS WISHING TO INSTALL SMALL WIND ENERGY CONVERSION SYSTEMS (WECS). SMALL WECS ARE DEFINED HERE AS SYSTEMS CONSISTING OF ONE OR TWO MACHINES, EACH HAVING A RATED CAPACITY OF LESS THAN 100 KILOWATTS. TO UNDERSTAND AND APPLY THE SITING PRINCIPLES DISCUSSED, THE USER NEEDS NO TECHNICAL BACKGROUND IN METEOROLOGY OR ENGINEERING; HE NEEDS ONLY A KNOWLEDGE OF BASIC ARITHMETIC AND THE ABILITY TO UNDERSTAND SIMPLE GRAPHS AND TABLES. ACCORDING TO MANUFACTURERS OF SMALL WECS, THE GREATEST CAUSE OF DISSATISFACTION AMONG OWNERS HAS BEEN IMPROPER SITING. A POTENTIAL OWNER OF A SMALL WECS SHOULD REALIZE THAT A RELATIVELY SMALL INVESTMENT TO LOCATE THE BEST AVAILABLE SITE CAN EASILY YIELD SAVINGS OF SEVERAL THOUSAND DOLLARS OVER THE LIFETIME OF THE SYSTEM.

78-0249 SHURTLEFF W W
SOLAR ENERGY SYSTEM TESTING: SOME EXPERIENCES WITH MINICOMPUTERS.
NTIS, 1978. 8P.
SAND-78-0879C

THIS PAPER IS FROM SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, WASH., D.C., MAY 22, 1978. FOR THE PAST FEW YEARS, SANDIA LABORATORIES HAS BEEN INVOLVED WITH TESTING DIFFERENT COMPONENTS AND SYSTEMS ASSOCIATED WITH SOLAR (AND WIND) ENERGY STUDIES. SANDIA NOW HAS FIVE MINICOMPUTER BASED CONTROLLERS WHICH AID IN DATA ACQUISITION AND CONTROL OF SUCH PROJECTS AS THE SOLAR TOTAL ENERGY PROJECT, PHOTOVOLTAIC TEST PROJECT, SOLAR COLLECTOR PROJECT, SOLAR THERMAL TEST FACILITY (POWER TOWER), AND THE VERTICAL AXIS WIND TURBINE. THE EXPERIENCES ASSOCIATED WITH THESE PROJECTS HAVE GIVEN SOME INSIGHT INTO DEVELOPING A "PHILOSOPHY OF APPLICATION" OF MINICOMPUTERS OR MICROPROCESSORS TO THIS TYPE OF TESTING. IN THIS PAPER, SUCH IDEAS AS VERSATILITY OF HARDWARE AND SOFTWARE AND "DISTRIBUTED" SYSTEMS ARE EXPLAINED WITH THE PURPOSE OF OUTLINING THIS PHILOSOPHY.

78-0250 WHO OWNS WINDMILLS.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0251 WILSON R E
EFFECT OF HUB FAIRINGS ON WIND TURBINE ROTOR PERFORMANCE.
J. FLUIDS ENG. 100(1): 120-122, MARCH 1978.

HUB FAIRINGS OR SPINNERS ARE FREQUENTLY SUGGESTED FOR WIND TURBINES FOR REASONS OF AESTHETICS OR PERFORMANCE. WHILE HUB FAIRINGS RARELY, IF EVER, DECREASE THE APPEARANCE OF A WIND TURBINE, THE EFFECTS OF A NOSE FAIRING MAY ACTUALLY DECREASE RATHER THAN INCREASE WIND TURBINE ROTOR PERFORMANCE. ANALYSIS OF HUB FAIRINGS EFFECTS ON WIND TURBINE PERFORMANCE IS PRESENTED.

78-0252 HUBBARD K G
WIND ENERGY.
UTAH SCI. 39(3): 104-106, SEPTEMBER 1978.

78-0253 WIND IN CALIFORNIA.
CALIFORNIA. (STATE) DEPARTMENT OF WATER RESOURCES BULL. 185, JANUARY 1978. 275P.

THIS BULLETIN SUMMARIZES 15 MILLION HOURLY WIND OBSERVATIONS AT 220 STATIONS IN CALIFORNIA. IT DISCUSSES THE HISTORY AND NATURE OF WIND MEASUREMENTS AND OCCURANCE IN CALIFORNIA. THE OBJECTIVE OF THE BULLETIN IS TO SUMMARIZE READILY AVAILABLE WIND DATA IN CALIFORNIA IN A CONVENIENT VOLUME, AS A FIRST STEP IN ASSESSING THE WIND POWER POTENTIAL FOR THE STATE OF CALIFORNIA.

78-0254 WIND OWNERS SURVEY.
WIND POWER DIG NO. 12: 42-43, SPRING 1978.

78-0255 THE WIND PROGRAM STRUCTURE AT DOE.
WINDLETTER, P. 14, FEBRUARY 1978.

78-0256 WIND STUDY PLAN APPROVED.
SOL. ENERGY INTELL. REP. 4(19): 135, MAY 8, 1978.

78-0257 ANDERSON M B, NEWTON K, RYLE M, SCOTT P F
SHORT-TERM STORAGE AND WIND POWER AVAILABILITY.
NATURE 275(5679): 432-434, OCTOBER 5, 1978.

HOURLY WIND AND TEMPERATURE MEASUREMENTS OVER A 17-YEAR PERIOD ARE USED TO INVESTIGATE THE PERFORMANCE OF A SIMPLE SYSTEM IN WHICH WIND POWER IS USED IN CONJUNCTION WITH 150-H THERMAL STORAGE TO PROVIDE DOMESTIC SPACE HEATING. THE RESULTS ARE PROMISING, EVEN FOR THIS BASIC SYSTEM, AND CONFIRM THAT, WITH SOME MODIFICATIONS, SUCH A SYSTEM CAN PROVIDE ADEQUATE RELIABILITY. A SIGNIFICANT RESULT OF THIS ANALYSIS HAS BEEN TO INDICATE THE IMPORTANCE OF SELECTING AN APPROPRIATE VALUE FOR THE WIND SPEED AT WHICH THE WIND TURBINE IS TO PRODUCE ITS PEAK OUTPUT (THE "RATED" WIND SPEED).

78-0258 WIND WORK IN NEW MEXICO.
WIND POWER DIG. NO. 12: 21-22, SPRING 1978.

78-0259 WINDMILL CATALOG.
ROCKVILLE CENTER, N.Y., WIND DIRECTORY, 1978.

THIS BOOK DESCRIBES THE DIFFERENT WIND POWER SYSTEMS AVAILABLE IN THE U.S. AND CANADA, AND LISTS MANUFACTURERS AND CONSULTANTS.

78-0260 YEE S T
INFLUENCE OF WIND TURBINE FOUNDATION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 103-108.
CONF-771148

THE 200KW MOD-OA WIND TURBINE WAS MODELED USING A 3 LUMPED MASS-SPRING SYSTEM FOR THE SUPERSTRUCTURE AND A ROTATIONAL SPRING FOR THE FOUNDATION AND SUPPORTING SOIL. NATURAL FREQUENCIES WERE CALCULATED USING SOIL ELASTIC MODULI VARYING FROM 3000 TO 22,400 P.S.I. THE REDUCTION IN NATURAL FREQUENCIES FROM THE RIGID FOUNDATION CASE RANGED UP TO 20 PERCENT.

78-0261 YEN J T
HARNESSING THE WIND.
IEEE SPECTRUM 15(3): 42-47, MARCH 1978.

VARIOUS TYPES OF WIND TURBINES ARE COMPARED. ECONOMIC ASPECTS OF WIND TURBINES ARE CONSIDERED. SPECIAL ATTENTION IS GIVEN TO THE TORNADO-TYPE WIND TURBINE.

78-0262 YEN J T
TORNADO TYPE WIND TURBINE.
U.S. PATENT NO. 4,070,131, JANUARY 24, 1978. 8P.

ATMOSPHERIC WIND IS ADMITTED TANGENTIALLY INTO A VERTICALLY EXTENDING STRUCTURE AND DIRECTED AGAINST THE INTERIOR CURVED SURFACE OF THE STRUCTURE TO PRODUCE VORTEX FLOW. THE STRUCTURE IS OPEN ENDED AND SPACED FROM GROUND OR CONNECTED TO A RAM-AIR SUBTERRANEAN TUNNEL. THE VORTEX FLOW AND CORRESPONDING LOW PRESSURE CORE DRAWS AMBIENT AND/OR RAM-AIR INTO THE BOTTOM OF THE STRUCTURE TO DRIVE A HORIZONTAL TURBINE.

78-0263 WIND TURBINE GENERATOR SYSTEM, BLOCK ISLAND, RHODE ISLAND. FINAL ENVIRONMENTAL IMPACT STATEMENT.
NTIS, JULY 1978. 153P.
DOE/EIS-0006

INFORMATION ON THE ENVIRONMENTAL IMPACTS OF A MOD-OA WIND TURBINE ON BLOCK ISLAND, RHODE ISLAND IS PRESENTED CONCERNING DESCRIPTION OF THE PROPOSED ACTION; CHARACTERISTICS OF THE EXISTING ENVIRONMENT; POTENTIAL ENVIRONMENTAL IMPACTS; UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS; ALTERNATIVES; RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM PRODUCTIVITY; RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND

CONTROLS; IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES; AND ENVIRONMENTAL TRADE-OFF ANALYSIS.

78-0264 WENDELL L L, WEGLEY H L, VERHOLEK M G
REPORT FROM A WORKING GROUP MEETING ON WIND FORECASTS FOR WECS OPERATION.
NTIS, MARCH 1978. 33P.
PNL-2513

THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM (FWEP) IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS) FOR COMMERCIAL USE. AS PART OF THE FWEP THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) AIDS IN ACCOMPLISHING THIS OBJECTIVE IN VARIOUS WAYS. ONE WAY IS THE DESCRIPTION OF THE DAY TO DAY VARIABILITY OF WIND ENERGY IN TERMS OF PREDICTIBILITY FOR WECS OPERATIONS. IF UTILITIES THAT USE WECS ARE TO USE THEM EFFECTIVELY ON A DAY TO DAY BASIS, THEY MUST HAVE RELIABLE FORECASTS OF WIND POWER. TO THIS END, A WORKING-GROUP DISCUSSION TO IDENTIFY THE SPECIFIC WIND FORECASTING NEEDS AND THE CURRENT SHORT TERM WIND FORECASTING CAPABILITIES WAS HELD AT PACIFIC NORTHWEST LABORATORY (PNL) IN RICHLAND, WASHINGTON, ON DECEMBER 15, 1977. PRIOR TO THE MEETING, AN ATTEMPT WAS MADE TO ASCERTAIN THE INTEREST IN AND THE NEED FOR WIND FORECASTING FOR WECS IN THE DISPATCHING AND/OR SCHEDULING OF WIND-ENERGY GENERATION IN THE UTILITY SYSTEM. RELEVANT INFORMATION FROM DISPATCHERS WAS GATHERED THROUGH TELEPHONE INTERVIEWS AND WAS PRESENTED DURING THE WORKING-GROUP DISCUSSION BY GARY VERHOLEK (PNL). ALTHOUGH THE UTILITY COMPANY DISPATCHERS WERE INVITED TO THE MEETING, ONLY ONE DISPATCHER ATTENDED THE WORKING-GROUP DISCUSSION. THE MEETING OPENED WITH SEVERAL PRESENTATIONS ON ASPECTS OF WIND FORECASTING AND WECS OPERATIONS. THE IDEAS PRESENTED WERE THEN DISCUSSED. AT THE MEETING'S CLOSE, RECOMMENDATIONS WERE FORMED. THIS REPORT REFLECTS THE MEETING'S ORGANIZATION, WITH THE ADDITION OF CONCLUSIONS AND RECOMMENDATIONS DEVELOPED BY PNL AFTER THE MEETING.

78-0265 WALTON J J, HARDY D M
PRINCIPAL COMPONENTS ANALYSIS AND ITS APPLICATION TO WIND FIELD PATTERN RECOGNITION.
NTIS, JUNE 15, 1978. 31P.
UCRL-52488

THE AUTHORS HAVE APPLIED THE METHOD OF PRINCIPAL COMPONENTS ANALYSIS TO THE PROBLEM OF RECOGNIZING RECURRENT WIND PATTERNS ON A REGIONAL SCALE. DATA FROM THREE VERY DIFFERENT GEOGRAPHICAL REGIONS HAVE BEEN ANALYZED, AND EIGENVECTORS AND ASSOCIATED EXPANSION COEFFIEIENTS USED TO COMPUTE TYPICAL WIND FIELDS FOR THESE REGIONS.

78-0266 WINDMILL CUTS ELECTRICAL NEEDS 22% AT DAIRY.
COLO. RANCH. FARM. 33(1): 26-27, NOVEMBER 1978.

THE WINDMILL IN USE AT CSU'S DAIRY FARM FOR MILK COOLING AND WATER HEATING IS DESCRIBED.

78-0267 SHEPERDSON B
WIND IN VERMONT. UTILITIES LEARN ABOUT WIND ENERGY POTENTIAL.
WIND POWER DIG. NO. 14: 6-7, WINTER 1978.

THE VT. WIND WORKSHOP, HELD IN BURLINGTON VT. ON NOVEMBER 9, 1978, IS DESCRIBED. THE MEETING WAS SPONSORED BY THE VERMONT STATE ENERGY OFFICE, AND THE STATED PURPOSE OF THE EVENT WAS TO INFORM THE VERMONT ELECTRIC UTILITY INDUSTRY ABOUT THE STATUS OF LARGE SCALE WIND ENERGY TECHNOLOGY DEVELOPMENT, SYSTEMS OF 100 KW POWER GENERATION CAPACITY AND GREATER.

78-0268 SOLAR POLICY REVIEW. OPTIONS FOR WIND ENERGY FUNDING + POLICY.
WIND POWER DIG. NO. 14: 8-12, WINTER 1978.

THIS IS THE FINAL REPORT OF A PANEL HEADED BY RICK KATZENBERG WHICH REVIEWED WIND ENERGY BUDGET POLICIES FOR THE DEPARTMENT OF ENERGY.

78-0269 MUSGROVE P J
BRITISH WIND RESEARCH.
WIND POWER DIG. NO. 14: 14-15, WINTER 1978.

THE STATUS OF WIND POWER RESEARCH IN GREAT BRITAIN IS REVIEWED.

78-0270 SHEPERDSON B
NOTES ON THE AWEA.
WIND POWER DIG. NO. 14: 14-16, WINTER 1978.

THE ROLE AND OBJECTIVES OF THE AMERICAN WIND ENERGY ASSOCIATION ARE DISCUSSED.

78-0271 DARRIEUS-SILO DEMONSTRATION PROJECT NOW UNDERWAY.
WIND POWER DIG. NO. 14: 18-19, WINTER 1978.

A UNIQUE WIND ENERGY DEMONSTRATION PROJECT FUNDED BY NINE PRIVATE AND INVESTOR-OWNER COMPANIES WAS DEDICATED AT CLARKSON COLLEGE IN POTSDAM, NEW YORK ON NOVEMBER 18, 1978. THE PROJECT FEATURES A SILO-MOUNTED DARRIEUS WIND TURBINE WITH A RATED OUTPUT OF 12,000 WATTS THAT IS EXPECTED TO PROVIDE 25% OF THE ELECTRICAL ENERGY REQUIRED BY A TYPICAL DAIRY FARM. DESIGNED BY PROFESSOR JOHN ROLLINS OF CLARKSON, THE PROJECT WAS LARGELY UNDERWRITTEN BY CONTRIBUTIONS FROM AGWAY, ALCOA, ALLEN BRADLEY COMPANY, CHROMALLOY FARM SYSTEMS, NIAGARA MOHAWK POWER CORPORATION, RELIANCE ELECTRIC COMPANY, SIGN X LAB, UNARCO ROHN AND PCB PIEZOTRONICS.

78-0272 CALIFORNIA WIND TAX CREDITS BEGIN.
WIND POWER DIG. NO. 14: 19, WINTER 1978.

78-0273 ALASKAN WINDS HARNESSED.
WIND POWER DIG. NO. 14: 20-21, WINTER 1978.

A HOME-BUILT WIND CHARGER WHICH RECHARGES RADIO BATTERIES AT AN ALASKAN SUMMER FIELD CAMP IS DESCRIBED.

78-0274 WIND-HYDRO STUDY CONTINUES.
WIND POWER DIG. NO. 14: 22, WINTER 1978.

THE BUREAU OF RECLAMATION HAS BEEN WORKING WITH THE CONCEPT OF INTEGRATING LARGE-SCALE WIND TURBINES WITH EXISTING HYDROELECTRIC SYSTEMS. FIVE POTENTIAL SITES HAVE BEEN IDENTIFIED, INCLUDING THE MEDICINE BOW AREA OF WYOMING.

78-0275 THE 1979 WIND ACCESS CATALOG.
WIND POWER DIG. NO. 14: WINTER 1978.

THIS 63-PAGE CATALOG IS EMBEDDED BETWEEN PAGES 22 AND 23 OF THE WINTER 1978 WIND POWER DIGEST. IT INCLUDES "THE WIND ENERGY PRIMER", AN INTRODUCTION TO THE USE OF WIND ENERGY SYSTEMS, AND THEN LISTS MANUFACTURERS OF WIND MACHINES, WATER-PUMPING WINDMILL DISTRIBUTORS, WIND SYSTEM DISTRIBUTORS, ANEMOMETERS, INVERTERS, STORAGE, TOWERS, ACCESSORIES, AND ENDS WITH AN ARTICLE ON SITE SELECTION ENTITLED "WIND ENERGY PROSPECTING".

78-0276 BAKER R W, WADE J E
WIND ENERGY PROSPECTING.
WIND POWER DIG. NO. 14: P. 59-63 OF THE 1979 WIND ACCESS CATALOG, WINTER 1978.

SINCE THE POWER IN THE WIND IS PROPORTIONAL TO THE CUBE OF THE WIND SPEED, IT IS CRUCIAL TO THE ECONOMIC VIABILITY OF WIND POWER THAT WIND SYSTEMS BE LOCATED IN AREAS WITH PERSISTENT, STRONG WINDS. THE METHODOLOGY PRESENTED IN THIS PAPER IS SUGGESTED AS A COST EFFECTIVE APPROACH TO SITE SELECTION AND EVALUATION.

78-0277 THE WIND ENERGY PRIMER. AN INTRODUCTION TO THE USE OF WIND ENERGY SYSTEMS.
WIND POWER DIG. NO. 14: P. 2-9 OF THE 1979 WIND ACCESS CATALOG, WINTER 1978.

THIS PRIMER IS IN THE 1979 WIND ACCESS CATALOG. IT IS A GENERAL INTRODUCTION TO THE SUBJECT OF WIND ENERGY AND HOW WIND ENERGY CAN BE HARNESSED TO PROVIDE POWER FOR HOMES, FARMS AND COMMUNITY-SCALE PROJECTS.

78-0278 SHEPERDSON B
A VISIT WITH ASTRAL-WILCON.
WIND POWER DIG. NO. 14: 36-38, WINTER 1978.

THIS ARTICLE DISCUSSES ASTRAL-WILCON, INC., AND THE PROTOTYPE WINDTURBINE GENERATOR, AW 10-B, WHICH THEY HAVE RECENTLY DEVELOPED.

78-0279 EVANS M
TAX CREDITS PASS--AT LAST!
WIND POWER DIG. NO. 14: 35, WINTER 1978.

THIS ARTICLE SERVES AS A SHORT GUIDE TO THE TAX CREDITS AND OTHER INCENTIVES AVAILABLE BY AGENCY FOR ALL PROSPECTIVE AND CURRENT WIND SYSTEM OWNERS.

78-0280 BAIN D
AIR QUALITY POLICY AND WIND ENERGY. ENVIRONMENT CREDITS COULD ENCOURAGE UTILITY USE OF LARGE-SCALE WIND TURBINES.
WIND POWER DIG. NO. 14: 32-34, WINTER 1978.

78-0281 CARTER J
USING WATER-PUMPING WINDMILLS. PART 1. SO YOU WANT TO BUY A WINDMILL?
WIND POWER DIG. NO. 14: 25-26, 28, 30-31, WINTER 1978.

78-0282 COLLEGE WIND.
WIND POWER DIG. NO. 14: 23, WINTER 1978.

78-0283 LARGE WECS STUDIED.
WIND POWER DIG. NO. 14: 23, WINTER 1978.

78-0284 RFPS ANNOUNCED.
WIND POWER DIG. NO. 14: 22-23, WINTER 1978.

77-0009 AGA R
A HAND CALCULATOR AS AN RPM COUNTER.
ALTERN. SOURCES ENERGY NO. 24: 24-27, FEBRUARY 1977.

77-0010 AGSTEN C F
WIND DRIVEN ELECTRIC POWER GENERATOR.
U.S. PATENT NO. 4,036,916, JULY 19, 1977. 10P.

A WIND DRIVEN ELECTRIC POWER GENERATOR IS DESCRIBED WHICH HAS A SHROUD ARRANGED IN A PATH OF FLUID FLOW. WITHIN THE SHROUD IS DISPOSED A STATIONARY SHAFT SUPPORTING A WIND GENERATOR ASSEMBLY. THE SHROUD CAN BE THE VEIL OF A CONVENTIONAL COOLING TOWER, WITH THE WIND GENERATOR ASSEMBLY INCLUDING A ROTOR CONNECTED TO AN ELECTRIC GENERATOR ARRANGED FOR CONVERTING ROTARY MOTION OF THE ROTOR TO ELECTRICAL ENERGY, THUS SAVING SOME OF THE ENERGY CREATED BY THE NATURAL DRAFT PASSING UP THE VEIL OF THE COOLING TOWER. SPACE FRAME BOX TRUSSES PROVIDED WITH AIRFOILS PROVIDE LIGHTWEIGHT ARMS FOR THE ROTOR, WITH THE ROTOR BEING ARRANGED ANYWHERE IN THE SHROUD. WHEN A HYPERBOLIC COOLING TOWER VEIL IS USED AS THE SHROUD, THE ROTOR WILL USUALLY BE POSITIONED IN THE THROAT OF THE VEIL.

77-0011 ALLISON W D
MULTIVANE WINDMILL.
U.S. PATENT NO. 4,065,225, DECEMBER 27, 1977. 6P.

A WINDMILL IS DESCRIBED WHICH HAS A PLURALITY OF PAIRS OF DIAMETRICALLY OPPOSED VANES MOUNTED FOR ROTATION ABOUT A HORIZONTAL AXIS IN ALIGNMENT WITH THE WIND. THE PAIRS OF VANES ARE SUPPORTED IN UNIFORMLY SPACED RELATIONSHIP TO EACH OTHER AXIALLY OF THE AXIS OF ROTATION AND EACH SUCCESSIVE PAIR IS INDEXED CIRCUMFERENTIALLY IN THE DIRECTION OF ROTATION RELATIVE TO THE PRIOR PAIR. THE VANES ARE AUTOMATICALLY MOVED TO A LESS EFFICIENT POSITION AS THE SPEED OF THE WIND INCREASES TO LIMIT THE MAXIMUM SPEED OF THE WINDMILL.

77-0012 ANDERSON T D, BOWER H I, DELENE J G, FULLER L C, KAPLAN S I, WILSON J V
SUMMARY REPORT: AN EXPLORATORY STUDY OF COST TARGETS FOR SOLAR ELECTRIC POWER PLANTS.
NTIS, MARCH 1977. 34P.
ORNL/TM-5787

A PRELIMINARY EVALUATION WAS MADE OF THE ECONOMIC GOALS THAT NEED TO BE ACHIEVED IN THE SOLAR-ELECTRIC R AND D AND DEMONSTRATION PROGRAMS SO THAT SOLAR CAN BECOME A VIABLE COMPONENT OF OUR NATIONAL ELECTRIC ENERGY PRODUCTION SYSTEM. SOLAR ELECTRIC TECHNOLOGIES CONSIDERED ARE: SOLAR THERMAL CONVERSION, SOLAR PHOTOVOLTAIC, WIND ENERGY CONVERSION, AND OCEAN THERMAL. TARGET COSTS WERE DEVELOPED FOR SELECTED APPLICATIONS OF SOLAR BY COMPARISON WITH KNOWN MEANS OF ACCOMPLISHING THE SAME END RESULTS. THE KNOWN TECHNOLOGIES WERE ASSUMED TO BE FOSSIL AND NUCLEAR ENERGY SOURCES.

77-0013 BAILEY D Z
LARGE-SPAN TENSIONED HYDRO (AERO) FOILS FOR POWER GENERATION ANCHORED ACROSS A STREAM, CURRENT, OR WIND.
MAR. TECHNOL. SOC. J. 11(5/6): 22-29, 1977.

LARGE-SPAN RIBBON FOIL SYSTEMS FOR THE EXTRACTION OF KINETIC ENERGY FROM THE WINDS AND OCEAN CURRENTS ARE ARRANGED IN THE FORM OF HORIZONTAL ROTARY SYSTEMS. THE CARDINAL FEATURE OF THESE SYSTEMS IS THE STRUCTURAL EFFICIENCY GAINED BY VIRTUE OF RIBBON FOILS WHICH ARE SUBJECT TO PURELY TENSILE LOADS. HENCE, THE MAIN STRUCTURAL ELEMENT OF THE FOILS IS PROVIDED BY CABLES. THE NECESSARILY LARGE TENSILE LOADS ARE APPLIED TO THE CABLES BY PLACING MASSIVE CONCRETE ANCHORAGES AT OPPOSING POINTS ACROSS A STREAM, AND THUS THE EARTH BECOMES THE COMPRESSION MEMBER. BASED ON A SIMPLIFIED FLOW MODEL PERFORMANCE CALCULATIONS INDICATE THAT, IN PRINCIPLE, POWER PRODUCTION CAN BE INCREASED OVER THAT OF CONVENTIONAL SYSTEMS BY SEVERAL ORDERS OF MAGNITUDE, AND IT IS THIS POWER POTENTIAL WHICH MAKES THESE SYSTEMS ATTRACTIVE.

77-0014 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOL. III. WIND CONVERSION SYSTEMS WITH ENERGY STORAGE. FINAL REPORT.
NTIS, SEPTEMBER 27, 1977. 330P.
TID-28287/3

THE PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO WIND ENERGY CONVERSION SYSTEMS (WECS) AND THEIR USE OF ENERGY STORAGE WERE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE UTILIZATION. THE SCOPE OF INVESTIGATIONS INCLUDED BOTH UTILITY AND NON-UTILITY APPLICATIONS. IN ADDITION TO ESTABLISHING COST GOALS FOR STORAGE, THE IMPACT OF CHARGING STORAGE FROM MULTIPLE SOURCES, AS WELL AS FROM WIND SYSTEMS ALONE, WAS INCLUDED, ALONG WITH THE EFFECTS OF WIND FORECASTING AND TRANSIENT SMOOTHING OF THE WIND SYSTEM OUTPUT.

77-0015 ARK; HOW TO BIOENGINEER HUMAN HABITATS.
ENVIRON. SCI. TECHNOL. 11: 744-746, AUGUST 1977.

77-0016 ASHLEY H
SOME CONTRIBUTIONS TO AERODYNAMIC THEORY FOR VERTICAL AXIS WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH. PROCEEDINGS.
LA GRANGE PARK, ILL., AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1624-1632.

A REVIEW AND MODEST EXTENSIONS OF QUASI-STEADY AERODYNAMIC THEORY FOR PERFORMANCE PREDICTION ON DARRIEUS-TYPE TURBINES ARE PRESENTED. RESULTS ARE GIVEN FOR BOTH PARALLEL-AXIS AND CURVED-BLADE CONFIGURATIONS. BLADE STALL AND VARIABLE INFLOW ARE NEGLECTED; IT IS HYPOTHESIZED THAT UNSTEADY EFFECTS SUPPORT THE FORMER APPROXIMATION DOWN TO LOWER VALUES OF TIP-SPEED RATIO THAN HITHERTO BELIEVED. BOTH PROFILE AND INDUCED DRAG ARE INCLUDED, AND THEIR INFLUENCES ON POWER AND DOWNWIND FORCE ARE EXPRESSED IN TERMS OF ELLIPTIC INTEGRALS. COMPARISONS ARE PRESENTED WITH POWER DATA FROM THE SANDIA 2-METER TURBINE. THREE VALUES OF PROFILE DRAG COEFFICIENT ARE EMPLOYED, AND IT IS ARGUED THAT NUMBERS IN THE RANGE DRAG COEFFICIENT RANGE OF 0.015-0.017 ARE MOST APPROPRIATE TO THE EXAMPLE CHOSEN. A LINEARIZED ANALYSIS OF UNSTEADY-FLOW EFFECTS ON PERFORMANCE IS SUMMARIZED. CALCULATIONS SUGGEST THAT THEY MAY BE LARGER THAN MIGHT BE EXPECTED IN VIEW OF THE LOW OPERATING REDUCED FREQUENCIES OF THESE MACHINES.

77-0017 AUER P L, BOS P B, ROBERTS V W, GOUGH W C
UNCONVENTIONAL ENERGY RESOURCES.
WORLD ENERGY RESOURCES, 1985-2020. EXECUTIVE SUMMARIES OF REPORTS ON RESOURCES, CONSERVATION, AND DEMAND TO THE CONSERVATION COMMISSION OF THE WORLD ENERGY CONFERENCE. NEW YORK, IPC SCIENCE AND TECHNOLOGY PRESS, 1977. P. 135-179.

THIS REPORT IS CONCERNED WITH THE FOLLOWING UNCONVENTIONAL ENERGY SOURCES: SOLAR (WHICH INCLUDES ENERGY DERIVED DIRECTLY FROM SUNLIGHT AS WELL AS INDIRECTLY IN THE FORM OF WIND, WAVES, TIDES, OCEAN THERMAL GRADIENTS, OR AS FUEL FROM BIOMASS AND OTHER PHOTOCHEMICAL REACTION PRODUCTS), GEOTHERMAL, AND FUSION. THESE POTENTIAL SOURCES OF COMMERCIAL ENERGY SUPPLIES REPRESENT EITHER RENEWABLE OR VIRTUALLY INEXHAUSTIBLE RESOURCES AND ARE NOT NOW IN WIDESPREAD COMMERCIAL USE. THE REPORT IS CONSIDERED A COMPLEMENT TO A REPORT ON NUCLEAR FUSION SINCE THEY ARE ALL PROSPECTIVE LONG-TERM ENERGY SUPPLIES. EACH OF THE PRINCIPAL TECHNOLOGIES AND SYSTEMS THAT ARE CURRENTLY BEING CONSIDERED AS MEANS FOR UTILIZING SOLAR, GEOTHERMAL, AND FUSION RESOURCES ARE DISCUSSED. INSOFAR AS POSSIBLE, THEIR POTENTIAL CONTRIBUTIONS TO COMMERCIAL ENERGY SUPPLIES ARE DISCUSSED. THE ROLE OF THESE UNCONVENTIONAL RESOURCES MAY BE EXPECTED TO VARY NOT ONLY AS A FUNCTION OF WHICH CATEGORY IS UNDER CONSIDERATION, BUT ALSO GEOGRAPHICALLY VARY.

77-0018 ARCHIBALD P B, KNOX J B
ANALYSIS OF THE WINDS OF SITE 300 AS A SOURCE OF POWER.
NTIS, APRIL 19, 1977. 15P.
UCRL-51469 (ADD.)

SITE 300 IS A STRATEGICALLY LOCATED AREA LYING EAST OF THE LAWRENCE LIVERMORE LABORATORY AT LIVERMORE, CALIFORNIA. IN A PREVIOUS REPORT, WIND SPEED AND DIRECTION FOR THE PERIOD OCTOBER 1972 TO SEPTEMBER 1973 ARE SUMMARIZED. THE PRESENT REPORT SUMMARIZES AN ADDITIONAL YEAR OF MEASUREMENTS. A COMPARISON OF THE MEASUREMENTS SHOWS THAT THE ANNUAL AVERAGE WIND SPEEDS FOR THE 2 YEARS IS ESSENTIALLY THE SAME; HOWEVER, THE MONTHLY AVERAGES DIFFER. THESE ADDITIONAL MEASUREMENTS CONFIRM THE OBSERVATION THAT THE SPRING AND SUMMER WINDS OF THIS REGION HAVE THE GREATEST POTENTIAL FOR WIND POWER DEVELOPMENT.

77-0019 BAIN D
AN ASSESSMENT OF THE RESIDENTIAL WIND POWER MARKET; EXCERPTS FROM THE LOCKHEED STUDY.
WIND POWER DIG. NO. 10: 34-47, FALL 1977.

IN EARLY 1975, THE LOCKHEED-CALIFORNIA COMPANY WAS AWARDED THE WIND ENERGY MISSION ANALYSIS (WEMA) CONTRACT BY ERDA. THE OBJECTIVES OF THIS $484,000 STUDY WERE TO ASSESS THE NATIONAL POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS (WECS), IDENTIFY THE SIZES AND APPLICATIONS OF WECS THAT HAVE THE HIGHEST PROBABILITY OF IMPLEMENTATION, AND ESTABLISH THE PERFORMANCE, COST AND OPERATIONAL REQUIREMENTS OF WIND TURBINE GENERATORS (WTGS). THE IMPACT ON NATIONAL RESOURCES AND THE AVAILABILITY OF SUITABLE SITES WERE SOME OF THE OTHER STUDY GOALS. IN APRIL 1976, THE STUDY WAS COMPLETED AND RESULTED IN AN 850 PAGE FINAL REPORT, OVER 1,000 PAGES OF PROCESSED WIND DATA, AND A 287-PAGE APPENDIX VOLUME. THIS ARTICLE CONTAINS EXCERPTS FROM THAT REPORT.

77-0020 BAIN D
WIND TOWER HEIGHT ECONOMICS.
ALTERN. SOURCES ENERGY NO. 29: 21-23, DECEMBER 1977.

MEASURING THE WIND CONDITIONS AT A PROSPECTIVE SITE CAN BE A COMPLICATED PROCESS. MOST INDIVIDUALS ARE NOT ABLE TO TAKE ALL OF THE MEASUREMENTS KNOWN TO BE IMPORTANT. ONE OF THE MOST DIFFICULT PARAMETERS TO MEASURE IS THE FACTOR, ALPHA, OR HOW MUCH WIND CAN BE EXPECTED ALOFT. A COMPUTER MODEL AND FINANCIAL ANALYSIS WERE COMBINED TO SEE HOW RELEVANT ALPHA IS TO THE SMALL WIND GENERATOR USER. THE RESULTS OBTAINED SHOW THAT, FOR LEAST COST OF DELIVERED ELECTRICAL POWER, DETERMINATION OF A SITE'S ALPHA BY MEASUREMENT IS NOT NECESSARY TO ESTABLISH OPTIMUM TOWER HEIGHT.

77-0021 BAKER R W, HENNESSEY J P
ESTIMATING WIND POWER POTENTIAL.
POWER ENG. 81(3): 56-57, MARCH 1977.

TESTS OF THE WIDGER METHOD AT FOUR PACIFIC NORTHWEST LOCATIONS SHOW THAT ACCURATELY ESTIMATING THE SHAPE OF WIND SPEED DISTRIBUTION IS CRITICAL, AND THAT AN EMPIRICAL METHOD OF WIND SPEED MEASUREMENT MAY NOT BE USABLE AT GOOD WIND POWER SITES.

77-0022 BOWEN A J
A REVIEW OF CURRENT RESEARCH RELEVANT TO THE OPTIMUM SITING OF WIND POWER INSTALLATIONS IN HILLY TERRAIN.
CHRIST CHURCH, NEW ZEALAND, UNIVERSITY OF CANTERBURY, MECHANICAL ENGINEERING DEPARTMENT, MAY 1977. 30P.

EXISTING INFORMATION THAT COULD ASSIST IN THE OPTIMUM SITING OF WIND POWER INSTALLATIONS IN HILLY TERRAIN IS WELL SCATTERED AND IT IS ONLY RECENTLY THAT SIGNIFICANT RESEARCH PROGRESS HAS BEEN MADE. IN AN ATTEMPT TO COLLATE THE RECENT ACTIVTIES IN THIS FIELD, THIS REPORT REVIEWS THE PROGRESS OF CURRENT RESEARCH INTO THE TOPOGRAPHICAL EFFECTS ON THE WIND FLOW CLOSE TO THE GROUND, FOLLOWING A SERIES OF VISITS TO THE ORGANISATIONS INVOLVED. THE RELEVANT PROJECTS THAT ARE UNDERWAY AT EACH LOCATION ARE DESCRIBED AND MAJOR CONCLUSIONS FROM THEIR RECENT WORK ARE SUMMARIZED BRIEFLY, WITH REFERENCES GIVEN IF MORE DETAILED INFORMATION IS REQUIRED.

77-0023 BARNETT K M
THE NEW MEXICO WIND ENERGY RESOURCE.
TECHNICAL COMPLETION REPORT. LAS CRUCES, NEW MEXICO ENERGY INSTITUTE, NOVEMBER 1977.
NMEI-7, PB-295842

WIND IS A VALUABLE NATURAL RESOURCE IN NEW MEXICO. LIKE OIL, GAS, COAL, URANIUM, SOLAR RADIATION AND UNDERGROUND HEAT, IT CAN PROVIDE ENERGY. NEW MEXICO HAS MORE WIND ENERGY THAN MANY OTHER STATES. THIS REPORT IS INTENDED TO ENCOURAGE FARMERS, RANCHERS AND HOME OWNERS TO USE MORE WIND ENERGY. IT PRESENTS NEW MEXICO WIND INFORMATION AND THE EFFECTS OF SEASONS, TERRAIN AND EQUIPMENT HEIGHT ON WIND ENERGY. STEPS IN PLANNING AND INSTALLING COMMON WIND ENERGY SYSTEMS ARE REVIEWED AND DIAGRAMMED. PRESENT WIND USE PATTERNS IN NEW MEXICO AND THE RESEARCH IN THE U.S. TO INCREASE USE ARE ALSO REVIEWED.

77-0024 BASE T E, RUSSELL L J

COMPUTER AIDED AEROGENERATOR ANALYSIS AND PERFORMANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A4.53-A4.74.

THEORETICAL AND EXPERIMENTAL STUDIES HAVE BEEN MADE TO DETERMINE THE PERFORMANCE OF BOTH HORIZONTAL AND VERTICAL SHAFT AEROGENERATORS AND ALSO TO PREDICT THEIR PERFORMANCE IN A TURBULENT APPROACHING AIRFLOW. COMPUTER PROGRAMS HAVE BEEN WRITTEN, BASED ON THE THEORY OF RANKIE-FROUDE AND THE BLADE ELEMENT THEORY, WHICH CALCULATES THE AEROGENERATOR PERFORMANCE FROM THE BLADE GEOMETRY, AEROFOIL CHARACTERISTICS AND WIND CONDITIONS. THE DIFFICULTY WITH MOST PERFORMANCE CALCULATIONS, IN THE PAST, HAS BEEN THE ESTIMATION OF THE INFLOW FACTORS. HOWEVER, IN THE COMPUTER PROGRAMS DEVELOPED AT THE UNIVERSITY OF WESTERN ONTARIO, THIS IS OVERCOME BY AN ITERATIVE TECHNIQUE. AT PRESENT LITTLE INFORMATION IS AVAILABLE ON INFLOW FACTORS FOR VERTICAL SHAFT WINDMILLS OF THE DARRIEUS ROTOR TYPE. A SMALL SCALE MODEL OF A STRAIGHT BLADED VERTICAL AXIS WINDMILL WAS DESIGNED, FABRICATED AND TESTED IN A LOW SPEED WIND TUNNEL. SEVERAL AEROFOIL CROSS SECTIONAL SHAPES WERE USED FOR BLADES. STUDIES HAVE BEEN MADE TO DETERMINE THE EFFECT OF WIND SHEAR AND TURBULENCE STRUCTURE ON THE PERFORMANCE OF A HORIZONTAL SHAFT WINDMILL. PRESENT TENTATIVE RESULTS INDICATE THAT THE PERFORMANCE IS CHANGED, AND IN GENERAL DECREASED, DUE TO THE TURBULENCE. THE FLUCTUATING DRAG IS IMPORTANT FOR STRUCTURAL DESIGN REASONS.

77-0025 BAXTER A C
LOW COST WINDMILL ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C8.101-C8.108.

THE ROTOR IS OF THE VERTICAL AXIS TYPE DEVELOPED IN CANADA BY THE NATIONAL RESEARCH COUNCIL, OTTAWA. THE NEW DESIGN REPLACES THE RIGID AEROFOIL SECTION OF THAT DESIGN WITH A FABRIC SLEEVE ENCLOSING STEEL LEADING AND TRAILING EDGES. THE FABRIC IS TENSIONED AND THE BLADE IS THEN FORMED INTO A CATENARY SHAPE TO MINIMIZE THE BLADE STRESSES DUE TO CENTRIPETAL ACTION. MODEL TESTS HAVE BEEN CARRIED OUT TO INVESTIGATE THE NEW DESIGN. A RIGID AEROFOIL IS COMPARED WITH ONE BLADE FORMED BY STRETCHING PARACHUTE FABRIC BETWEEN TWO RODS HELD APART BY SPRINGS AND WITH ANOTHER BLADE FORMED BY STRETCHING A LATEX RUBBER FILM OVER THE RODS. THE PAPER DISCUSSES THE PROMISE OF THE DESIGN, THE EFFECTS OF NON-UNIFORM TENSION IN THE FABRIC, THE EFFECT OF THE CENTRIPETAL FIELD ON THE FABRIC AND THE EFFECT OF NON-UNIFORM WIND VELOCITY ON THE BEHAVIOR OF A VERTICAL AXIS WINDMILL.

77-0026 BAUMGARTNER F W, MURPHY J M
WIND DRIVEN POWER GENERATOR.
U.S. PATENT NO. 4,012,163, MARCH 15, 1977. 6P.

A TURBINE TYPE POWER GENERATOR INCLUDES A ROTOR HAVING A VERTICAL SHAFT TO DRIVE A LOAD WHICH MAY BE AN ELECTRIC GENERATOR OR MECHANICAL GEAR TRAIN OR OTHER DEVICE FOR USING OR TRANSMITTING POWER. GENERALLY VERTICALLY EXTENDING BLADES ARE SECURED AT THEIR ENDS TO THE ROTOR SHAFT AND ARE SET AT AN ANGLE TO THE RELATIVE WIND TO BE DRIVEN THEREBY. THE ROTOR IS SURROUNDED BY WIND CONTROLLING SHIELD MEANS THROUGH WHICH THE AIR FLOW PASSES TO CONTACT THE BLADES IN THE PROPER DIRECTION FOR CAUSING ROTATION. THE FREE FLOW AIR INLET AREA IS SUBSTANTIALLY LESS THAN THE MAXIMUM PROJECTED AREA OF THE SHIELD MEANS NORMAL TO THE RELATIVE WIND SO THAT THE TOTAL WIND TRAPPED MUST FLOW THROUGH A REDUCED AREA WITH A CONSEQUENT INCREASE IN VELOCITY TO IMPART MORE ENERGY TO THE ROTOR BLADES.

77-0027 BEA K J
WIND POWERED FLUID COMPRESSOR.
U.S. PATENT NO. 4,008,006, FEBRUARY 15, 1977. 10P.

A WIND MACHINE COMPRISING A FIXED OR CONTROLLED PITCH BLADE ASSEMBLY DRIVES A VARIABLE DISPLACEMENT OR VARIABLE CLEARANCE FLUID COMPRESSOR. MEANS WHICH MAY BE MECHANICAL, HYDRAULIC, PNEUMATIC OR ELECTRICAL INTERCONNECT THE BLADE ASSEMBLY AND THE COMPRESSOR TO VARY THE FLUID DISPLACEMENT OR CLEARANCE VOLUME OF THE COMPRESSOR AS A FUNCTION OF THE DRAG OR LIFT FORCES OF THE WIND ON THE BLADE ASSEMBLY.

77-0028 BEGEMANN S H A, JANSEN P
RELATIVE COST-PERFORMANCE OF VARIOUS SOLAR-BASED POWER SUPPLY PACKAGES.
ACTA ELECTR. 20(2): 197-204, 1977.

THE DEVELOPMENT OR IMPROVEMENT OF VARIOUS SOLAR-BASED SYSTEMS TO PRODUCE ELECTRICITY IS CREATING MANY NEW POSSIBILITIES TO PROVIDE POWER IN PLACES WHERE AN ELECTRIC UTILITY DISTRIBUTION SYSTEM IS LACKING. THE EXTENT TO WHICH SOLAR-BASED SYSTEMS WILL BE USED DEPENDS ON THE OVERALL COST-PERFORMANCE OF THESE NEW SYSTEMS COMPARED TO THE CONVENTIONAL SYSTEMS. SEVERAL OF THE MORE PROMISING CONTINUOUS AND AUTONOMOUS SOLAR-BASED POWER SUPPLY SYSTEMS FOR APPLICATIONS REQUIRING DAILY AVAILABILITY OF A GIVEN (SMALL) NUMBER OF KWH'S HAVE BEEN COMPUTER SIMULATED FOR SIX DIFFERENT CLIMATIC REGIONS. THE COST-PERFORMANCE OF THESE SYSTEMS WAS CALCULATED FOR THE DIFFERENT CLIMATES FOR THE NEXT TEN YEARS, TAKING INTO ACCOUNT AN EXPECTED PRICE DECREASE OF PHOTOVOLTAIC CELLS, TO DETERMINE ITS EFFECT ON THE RELATIVE COST-PERFORMANCE OF THE VARIOUS SYSTEMS. THE SYSTEMS CHOSEN CONSISTED OF BATTERIES (STORAGE SYSTEM) AND ONE (SIMPLE SYSTEM) OR MORE (OF HYBRID SYSTEM) OF THE FOLLOWING GENERATING COMPONENTS: PHOTOVOLTAIC CELLS, WIND GENERATORS AND CONVENTIONAL GENERATOR. THE RESULTS SHOW THE IMPORTANCE OF CHOOSING THE RIGHT GENERATING COMPONENT(S) FOR A PARTICULAR CLIMATE AND THE SIGNIFICANT IMPROVEMENT IN COST-PERFORMANCE WHEN TWO OR MORE DIFFERENT GENERATING COMPONENTS ARE COMBINED IN A HYBRID SYSTEM.

77-0029 BELL G C
SOLAR THERMAL POWER GENERATION. A BIBLIOGRAPHY WITH ABSTRACTS.
ALBUQUERQUE, N.M., NEW MEXICO UNIVERSITY, TECHNOLOGY APPLICATION CENTER, JULY 1977. 55P.

THE BIBLIOGRAPHY CONTAINS 148 REFERENCES TO INFORMATION ON ENERGY OVERVIEWS, SOLAR OVERVIEWS, ECONOMICS AND LAW, THERMAL POWER, THERMIONIC AND THERMOELECTRIC, OCEAN THERMAL DIFFERENTIAL, WIND CONVERSION, BIOCONVERSION, RESIDENTIAL, AND OTHER (HYDROGEN PRODUCTION, LARGE-SCALE PHOTOVOLTAIC, ETC.).

77-0030 BENIM T E
PERFORMANCE MEASUREMENT OF A TEN KILOWATT HORIZONTAL AXIS WIND TURBINE.
M.S. THESIS. BLACKSBURG, VIRGINIA, VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, SEPTEMBER 1977. 103P.

A SYSTEM TO MEASURE THE PERFORMANCE OF A 10 KW HORIZONTAL AXIS WIND TURBINE WAS DESIGNED AND WAS EMPLOYED TO TEST AN ELECTRO WVG-120G WIND GENERATOR. PARAMETERS MEASURED WERE WIND SPEED, VOLTAGE, CURRENT, AND FREQUENCY. OUTPUT POWER AND TIP SPEED RATIO WERE CALCULATED FROM THE MEASURED PARAMETERS. A SYSTEM TO AUTOMATICALLY CALCULATE INSTANTANEOUS POWER AND TO INTEGRATE POWER WAS DEVELOPED. AN IMPROVED DIGITAL ANEMOMETER ODOMETER WAS DESIGNED AND BUILT. TESTS WERE PERFORMED WITH THE WINDMILL POWERING A RESISTIVE HEATING LOAD AS WELL AS CHARGING A BATTERY.

77-0031 BERENY J A
SURVEY OF THE EMERGING SOLAR ENERGY INDUSTRY.
SAN MATEO, CALIFORNIA, SOLAR ENERGY INFORMATION SERVICES, 1977. 416P.

THE SIX MAJOR SUBDIVISIONS OF SOLAR TECHNOLOGY ARE REVIEWED IN CONSIDERABLE DEPTH: I.E., HEATING AND COOLING; SOLAR THERMAL ELECTRIC; PHOTOVOLTAICS; WIND ENERGY; OCEAN THERMAL; AND BIOCONVERSION. THE CATALYTIC ROLE OF THE FEDERAL GOVERNMENT IN SPURRING THE DEVELOPMENT OF SOLAR TECHNOLOGY IS TRACED, AND A COMPREHENSIVE ANALYSIS OF ALL STATE GOVERNMENT SOLAR-ORIENTED LEGISLATION IS INCLUDED. THE IMPACT OF SOLAR TECHNOLOGY ON THE UTILITY INDUSTRY IS EXAMINED; ALL MAJOR "SOLAR" PROJECTS OF THE ELECTRIC UTILITIES ARE LISTED AND SOME OF THE MAJOR DEMONSTRATION PROJECTS ARE DISCUSSED IN DETAIL. THE RESEARCH ACTIVITIES OF UNIVERSITIES, NONPROFIT ORGANIZATIONS AND GOVERNMENT LABORATORIES ARE IDENTIFIED BY TECHNICAL AREA. ALL LEADING COMPANIES (BOTH PUBLICLY AND PRIVATELY OWNED -- INCLUDING A NUMBER OF THE "FORTUNE 500") WHICH ARE NOW ACTIVE IN THE FIELD ARE LISTED IN THE TWO DIRECTORIES THAT HAVE BEEN INCORPORATED AS PART OF THE SURVEY. CONSENSUS MARKET FORECASTS ARE PRESENTED AND COMMENTED UPON. THE LONG-RANGE FINANCIAL IMPLICATIONS OF "BREAKTHROUGHS" IN CERTAIN TECHNOLOGIES ARE POINTED OUT.

77-0032 BERTELSMEIER G
CLOSED WIND TURBINE WITH A CONICALLY ADJUSTABLE WIND TUNNEL FOR THE

GENERATION OF CURRENT AND DIRECT ENERGY.
GERMAN (FRG) PATENT NO. 2,539,058/A/, MARCH 10, 1977. 7P. (IN GERMAN)

THE INVENTION REFERS TO A CLOSED WIND TURBINE WITH A CONICALLY ADJUSTABLE WIND TUNNEL FOR THE GENERATION OF ELECTRIC AND/OR MECHANICAL POWER. THE DEVICE IS CHARACTERIZED BY A WIND WHEEL EQUIPPED WITH COVERS AND A WIND CATCHING DEVICE, WHICH IS INSTALLED WITHIN THE FRAME CONSTRUCTION IN A REVOLVING POSITION IN A CLOSED CASE.

77-0033 BLACKWELL B F, BANAS J F, REUTER R C, SULLIVAN W N
ENGINEERING DEVELOPMENT STATUS OF THE DARRIEUS WIND TURBINE.
NTIS, MARCH 1977. 67P.
SAND-76-0650

THE AERODYNAMIC, STRUCTURAL, AND SYSTEM CONSIDERATIONS REQUIRED FOR THE ENGINEERING DEVELOPMENT OF THE DARRIEUS TURBINE ARE DESCRIBED. PARTICULAR EMPHASIS IS GIVEN TO THE NECESSITY FOR CLOSE INTERACTION OF THESE THREE AREAS AND THEIR EFFECTS ON ENERGY COSTS. CURRENTLY AVAILABLE EXPERIMENTAL DATA AND ANALYTICAL METHODS ARE DISCUSSED, TOGETHER WITH SPECIFIC RESULTS AND TRENDS OBTAINED TO DATE.

77-0034 BLACKWELL B F, SHELDAHL R E
SELECTED WIND TUNNEL TEST RESULTS FOR THE DARRIEUS WIND TURBINE.
J. ENERGY 1(6): 382-386, NOVEMBER-DECEMBER 1977.

FIVE BLADE CONFIGURATIONS OF A 2-M-DIAMETER DARRIEUS WIND TURBINE HAVE BEEN TESTED IN THE VOUGHT CORPORATION 4.6- X 6.1-M (15- X 20-FT) LOW-SPEED WIND TUNNEL. ROTOR SOLIDITY, REYNOLDS NUMBER, AND FREESTREAM VELOCITIES WERE TESTED. THE PARAMETERS MEASURED WERE ROTOR TORQUE, ROTOR ROTATIONAL SPEED, AND TUNNEL CONDITIONS. DATA ARE PRESENTED IN THE FORM OF POWER COEFFICIENT AS A FUNCTION OF TIP-SPEED RATIO ALONG WITH COMPARATIVE RESULTS FROM AN ANALYTICAL MODEL.

77-0035 BLACKWELL B F, SHELDAHL R E, FELTZ L V
WIND TUNNEL PERFORMANCE DATA FOR TWO- AND THREE-BUCKET SAVONIUS ROTORS.
NTIS, JULY 1977. 107P.
SAND-76-0131

FIFTEEN CONFIGURATIONS OF A SAVONIUS ROTOR WIND TURBINE WERE TESTED IN THE VOUGHT CORPORATION SYSTEMS DIVISION 4.9- X 6.1-M LOW SPEED WIND TUNNEL TO DETERMINE AERODYNAMIC PERFORMANCE. THE MEASURED TEST VARIABLES WERE TORQUE, ROTATIONAL SPEED, AND TUNNEL CONDITIONS. THE DATA PRESENTED ARE IN THE FORM OF POWER AND TORQUE COEFFICIENTS AS A FUNCTION OF SPEED RATIO (OR ANGULAR POSITION FOR STATIC STARTING TORQUES). IT IS CONCLUDED THAT INCREASING REYNOLDS NUMBER AND/OR ASPECT RATIO IMPROVES PERFORMANCE. THE RECOMMENDED CONFIGURATION CONSISTS OF TWO SETS OF TWO-BUCKET ROTORS, ROTATED 90 DEGREES APART, WITH EACH ROTOR HAVING A DIMENSIONLESS GAP WIDTH OF 0.1 TO 0.15.

77-0036 BLACKWELL B F, REIS G E
BLADE SHAPE FOR TROPOSKEIN TYPE OF VERTICAL-AXIS WIND TURBINE.
NTIS, MARCH 1977. 27P.
SLA-74-0154

THE EQUATIONS DERIVED TO DEFINE A TROPOSKEIN (THE SHAPE A COMPLETELY FLEXIBLE CABLE ASSUMES WHEN IT IS SPUN AT A CONSTANT ANGULAR VELOCITY ABOUT A VERTICAL AXIS TO WHICH ITS TWO ENDS ARE ATTACHED) ARE DESCRIBED. THE IMPLICATIONS OF THE SOLUTIONS ON THE DESIGN OF A VERTICAL-AXIS WIND TURBINE ARE DISCUSSED FOR CASES WHERE GRAVITY IS NEGLECTED.

77-0037 BLANTON J C
DESIGN OF A WINDPOWERED COOLING SYSTEM FOR AN APPLE STORAGE FACILITY.
M.S. THESIS. BLACKSBURG, VIRGINIA, VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, AUGUST 1977. 57P.

A STUDY WAS UNDERTAKEN TO DETERMINE THE PROBLEMS INVOLVED IN APPLYING WIND-PRODUCED ELECTRIC ENERGY TOWARD THE NEEDS OF AN APPLE STORAGE FACILITY, AND TO DESIGN AN APPROPRIATE ENERGY SYSTEM. FRUIT REQUIREMENTS, WIND GENERATOR CHARACTERISTICS, AND ENERGY STORAGE ARE DISCUSSED. DETAILED DESIGN OF A COOLING SYSTEM WAS PERFORMED, INCLUDING DESIGN CALCULATIONS AND EQUIPMENT SPECIFICATIONS. THE EXPECTED COOLING LOADS FOR THE BUILDING WERE CALCULATED AND A VAPOR COMPRESSION REFRIGERATION CONDENSING UNIT WAS SELECTED. AN ENERGY STORAGE DEVICE

UTILIZING THE LATENT HEAT OF FUSION OF ICE WAS DESIGNED AND CALCULATIONS WERE PERFORMED TO DETERMINE ITS ENERGY CAPACITY AND HEAT TRANSFER CHARACTERISTICS. THE REQUIREMENTS OF THE AIR DISTRIBUTION SYSTEM ARE DISCUSSED, AND THE PRESSURE DROP CALCULATIONS ARE SHOWN IN CONNECTION WITH THE CIRCULATING FAN SELECTION. THE OVERALL SYSTEM OPERATION IS DISCUSSED, INCLUDING CONTROL SYSTEM REQUIREMENTS.

77-0038 BOLT J B D H
PROGRAMME OF MEASUREMENTS OF THE DUTCH EXPERIMENTAL WIND PLANT WITH VERTICAL AXIS.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 125-132. (IN GERMAN)

THE REPORT GIVES INFORMATION ON THE DESIGN CRITERIA OF THE EXPERIMENTAL DARRIEUS ROTOR, WHICH WAS BUILT IN 1976 BY FOKKER VFW FOR THE DUTCH RESEARCH PROGRAMME ON WIND ENERGY.

77-0039 BOSSEL U
COUPLING OF THE USE OF SOLAR AND WIND ENERGY.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 275-303. (IN GERMAN)

WIND ENERGY REPRESENTS AN INDIRECT FORM OF SOLAR ENERGY. AS A HIGH VALUE FORM OF MECHANICAL ENERGY, IT REPRESENTS A VALUABLE ADDITION TO DIRECT SOLAR ENERGY, WHICH IN THE THERMODYNAMIC SENSE HAS A LOW VALUE. THE FOLLOWING PAPER INVESTIGATES HOW FAR A COUPLING OF THE USE OF SOLAR AND WIND ENERGY IS POSSIBLE, WHAT ARE THE STARTING POINTS FOR THEIR COMPLEMENTARY USE, AND WHAT ONE CAN EXPECT IN THE SPECIAL CASE OF SPACE HEATING.

77-0040 BOURQUARDEZ G
WIND DRIVEN POWER SYSTEM.
U.S. PATENT NO. 4,050,246, SEPTEMBER 27, 1977. 10P.

A WIND DRIVEN POWER PLANT IS DESCRIBED WHICH HAS A VERTICAL AXIS ROTOR WHICH IS RIGIDLY CONNECTED TO A CENTER BODY IN TURN CONNECTED TO A ROTATING BASE. THE BASE IS SUPPORTED ON A FIXED PYLON BY MEANS OF A MECHANICAL, OR PREFERABLY FLUIDIC BEARING. THE ROTOR BLADES ARE STRONGLY BOWED, SOFT IN TORSION AND PROVIDED, NEAR THEIR TIP REGION, WITH AUTOMATIC PITCH PILOTING MEANS.

77-0041 BOCCI A J
NEW SERIES OF AEROFOIL SECTIONS SUITABLE FOR AIRCRAFT PROPELLERS.
AERONAUT. Q. 28(1): 59-73, FEBRUARY 1977.

THE SECTIONS COMBINE ADVANCED SUPERCRITICAL FLOW CHARACTERISTICS WITH GOOD LOW-SPEED PERFORMANCE AND ARE ALSO DIRECTLY APPLICABLE TO OTHER ROTATING AERODYNAMIC MACHINERY, SUCH AS LOW-SOLIDITY DUCTED FANS, WINDMILLS, ETC.

77-0042 BLACKWELL B F
STATUS OF THE ERDA/SANDIA 17-METRE DARRIEUS TURBINE DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C6.81 TO C6.86.

77-0043 BLEGAA S, JOSEPHSEN L, MEYER N I, SORENSEN B
ALTERNATIVE DANISH ENERGY PLANNING.
ENERGY POL. 5(2): 87-94, JUNE 1977.

IN THE SPRING OF 1976 THE DANISH GOVERNMENT PUBLISHED AN ENERGY PLAN FOR DENMARK FOR THE PERIOD UP TO 1995. AN ESSENTIAL PART OF THIS PLAN WAS THE INTRODUCTION OF FIVE NUCLEAR POWER PLANTS IN THE DANISH SUPPLY SYSTEM. AN ALTERNATIVE ENERGY PLAN WHICH EXCLUDED NUCLEAR POWER WAS LATER PUBLISHED BY A GROUP OF DANISH SCIENTISTS. IT INCLUDES A RELATIVELY EXTENDED APPLICATION OF SOLAR AND WIND ENERGY, AND ALSO EMPHASISES THE USE OF DECENTRALISED FOSSIL FUEL PLANTS WITH COMBINED POWER PRODUCTION AND DISTRICT HEATING. THE MAIN FEATURES AND DATA OF THE ALTERNATIVE DANISH ENERGY PLAN ARE EXAMINED AND COMPARED WITH THE OFFICIAL GOVERNMENT PLAN.

77-0044 AMERICAN POWER CONFERENCE 1976.
ARCH. ENERGIEWIRTSCH. 31(1): 19-32, JANUARY 1977. (IN GERMAN)

A REPORT IS GIVEN OF SOME LECTURES HELD AT A MEETING WHICH DEALT WITH PUMPED STORAGE PLANTS AND OTHER STORAGE TECHNIQUES. OTHER TOPICS ARE WIND-ENERGY CONVERSION AND SITING PROBLEMS.

77-0045 BURR N
THE WIND OF CHANGE IN POWER PRODUCTION: DEVELOPING THE NEW.
NEW CIV. ENG. NO. 266: 27-28, OCTOBER 27, 1977.

77-0046 BROWN J E, BROWN A E
HARNESS THE WIND, THE STORY OF WINDMILLS.
NEW YORK, DODD, MEAD, 1977. 109P.

THIS IS A CHILDREN'S BOOK.

77-0047 BROWN S
WIND ENERGY ON THE FARM: IT'S A NATURAL.
FORT COLLINS COLORADOAN 104(111): 1, 3, SEPTEMBER 1, 1977.

THE WINDMILL USED BY THE CSU DAIRY FARM FOR MILK COOLING AND WATER HEATING IS DESCRIBED.

77-0048 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL FOR GENERATION OF ELECTRICAL POWER. VOLUME II. TECHNICAL DISCUSSION. FINAL REPORT, APRIL 1975 - APRIL 1976.
NTIS, JANUARY 1977. 73P.
COO/2617-76/1/2

THIS ONE YEAR STUDY CONCENTRATED ON DETERMINING THE FEASIBILITY OF THE GIROMILL FOR THE COST EFFECTIVE PRODUCTION OF ELECTRICAL ENERGY. TWENTY-ONE DIFFERENT GIROMILL CONFIGURATIONS COVERING THREE SIZES OF GIROMILL SYSTEMS (120, 500, AND 1500 KW) WERE ANALYZED, VARYING SUCH PARAMETERS AS ROTOR SOLIDITY, ROTOR ASPECT RATIO, RATED WIND VELOCITY, AND NUMBER OF ROTOR BLADES. THE GIROMILL SYSTEM ANALYSIS EMPLOYED THE SAME GROUND RULES BEING USED FOR CONVENTIONAL WINDMILL ANALYSES TO FACILITATE COMPARISONS BETWEEN THESE SYSTEMS. THE RESULTS INDICATE THAT A GIROMILL IS A VERY EFFICIENT DEVICE, AND COUPLED WITH ITS RELATIVELY SIMPLE CONSTRUCTION APPEARS QUITE COST EFFECTIVE WHEN COMPARED TO CONVENTIONAL WINDMILLS.

77-0049 BUDENHOLZER R A, LAVAN Z
PUTTING ALTERNATIVE SOURCES OF ENERGY INTO PERSPECTIVE.
CIV. ENG. 47(1): 70-72, JANUARY 1977.

THE FUTURE OUTLOOK FOR NUCLEAR POWER; HYDROELECTRIC POWER; TIDAL POWER; OIL SHALE AND TAR SANDS; SYNTHETIC FUELS; GEOTHERMAL ENERGY; OCEAN THERMAL GRADIENT POWER; WIND POWER; AND SOLAR ENERGY ARE SURVEYED. THERE IS ENOUGH MODERATELY PRICED URANIUM AVAILABLE TO PROVIDE ALL U.S. ELECTRIC POWER REQUIREMENTS FOR ABOUT 100 YEARS. WITH THE BREEDER REACTOR, THIS COULD BE EXTENDED TO OVER 6000 YEARS. THE U.S. WILL HAVE TO RELY MAINLY ON THE FOSSIL AND NUCLEAR SOURCES WELL INTO THE 21ST CENTURY. THE FOSSIL COMPONENT WILL COME MOSTLY FROM COAL, WITH SOME SHALE OIL. ERDA ESTIMATES THAT BY THE YEAR 2000, 33% OF ALL HOUSES WILL USE SOME SOLAR HEATING, BUT THE BREEDER REACTOR WILL GRADUALLY PROVIDE A GREATER LOAD OF THE TOTAL ENERGY SUPPLY.

77-0050 BUICK T R, DOHERTY M A, MCMULLAN J T , MORGAN R, MURRAY R B
ON THE ENERGY PATTERN FACTOR IN WIND MEASUREMENTS.
INT. J. ENERGY RES. 1(2): 127-133, APRIL-JUNE 1977.

IT IS WELL KNOWN THAT THE POWER PRESENT IN A STEADY WIND OF SPEED V IS PROPORTIONAL TO THE CUBE OF THE SPEED. IT IS EQUALLY WELL KNOWN, ALTHOUGH RATHER LESS GENERALLY REALIZED, THAT, IN ESTIMATING THE AVERAGE POWER OVER A PERIOD OF TIME IN A GIVEN LOCATION, IT IS NOT ENOUGH TO MEASURE THE AVERAGE WIND SPEED AND TO CUBE IT TO YIELD THE CUBE OF THE AVERAGE, SINCE THE QUANTITY ACTUALLY REQUIRED IS THE AVERAGE OF THE CUBE, AND THESE ARE NOT IDENTICAL. MEASUREMENTS OF ENERGY PATTERN FACTOR WERE MADE USING A CONTINUOUS ANALOG TECHNIQUE, RATHER THAN BY THE MORE USUAL SAMPLING PROCEDURE. THE VALUES OBTAINED WERE SIGNIFICANTLY LARGER THAN THE USUALLY ACCEPTED FIGURE. THE DISCREPANCY IS ATTRIBUTED PARTLY TO THE

METHOD OF MEASUREMENT, AND PARTLY TO THE USE OF RATHER MORE TYPICAL WIND SPEEDS.

77-0051 BUNNELL S, FRIKE T
A SAVONIUS AQUACULTURE EXPERIMENT.
WIND POWER DIG. 10: 24-27, FALL 1977.

77-0052 BUTLER B L, BLACKWELL B F
APPLICATION OF LAMINATED WOODEN BLADES TO A TWO-METER DARRIEUS TYPE VERTICAL AXIS WIND TURBINE.
SAMPE Q. 8(2): 1-6, JANUARY 1977.

THIS PAPER DESCRIBES THE USE OF LAMINATED LAUAN PLYWOOD IN A 2-METER-DIAMETER, 3-BLADED DARRIEUS WIND TURBINE. THE MANUFACTURE, TESTING AND TENSILE STRESS ANALYSIS OF LAMINATED WOODEN BLADES ARE DESCRIBED. THE 2-METER WIND TURBINE MODEL TESTS INDICATED THAT, WITH APPROPRIATE BLADE DESIGN, WOOD HAS POTENTIAL FOR SMALL VERTICAL AXIS WIND TURBINES.

77-0053 BUTLER P
WIND TURBINE "FIRST" CLAIMED BY THE INDIAN NATIONAL AERONAUTICAL LABORATORY AT BANGALORE.
ENGINEER 244: 13, FEBRUARY 24, 1977.

THE INDIAN NATIONAL AERONAUTICAL LABORATORY AT BANGALORE HAS BUILT WHAT IT BELIEVES TO BE THE FIRST FULL-SCALE STRAIGHT BLADED DARRIEUS-TYPE WIND TURBINE. USING SAVONIUS STARTER BUCKETS IT GIVES ABOUT 1 KW SHAFT POWER AT 80 REV/MIN IN WINDS OF ABOUT 25 KM/H.

77-0054 BUTLER T W
ENERGY CONVERSION SYSTEM.
U.S. PATENT NO. 4,004,427, JANUARY 25, 1977. 14P.

AN ENERGY CONVERSION SYSTEM IS ASSOCIATED WITH AN EDIFICE FOR CONVERTING NATURAL ENERGY TO USABLE ENERGY. THE EDIFICE HAS A GENERALLY VERTICAL OUTWARDLY FACING SIDE SURFACE, AND THE SYSTEM INCLUDES RADIATION COLLECTING MEANS DEFINING A PLURALITY OF RADIATION RECEIVING SURFACES ADJACENT TO BUT SPACED FROM THE EDIFICE SIDE SURFACE. THUS, A FLOW-WAY IS DEFINED BETWEEN THE RADIATION RECEIVING SURFACES AND THE SIDE SURFACE OF THE EDIFICE. EACH OF THE RADIATION RECEIVING SURFACES FACES GENERALLY UPWARDLY AND HAS A PLURALITY OF HOLLOWS. THE SYSTEM FURTHER COMPRISES A ROTOR ROTATABLY MOUNTED ON THE EDIFICE ABOVE THE RADIATION RECEIVING SURFACES AND DUCTING APPARATUS FOR DIRECTING A GASEOUS MEDIUM, SUCH AS AIR, FROM THE FLOWWAY TO THE ROTOR TO ROTATE THE LATTER. THE ROTATION OF THE ROTOR IN TURN DRIVES AT LEAST A PART OF A SUITABLE ENERGY-USING FIRST OPERATOR MEANS. THE SYSTEM MAY ALSO COMPRISE WIND DRIVEN MEANS COMPRISING BRACED WEB MEMBERS OPERATIVELY CONNECTED TO A SECOND OPERATOR MEANS.

77-0055 C-TURBINE TESTED.
WIND POWER DIG. 1(8): 22, SPRING 1977.

PINSON ENERGY CORPORATION HAS BEGUN RESEARCHING THE USE OF THEIR CYCLOTURBINE WITH A COMPRESSED AIR POWER PRODUCTION SYSTEM. THE RESEARCH WILL BE DONE IN COLLABORATION WITH THE NEW ALCHEMY INSTITUTE, AND IS SPECIFICALLY AIMED TOWARD SUPPLYING ENERGY FOR A SOLAR GREENHOUSE.

77-0056 CADWALLADER E A, WILLIAMSON W R, WESTBERG J E
THE APPLICATION OF WIND ENERGY SYSTEMS TO DESALINATION.
NTIS, APRIL 1977. 68P.
PB-276174

THE IMPACT OF RAPIDLY INCREASING FUEL COSTS HAS ALL BUT MADE SALINE WATER CONVERSION UNECONOMICAL. HOWEVER THE APPLICATION OF WIND ENERGY SYSTEMS TO MEMBRANE PROCESSES FOR BRACKISH WATER CONVERSION OFFERS AN ECONOMICAL SOLUTION. COMMERCIALLY AVAILABLE WIND TURBINES AND THOSE UNDER DEVELOPMENT APPEAR PROMISING FOR PRODUCING ELECTRICAL ENERGY AT COSTS RANGING FROM FIVE CENTS DOWN TO 1.8 CENTS PER KILOWATT HOUR. IT IS STILL POSSIBLE TO REACH COSTS FOR DESALTING BRACKISH WATER AT LESS THAN $1.00 PER THOUSAND GALLONS WITH LARGE WIND ENERGY DESALINATION SYSTEMS. THE COUPLING OF WIND ENERGY TURBINES TO ELECTRODIALYSIS AND REVERSE OSMOSIS ALSO OFFERS TECHNOLOGICAL ADVANTAGES, SUCH AS VARIABLE FLUID FLOWS IN THE DESALINATION PROCESSES FOR MAXIMUM ECONOMIC PRODUCTION OF POTABLE WATER.

RESEARCH AND DEVELOPMENT EFFORTS IN THIS DIRECTION ARE INDICATED.

77-0057 CALIFORNIA ELECTRICITY GENERATION METHODS ASSESSMENT PROJECT. FINAL REPORT.
REDONDO BEACH, CALIFORNIA, TRW ENERGY SYSTEMS MANAGEMENT DIV., JANUARY 30, 1977. 390P.

INFORMATION IS PROVIDED ON CURRENT AND FORECASTED ECONOMIC COSTS OF DIFFERENT METHODS OF ELECTRICITY GENERATION NEEDED TO MEET BASE-, INTERMEDIATE-, AND PEAK-LOAD DEMAND REQUIREMENTS IN CALIFORNIA. IN ADDITION, THE RELIABILITY, FUEL REQUIREMENTS, OTHER RESOURCE REQUIREMENTS, AND ENVIRONMENTAL IMPACTS OF THE DIFFERENT METHODS OF GENERATING ELECTRICITY ARE ASSESSED. INFORMATION FOR THIS REPORT WAS OBTAINED BY REVIEWING AND SUMMARIZING MAJOR STUDIES ON ELECTRICITY GENERATION THAT HAVE BEEN CONDUCTED IN RECENT YEARS. ONE PORTION OF THIS REVIEW IS THE EVALUATION OF THE METHODS AND ASSUMPTIONS USED IN THESE MAJOR STUDIES. WHERE MAJOR ESTIMATES AND PROJECTIONS DIFFER SUBSTANTIALLY, REASONS FOR SUCH DIFFERENCES ARE IDENTIFIED. IN SOME INSTANCES, FURTHER RESEARCH NEEDS AND ADDITIONAL SOURCES OF ESTIMATES AND FORECASTS ARE IDENTIFIED. THE METHODS REVIEWED IN DIFFERENT CATEGORIES ARE: PRESENTLY AVAILABLE METHODS - NUCLEAR POWER, CONVENTIONAL COAL AND OIL POWER, GAS TURBINE AND COMBINED-CYCLE UNITS, GEOTHERMAL, HYDROELECTRIC, AND PUMPED STORAGE; POTENTIAL FUTURE METHODS - SOLAR THERMAL, HYDROTHERMAL AND HOT ROCK CONVERSION, ADVANCED COAL-FIRED POWER PLANTS, FUEL CELLS, WIND ENERGY CONVERSION, SOLAR PHOTOVOLTAIC, AND OCEAN THERMAL CONVERSION; CLEAN FUEL OPTIONS - NAPHTHA, SYNTHETIC GAS FROM NAPHTHA, LOW-SULFUR FUEL OIL, METHANOL, AND HYDROGEN; AND PEAK-LOAD TECHNOLOGIES - BATTERIES, FUEL CELLS, FLYWHEELS, COMPRESSED AIR. ADDITIONAL INFORMATION IS INCLUDED IN APPENDIX A ON A COST-VARIANCE ANALYSIS OF ELECTRIC POWER FROM CONVENTIONAL PLANTS; APPENDIX B, NUCLEAR FUEL-CYCLE COSTS, 1975; APPENDIX C, DETAIL OF COAL COST EVALUATION; AND APPENDIX D, CORRESPONDENCE AND ADDITIONAL COMMENTS PERTINENT TO THE REPORT.

77-0058 CARLIN P, KENNEDY D, FENG C, CARR R
ON SOME ENERGY PROJECTS AT THE UNIVERSITY OF COLORADO.
J. ENERGY DEV. 2(2): 332-334, SPRING 1977.

TWO ENERGY PROGRAMS AT THE UNIVERSITY OF COLORADO INVOLVE MOUNTAIN WIND TESTING AND A SOLAR HEATING SYSTEM FOR A SENIOR CITIZEN'S CENTER. A WIND TURBINE, DESIGNED TO WORK BEST AT 20 MPH BUT ABLE TO WITHSTAND 150-MPH WINDS, WILL BE INSTALLED ON A 12,300-FOOT RIDGE NEAR BOULDER TO RECORD AND ASSESS THE POTENTIAL USE OF STRONG WINDS. A MICROPROCESSOR KEEPING TRACK OF WIND CHANGES WILL ADJUST THE WINDMILL BLADES ACCORDINGLY. THE COMPUTER WILL ALSO MAKE ADJUSTMENT FOR TEMPERATURE CHANGES AND WILL SEARCH ITS OWN RECORDS FOR PREVIOUS ADJUSTMENT DATA. THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT IS COOPERATING IN THE SOLAR PROJECT FOR THE CENTER. SEVERE WIND CONDITIONS IN BOULDER WILL REQUIRE SPECIALLY DESIGNED SOLAR PANELS AND SUPPORTS. HEAT WILL BE AVAILABLE EITHER DIRECTLY OR FROM THE 5000-GALLON STORAGE TANK, WITH A BACKUP GAS HEATING SYSTEM. RETROFITTING DECISIONS WILL BENEFIT FROM THE INFORMATION GATHERED IN DESIGNING THIS PROJECT.

77-0059 CARTER J
AT HOME WITH MARTIN JOPP, WIND POWER PIONEER.
WIND POWER DIG. 1(8): 6-8, SPRING 1977.

77-0060 CARTER J
BUILD A SMALL INVERTER.
WIND POWER DIG. 1(8): 45, SPRING 1977.

77-0061 CARTER J
USDA'S SMALL-SCALE WIND SYSTEM PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P.20-22, SPRING 1977.

VARIOUS SMALL SCALE PROGRAMS UNDERWAY BY THE USDA ARE DESCRIBED INCLUDING: A STUDY AT USDA'S SOUTHWESTERN GREAT PLAINS RESEARCH CENTER ON DEEPWELL PUMPING WITH A DAF TURBINE; A STUDY AT KANSAS STATE UNIVERSITY USING WIND TURBINES FOR WATER PUMPING FROM SHALLOW WELLS; A STUDY AT IOWA STATE UNIVERSITY INTEGRATING A WIND SYSTEM WITH A WATER HEATER, FURNACE AND HEAT PUMP; A STUDY DONE AT THE VIRGINIA POLYTECHNIC INSTITUTE AIMED AT DEVELOPING A WIND-ASSISTED COOLING SYSTEM FOR APPLE STORAGE; A STUDY PERFORMED BY THE KAMAN SCIENCE CORPORATION IN

COLLABORATION WITH COLORADO STATE UNIVERSITY TO APPLY WIND POWER TO A DAIRY OPERATION; AND A STUDY AT CORNELL UNIVERSITY TO HEAT WATER BY INTENSE AGITATION.

77-0062 CARTER J
USDA'S WIND TESTING PROGRAM.
WIND POWER DIG. 1(8): 38-40, SPRING 1977.

THE ROCKY FLATS TESTING OF SMALL-SCALE SYSTEMS IS DESCRIBED.

77-0063 CARTER J
VAWT RESEARCH AT SANDIA LABS.
WIND POWER DIG. 1(9): 42-45. SUMMER 1977.

77-0064 CARTER J, FINCH T
WIND AND SOLAR AT EAST 11TH.
WIND POWER DIG. 1(9): 12-17, SUMMER 1977.

AN APARTMENT HOUSE IN NEW YORK CITY WHICH USES WIND AND SOLAR SYSTEMS IS DESCRIBED.

77-0065 CHAMIS C C, MANOS P, SINCLAIR J H, WINEMILLER J R
NASTRAN USE FOR CYCLIC RESPONSE AND FATIGUE ANALYSIS OF WIND TURBINE TOWERS.
NTIS, OCTOBER 1977. P. 213-233.
ERDA/NASA/1004-77/3

THIS PAPER IS FROM THE 6TH NASTRAN USER'S COLLOQUIUM. A PROCEDURE IS DESCRIBED WHICH USES NASTRAN COUPLED WITH FATIGUE CRITERIA VIA A POSTPROCESSOR TO DETERMINE THE CYCLIC RESPONSE AND TO ASSESS THE FATIGUE RESISTANCE (FATIGUE LIFE) OF WIND TURBINE GENERATOR TOWERS. THE CYCLIC LOADS TO WHICH THE TOWER MAY BE SUBJECTED ARE ENTERED EITHER IN A QUASI-STATIC APPROACH THROUGH STATIC LOAD SUBCASES (RIGID FORMAT 1) OR THROUGH THE DIRECT DYNAMIC RESPONSE (RIGID FORMAT 9) FEATURES OF NASTRAN. THE FATIGUE CRITERIA ARE APPLIED TO NASTRAN OUTPUT DATA FROM EITHER RIGID FORMAT THROUGH AN EXTERNALLY WRITTEN USER PROGRAM EMBEDDED IN A POSTPROCESSOR.

77-0066 CHEN P I, GARG V K
WIND ENERGY: A SUPPLEMENT TO HYDRO-ELECTRIC ENERGY USING THE COLUMBIA RIVER VALLEY AS AN EXAMPLE.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESS. B. 2. 6P.

THIS PAPER EXPLORES A CONCEPTUAL WIND ENERGY CONVERSON SYSTEM (WECS) WHICH CONSISTS OF A WIND POWER CONVERSION UNIT THAT PUMPS WATER FROM THE TAIL WATER LEVEL TO THE RESERVOIR LEVEL IN ORDER TO STORE IT THERE IN A FORM OF POTENTIAL ENERGY THAT CAN BE CONVERTED INTO ELECTRICAL ENERGY THROUGH EXISTING HYDRO-ELECTRIC POWER PLANT. SITE SELECTIONS FOR USING THIS WECS ARE CONSTRAINED THEREFORE NOT ONLY BY THE AVAILABILITY OF WIND POWER BUT ALSO THE EXISTENCE OF HYDRO-POWER FACILITIES. IN THIS STUDY, EXAMPLES OF THE TOTAL WIND ENERGY POTENTIAL AT CASCADE LOCKS, THE DALLES, JOHN DAY AND MCNARY SITES WERE ANALYZED BASED ON AVAILABLE DATA. ECONOMIC ASSESSMENTS OF THE WIND POWER SYSTEMS ARE PRESENTED.

77-0067 CHERRY N J
AN APPRAISAL OF NEW ZEALAND'S PRACTICAL ALTERNATIVES TO NUCLEAR POWER.
NEW ZEALAND, ROYAL COMMISSION ON NUCLEAR POWER GENERATION, SUBMISSION. NO. 118, MAY 1977. 68P.

77-0068 CHOPRA I
NONLINEAR DYNAMIC RESPONSE OF WIND TURBINE ROTORS. PHD. THESIS.
NTIS, FEBRUARY 1977. 230P.
N78-15565

THE NONLINEAR EQUATIONS OF MOTION FOR A RIGID ROTOR RESTRAINED BY THREE FLEXIBLE SPRINGS REPRESENTING THE FLAPPING, LAGGING AND FEATHERING MOTIONS ARE DERIVED USING LAGRANGE'S EQUATIONS FOR ARBITRARY ANGULAR ROTATIONS. THESE ARE REDUCED TO A CONSISTENT SET OF NONLINEAR EQUATIONS USING NONLINEAR TERMS UP TO THIRD ORDER.

77-0069 CHRISTIANSEN M, CRAIG P, MCGUIRE C B, SIMMONS M
DISTRIBUTED TECHNOLOGIES IN CALIFORNIA'S ENERGY FUTURE, VOLUME 1.
NTIS, SEPTEMBER 1977. 248P.
LBL-6831-VOL. 1

ALTERNATIVE ENERGY SOURCES BASED ON RENEWABLE ENERGY FORMS ARE CONSIDERED IN TERMS OF DEVELOPMENT OF DISTRIBUTION ENERGY SYSTEMS WITH EMPHASIS ON THE CALIFORNIA SETTING. TRENDS IN ENERGY SUPPLY AND PATTERNS OF ENERGY USE ARE REVIEWED, ENERGY RESOURCES ARE DISCUSSED INCLUDING BIOMASS, SOLAR ENERGY, GEOTHERMAL ENERGY, AND WIND ENERGY, AND ENVIRONMENTAL AND LAND USE FACTORS ARE CONSIDERED. ECONOMIC, SOCIAL, AND POLITICAL ISSUES ARE INCLUDED. IT IS CONCLUDED THAT IT IS POSSIBLE TO RUN A COMPLEX, HIGHLY INDUSTRIALIZED, POST-INDUSTRIAL SOCIETY ENTIRELY ON RENEWABLE RESOURCES INTERNAL TO THE STATE, AND THAT THIS CAN OCCUR IN THE PRESENCE OF GROWTH IN GROSS STATE PRODUCT.

77-0070 CHRISTIANSON M
WINDMILL POWER FOR CITY PEOPLE.
NTIS, MAY 1977. 73P.
PB-275658

THIS REPORT DISCUSSES THE FIRST URBAN WINDMILL USED AS AN ALTERNATIVE ENERGY SOURCE. THE WINDMILL WAS DESIGNED AND INSTALLED AT 519 EAST 11TH STREET, A TENEMENT BUILDING IN NEW YORK CITY. FINDINGS SHOW THAT THE ENERGY PRODUCED FROM THE WINDMILL IS AN IMPORTANT RENEWABLE ENERGY RESOURCE WHICH CAN BE USED IN MOST URBAN AREAS AND WHICH REDUCES DEPENDENCY ON UTILITY COMPANIES. A BRIEF HISTORY OF THE WINDMILL'S ORIGIN, DESIGN AND INSTALLATION PROCEDURES ARE OUTLINED. ALSO INCLUDED ARE COMPARISONS OF ENERGY SAVINGS OF THE WINDMILL ENERGY VERSUS THE UTILITY COMPANIES. AN APPENDIX CONSISTS OF LITERATURE, RESOURCES, A WIND SPEED AND DIRECTION MAP OF THE USA, STRUCTURAL ENGINEERING CALCULATIONS AND AN EXPLANATION OF WINDFORCES ON WINDMILLS.

77-0071 CLARK R
HEADING INTO THE WIND.
COLO. ENG. 73(2): 16-19, JANUARY 1977.

A BRIEF HISTORY AND CURRENT STATUS OF WIND POWER RESEARCH IS GIVEN.

77-0072 CLARKE R M
WIND POWER. IT'S POTENTIAL FOR ENERGY SAVING.
IRRIG. POWER 34(2): 191-195, APRIL 1977.

77-0073 CLIFF W C
THE EFFECT OF GENERALIZED WIND CHARACTERISTICS ON ANNUAL POWER ESTIMATES FROM WIND TURBINE GENERATORS.
NTIS, OCTOBER 1977. 57P.
PNL-2436

A TECHNIQUE IS PRESENTED FOR ESTIMATING THE AVERAGE POWER OUTPUT OF A WIND TURBINE USING, AS THE WIND CHARACTERISTIC INPUT, ONLY THE MEAN ANNUAL WIND MAGNITUDE. HOURLY WIND SPEEDS ARE ASSUMED TO HAVE A RAYLEIGH FREQUENCY DISTRIBUTION WHICH REQUIRES A SINGLE PARAMETER INPUT (E.G., THE MEAN VALUE, VARIANCE OR HIGHER MOMENT VALUES). BASED UPON A GENERAL SHAPE, FOR THE WIND SPEED VERSUS MACHINE OUTPUT, A GENERIC SET OF CURVES IS DEVELOPED TO ESTIMATE THE AVERAGE POWER OUTPUT OF WIND TURBINES. ALSO, ESTIMATES OF THE PERCENT OF TIME THE WIND TURBINE WOULD NOT PRODUCE POWER (PERCENT DOWN TIME) AND THE PERCENT OF TIME THE WIND TURBINE WOULD BE OPERATING AT ITS RATED POWER ARE PRESENTED.

77-0074 COCHRAN K
WESTERN REPORT.
WIND POWER DIG. 1(8): 32-33, SPRING 1977.

77-0075 COONLEY D R
THE USE OF BUILT FORM TO ENHANCE THE OUTPUT OF WIND COLLECTORS.
WIND TECHNOL. J. 1(2): 24-30, SUMMER 1977.

USE OF BUILT FORM TO INCREASE WIND VELOCITIES THROUGH WIND COLLECTION DEVICES IS EXPLORED; VARIATION OF FIXED WIND COLLECTOR OUTPUT WITH VARIATION IN WIND DIRECTIONS AND METHODS FOR REDUCING WIND PROBLEMS AROUND BUILDINGS; PLUS DESIGN CONSIDERATIONS AND INTEGRATED CONCEPTS.

77-0076 COROTIS R B
STOCHASTIC MODELING OF SITE WIND CHARACTERISTICS. PROGRESS REPORT, SEPTEMBER 15, 1976 - DECEMBER 14, 1976.
NTIS, JANUARY 1977. 6P.
RLO/2342-1

WORK WAS STARTED RELATIVE TO CHANGING THE EXISTING COMPUTER PROGRAMS TO ACCOMPLISH THE GOALS OF THE PRESENT CONTRACT. PRELIMINARY WORK WAS ALSO DONE ON SITE SELECTION AND FIVE REGIONAL SITES WERE IDENTIFIED FOR CLOSER STUDY. FROM THESE FIVE SITES THE FINAL SELECTION OF LOCATIONS FOR THE STUDY WILL BE MADE. LETTERS WERE SENT TO A NUMBER OF FELLOW RESEARCHERS INQUIRING INTO THE AVAILABILITY OF APPROPRIATE WIND RECORDS.

77-0077 COROTIS R B
STOCHASTIC MODELING OF SITE WIND CHARACTERISTICS. FINAL REPORT.
NTIS, SEPTEMBER 1977. 143P.
RLO/2342-77/2

STATISTICAL ANALYSIS PROCEDURES AND PROBABILITY MODELS THAT ARE APPLICABLE TO WIND ENERGY CONVERSION SITES IN GENERAL ARE DEVELOPED. SPECIAL COMPUTER ALGORITHMS ARE USED TO STUDY VARIANCES, FIT PROBABILITY DISTRIBUTIONS, ANALYZE RUN DURATION, AND DETERMINE CORRELATION STRUCTURE IN THE WIND. A TOTAL OF 20 ONE-HOUR OR THREE-HOUR RECORDS ARE ANALYZED FROM SITES IN NEW ZEALAND, ILLINOIS, MONTANA, KANSAS, WYOMING, AND TEXAS IN DEVELOPING AND TESTING THE MODELS.

77-0078 COROTIS R B, SIGL A B, COHEN M P
VARIANCE ANALYSIS OF WIND CHARACTERISTICS FOR ENERGY CONVERSION.
J. APPL. METEOROL. 16(11): 1149-1157, NOVEMBER 1977.

VARIANCE ANALYSIS OF HOURLY WIND DATA IS UTILIZED TO ASSIST IN WIND CHARACTERISTIC ASSESSMENT FOR DIRECT ENERGY CONVERSION SYSTEMS. FEASIBILITY OF LARGE-SCALE WIND ENERGY UTILIZATION, AS WELL AS SITING, SIZING AND OPERATING POLICY, DEPEND ON THE VARIABILITY OF THE WIND. SEVERAL MIDWESTERN SITES ARE USED TO ILLUSTRATE A TEMPORAL STUDY OF VARIANCE SOURCES THAT LEADS TO THE EVALUATION OF EQUIVALENT INDEPENDENT HOURS. FOR THE SITES CONSIDERED THESE VARY FROM TWO TO THREE PER DAY. THIS INFORMATION IS UTILIZED TO DETERMINE DURATION OF SURVEY REQUIREMENTS FOR STATED CONFIDENCE LEVELS AND DESIRED ACCURACY. REASONABLY RELIABLE AND ACCURATE ESTIMATES OF THE MEAN SEASONAL WIND CAN BE OBTAINED IN ONE OR TWO YEARS FOR THE SITES ANALYZED. AUTOCORRELATION AND CROSS-CORRELATION ANALYSIS CONFIRMS THE EXISTENCE OF SIGNIFICANT CORRELATION IN THE WIND AT A SINGLE SITE FOR A PERIOD OF 8-12 H AND BETWEEN SITES FOR SIMILAR TIME LAGS AND SEPARATIONS UP TO 100 KM OR MORE. MEANINGFUL PREDICTION OF VARIATION FROM THE MEAN APPEARS POSSIBLE IN THESE CASES. THE DIURNAL CYCLE EFFECT IS SEEN TO DEPEND SIGNIFICANTLY ON SEASON AND ELEVATION.

77-0079 COSNER S
AMERICAN WINDMILLS, HARNESSERS OF ENERGY
NEW YORK, MCKAY, 1977. 50P.

THIS BOOK PRESENTS THE HISTORY AND DEVELOPMENT OF WINDMILLS IN THE UNITED STATES FROM THE EARLIEST ONES BUILT BY THE PILGRIMS TO THE GIANT, ILL-FATED WIND MACHINE BUILT IN VERMONT DURING WORLD WAR II.

77-0080 COSTE W H, LOTKER M
EVALUATING A COMBINED WIND POWER/ENERGY STORAGE SYSTEM.
POWER ENG. 81(5): 48-51, MAY 1977.

A COMPUTER MODEL IS DESCRIBED WHICH WAS DEVELOPED TO OPTIMIZE THE AMOUNT OF STORAGE AND GENERATING CAPACITY OF A COMBINATION WIND-DRIVEN GENERATOR PLUS STORAGE SYSTEM FOR A PARTICULAR LOCATION. THIS OPTIMIZED SYSTEM WILL HAVE THE LOWEST ENERGY COST WHILE STILL MEETING THE PREDETERMINED AVAILABILITY CRITERIA, WHICH WAS 80% FOR THIS STUDY. THE MODEL DETERMINES THE LOWEST COST CASE AT EACH CAPACITY FACTOR. A MAJOR RESULT OF THIS STUDY IS THE SUGGESTION THAT THE COMBINED WIND-DRIVEN GENERATOR/STORAGE SYSTEM IS CAPABLE OF PRODUCING RELIABLE, ALBEIT COSTLY, POWER AT ALL CAPACITY FACTORS WITH A REASONABLE AVAILABILITY. THE STUDY ALSO SUGGESTS THAT SITES WITH AVERAGE WIND SPEED IN EXCESS OF 15 MPH MAY BE REQUIRED FOR ECONOMIC VIABILITY OF THIS SYSTEM.

77-0081 COTY U A, VAUGHN L

EFFECTS OF INITIAL PRODUCTION QUANTITY AND INCENTIVES ON THE COST OF WIND ENERGY.
BURBANK, CALIFORNIA, LOCKHEED-CALIFORNIA CO., JANUARY 3, 1977. 9P.

THIS PAPER WAS GIVEN AT THE AAAS CONFERENCE IN DENVER, FEBRUARY 20, 1977. THE EFFECT OF INITIAL PRODUCTION QUANTITY ON THE SELLING PRICE OF A 2-MW WIND TURBINE GENERATOR IS DETERMINED. TO THIS IS ADDED THE EFFECT OF LOAN INTEREST RATES, TAXES, AND OTHER ANNUAL OPERATING EXPENSES. THE COST OF ELECTRICAL ENERGY GENERATED IS DETERMINED AND COMPARED TO THE COST OF FUEL FOR PRIVATE UTILITIES AND TO THE COST OF BUYING ENERGY WHOLESALE FOR PUBLIC UTILITIES. FROM THIS COMPARISON, THE INITIAL PRODUCTION QUANTITIES OF WIND TURBINE GENERATORS IS DETERMINED WHICH WOULD BRING COST OF WIND ENERGY DOWN TO A COMPETITIVE LEVEL. THE DATA PRESENTED ALSO SHOWS THE EFFECT ON INITIAL PRODUCTION QUANTITY REQUIRED OF INTRODUCING INCENTIVES SUCH AS GUARANTEED LOANS. THE EFFECT OF ANNUAL AVERAGE WINDSPEED AT THE SITE IS ASSESSED IN TERMS OF INITIAL PRODUCTION QUANTITY REQUIRED. IT IS CONCLUDED THAT WITHOUT INCENTIVES, AND WITH WIND SITES HAVING 7 M/S ANNUAL AVERAGE WINDSPEED, THE INITIAL PRODUCTION QUANTITY IS 260 UNITS TO BRING THE COST OF WIND ENERGY DOWN TO THE PRESENT PRICE OF OIL (2.6 CENTS/KWH) FOR PRIVATE UTILITIES AND DOWN TO 1.5 CENTS/KWH FOR PUBLIC UTILITIES. WITH GUARANTEED LOANS PROVIDED AS AN INCENTIVE, THE INITIAL PRODUCTION QUANTITY REQUIRED DROPS TO 95 UNITS. IF SITES WITH 8 M/S ANNUAL AVERAGE WINDSPEED ARE USED, AND GUARANTEED LOANS ARE MADE AVAILABLE, THE INITIAL PRODUCTION QUANTITY REQUIRED TO MEET THE COMPETITIVE COST CRITERIA OF PUBLIC AND PRIVATE UTILITIES IS REDUCED TO 65 UNITS. FEDERAL POWER AGENCIES COULD MEET THE PRESENT COST OF OIL WITH ENERGY FROM WIND TURBINE GENERATORS WITH AN INITIAL PRODUCTION ORDER OF 40 UNITS.

77-0082 COTY U A, VAUGHN L
IMPLEMENTATION ISSUES OF WIND ENERGY.
NEW OPTIONS IN ENERGY TECHNOLOGY; PROCEEDINGS OF THE CONFERENCE, SAN FRANCISCO, CAL., AUGUST 2-4, 1977. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 106-116.

INITIAL PRODUCTION QUANTITIES REQUIRED BY USERS (INCLUDING DEVELOPING NATIONS), COMPETITIVE ENERGY COST CRITERIA, AND ENERGY COST FRACTIONS ARE TABULATED AND COMPARED. AVAILABILITY OF ALTERNATIVE ENERGY SOURCES, AVAILABILITY OF INCENTIVES (FINANCING BY GOVERNMENT OR FOREIGN LOANS), AND AVAILABILITY OF SUITABLE HIGH-WIND SITES ARE TAKEN INTO ACCOUNT. MINIMUM INVESTMENTS AND COMMITMENTS TO PURCHASES OF WIND TURBINE GENERATORS TO IMPLEMENT A WIND POWER DEVELOPMENT PROGRAM ON A COMMERCIAL BASIS ARE ESTIMATED.

77-0083 CRITERIA FOR THE MANUFACTURE AND OPERATION OF WIND POWER PLANT UP TO 10 KW.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 353-362. (IN GERMAN)

THE REQUIREMENTS ARE DESCRIBED FOR THE MANUFACTURE AND OPERATION OF 10 KW WIND POWER PLANTS. THE FOLLOWING ARE TREATED IN DETAIL: SAFETY PROBLEMS, GENERATOR CONSTRUCTION, BATTERIES, CONVERTERS.

77-0084 CROMACK D E, HERONEMUS W E, MCGOWAN J G
DESIGN AND OPERATIONAL EVALUATION OF A 25 KW WIND TURBINE GENERATOR FOR RESIDENTIAL HEATING APPLICATIONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILL., AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1668-1675.

AN IMMEDIATE APPLICATION AREA OF WINDPOWER SYSTEMS IS TO PROVIDE POWER FOR RESIDENTIAL HEATING. THIS PAPER PRESENTS A DESCRIPTION OF THE MAIN COMPONENT, THE WIND TURBINE GENERATOR (WTG) OF AN EXPERIMENTAL HEATING SYSTEM DESIGNED TO TEST THIS CONCEPT. THE DESIGN CRITERIA, CONSTRUCTION DETAILS, COMPONENT COSTS, AND PERFORMANCE TESTING OF THIS COMPONENT ARE INCLUDED. VARIOUS SUBSYSTEMS INCLUDING ROTOR, MAIN FRAME, DRIVE TRAIN, YAW CONTROL, GENERATOR, SUPPORT TOWER, AND CONTROL SYSTEMS ARE DISCUSSED. INITIAL EXPERIMENTAL RESULTS SHOW THAT THE PERFORMANCE OF THE WIND TURBINE GENERATOR IS CLOSE TO ANALYTICAL PREDICTION.

77-0085 CROMACK D E, LEFEBVRE P L
OPTIMUM AND NEAR OPTIMUM BLADE CONFIGURATIONS FOR HIGH SPEED WIND

TURBINES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19. P. 16-19.

PRESENTED ARE THE RESULTS OF A PARAMETRIC STUDY SHOWING COMPARISONS FOR HIGH SPEED WINDMILL ROTORS OF 2, 3, AND 4 BLADES AND OF AERODYNAMICALLY OPTIMUM, NEAR OPTIMUM, AND CONSTANT CHORD ZERO-TWIST BLADE SHAPES. NEAR OPTIMUM BLADES CONSISTING OF LINEAR-TAPER AND LINEAR-TWIST REPRESENT A SIGNIFICANT DEGREE OF SIMPLIFICATION FOR MANUFACTURE. RESULTS OF THIS STUDY INDICATE THAT ONLY A SMALL PERFORMANCE LOSS IS INCURRED FOR NEAR-OPTIMUM BLADES WHEN COMPARED TO THE OPTIMUM CHORD AND TWIST BLADES PROVIDING THAT THE TAPER AND TWIST ARE PROPERLY DISTRIBUTED. CURVES ARE PRESENTED FOR THE SELECTION OF DESIGN PARAMETERS FOR SEVERAL NEAR OPTIMUM BLADES.

77-0086 CROSNO D
THE INDUCTION GENERATOR FOR WIND ENERGY CONVERSION.
WIND TECHNOL. J. 1(3): 26-30, FALL 1977.

A WIND-DRIVEN INDUCTION GENERATOR MAY PROVE TO BE A PRACTICAL SOURCE OF SUPPLEMENTAL ELECTRIC ENERGY FOR HOMES AND SMALL FARMS WHICH ARE SERVED BY PUBLIC UTILITY POWER LINES. FOR SUCH A POWER SOURCE, THE WIND-DRIVEN GENERATOR IS CONNECTED TO THE CUSTOMER'S SIDE OF THE ELECTRIC COMPANY'S WATT-HOUR METER. SUCH A SYSTEM IS DESCRIBED.

77-0087 CROUZET-PASCAL J
A NON-AEROSPACE APPLICATION OF PLANS: PRELIMINARY STRUCTURAL DESIGN OF WIND TURBINE DIFFUSER.
NTIS, MARCH 1977. 88P.
RM-629, N77-31604

A BASELINE DESIGN FOR A LIGHTWEIGHT DIFFUSER, ITS CALCULATED WEIGHT, AND THE METHOD EMPLOYED TO CALCULATE THE SPECIFIC SIZES IN THE DESIGN ARE DESCRIBED. FORMULAS ARE PRESENTED THAT PERMIT THE STRAIGHTFORWARD ASSESSMENT OF THE EFFECT ON THE DIFFUSER WEIGHT, AND THE RELATED COST OF POWER GENERATION, OF CHANGES IN DIMENSIONS, MATERIAL, OR ALLOWABLE DEFLECTIONS. IT WAS ESTABLISHED THAT FOR A SCALE VARIATION IN THE OVER-ALL SIZE OF THE DIFFUSER, THE COST OF POWER GENERATION ATTRIBUTABLE TO THE DIFFUSER VARIES LINEARLY WITH THE DIFFUSER FRONT RADIUS. IT WAS ALSO ESTABLISHED THAT AS COMPARED TO USING ALUMINUM, THE COST WOULD ACTUALLY GO UP WITH STANDARD STRENGTH STEEL BUT DOWN WITH HIGHER STRENGTH STEEL. ALLOWING THE STRUCTURE TO BE MORE FLEXIBLE CANNOT YIELD A REDUCTION IN COST UNLESS A CHANGE IN MATERIAL PROPERTIES IS ALLOWED.

77-0088 CROWTHER R L
CLIMATE AND ARCHITECTURE.
AMER. METEOROL. SOC. BULL. 58(7): 595-598, JULY 1977.

ARCHITECTURE MUST BE DESIGNED TO RESPOND TO ITS MICROCLIMATE AND TO OPTIMIZE CHARACTERISTICS OF ITS INTERNAL ENERGIES. METEOROLOGISTS MUST PRODUCE A RELIABLE INFORMATION BASE FOR USE IN URBAN PLANNING AND ARCHITECTURAL DESIGN FOR OPTIMAL CONSERVATION OF ENERGY AND PRACTICAL USE OF ONSITE NATURAL ENERGIES, SUCH AS THE SUN AND THE WIND. ARCHITECTS AND METEOROLOGISTS MUST WORK TOGETHER TO DESIGN ENERGY EFFICIENT DWELLINGS.

77-0089 DARKAZALLI G
SOLAR AND WIND HOME HEATING AND DOMESTIC HOT WATER SYSTEMS: ENERGY AND ECONOMICS STUDY. PH.D. THESIS.
AMHERST, MASSACHUSETTS UNIVERSITY, 1977. AVAIL: ANN ARBOR, UNIVERSITY MICROFILMS, 1977. 273 P. ORDER NO. 77-13790.

A DEVELOPMENT OF A DIGITAL COMPUTER BASED METHODOLOGY TO CALCULATE SYSTEM PERFORMANCE AND COSTS IS PRESENTED. IN ADDITION TO WIND POWERED SYSTEMS, SOLAR, AND COMBINED WIND AND SOLAR SYSTEMS ARE CONSIDERED IN DETAIL. THE ANALYSIS IS BASED ON TWO SEPARATE COMPUTER PROGRAMS: (1) AN ENERGY PROGRAM THAT DETERMINES SYSTEM PERFORMANCE AS A FUNCTION OF SUBCOMPONENT PARAMETERS AND AUXILARY ENERGY REQUIREMENTS, AND, (2) AN ECONOMICS PROGRAM THAT CALCULATES PRESENT AND FUTURE (MASS PRODUCED) COSTS OF THE WIND AND/OR SOLAR COMPONENTS AND SYSTEM. COMPLETE DETAILS OF ALL PARTS OF THE MODEL, WHICH IS INTENDED TO BE A GENERAL DESIGN TOOL FOR SUCH SYSTEMS, ARE PRESENTED. THE RESULTS INCLUDE A DETAILED SERIES OF RUNS

BASED ON HOURLY WEATHER AND SOLAR DATA FOR A TYPICAL NEW ENGLAND SITE, USING AN AVERAGE AND RESIDENCE MODEL. ALSO, ADDITIONAL RUNS ARE PRESENTED FOR OTHER SITES AND RESIDENCES.

77-0090 DARKAZALLI G, MCGOWAN J G
ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF RESIDENTIAL WIND AND SOLAR HEATING SYSTEMS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL.1. ORLANDO, FLORIDA. JUNE 6-9, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 24. P. 20-24.

A PERFORMANCE AND COST MODEL FOR A VARIETY OF WIND SPACE AND WATER HEATING SYSTEMS FOR SINGLE FAMILY RESIDENCES IS PRESENTED. IN ADDITION TO WIND POWERED SYSTEMS, COMBINED WIND AND SOLAR SYSTEMS ARE MODELED AND COMPARED TO CONVENTIONAL AND SOLAR ONLY HEATING SYSTEMS. ANALYTICAL RESULTS ARE PRESENTED FOR A SITE IN AMHERST, MASSACHUSETTS. SYSTEM CAPITAL ECONOMIC DETAILS INCLUDE AN ITEMIZED COST BREAKDOWN OF THE WIND HEATING SYSTEM COMPONENTS. THE RESULTS DEMONSTRATE THAT WIND POWERED SYSTEMS ARE PRESENTLY COMPETITIVE WITH ELECTRIC BASED HEATING SYSTEMS AND WILL BE COMPETITIVE WITH OIL OR GAS SYSTEMS IN THE FUTURE.

77-0091 DARVISHIAN A
HIGHER EFFICIENCY WIND MOTOR WITH RECEPTORS OF DIMINISHED DRAG CHARACTERISTICS.
U.S. PATENT NO. 4,015,911, APRIL 5, 1977. 8P.

A WIND MOTOR FOR THE CONVERSION OF WIND POWER TO MECHANICAL OR ELECTRICAL POWER OR OTHER FORM THEREOF IS DESCRIBED WHICH INCLUDES A PLURALITY OF WIND RECEPTORS, WHICH HAVE OPENINGS THEREIN FOR THE PASSAGE OF AIR THERETHROUGH DURING OPERATION OF THE WIND MOTOR, ESPECIALLY WHEN THE RECEPTORS ARE MOVING AGAINST THE WIND, SO AS TO DIMINISH AIR RESISTANCE (DRAG) OPPOSING SUCH MOVEMENT, THEREBY INCREASING THE EFFICIENCY OF THE WIND MOTOR.

77-0092 DAS S C, LINSCOTT B S
APPROXIMATE METHOD FOR CALCULATING FREE VIBRATIONS OF A LARGE WIND TURBINE TOWER STRUCTURE.
NTIS, DECEMBER 1977. 42P.
NASA-TM-73754

A SET OF ORDINARY DIFFERENTIAL EQUATIONS ARE DERIVED FOR A SIMPLIFIED STRUCTURAL DYNAMIC LUMPED-MASS MODEL OF A TYPICAL LARGE-WIND-TURBINE TOWER STRUCTURE. DUNKERLEY'S EQUATION IS USED TO ARRIVE AT A SOLUTION FOR THE FUNDAMENTAL NATURAL FREQUENCIES OF THE TOWER IN BENDING AND TORSION. THE ERDA-NASA 100-KW WIND TURBINE TOWER STRUCTURE IS MODELED, AND THE FUNDAMENTAL FREQUENCIES ARE DETERMINED BY THE SIMPLIFIED METHOD DESCRIBED. THE APPROXIMATE FUNDAMENTAL NATURAL FREQUENCIES FOR THE TOWER AGREE WITHIN 18 PERCENT WITH TEST DATA AND PREDICTIONS ANALYZED BY MEANS OF NASTRAN.

77-0093 DAVIDSON M, GRETHER D, WILCOX K
ECOLOGICAL CONSIDERATIONS OF THE SOLAR ALTERNATIVE.
UNIVERSITY OF CALIFORNIA, BERKELEY, LAWRENCE BERKELEY LABORATORY, FEBRUARY 1977. 48P.
LBL-5927

77-0094 DAVIS B L, ECKHERN M W
WIND FABRIC DIAGRAMS AND THEIR APPLICATION TO WIND ENERGY ANALYSIS.
J. APPL. METEOROL. 16(5): 522-531, MAY 1977.

BY MEANS OF THE LAMBERT PROJECTION, WIND VECTOR DATA MAY BE PLOTTED ONTO A FREQUENCY MAP. THE RESULTING DIAGRAM PORTRAYS THE "WIND FABRIC" FOR THE DATA SAMPLE OF A SINGLE STATION OR FOR GROUPS OF STATIONS. THE AREA-TRUE DISTRIBUTION OF WIND VECTORS IS THUS GIVEN IN GREAT DETAIL AND ALLOWS SEVERAL STANDARD TESTS FOR HOMOGENEITY AND ANOMALY SIGNIFICANCE. BY USING A "SWINGING PLATE" DEVICE THE WIND ENERGY DENSITY AND WIND POWER CAN BE CALCULATED FOR ANY VELOCITY-COMPASS HEADING SECTOR OF THE DIAGRAM DESIRED AND ALLOWS FOR A UNIVERSAL SCALING OF THE VELOCITY VARIABLE OF THE DIAGRAM.

77-0095 DAVITIAN H
USE OF WIND POWER BY ELECTRIC UTILITIES.

AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECTION 19. P. 1-5.

TWO CHARACTERISTICS OF WIND MACHINES ARE PARTICULARLY PROBLEMATICAL FROM A UTILITY PERSPECTIVE: VARIATIONS IN OUTPUT AND THE SMALL SIZE OF THE MACHINES. CURRENTLY AVAILABLE ESTIMATES FOR THE COSTS OF PRODUCING AND INSTALLING MACHINES ARE IN THE RANGE OF $500 TO $700/KW FOR THE 100TH MACHINE PRODUCED. THE VALUE OF WIND MACHINES TO UTILITIES WILL BE IN THIS RANGE IN SOME PARTS OF THE U.S., GIVEN EXPECTED INCREASES IN FUEL COSTS. THIS PRELIMINARY ANALYSIS OF THE ECONOMICS OF WIND POWER INDICATES A PROMISING POTENTIAL FOR REGIONS OF THE U.S. WITH HIGH WIND POWER AVAILABILITY AND HIGH FUEL COSTS.

77-0096 DAVITIAN H
THE ROLE OF WIND POWER IN ELECTRIC UTILITIES.
NTIS, SEPTEMBER 1977. 15P.
BNL-50736

CURRENT ESTIMATES SUGGEST THAT THE COST OF WIND GENERATED POWER IS LIKELY TO BE COMPETITIVE WITH CONVENTIONALLY GENERATED POWER IN THE NEAR FUTURE IN REGIONS OF THE UNITED STATES WITH FAVORABLE WINDS AND HIGH COSTS FOR CONVENTIONALLY GENERATED ELECTRICITY. THESE PRELIMINARY ESTIMATES INDICATE COSTS OF $500-700 PER INSTALLED KW FOR MASS PRODUCED WIND TURBINES. THIS ASSESSMENT REGARDING COMPETITIVENESS INCLUDES THE EFFECTS OF THE REDUCED RELIABILITY OF WIND POWER COMPARED TO CONVENTIONAL SOURCES. UTILITIES EMPLOYING WIND POWER ARE LIKELY TO PURCHASE MORE PEAKING CAPACITY AND LESS BASELOAD CAPACITY THAN THEY WOULD HAVE OTHERWISE TO PROVIDE THE LOWEST COST RESERVE POWER. THIS RESERVE POWER IS NEEDED MAINLY WHEN WIND OUTAGES COINCIDE WITH PEAK LOADS. THE MONETARY SAVINGS ASSOCIATED WITH THIS SHIFT CONTRIBUTE SUBSTANTIALLY TO THE VALUE OF WIND ENERGY TO A UTILITY.

77-0097 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. EXECUTIVE SUMMARY.
NTIS, JULY 1977. 94P.
NASA-CR-134936

THIS REPORT PRESENTS A SUMMARY OF THE RESULTS OF A PROGRAM TO DEVELOP PRELIMINARY DESIGNS OF LOW POWER (50-500 KW) AND HIGH POWER (500-3000 KW) WIND GENERATOR SYSTEMS (WGS) FOR ELECTRIC UTILITY APPLICATIONS. THESE DESIGNS PROVIDE THE BASES FOR DETAIL DESIGN, FABRICATION, AND EXPERIMENTAL DEMONSTRATION TESTING OF THESE UNITS AT SELECTED UTILITY SITES. THE PROGRAM INCLUDED FOUR TASKS: A CONCEPTUAL DESIGN TASK; AN OPTIMAZATION TASK; A PRELIMINARY DESIGN TASK; AND A UTILITY REQUIREMENTS EVALUATION TASK.

77-0098 DEVINE W D
ENERGY ANALYSIS OF A WIND ENERGY CONVERSION SYSTEM FOR FUEL DISPLACEMENT.
NTIS, FEBRUARY 1977. 55P.
ORAU/IEA(M)-77-2

ENERGY CONVERSION MACHINES WHICH UTILIZE RENEWABLE SUPPLIES OF ENERGY AS FUEL MAY DELIVER CONSIDERABLY MORE ENERGY TO ULTIMATE USERS THAN IS CONSUMED DURING MANUFACTURE, DEPLOYMENT, AND OPERATION OF THE MACHINE. AN INPUT/OUTPUT APPROACH IS EMPLOYED TO ESTIMATE THE ENERGY EMBODIED IN A 1,500 KW(E) HORIZONTAL-AXIS WIND ELECTRIC GENERATING STATION USED TO DISPLACE FOSSIL FUEL IN AN ELECTRIC UTILITY SYSTEM. FIVE RATIOS COMPARING DELIVERED ELECTRICAL ENERGY TO THE ENERGY REQUIREMENT OF THE WIND MACHINE ARE DISPLAYED. THE RESULTS INDICATE THAT THE SYSTEM CONSIDERED COULD BE A LARGE NET PRODUCER OF ENERGY AND SHOULD DISPLACE A QUANTITY OF FOSSIL ENERGY EQUIVALENT TO THAT EMBODIED IN THE MACHINE IN CONSIDERABLY LESS THAN ONE YEAR.

77-0099 DEW J
A DOWN-WIND CONING-TYPE GENERATOR.
ALTERN. SOURCES ENERGY NO. 24: 11-14, FEBRUARY 1977.

77-0100 DIGGS R E
HIGH POWER WIND TURBINE WITH KINETIC ACCUMULATOR.
U.S. PATENT NO. 4,035,658, JULY 12, 1977. 10P.

A HIGH POWER WIND TURBINE WITH KINETIC ACCUMULATOR IS DISCLOSED. THE INVENTION INCLUDES A CIRCULAR WALL, A WALL TURBINE MOVABLY MOUNTED TO THE CIRCULAR WALL SO THAT IT CAN BE MOVED TO FACE THE WIND, A NON-LINEAR GENERATOR CONNECTED TO THE WIND TURBINE TO GENERATE ELECTRICAL POWER, A FLY WHEEL, AND A DRIVE WHEEL DISPOSED IN CONTACT WITH THE FLY WHEEL TO DRIVE THE FLY WHEEL. A REVERSIBLE NON-LINEAR MOTOR IS CONNECTED TO THE DRIVE WHEEL TO DRIVE THE DRIVE WHEEL OR TO BE DRIVEN BY THE DRIVE WHEEL. THE NON-LINEAR GENERATOR IS CONNECTED TO THE REVERSIBLE MOTOR TO ROTATE THE DRIVE WHEEL TO ROTATE THE FLY WHEEL WHEN THE NON-LINEAR GENERATOR GENERATES EXCESS ELECTRICAL POWER. THE FLY WHEEL ROTATES THE DRIVE WHEEL TO DRIVE THE REVERSIBLE MOTOR TO GENERATE ELECTRICAL POWER WHEN THE NON-LINEAR GENERATOR DOES NOT GENERATE SUFFICIENT ELECTRICAL POWER.

77-0101 DODD C W
LIGHTNING PROTECTION FOR THE VERTICAL-AXIS WIND TURBINE.
NTIS, OCTOBER 1977. 26P.
SAND-77-1241

THIS REPORT CONTAINS THE RESULTS OF LIGHTNING PROTECTION STUDIES FOR VERTICAL AXIS WIND TURBINES. THE METHODOLOGY IS ESTABLISHED FOR DETERMINING THE CHANCES FOR A LIGHTNING STRIKE AT A VAWT SITE. PROPOSED DESIGNS FOR LIGHTNING PROTECTION SYSTEMS ARE DESCRIBED. THESE DESIGNS INCLUDE AN INSULATOR DESIGN, A BRUSH BY-PASS DESIGN, A CONE OF PROTECTION, LIGHTNING ELIMINATION DEVICE, AND A CONCENTRIC TOWER PROTECTION SYSTEM. THE WORK ALSO DESCRIBES AN EFFECTIVE GROUNDING SYSTEM.

77-0102 DODD H M, STEWART R E D, VARNADO S G, ARONSON E A, CHANG G C
ASSESSMENT OF MECHANICAL ENERGY STORAGE FOR SOLAR SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1174-1180.

THE PRIMARY OBJECTIVE OF THIS STUDY IS TO ASSESS THE RELATIVE MERITS OF VARIOUS MECHANICAL ENERGY STORAGE SYSTEMS WHEN USED IN CONJUNCTION WITH SOLAR AND WIND SOURCES. THIS INITIAL STUDY CONSIDERED FLYWHEEL, PNEUMATIC (COMPRESSED AIR) AND UNDERGROUND PUMPED HYDRO STORAGE CONCEPTS. BOTH THERMAL AND PHOTOVOLTAIC COLLECTORS UTILIZING STATIONARY FLAT PLATE THROUGH TOTAL TRACKING FOCUSED SYSTEMS WERE INCLUDED. FOR WIND COLLECTION, A HORIZONTAL AXIS WIND TURBINE WAS MODELED. ELECTRICAL LOAD DEMANDS FROM SINGLE RESIDENCES THROUGH UTILITY GRIDS WERE INCLUDED. ALTERNATIVE SYSTEMS WERE RANKED ACCORDING TO LEVELIZED, BUSBAR ENERGY COST CALCULATIONS, AND THE AMOUNT OF DISPLACED CONVENTIONALLY GENERATED ELECTRICITY ALSO SERVED AS A BENEFIT MEASURE.

77-0103 DORAN J C, BATES J A, LIDDELL P J, FOX T D
ACCURACY OF WIND POWER ESTIMATES.
NTIS, OCTOBER 1, 1977. 22P.
PNL-2442

SEVERAL ASPECTS OF POWER ESTIMATION TECHNIQUES FOR WIND ENERGY CONVERSION SYSTEMS ARE STUDIED. THE SAMPLING RATE AT WHICH THE DATA ARE COLLECTED, RANGING FROM ONCE EVERY 2 MINUTES TO ONCE EVERY 3 HOURS, DOES NOT APPEAR TO SIGNIFICANTLY AFFECT THE AVERAGE POWER FOR RECORDING PERIODS OF ONE SEASON. INCREASED AVERAGING TIMES PRODUCE SMALL UNDERESTIMATES (10 PERCENT) OF AVAILABLE POWER. THE RAYLEIGH AND WEIBULL DISTRIBUTIONS BOTH GIVE POOR ESTIMATES OF POWER FOR LOW MEAN WIND SPEED SITUATIONS; WITH THE FORMER BEING SIGNIFICANTLY WORSE. AT HIGHER WIND SPEED BOTH GIVE GOOD ESTIMATES, AND THE RAYLEIGH DISTRIBUTION IS CONSIDERABLY SIMPLER IN FORMAT AND APPLICATION. A HEIGHT EXTRAPOLATION SCHEME FOR WEIBULL PARAMETERS IS ALSO INVESTIGATED. RESULTS ARE SATISFACTORY FOR POWER ESTIMATES OF ENSEMBLES OF MACHINES, BUT THE SCATTER OF VALUES ABOUT THE MEAN MAKES THE METHOD INAPPROPRIATE FOR INDIVIDUAL CASES.

77-0104 DORNER H
WIND ENERGY CONVERSION: UNITS WITH HORIZONTAL AXIS.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P.81-97. (IN GERMAN)

A GENERAL SURVEY IS PRESENTED ON THE PROBLEMS OF HORIZONTAL AXIS WIND ENERGY CONVERTERS (HA-WEK). DESIGNS ARE CONCENTRATED ON PLANT FOR PRODUCING ELECTRICAL POWER. ONLY THE FUNDAMENTAL PROBLEMS OF

INDIVIDUALLY FUNCTIONING SYSTEMS AND POSSIBLE VARIATIONS OF ARRANGEMENT FOR TOTAL PLANT ARE CONSIDERED. THE ADVANTAGE OF THE HORIZONTAL AXIS WIND ENERGY CONVERTER COMPARED TO OTHER SYSTEMS IS SHOWN IN AN EXTENSIVE COMPARISON.

77-0105 DROZD D
THE THEORY OF HIGH-SPEED WINDMILLS. PART 1.
WIND POWER DIG. NO. 10: 28-33, FALL 1977.

THIS IS THE FIRST OF A SERIES OF ARTICLES ABOUT THE THEORY OF HIGH SPEED WINDMILLS, I.E., THOSE WHOSE TIP SPEED RATIO, THE RATIO BETWEEN THE SPEED OF THE BLADE TIPS AND THE WIND VELOCITY, IS FOUR OR GREATER.

77-0106 DUBEY M
CONVERSION AND STORAGE OF WIND ENERGY AS NITROGENOUS FERTILIZER.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P.525-532.

THE USE OF WIND ENERGY, AIR, AND WATER TO PRODUCE AMMONIA FOR USE AS A NITROGENOUS FERTILIZER IS DISCUSSED. A STUDY SHOWS THAT IT IS TECHNOLOGICALLY FEASIBLE TO REDUCE THE SCALE OF AN AMMONIA PROCESSING PLANT TO PRODUCE A TINY FRACTION OF THE OUTPUT RATES OF A FULL SCALE COMMERCIAL PLANT. SUCH A SYSTEM CAN BE ADEQUATELY POWERED BY A WIND TURBINE DRIVING AN ELECTROLYSIS CELL TO PRODUCE THE REQUIRED HYDROGEN FEEDSTOCK. THE PROCESS IS DESCRIBED, AND SEVERAL FACTORS, SUCH AS ENERGY STORAGE, PRODUCT STORAGE, AND ENERGY BALANCE AND COMPONENT MATCHING, ARE CONSIDERED. THE ECONOMICS OF THE SYSTEM ARE ANALYZED, AND IT IS THOUGHT THAT THE COST OF THE PRODUCED FERTILIZER WILL BE COMPETITIVE IF NATURAL GAS PRICES CONTINUE TO RISE.

77-0107 DUCHON C E
MEASUREMENT AND ANALYSIS OF WIND FLOW IN COMPLEX TERRAIN WITH APPLICATION TO SITING OF WECS. FINAL REPORT.
NTIS, MAY 1977, 74P.
DOE/NSF-00619/75/1

MEASUREMENTS OF WIND SPEED AND DIRECTION WERE MADE AT A HEIGHT OF ABOUT 8 M AT THREE LOCATIONS ALONG A TRANSECT THROUGH A DIVIDE-STREAMBED SYSTEM IN CENTRAL OKLAHOMA. STATION SPACING WAS ON THE ORDER OF 140 M AND THE VERTICAL DISTANCE FROM STREAMBED TO DIVIDE WAS ABOUT 20 M. THE RESULTS SHOW THAT FOR FLOW ACROSS THE DIVIDE AXIS AND FOR FLOW DOWN THE STREAMBED THE HIGHER THE WIND SPEED THE GREATER THE MAGNITUDE OF WIND SPEED REDUCTION AT A GIVEN LOCATION DOWN THE SLOPE. THE DECREASE IS APPROXIMATELY LINEARILY RELATED TO THE WIND SPEED AT THE DIVIDE. THE RELATIONSHIP BETWEEN THE RATIO OF WIND SPEED DOWN THE SLOPE TO THE DIVIDE SPEED AND THE DISTANCE DOWN THE SLOPE IS ALSO APPROXIMATELY LINEAR. FOR FLOW UP THE STREAMBED AND PARALLEL TO IT MEASUREMENTS INDICATE A SLIGHTLY HIGHER SPEED AT MID-SLOPE THAN AT THE STREAMBED OR DIVIDE. A METHOD WAS DEVISED FOR ESTIMATING THE ANNUAL DISTRIBUTION OF AVAILABLE WIND ENERGY WITH DIRECTION AT THE THREE FIELD STATIONS AND OKLAHOMA CITY, 50 KM AWAY. IT IS BASED ON A SHORT PERIOD OF SIMULTANEOUS WIND MEASUREMENTS AT BOTH SITES AND WIND CLIMATOLOGY AT OKLAHOMA CITY. AS EXPECTED THE AVAILABLE ENERGY FOR ALL STATIONS WAS GREATEST FOR THE SOUTHERLY WIND DIRECTION AND LEAST FOR THE EASTERLY DIRECTION. OVER ALL DIRECTIONS THE AVAILABLE WIND ENERGY WAS GREATEST AT THE DIVIDE LOCATION AND THE LEAST AT THE STREAMBED.

77-0108 ERDA ISSUES RFPS.
WIND POWER DIG. 1(8): 22, SPRING 1977.

77-0109 ERDA ISSUES THREE RFPS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P.12-13, SPRING 1977.

77-0110 ERDA PLANS KING-SIZE ENERGY-PRODUCING WINDMILLS.
PLAST. WORLD 35: 9, JUNE 1977.

77-0111 ERDA SUPER TURBINE PROPELS FEDERAL WIND ENERGY PROGRAM.
ENG. NEWS-REC. 199(5): 19, AUGUST 4, 1977.

ERDA'S PLAN TO DO RESEARCH WITH A 2.5 MW WIND TURBINE, THE LARGEST YET IN THEIR WIND ENERGY PROGRAM, IS DISCUSSED.

77-0112 ECKERT R
REINFORCED-CONCRETE TOWERS FOR THE PRODUCTION OF GASEOUS HYDROGEN AND OXYGEN BY DECOMPOSITION OF WATER USING DIRECT CURRENT, ELECTROLYSIS. GERMAN (FRG) PATENT NO. 2,532,676/A/, FEBRUARY 10, 1977. 5P. (IN GERMAN)

A TOWER EQUIPPED WITH WIND WHEELS IS PROPOSED FOR THE ELECTROLYTICAL DECOMPOSITION OF WATER. IN ORDER TO ENSURE CONTINUOUS OPERATION, THE HEIGHT OF THE TOWER SHOULD BE > 70 M, I.E. BE IN THE WHIRL ZONE OF EARTH. THE ELECTRIC CURRENT NECESSARY IS GENERATED BY THE WIND WHEELS VIA GENERATORS. THE TOWER IS VERTICALLY SEPARATED IN THE CENTER AND OCCLUDED BY A CANT COPE. BOTH CHAMBERS ARE FILLED WITH ELECTROLYTES, AND EQUIPPED WITH AN ANODE AND A CATHODE. THE GASES PRODUCED OUST THE ELECTROLYTE INTO A STORAGE TANK AND ARE SUCKED OFF IN INTERVALS. FURTHER CLAIMS DESCRIBE THE CONFIGURATION OF THE TOWER, THE DUCTS, AND VALVES.

77-0113 EDWARDS P J
LOW COST RECORDER FOR A WIND ENERGY SURVEY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS, CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X20-X21.

AN OBSERVATIONAL PROGRAM FOR A WIND ENERGY SURVEY IS BEING CARRIED OUT IN SEVERAL AREAS OF NEW ZEALAND. THE INSTRUMENTATION REQUIRED, EXCLUDING THE ANEMOMETER ASSEMBLY, WAS DEVELOPED LOCALLY. WIND-RUN, OR MEAN WIND SPEED, IS OBTAINED BY COUNTING ONE PULSE PER REVOLUTION OF THE ANEMOMETER ON A MODIFIED POCKET CALCULATOR. MEAN WIND SPEEDS ARE RECORDED ELECTRONICALLY ON STANDARD TWO-CHANNEL REEL-TO-REEL OR CASSETTE TAPE DECKS. A FREQUENCY PROPORTIONAL TO THE WIND SPEED IS RECORDED ON CHANNEL ONE AND A CLOCK PULSE TRAIN ON CHANNEL TWO. MEAN WIND SPEEDS OVER TIME INTERVALS AS SHORT AS THREE TO FIVE SECONDS OR AS LONG AS ONE MONTH CAN BE RETRIEVED.

77-0114 EISENHARD R M
STATE SOLAR ENERGY LEGISLATION OF 1976: A REVIEW OF STATUTES RELATING TO BUILDINGS.
NTIS, SEPTEMBER 1977. 262P.
NBSR-77-1297

STATE LEGISLATION ON SOLAR ENERGY USE IN BUILDINGS ENACTED IN 1976 IS REVIEWED. ACTS INVOLVE TAX INCENTIVES FOR THE INSTALLATION OF SOLAR DEVICES, SUPPORT FOR THE PROPOSED SOLAR ENERGY RESEARCH INSTITUTE CALLED FOR IN PUBLIC LAW 93-473, SOLAR STANDARDS, STATE ENERGY OFFICES, STUDIES, BUILDING REQUIREMENTS AND SOLAR PROJECTS. DETAILED INFORMATION ON 44 ACTS ENACTED BY STATE LEGISLATURES IS GIVEN, AND RESPONSIBLE STATE OFFICIALS ARE LISTED. THE ACTS, AS WELL AS SUPPORTING FORMS AND OTHER INFORMATION, ARE INCLUDED IN THE APPENDIXES.

77-0115 ELDRIDGE F R
UNDERGROUND GAS STORAGE IN THE UNITED STATES, AND ITS POTENTIAL APPLICATION TO WIND-POWERED SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X77-X79.

IT IS SEEN THAT GAS TURBINE SYSTEMS THAT USE WIND POWER FOR COMPRESSING AIR, WHICH IS, IN TURN, STORED IN HIGH-CAPACITY, NATURAL UNDERGROUND RESERVOIRS, OFFER THE POSSIBILITY FOR NOT ONLY LOW-COST, SHORT-DURATION ENERGY STORAGE, SUCH AS FOR "CHANGEOVER BUFFER STORAGE" WHERE THE PURPOSE IS TO PROVIDE ENERGY DURING THE TIME REQUIRED TO SHIFT BETWEEN WECS AND A CONVENTIONAL ELECTRIC POWER SYSTEM, IN A FUEL-SAVER MODE OF OPERATION, OR FOR "DIURNAL LOAD SMOOTHING STORAGE" WHERE THE PURPOSE IS TO PROVIDE ADDITIONAL ENERGY TO MEET THE DIURNAL LOAD DURING PERIODS OF PEAK DEMAND.

77-0116 ELDERKIN C E, RAMSDELL J V, TENNYSON G P
WIND CHARACTERISTICS WORKSHOP--MEETING REVIEW, BOSTON, JUNE 2-4, 1976.
AM. METEOROL. SOC. BULL. 58(1): 45-51, 1977.

THE MEETING WAS HELD IN CONNECTION WITH THE ERDA WIND ENERGY CONVERSION PROGRAM. THE WORKSHOP RELATED WIND CHARACTERISTICS INFORMATION TO THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS (WECS).

77-0117 ELDERKIN C E, RAMSDELL J V

ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD APRIL 1976 THROUGH JUNE 1977.
NTIS, JULY 1977. 129P.
BNWL/WIND-10

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS A SERVICE ELEMENT TO PROVIDE METEOROLOGICAL INFORMATION TO OTHER PARTS OF THE WIND ENERGY CONVERSION PROGRAM. IN THIS ROLE, THE WCPE HAS AS ITS GENERAL OBJECTIVE ACCELERATION OF THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS). TO ACCOMPLISH THIS OBJECTIVE, FOUR TECHNICAL PROGRAM AREAS HAVE BEEN ESTABLISHED WITHIN THE WCPE. THESE ARE: WIND CHARACTERISTICS FOR WECS DESIGN AND PERFORMANCE EVALUATION; WIND CHARACTERISTICS FOR WECS SITE SELECTION; WIND CHARACTERISTICS FOR WECS PRESITING EVALUATION; AND WIND CHARACTERISTICS FOR WECS PLANNING AND OPERATIONS. THIS REPORT DISCUSSES WORK UNDERTAKEN IN THE FIRST THREE OF THE PROGRAM AREAS.

77-0118 ELDERKIN C E, RAMSDELL J V
SEMI-ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD APRIL 1976 THROUGH DECEMBER 1976.
NTIS, JANUARY 1977, 83P.
BNWL/WIND-02

77-0119 ELDERKIN C E, WENDELL L L
SUMMARY OF THE DEVELOPMENT PLANS FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE FEDERAL WIND ENERGY PROGRAM.
NTIS, OCTOBER 1977. 49P.
PNL-2501

THE WIND SYSTEMS BRANCH (WSB) OF THE SOLAR TECHNOLOGY DIVISION OF DOE IS RESPONSIBLE FOR THE FWEP AND HAS DIVIDED THE PROGRAM INTO SEVERAL PROGRAM ELEMENTS. THE FOCUS OF THIS REPORT IS ON THE DEVELOPMENT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCEP). PACIFIC NORTHWEST LABORATORY (PNL) PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE WCPE (AS OF MAY 1976). THE DEVELOPMENT PLAN PRESENTED CONTAINS A DETAILED BREAKDOWN OF THE PROPOSED PROGRAM FOR FY-1978 AND A PROGRAM OVERVIEW AND PROJECTION THROUGH FY-1980. THE BASIC DOCUMENT PROVIDES A BASIS FOR COMMUNICATION BETWEEN THE WSB AND THE WCPE AND WILL BE CONTINUALLY UPDATED AS REQUIRED TO ACCOMPLISH THE OVERALL OBJECTIVES OF THE FWEP. THIS SUMMARY DOCUMENT IS AIMED AT APPRISING THE PARTICIPANT AND USER COMMUNITIES OF THE AIMS AND PRIORITIES OF THE WCPE.

77-0120 ELDRIDGE F R
A PRELIMINARY FEDERAL COMMERCIALIZATION PLAN FOR WECS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P. 14-19, SPRING 1977.

THE AUTHOR DISCUSSES A STUDY PERFORMED BY THE MITRE CORPORATION WHOSE OBJECTIVE WAS TO FORMULATE, EVALUATE AND RECOMMEND A PRELIMINARY FEDERAL COMMERCIALIZATION PLAN FOR WIND ENERGY CONVERSION SYSTEMS, INCLUDING A PREFERRED SET OF FEDERAL INCENTIVES THAT COULD BE USED TO ACCELERATE THE COMMERCIALIZATION OF WECS. PROGRESS TO DATE ON THE PROJECT IS REPORTED.

77-0121 ELKO D G
DESIGN, INSTRUMENTATION, AND CALIBRATION OF A VERTICAL AXIS WIND TURBINE ROTOR.
NTIS, 1977. 112P.
TID-27754

THE DESIGN, INSTRUMENTATION AND CALIBRATION OF A VERTICAL AXIS WIND TURBINE THAT HAS BEEN BUILT BY THE DEPARTMENT OF AEROSPACE ENGINEERING AT WEST VIRGINIA UNIVERSITY (WVU) ARE DESCRIBED. THE TURBINE WAS DESIGNED STRICTLY FOR RESEARCH PURPOSES, IN ORDER TO CONFIRM THEORETICAL PERFORMANCE CALCULATIONS DEVELOPED BY THE DEPARTMENT. AREAS OF SPECIAL INTEREST ARE AERODYNAMIC PERFORMANCE AND STRUCTURAL ANALYSIS.

77-0122 ELLIOTT D L
SYNTHESIS OF NATIONAL WIND ENERGY ASSESSMENTS.
NTIS, JULY 1977. 58P.
BNWL/WIND-05

THE OBJECTIVE OF THIS STUDY IS TO PERFORM A SYNTHESIS OF EXISTING NATIONAL WIND ENERGY ASSESSMENTS TO DEVELOP AN IMPROVED CONSISTENT ASSESSMENT OF THE GEOGRAPHICAL DISTRIBUTION OF THE AVAILABLE WIND POWER

OVER THE UNITED STATES.

77-0123 ENERGY LAB'S DIVERSE SEARCH LOOKS TO SUN, WIND AND ATOMS.
ENG. NEWS-REC. 198(15): 108-111, APRIL 14, 1977.

SANDIA LABORATORIES INVOLVEMENT IN THE SEARCH FOR VIABLE ENERGY ALTERNATIVES IS A POTPOURRI OF SOLAR, FISSION, FUSION, FOSSIL, AND SYNTHETIC FUELS RESEARCH. THOUGH ITS MAJOR CONCERN IS STILL DEFENSE RELATED, SANDIA BEGAN AN INTENSIVE ENERGY RESEARCH PROGRAM IN 1963. THE LABORATORIES' ASSETS, WORTH $353 MILLION, ARE OWNED BY ERDA, AND INCLUDE AN ENERGY BUDGET FOR 1977 TOTALING $85 MILLION. OF SPECIAL NOTE AMONG ITS MANY PROJECTS IS A 5 MW THERMAL TEST FACILITY, CONSISTING OF 300 SUN-TRACKING REFLECTORS, THAT IS SLATED TO BECOME THE WORLD'S LARGEST SOLAR POWER PLANT. NUCLEAR AND FOSSIL FUEL RESEARCH ARE ALSO DETAILED.

77-0124 ENERGY RATE INITIATIVES. STUDY OF THE INTERFACE BETWEEN SOLAR AND WIND ENERGY SYSTEMS AND ELECTRIC UTILITIES.
NTIS, MARCH 1977. 106P.
PB-265607

THE IMPLEMENTATION OF ALTERNATIVE UTILITY RATE STRUCTURE AS REQUIRED BY THE ENERGY CONSERVATION AND PRODUCTION ACT COULD EASILY IMPACT THE ECONOMICS OF FUTURE SOLAR HEATING AND COOLING SYSTEMS FOR BUILDINGS (SHACOB). IT IS EXPECTED THAT SUCH VARIATIONS IN SHACOB ECONOMICS MAY AFFECT THE DESIGN OF THESE SYSTEMS AND THEIR RATE OF MARKET PENETRATION AND ULTIMATELY IMPACT THE BACKUP ENERGY LOAD THAT THEY PLACE ON THE UTILITIES. THIS REPORT DISCUSSES THE PROBLEM IN TERMS OF SEVEN KEY ISSUES, AND SUGGESTS SEVEN POSSIBLE ACTIONS GOVERNMENT AND REGULATORY BODIES MAY WISH TO CONSIDER.

77-0125 ENERGY: WHO'S DOING WHAT.
ARLINGTON, VIRGINIA, NATIONAL RECREATION AND PARK ASSOCIATION, JANUARY 1977. 47P.

APPROXIMATELY 200 U.S. CITIZEN GROUPS, COMPANIES, AND NON-PROFIT AGENCIES THAT ARE INVOLVED IN SOME TYPE OF ENERGY WORK ARE LISTED. THE LIST WAS COMPILED AS A SERVICE TO INTERPRETERS AND NATURALISTS IN PARKS AROUND THE NATION PARTICIPATING IN AN EXPERIMENTAL EFFORT TO ENCOURAGE THE USE OF ENERGY CONSERVATION THEMES IN PARK PROGRAMS (THE PARK PROJECT ON ENERGY INTERPRETATION). THE ORGANIZATIONS INCLUDED WERE SELECTED BECAUSE THEY HAVE PROGRAMS OR FACILITIES THAT MAY BE OF EDUCATIONAL VALUE TO CITIZENS. THEY EMBRACE A VARIETY OF POLITICAL AND PHILOSOPHICAL SOLUTIONS TO ENERGY PROBLEMS. FOR EXAMPLE, PRO-NUCLEAR AS WELL AS ANTI-NUCLEAR GROUPS, AND HIGH-TECHNOLOGY-ORIENTED CORPORATIONS AND LOW-TECHNOLOGY, SELF-SUFFICIENT APPROACHES ARE INCLUDED. THE COMPILATION IS ARRANGED ALPHABETICALLY, BY STATE, ALTHOUGH ALL STATES ARE NOT REPRESENTED.

77-0126 ENGLARGED VERTICAL AXIS WIND TURBINE PRODUCES 60 KW.
DESIGN NEWS 33: 12-13, JULY 18, 1977.

77-0127 EPSTEIN E
GRUMMAN'S JIM YEN MAY MAKE WIND POWER PROFITABLE.
NEW ENG. 6(3): 19-23, MARCH 1977.

A GRUMMAN ENGINEER HAS INVENTED A WIND MACHINE THAT CREATES A TORNADO-LIKE WIND FLOW WITH THE POTENTIAL TO PRODUCE WIND PRESSURE ENERGY THAT IS ABOUT 3000 TIMES GREATER THAN THE KINETIC ENERGY TAPPED BY A WINDMILL. THE DESIGN CALLS FOR A TOWER WITH VANES THAT OPEN AND CLOSE. WHEN WINDS ENTER THE TOWER, THEY GAIN SPEED AND FORM A VORTEX; THE AIR THEN RUSHES INTO A TURBINE THAT DRIVES A GENERATOR. RESULTS OF EXPERIMENTS WITH A TOY MODEL OF THIS CONTRAPTION HAVE SHOWN THAT ENGINEER JIM YEN'S TORNADO MACHINE PRODUCES 10 TIMES MORE ENERGY THAN A CONVENTIONAL WINDMILL DOES.

77-0128 ESCOBAR I, IBACACHE M E
CONTRIBUTION TO THE ANALYSIS OF THE DEVELOPMENT OF UNCONVENTIONAL ENERGY SOURCES IN LATIN AMERICA. TRANSLATION OF SPANISH REPORT.
NTIS, APRIL 1977. 32P.
ERDA-TR-298

THE ENERGY DEMAND FOR LATIN AMERICA WILL BE SATISFIED BY THE END OF THE PRESENT CENTURY MAINLY THROUGH UTILIZATION OF ITS CONVENTIONAL HYDRAULIC AND FOSSIL RESOURCES. NUCLEAR ENERGY WILL EXPERIENCE A GREAT DEVELOPMENT

IN ARGENTINA, BRAZIL, AND MEXICO IN THE COMING 20 YEARS. THE ELECTRONUCLEAR ALTERNATIVE IN OTHER LATIN AMERICAN COUNTRIES WILL BE CONSIDERABLE DEPENDING ON THE DEGREE OF INDUSTRIALIZATION, GEOGRAPHICAL LOCATION AND THE POSSIBILITIES FOR INTERCONNECTING NETWORKS FOR TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY IN THE COUNTRY CONSIDERED AND DEPENDING ON REDUCTION IN DESIGN SCALE AND SAVINGS MADE IN NUCLEAR REACTORS PRESENTLY IN USE (DROPPING DOWN TO CAPACITIES OF ABOUT 150 MW PER PLANT). THE DEVELOPMENT OF WIND ENERGY, THERMAL GRADIENT OF THE OCEAN, SOLAR ENERGY, PHOTOVOLTAIC CELLS, PROCESSES OF PHOTOSYNTHESIS, MHD ENERGY, GEOTHERMAL ENERGY, AND TIDAL POWER AS ENERGY SOURCES IS DISCUSSED.

77-0129 EVANS A L, REID R L, HENDRICKS R C
FEASIBILITY STUDY OF A COMBINED WIND-SOLAR SYSTEM FOR SPACE AND DOMESTIC HOT WATER HEATING.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19. P.41-45.

IN THIS STUDY, A COMBINED WIND-SOLAR SYSTEM WAS SIMULATED WHERE THE ELECTRICAL ENERGY PRODUCED BY THE WIND GENERATOR WAS STORED THERMALLY IN THE WATER STORAGE TANK OF THE SOLAR SYSTEM. AN EXAMINATION OF WIND AND SOLAR DATA FOR CLEVELAND, OHIO SHOWED THE SYSTEM TO BE PARTICULARLY ATTRACTIVE FOR THIS LOCATION. A COMPUTER SIMULATION WAS RUN OVER A YEAR PERIOD USING A MODIFIED VERSION OF TRNSYS. TRNSYS HAD PREVIOUSLY BEEN MODIFIED TO INCLUDE A WIND GENERATOR SUBROUTINE. THE ECONOMIC ANALYSIS SHOWED THAT A COMBINED WIND-SOLAR SYSTEM WITH HOME-ASSEMBLED WIND GENERATORS WILL BE ECONOMICAL.

77-0130 HIRST P, REES D H
THE REGULATION, STORAGE, AND CONVERSION OF WIND PRODUCED ELECTRICAL ENERGY AT THE LEVEL OF A FEW HUNDRED WATTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F4-41 TO F4-48.

WIND PRODUCED ELECTRICAL ENERGY IS HIGHLY VARIABLE IN BOTH MAGNITUDE AND DURATION IN BOTH THE SHORT TERM--MINUTES, AND THE LONG TERM--HOURS AND DAYS. AS THE COST OF THE WIND TURBINE AND ITS SUPPORTING STRUCTURE IS VERY HIGH FOR THE POWER PRODUCED (COMPARED WITH OTHER PRIME SOURCES) IT IS DESIRABLE TO EXTRACT THE MAXIMUM PRACTICAL POWER FROM A FLUCTUATING WIND SPEED. NORMALLY POWER MUST BE EXTRACTED OVER A WIDE RANGE OF WIND SPEEDS, AND A LOAD BE APPLIED TO THE WIND TURBINE, APPROPRIATE TO THAT SPEED, TO OPERATE IT NEAR OPTIMUM EFFICIENCY. IT IS NECESSARY THAT ATTENTION BE PAID TO THE BEHAVIOUR WITH HIGH WIND SPEEDS TO PREVENT DAMAGE TO THE WIND TURBINE, ITS SUPPORT, OR THE POWER HANDLING EQUIPMENT. IN MANY CASES POWER IS REQUIRED AT A RATE WHICH BEARS NO RELATION TO WIND CONDITIONS AND STORAGE MUST BE PROVIDED. THIS PAPER DESCRIBES THE PROVISION OF A STEADY ELECTRICAL SUPPLY OF EITHER 50V, DC, OR 240V. 50HZ A.C., AT POWER LEVELS OF AROUND 100W. (THOUGH THESE FIGURES MAY BE VARIED), FROM WIND AS A PRIME SOURCE. THE TYPE OF APPLICATION ENVISAGED IS THE POWERING OF COMMUNICATIONS REPEATERS, NAVIGATIONAL AIDS, ETC.

77-0131 FEDERAL WIND ENERGY PROGRAM. SUMMARY REPORT. JANUARY 1, 1977.
WASHINGTON, D.C., U.S. GOVT. PRINTING OFFICE, 1977.
ERDA-77-32

TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS: THIS IS THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM, MANAGED BY THE WIND SYSTEMS BRANCH (WBS) OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DIVISION OF SOLAR ENERGY. TO ACHIEVE THIS OBJECTIVE FOR BOTH SMALL AND LARGE WIND SYSTEMS INVOLVES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE AND ADDRESSING THE NONTECHNOLOGICAL ISSUES WHICH COULD DETER THE USE OF WIND ENERGY. THIS SUMMARY REPORT OUTLINES THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 76 TOWARD THE ACHIEVEMENT OF THESE GOALS. IT ALSO OUTLINES THE PROGRAM'S GENERAL ORGANIZATION AND THE PROGRAM ELEMENTS WHICH MAKE IT WORK.

77-0132 FEKETE G I
SELF-CONTAINED 5,000 KW CAPACITY WIND ENERGY CONVERSION SYSTEM WITH STORAGE.

INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F2.13-F2.29.

THE USE OF WIND ENERGY AS THE SOLE SOURCE OF GENERATING 5,000 KW-S OF CONTINUOUS ELECTRICAL POWER IS CONSIDERED FOR THE MAGDALEN ISLANDS. THE SYSTEM IS TO BE SELF-CONTAINED AND IT IS REQUIRED THAT IT CAN BE BUILT WITHIN THE NEXT FEW YEARS USING, BY THEN, KNOWN TECHNOLOGY. THE WIND ENVIRONMENT OF THE MAGDALEN ISLANDS IS FOUND TO BE IDEAL FOR WIND ENERGY CONVERSION SYSTEMS. PERFORMANCE CALCULATIONS ARE CARRIED OUT FOR TWO SYSTEMS WHICH ARE TECHNICALLY FEASIBLE. A CONSTANT LOAD DEMAND COMBINED WITH THE VARIATION IN THE AVAILABLE WIND ENERGY LEADS TO LARGE VARIATION IN THE GENERATOR LOAD FACTOR, AND TO EXTENSIVE STORAGE CAPACITY REQUIREMENTS. THE CAPITAL COST OF THE TWO SYSTEMS AND THE COST OF ELECTRICITY ARE ESTABLISHED TO FIRST ORDER.

77-0133 FERBER R, O'ROURKE D
ESTIMATION OF NUMBER OF INDIVIDUALS OWNING WIND ENERGY CONVERSION SYSTEMS. PROGRESS REPORT, SEPTEMBER 1, 1977 - NOVEMBER 30, 1977.
NTIS, DECEMBER 1977. 4P.
COO/4549-1

THE PURPOSE OF THIS STUDY IS TO LOCATE AND INTERVIEW A SAMPLE OF INDIVIDUALS OWNING WIND ENERGY CONVERSION SYSTEMS (WECS) AND TO OBTAIN INFORMATION ABOUT THEIR USE AND EXPERIENCES WITH SETTING UP AND OPERATING THESE SYSTEMS. SINCE NO LISTS OF SUCH INDIVIDUALS ARE CURRENTLY AVAILABLE, A MAJOR TASK OF THIS STUDY WILL INVOLVE COMPILING SUCH A LIST, WHICH IS BEING DONE BY A VARIETY OF TECHNIQUES, INCLUDING THUS FAR SENDING LETTERS TO A LARGE RANGE OF INDIVIDUALS AND COMPANIES, REQUESTING THE NAMES OF ANY PERSONS WHO MAY OWN A WECS.

77-0134 FILAMENT WINDING FINDS A WINDFALL IN SEARCH FOR NEW ENERGY SUPPLIES.
MOD. PLAST. 54(8): 54-55, AUGUST 1977.

BACKED BY FEDERAL FUNDING, COMPOSITES TECHNOLOGY IS BEING REFINED TO PRODUCE HUGE WINDMILL ROTOR BLADES. RP/CONCRETE AND URETHANE BLADES ARE ALSO DISCUSSED.

77-0135 FISHLOCK D
TAMING WINDS OF CHANGE IS ADVANCED TECHNOLOGY.
ENGINEER (SPECIAL ISSUE): 160-161, 163, 1977.

THE AUTHOR DISCUSSES THE POTENTIALS OF SEVERAL ALTERNATIVE SOURCES OF ENERGY IN ENGLAND.

77-0136 FLAY R G J, LINDLEY D, BOWEN A J
FIELD MEASUREMENT OF THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND.
CHRISTCHURCH, NEW ZEALAND, UNIVERSITY OF CANTERBURY, 1977. 23P.

ACCURATE FIELD MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND WIND SPEED PROFILES NEAR THE GROUND ARE ESSENTIAL FOR THE OPTIMUM SITING OF WIND TURBINES AND IN THE INVESTIGATION OF THEIR PERFORMANCE AT A TEST SITE. A FIELD LABORATORY UNIT APPROPRIATE FOR THIS APPLICATION HAS BEEN DEVELOPED BY THE UNIVERSITY OF CANTERBURY MECHANICAL ENGINEERING DEPARTMENT FOR THE PURPOSE OF RECORDING TURBULENCE DATA FROM THE ATMOSPHERIC BOUNDARY LAYER. WIND VELOCITY COUNTS AT SCAN RATES OF 7.5 HZ AND ABOVE CAN BE OBTAINED FROM UP TO TWELVE ORTHOGONAL ARRAYS OF FAST RESPONSE PROPELLER ANEMOMETERS AND RECORDED ON MAGNETIC TAPE FOR LATER ANALYSIS. THE TECHNIQUES EMPLOYED IN THE HANDLING AND SUBSEQUENT PROCESSING OF THE DATA ARE DESCRIBED AND SOME RESULTS FROM PRELIMINARY MEASUREMENTS IN THE FIRST TWENTY METRES OF A RURAL BOUNDARY LAYER ARE DISCUSSED.

77-0137 FREEMAN B E, TAFT J R
MATHEMATICAL MODELLING OF TOPGRAPHIC EFFECTS ON WIND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A3.39-A3.52.

IT IS GENERALLY RECOGNIZED THAT ECONOMIC OPERATION OF LARGE-SCALE WIND ENERGY INSTALLATIONS MUST BE PRECEDED BY A COMPREHENSIVE STUDY TO SELECT OPTIMUM WIND ENERGY SITES. THE SURVEY MUST CONSIDER HOW SITES CAN BE EXPECTED TO DIFFER FROM EACH OTHER WITH RESPECT TO THEIR MULTI-YEAR WIND

CHARACTERISTICS. A NEW STEP TO OVERCOME SERIOUS DEFICIENCIES IN WIND CHARACTERESTICS ASSESSMENT PROCEDURES IS DESCRIBED. THIS STEP EMPLOYS MATHEMATICAL MODEL-BASED METEOROLOGICAL PREDICTION TOOLS. WITH THEM CLIMATOLOGICAL DATA FROM WEATHER STATIONS IN THE REGION ARE USED TO INFER CLIMATOLOGICAL DATA AT THE UNMEASURED LOCATIONS WITHIN THE REGION. METEOROLOGICAL PHENOMENA ARE CONSIDERED WHICH TAKE PLACE IN REGIONS COMPARABLE TO THE DISTANCE BETWEEN SYNOPTIC WEATHER STATIONS (APPROXIMATELY 200 KM) AND IN THE IMMEDIATE VICINITY OF THE WINDMILL SITE (APPROXIMATELY 1 KM). COMPUTER CODES WERE DEVELOPED FOR EACH OF THESE REGIMES, AND CALCULATIONS OF WIND FLOW OVER COMPLEX TERRAIN HAVE BEEN PERFORMED. RESULTS OF SOME OF THESE WIND CALCULATIONS ARE PRESENTED, ILLUSTRATING THE EFFECTS OF TERRAIN ON WIND ENERGY POTENTIAL.

77-0138 FREES H
FREE WATER SUPPLY FROM WIND POWER.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 345-351. (IN GERMAN)

PUMPS DRIVEN BY WIND POWER (WIND PUMPS) ARE DESCRIBED WHICH ARE USED FOR DRAINING THE SOIL OR FOR IRRIGATING ECONOMICALLY USED AREAS.

77-0139 FRERIS L L
PERFORMANCE-OPTIMISED WIND ENERGY CONVERSION SYSTEM FOR SPACE HEATING.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS, CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X60-X62.

THE OBJECTIVE OF THIS PROJECT IS TO SET UP AND DEMONSTRATE A SMALL SIZE WIND ENERGY CONVERSION SYSTEM THAT IS CHEAP TO MANUFACTURE AND CAN PROVIDE ENERGY AT COMPETITIVE COST IN COMPARISION TO OTHER FUELS. FOR THE ECONOMICS TO BE FAVORABLE, IT IS NECESSARY TO SATISFY THE FOLLOWING CONDITIONS: (1) THE ENERGY CONVERTED SHOULD BE UTILIZED IN SUCH A WAY THAT THE MINIMUM COMPLICATION AND COST IS INCURRED, (2) A CHEAP ENERGY STORAGE DEVICE IS USED, (3) THE WINDMILL ROTOR SHOULD OPERATE AT MAXIMUM CONVERSION EFFICIENCY IRRESPECTIVE OF WIND SPEED CHANGES AND THE LEVEL OF UTILIZATION OF ITS OUTPUT SHOULD BE AS HIGH AS POSSIBLE. THE ABOVE CONDITIONS ARE SATISFIED IF THE WIND ENERGY IS WHOLLY UTILIZED FOR THE SPACE HEATING OF BUILDINGS AND GREENHOUSES. IN A HOUSEHOLD, SPACE AND WATER HEATING REPRESENT ABOUT 80 PERCENT OF THE YEARLY ENERGY DEMAND, SPACE HEATING IN NORTHERN CLIMATES BEING NECESSARY FOR TEN MONTHS OF THE YEAR AND WATER HEATING DEMAND BEING CONTINUOUS. WITH THE WINDMILL COUPLED TO AN ALTERNATOR THE OUTPUT OF WHICH IS USED DIRECTLY TO GENERATE HEAT IN A DISSIPATIVE LOAD, IMMEDIATE USE IS MADE OF THE AVAILABLE WIND ENERGY. WITH SUCH AN APPLICATION THERE IS NO NEED TO CONTROL THE FREQUENCY OF THE ALTERNATOR. THIS SIMPLIFIES THE ELECTRICAL SYSTEM AND PERMITS THE USE OF SIMPLER CONTROLLERS TO MAXIMIZE THE POWER EXTRACTED FROM THE WIND.

77-0140 FRITZSCHE A A
ECONOMICS OF A VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. D1.1-D1.6.

SOME ECONOMIC ASPECTS OF THE VERTICAL-AXIS WIND TURBINE (DARRIEUS TYPE) ARE CONSIDERED. A SUMMARY OF THE VARIOUS KINDS OF APPLICATION IS PRESENTED. THE COMPONENTS OF THE TURBINE CONSIST OF CONVENTIONAL AND NEW DEVELOPED ONES. THE MANUFACTURING PROCESSES OF THE ROTOR BLADES AND THE ROTATING TOWER DEPEND ON THE SIZE OF THE UNIT TO A FAR EXTENT. IT IS PROVED BY A COST ESTIMATE THAT THE MANUFACTURING COSTS ARE HIGHLY INFLUENCED BY LABOR COST. SPLITTING UP OF THE TOTAL UNIT IN INDIVIDUAL COMPONENTS FACILITATES A LESS COMPLEX MANUFACTURE OF ALL COMPONENTS WITH HIGH LABOR RATE IN DEVELOPING COUNTRIES. BASED ON THE PRESENT STAGE OF TECHNICAL DEVELOPMENT, MANUFACTURING COSTS OF THE VERTICAL-AXIS TURBINE ARE TO BE EXPECTED IN THE SAME ORDER OF MAGNITUDE AS THE COMMERCIALLY AVAILABLE WIND TURBINE WITH HORIZONTAL-AXIS (10 KW). IN A POWER-RANGE ABOVE 20 KW IT CAN BE ASSUMED THAT THE DARRIEUS ROTOR WILL BE LESS ECONOMICAL.

77-0141 GARSTANG M, ASPLIDEN C, PIELKE R, NNAJI S
COASTAL WIND ZONE ENERGY. ANNUAL PROGRESS REPORT, MARCH 15, 1977 - JUNE 15, 1977.

NTIS, JUNE 23, 1977. 3P.
RLO/2344-5

DURING THE PAST QUARTER MOST OF THE DATA OUTLINED IN THE HALF-YEARLY REPORT HAS BEEN ACQUIRED OR IS NOW NEARLY COMPLETELY COMPILED. THESE CONSIST OF THE FOLLOWING: HIGH FREQUENCY WIND MEASUREMENTS FROM NASA WALLOPS FLIGHT FACILITY TOWERS; MEDIUM FREQUENCY WIND MEASUREMENTS FROM NASA WALLOPS 10 M TOWERS (ISLAND AND MAINLAND) FOR ONE YEAR; LOW FREQUENCY WIND MEASUREMENTS FROM 50 COASTAL STATIONS TOGETHER WITH OTHER SURFACE METEOROLOGICAL VARIABLES; AND COAST GUARD STATIONS AND OCEAN STATIONS.

77-0142 GEBBEN V D
INVESTIGATION OF EXCITATION CONTROL FOR WIND-TURBINE GENERATOR STABILITY.
NTIS, AUGUST 1977. 17P.
N77-31614, ERDA/NASA/1028-77/3

HIGH SPEED HORIZONTAL AXIS WIND TURBINE GENERATORS WITH BLADES ON THE DOWNWIND SIDE OF THE SUPPORT TOWER REQUIRE SPECIAL DESIGN CONSIDERATIONS TO HANDLE DISTURBANCES INTRODUCED BY THE FLOW WAKE BEHIND THE TOWER. EXPERIMENTS AND ANALYTICAL ANALYSES WERE MADE TO DETERMINE BENEFITS THAT MIGHT BE OBTAINED BY USING THE GENERATOR EXCITER TO PROVIDE SYSTEM DAMPING FOR REDUCING POWER FLUCTUATIONS.

77-0143 GENERATE YOUR OWN WIND POWER.
SCI. DIG. 82(4): 30-31, OCTOBER 1977.

77-0144 GERMAIN F
ENERGY STORAGE AND CONVERSION TECHNIQUE AND APPARATUS.
U.S. PATENT NO. 4,058,979, NOVEMBER 22, 1977. 6P.

THE KINETIC ENERGY OF THE WIND IS CONVERTED INTO COMPRESSED AIR WHICH IS STORED, IN A SYSTEM WHICH MAINTAINS A PREDETERMINED OUTPUT PRESSURE, FOR USE IN DRIVING A TURBINE COUPLED TO AN ELECTRICAL POWER GENERATOR. THE GAS STORAGE SYSTEM INCLUDES TWO PAIR OF SERIALLY CONNECTED STORAGE TANKS WITH THE FIRST TANK IN EACH PAIR RECEIVING COMPRESSED AIR FROM WIND DRIVEN COMPRESSORS AND INCLUDING A HYDRAULICALLY ACTUATED PISTON FOR USE IN FORCING THE AIR INTO THE SECOND TANK. EACH OF THE SECOND TANKS OF EACH PAIR INCLUDES A FLOATING PISTON WHICH WILL BE CAUSED TO ASCEND IN RESPONSE TO THE DELIVERY OF PRESSURIZED GAS THERETO FROM THE SERIALLY CONNECTED TANK INCLUDING THE HYDRAULICALLY ACTUATED PISTON AND THE PRESSURE IN EACH OF THE SECOND TANKS WILL BE MAINTAINED BY THE WEIGHT OF THE FLOATING PISTON.

77-0145 GIANT EGGBEATER TO HARVEST THE WIND.
MECH. ILLUS. 73: 16, OCTOBER 1977.

77-0146 GILBERT B L, OMAN R A, FOREMAN K M
FLUID DYNAMICS OF DIFFUSER AUGUMENTED WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1651-1659.

THE DIFFUSER AUGUMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). APPLICATION OF MODERN BOUNDARY LAYER CONTROL TECHNIQUES HAS REDUCED THE SURFACE AREA REQUIREMENTS OF AN EFFICIENT DIFFUSER BY AN ORDER OF MAGNITUDE. MANY PARAMETERS THAT EFFECT THE PERFORMANCE OF THE DIFFUSER SYSTEM HAVE BEEN EXAMINED IN SMALL SCALE WIND TUNNEL TESTS WITH A FAMILY OF COMPACT DIFFUSERS, USING SCREENS AND CENTERBODIES TO SIMULATE THE PRESENCE OF A TURBINE. FLOW FIELD SURVEYS, OVERALL PERFORMANCE, THE EFFECT OF GROUND PROXIMITY, AND THE PROSPECTS FOR FURTHER IMPROVEMENT ARE DESCRIBED. THE BASELINE CONFIGURATION IS A CONICAL, 60 DEG INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THIS FIRST GENERATION DAWT CAN PROVIDE TWICE THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE DIAMETER AND WIND. ECONOMIC ESTIMATES SHOW THAT THIS DAWT CAN BE AS MUCH AS 50 PERCENT CHEAPER THAN CONVENTIONAL WECS FOR THE SAME RATED POWER.

77-0147 GILBERT L J
SYNCHRONIZATION OF THE DOE/NASA 100 KW WIND TURBINE GENERATOR WITH A LARGE UTILITY NETWORK
NTIS, DECEMBER 1977. 19P.

NASA-TM-73861, DOE/NASA/1028/77/10

THE DOE/NASA 100 KILOWATT WIND TURBINE GENERATOR SYSTEM HAS BEEN ROUTINELY SUCCESSFULLY SYNCHRONIZED WITH A LARGE UTILITY NETWORK SINCE SEPTEMBER 1976. THE SYSTEM EQUIPMENTS AND PROCEDURES ASSOCIATED WITH THE SYNCHRONIZATION PROCESS ARE DESCRIBED. TIME-HISTORY TRACES OF TYPICAL SYNCHRONIZATIONS ARE PRESENTED INDICATING THAT POWER AND CURRENT TRANSIENTS RESULTING FROM THE SYNCHRONIZING PROCEDURE ARE LIMITED TO ACCEPTABLE MAGNITUDES.

77-0148 GIPE P B
TOMORROW'S WIND TURBINES BEING BUILT TODAY IN PENNSYLVANIA.
ALTERN. SOURCES ENERGY NO. 29: 5-10, DECEMBER 1977.

TERRY MEHRKAM'S TWO WINDMILLS ON THE FAMILY FARM NEAR HAMBURG PA. ARE DESCRIBED.

77-0149 GIPE P B
WIND ACTIVISTS IN THE COMMONWEALTH.
WIND POWER DIG. 1(9): 32-35, SUMMER 1977.

TWO PENNSYLVANIA PROJECTS ARE DESCRIBED. ONE IS A GROUP WORKING ON LARGE SCALE PROJECTS. THE OTHER IS DO-IT-YOURSELFERS ON SMALL SCALE PROJECTS.

77-0150 GIPE P B
THE MEHRKHAMS REVISITED.
WIND POWER DIG. NO. 10: 13-16, FALL 1977.

77-0151 GIPE P B
WIND POWER IN PA: TERRY MEHRKHAM'S WIND MACHINE.
WIND POWER DIG. 1(9): 27-31, SUMMER 1977.

77-0152 GLASER P E
SOLAR ENERGY -- WHERE ARE THE OPPORTUNITIES?
AWARE NO. 77: 2-5, FEBRUARY 1977.

WIND ENERGY, OCEAN THERMAL GRADIENTS, DIRECT ENERGY CONVERSION, SOLAR HEAT CONVERSION, AND OTHER DEVICES ARE BEGINNING TO BE TESTED AS ALTERNATIVE MEASURES FOR CONVERTING SOLAR ENERGY INTO USEFUL FORMS. ON A SHORTER SCALE OF TIME, SOLAR CLIMATE CONTROL--WATER HEATING AND COOLING OF BUILDINGS--ALREADY HOLDS PROMISE AS FEASIBLE TECHNOLOGY FOR SOLAR CONVERSION. SOLAR COLLECTORS, THERMAL STORAGE MEDIUMS, CONVENTIONAL ENERGY SOURCE INTERFACES, HEAT ACTUATED AIR-CONDITIONERS, HEAT PUMPS, AND AUXILIARY EQUIPMENT ARE BEING RESEARCHED FOR INTEGRATION INTO SOLAR CLIMATE CONTROL SYSTEMS.

77-0153 GLUCKIN N
WIND; WHEN PUSH COMES TO SHOVE, YOU MAY BE LEARNING ANEW THAT IT'S NOT SO UNKIND.
SCI. DIG. 82(4): 26-32, OCTOBER 1977.

77-0154 GOLDEN HAMMER.
MECH ILLUS. 73(589): 34, JUNE 1977.

A BRIEF DESCRIPTION IS PRESENTED OF A TRAVEL TRAILER EQUIPPED WITH A WIND GENERATOR WHICH SUPPLIES ALL OF ITS ELECTRICAL NEEDS.

77-0155 GOLDING E W
THE GENERATION OF ELECTRICITY BY WIND POWER.
LONDON, E. AND F. N. SPON LTD., 1977. 350P.

THIS IS A REPRINT, WITH ADDITIONAL MATERIAL, OF THE 1955 EDITION.

77-0156 GOSLICH H D
CONCEPT FOR THE USE OF WIND ENERGY WITH FAVOURABLE COST IMPLICATIONS. RESULTS FROM EXPERIENCE WITH THE SYLT DOUBLE ROTOR.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 393-369. (IN GERMAN)

THE CONSTRUCTION OF AN 11 KW WIND ENERGY PLANT WHICH WAS CONSTRUCTED ON THE ISLAND OF SYLT IS DESCRIBED. THE ROTOR DIAMETER IS 10 METRES, AND THE NUMBER OF BLADES IS 2. THE CONTROL OF THE PLANT, WHICH IS USED FOR

HEATING PURPOSES, TAKES PLACE VIA LOAD EXTRACTION. THE BEHAVIOUR (OF THE PLANT) IN OPERATION WAS SATISFACTORY.

77-0157 GOSLICH H D
WIND TURBINE BLADE WITH SAFETY CONTRIVANCE AGAINST EXCESS LOADS.
GERMAN (FRG) PATENT NO. 2,546,884/A/, APRIL 21, 1977. 7P. (IN GERMAN)

THE INVENTION PERTAINS TO WIND TURBINE BLADES WITH A SAFETY CONTRIVANCE AGAINST EXCESS LOADS. THE BLADES ARE SEPARATELY HINGED ON TAPPETS WHICH ARE AT RIGHT ANGLES TO THE LONGITUDINAL AXES OF THE BLADES. SOME EXAMPLES OF REALIZATION OF THE INVENTION ARE GIVEN.

77-0158 GRASTRUP H
WIND ENERGY PROGRAMME OF THE DANISH GOVERNMENT AND THE DANISH ELECTRICITY UNDERTAKINGS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P.23-26. (IN GERMAN)

A SURVEY IS PRESENTED OF THE DANISH WIND ENERGY PROGRAMME, WHICH WAS APPROVED IN 1976. THIS PROGRAMME IS DESIGNED TO PRODUCE REALISTIC DATA ON THE TECHNOLOGY AND ECONOMIC FEASIBILITY OF THE UTILIZATION OF WIND ENERGY FROM CONCRETE, PRACTICAL SOLUTIONS TO TECHNICAL PROBLEMS, AND FROM MEASUREMENTS AND EXPERIENCE IN USING WIND TURBINES.

77-0159 GRIFFEE D G, GUSTAFSON R E, MORE E R
DESIGN, FABRICATION, AND TEST OF A COMPOSITE MATERIAL WIND TURBINE ROTOR BLADE.
NTIS, NOVEMBER 1977. 186P.
NASA-CR-135389

THE AERODYNAMIC AND STRUCTURAL DESIGN, FABRICATION, AND TEST OF A 60-FOOT (18.3-METER)- LONG FILAMENT WOUND, COMPOSITE MATERIAL, WIND TURBINE ROTOR BLADE ARE DESCRIBED. THE BLADE WAS DESIGNED FOR USE WITH THE DEPARTMENT OF ENERGY/NASA MOD-0 100 KILOWATT EXPERIMENTAL WIND TURBINE LOCATED IN SANDUSKY, OHIO.

77-0160 GRIFFITHS R T
THE EFFECT OF AEROFOIL CHARACTERISTICS ON WINDMILL PERFORMANCE.
AERONAUT. J. 81: 322-326, JULY 1977.

AN OUTLINE OF THE GENERAL DESIGN PROCEDURE FOR A MODERN HIGH SPEED WINDMILL IS PRESENTED ALONG WITH A REVIEW OF HOW THE AERODYNAMIC CHARACTERISTICS OF THE BLADE SECTION AFFECT THE POWER OUTPUT. THE ACTUAL WINDMILL PERFORMANCE IS EVALUATED WITH REGARD TO THE INTERFERENCE FACTORS, AND THE BASIC MOMENTUM CONSIDERATIONS. IT IS SHOWN THAT AIRFOIL CHARACTERISTICS HAVE SMALL EFFECTS ON PLANFORM SHAPE AND TWIST, BUT LARGE EFFECTS ON PERFORMANCE. SPECIFICALLY, IT IS CONCLUDED THAT THE MAXIMUM EFFICIENCY INCREASES RAPIDLY WITH A LIFT/DRAG RATIO OF UP TO APPROXIMATELY R = 30, THEREAFTER INCREASING LESS QUICKLY, AND THAT THE TIP SPEED RATIO ALSO DEPENDS ON THE CHARACTERISTIC OF THE AIRFOIL USED.

77-0161 GRIMMER D P, KOLSTAD C D
AN INEXPENSIVE METHOD FOR CONSTRUCTING DARRIEUS BLADES.
ALTERN. SOURCES ENERGY NO. 29: 14-20, DECEMBER 1977.

INEXPENSIVE WIND-POWER, PARTICULARLY FOR SMALL-SCALE APPLICATIONS, FROM VERTICAL-AXIS DARRIEUS WIND TURBINES HAS BEEN HAMPERED BY HIGH BLADE COSTS. THIS PAPER DISCUSSES A LOW COST BLADE DESIGN WHICH IS SIMPLE ENOUGH FOR CONSTRUCTION BY THE HOME CRAFTSMAN OR SMALL MANUFACTURER. MATERIALS COSTS ARE ESTIMATED AT $74 FOR A SINGLE 15 FOOT BLADE (1977 COSTS). CONSTRUCTION TECHNIQUES AS WELL AS DESIGNS ARE DISCUSSED.

77-0162 GROSSMAN R, DANEKER G
JOBS + ENERGY.
ENVIRONMENTALISTS FOR FULL EMPLOYMENT REPORT, SPRING 1977. 21P.

HISTORICALLY, INDUSTRY HAS SOUGHT TO SUBSTITUTE ENERGY-INTENSIVE ECONOMIES FOR HUMAN LABOR. IT HAS SUCCEEDED IN REPLACING HUMAN LABOR WITH ENERGY PURCHASES AT VERY LOW RATES FROM AN EXPANDING ENERGY INDUSTRY, WHICH HAS BEEN ACCUMULATING AN EVER-SPIRALING WEALTH OF PROFITS. INSTEAD, ENERGY SHOULD BE USED TO SERVE THE PEOPLE. ENERGY SUFFICIENCY, ECONOMIC PROSPERITY AND JOBS SHOULD BE PURSUED THROUGH A

PROGRAM WITH VARIOUS SAFE, ENERGY-EFFICIENT TECHNOLOGIES. ALTERNATIVE TECHNOLOGIES, SUCH AS SOLAR AND WIND ENERGY AND BIOMASS CONVERSION, CAN ACCOMPLISH THE DUAL GOAL OF PROVIDING BOTH ENERGY AND JOBS. A STRONG INPUT OF NEW LABOR WILL BE NEEDED TO DESIGN, MANUFACTURE, INSTALL, AND MAINTAIN SOLAR AND OTHER ALTERNATIVE EQUIPMENT.

77-0163 GROVER R D, VENERUSO A F
SANDIA VERTICAL AXIS WIND TURBINE PROGRAM. TECHNICAL QUARTERLY REPORT, JULY - SEPTEMBER 1976.
NTIS, JUNE 1977. 35P.
SAND-77-0711

THIS QUARTERLY REPORT DESCRIBES THE ACTIVITIES OF THE SANDIA LABORATORIES' VERTICAL-AXIS WIND TURBINE (VAWT) PROJECT DURING THE PERIOD JULY TO SEPTEMBER 1976, TRANSITIONAL QUARTER OF FISCAL YEAR 1976. INCLUDED ARE THE HIGHLIGHTS OF THE QUARTER; REVIEW OF THE STATUS OF GENERAL DESIGN EFFORTS IN THE AREAS OF AERODYNAMICS, STRUCTURES, AND TESTING.

77-0164 HAACK B N
AN EXAMINATION OF SMALL WIND ELECTRIC SYSTEMS IN MICHIGAN. PH.D. THESIS.
ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NUMBER 77-18048, 1977. 223P.

THE USE OF SMALL WIND POWERED GENERATORS FOR SUPPLYING ELECTRICITY TO INDIVIDUAL HOUSEHOLDS IN MICHIGAN IS EXAMINED. SMALL WIND ELECTRIC SYSTEMS ARE NOT CURRENTLY ECONOMICALLY COMPETITIVE WITH ELECTRICITY FROM UTILITY COMPANIES. INCREASING COSTS OF ELECTRICITY FROM UTILITY COMPANIES, GOVERNMENTAL SUBSIDIES FOR INDIVIDUALS INSTALLING WIND ELECTRIC SYSTEMS, OR DECREASED CAPITAL COSTS OF THESE SYSTEMS AS A RESULT OF LARGE VOLUME PRODUCTION MAY GREATLY INCREASE THE ECONOMIC COMPETITIVENESS OF SMALL WIND ELECTRIC SYSTEMS. THE NET ENERGY ANALYSES OF SMALL WIND ELECTRIC SYSTEMS CONCLUDED THAT THESE SYSTEMS ARE ENERGETICALLY COMPETITIVE WITH EXISTING UTILITY COMPANY'S SYSTEMS. DIRECT ENVIRONMENTAL IMPACTS FROM THE NORMAL OR ABNORMAL OPERATION OF SMALL WIND ELECTRIC SYSTEMS APPEAR TO BE SLIGHT BUT INDIRECT ENVIRONMENTAL IMPACTS, E.G., INCURRED DURING ACQUISITION OF MATERIALS FOR CONSTRUCTION, MAY BE CONSIDERABLE.

77-0165 HAM N D
AEROELASTIC ANALYSIS OF THE TROPOSKIEN WIND TURBINE.
NTIS, APRIL 1977. 28P.
SAND-77-0026

THE TESTING OF TROPOSKIEN-TYPE WIND TURBINES HAS INDICATED THAT UNDER CERTAIN CONDITIONS SERIOUS VIBRATIONS OF THE BLADES CAN OCCUR, INVOLVING FLATWISE BENDING, TORSION, AND CHORDWISE BENDING. IT IS THE PURPOSE OF THIS REPORT TO PERFORM AN AEROELASTIC ANALSYIS OF THE STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF SUCH BLADES WITH A VIEW TO DETERMINING THE CAUSE OF THESE VIBRATIONS AS A MEANS OF SUPPRESSING THEM. THE EMPHASIS OF THE ANALYSIS IS ON OBTAINING PHYSICAL UNDERSTANDING RATHER THAN EXACT NUMERICAL RESULTS. THE EFFECT OF EXTREME VARIATION OF THE CHORDWISE LOCATION OF THE SECTION CENTER OF GRAVITY OF TROPOSKIEN-TYPE ROTOR BLADES WAS FOUND TO BE NEGLIGIBLE WITH REGARD TO BLADE FLUTTER. THIS CONCLUSION IMPLIES THAT CHORDWISE MASS BALANCING OF THE BLADES IS NOT REQUIRED, WITH CONSEQUENT LARGE REDUCTIONS IN BLADE DESIGN AND MANUFACTURING REQUIREMENTS, AND THEREFORE IN BLADE COST.

77-0166 HAMMOND A L
SOFT TECHNOLOGY ENERGY DEBATE: LIMITS TO GROWTH REVISITED?
SCIENCE 196(4293): 959-961, MAY 27, 1977.

CONGRESSIONAL INQUIRIES, OFFICAL STUDIES BY ERDA, AND IMPASSIONED REBUTTALS BY MUCH OF THE ENERGY ESTABLISHMENT ARE REACTIONS TO THE THESIS OF AMORY LOVINS, A PHYSICIST TURNED ENVIRONMENTAL ADVOCATE FOR FOE. LOVINS BELIEVES THAT THE U.S. ALREADY CAN ACCOMPLISH A TOTAL CONVERSION TO SOFT TECHNOLOGY TO PROVIDE THE COUNTRY'S ENERGY NEEDS. THE ANALYSIS ADVOCATES THE USE OF SOLAR HEATING AND COOLING, WIND AND HYDROELECTRICITY, AND FUELS FROM RENEWABLE BIOLOGICAL MATERIALS. THE CONTROVERSIAL ASPECTS OF LOVINS' WORK HOLDS THAT WIND MILLS, HYDROELECTRICITY, BIOMASS, AND OTHER RENEWABLE RESOURCES ARE ALREADY SUFFICIENT TO MAKE THE SWITCH. ESTABLISHED ENERGY ORGANIZATIONS, SUCH AS ERDA, HAVE SPENT MUCH TIME PICKING APART LOVINS' ATTEMPT TO JUSTIFY THIS

CLAIM.

77-0167 HAND A J
HOME ENERGY HOW-TO.
NEW YORK, HARPER + ROW, 1977. 268P.

THIS IS A COMPLETE GUIDE TO SAVING AND PRODUCING HOME ENERGY. WAYS ARE SUMMARIZED TO CUT HOME OPERATING COSTS; CONSERVE FOSSIL FUELS; REDUCE POLLUTION; AND HEAT, COOL, AND POWER THE HOME. THE BOOK IS DIVIDED INTO TWO PARTS. PART I DEALS WITH WAYS TO CONSERVE ENERGY. PART II CONCENTRATES ON WAYS TO HARNESS THE ENERGIES OF SUN, WIND, WATER, AND BIOFUELS--AND HEAT WITH WOOD. PART I BEGINS WITH THOUGHTS ON ELIMINATING WASTE. MEANS ARE DESCRIBED TO KEEP WARM AND COOL AIR WHERE YOU WANT THEM. PRACTICAL CONCERNS INCLUDE INSULATION, CAULKING, WEATHERSTRIPPING, WINDOWS, DOORS, LANDSCAPING, AND HOUSE DESIGN. THE AUTHOR EXPLAINS HOW TO EVALUATE MATERIALS, COST, AND PAYBACK TIMES, AND PROVIDES CLEARLY ILLUSTRATED STEP-BY-STEP INSTRUCTIONS FOR HANDLING NEARLY ALL OF THE TASKS YOURSELF. MAINTENANCE OF FURNACES AND AIR CONDITIONING SYSTEMS IS DESCRIBED. PART II TELLS HOW TO PRODUCE ENERGY WITH SOLAR COLLECTORS, WIND AND WATER GENERATORS, BIOFUEL PLANTS, AND WOODBURNERS. THE AUTHOR EXPLAINS THE PRINCIPLES OF THE BEST HOT-AIR AND HOT-WATER SYSTEMS, AND THEN TELLS HOW TO DETERMINE WHICH WOULD WORK WELL. OVER 200 EASY-TO-FOLLOW ILLUSTRATIONS AND THE LATEST IN METHODS AND MATERIALS ARE INCLUDED.

77-0168 TILTING WINDMILL AT READING.
ELECTR. POWER 23(9): 685, SEPTEMBER 1977.

A PROTOTYPE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL DEVELOPED BY P. J. MUSGROVE AT THE UNIVERSITY OF READING IS DESCRIBED.

77-0169 HANNERVALL L, VON ZWEYBERGK S
LOW EFFICIENCY OF WIND POWER.
TEK. TIDSKR. 107(13): 27-28, 32-33, SEPTEMBER 9, 1977. (IN SWEDISH)

EXPERIMENTAL SMALL-SCALE WIND POWER PLANTS IN SWEDEN ARE DESCRIBED AND THEIR OPERATIONAL EXPERIENCE IS EVALUATED. THE DATA OBTAINED GIVE NO REASON TO AN EXAGGERATED OPTIMISM AS TO THE WIND POWER PLANT EFFICIENCY; THE INSTALLATION COSTS ARE HIGH AND THE ENERGY PRODUCTION IS LOW. PROBABILITIES FOR AN ECONOMICAL ENERGY PRODUCTION WITH SMALL-SCALE WIND POWER PLANTS ARE SHOWN TO BE SMALL.

77-0170 HARDER E L
SPECIFIC OUTPUT OF WINDMILLS: A DISCOVERY.
IEEE PROC. 65(11): 1623-1625, NOVEMBER 1977.

BECAUSE THE WIND VARIES WIDELY FROM POINT TO POINT ON THE EARTH IT HAS GENERALLY BEEN ASSUMED THAT THE SPECIFIC OUTPUT OF A WIND TURBINE GENERATOR, THE KILOWATTHOURS GENERATED IN A YEAR PER KILOWATT OF RATING, COULD ONLY BE DETERMINED FROM THE PARTICULAR WIND PATTERN INVOLVED. HOWEVER, IT WAS DISCOVERED EMPIRICALLY THAT THE SPECIFIC OUTPUT OF WINDMILLS IS PRACTICALLY INDEPENDENT OF THEIR LOCATION ON THE EARTH, OR OF THE MEAN ANNUAL WIND VELOCITY. IT DEPENDS INSTEAD ON THE RATIO OF THE RATED SPEED V/SUB R/, THE WIND SPEED AT WHICH FULL RATING IS REALIZED, TO THE MEAN ANNUAL WIND VELOCITY V/SUB M/. THIS IS DEMONSTRATED BY DATA FROM MANY DESIGNS AND WIND-POWER SITES. THE RESULTING CURVE OF SPECIFIC OUTPUT VERSUS V/SUB R//V/SUB M/, TOGETHER WITH THE FUNDAMENTAL FORMULA FOR POWER EXTRACTED FROM THE WIND BY A WINDMILL CONSTITUTES A USEFUL APPROXIMATE DESIGN AND OPTIMIZING METHOD.

77-0171 HARDY D M
WIND ENERGY ASSESSMENT.
NTIS, JUNE 1977. P 18-25.
UCRL-52000-77-6

AS PART OF THE FEDERAL WIND ENERGY PROGRAM, WORK ON THE ISLAND OF OAHU, HAWAII, TO DEVELOP GENERAL METHODS OF ASSESSING WIND ENERGY IS REPORTED; THIS WILL BE SUITABLE FOR OTHER MOUNTAINOUS REGIONS OF THE U.S., INCLUDING THE PACIFIC COAST, ROCKY MOUNTAIN, AND NEW ENGLAND AREAS. COMPUTER SIMULATIONS AND METEOROLOGICAL MEASUREMENTS HAVE BEEN MADE TO STUDY HOW WIND ENERGY VARIES IN TIME AND FROM PLACE TO PLACE. ROUGH, MOUNTAINOUS COUNTRY - LIKE OAHU - CAN CAUSE ENORMOUS LOCAL VARIATIONS IN WIND ENERGY. HOWEVER, SEVERAL SUBAREAS OF HIGH WIND-ENERGY POTENTIAL

HAVE BEEN IDENTIFIED, AND WORK IS BEING FOCUSED ON ONE THAT APPEARS ESPECIALLY SUITABLE FOR WIND-POWER DEVELOPMENT.

77-0172 HARDY D M
NUMERICAL AND MEASUREMENT METHODS OF WIND ENERGY ASSESSMENT.
NTIS, AUGUST 1977. 29P. ALSO NTIS, AUGUST 1977. 19P. REV.
UCRL-79896, UCRL-79896 (REV.1)

THIS PAPER WAS GIVEN AT THE 3D. BIENNIAL WIND ENERGY CONVERSION SYSTEMS CONFERENCE, WASHINGTON D.C., SEPTEMBER 19, 1977. THE LAWRENCE LIVERMORE LABORATORY (LLL) IS ENGAGED IN A QUANTITATIVE STUDY OF WIND ENERGY - ITS MAGNITUDE AND ITS VARIATIONS - AS PART OF THE FEDERAL WIND ENERGY PROGRAM. ATTENTION IS GIVEN TO HILLY OR MOUNTAINOUS REGIONS, WHERE TERRAIN STRONGLY EFFECTS THE NEAR-SURFACE AIR-FLOW. MANY PARTS OF THE NATION CAN BE CLASSED AS MOUNTAINOUS, INCLUDING THE PACIFIC COAST, ROCKY MOUNTAIN AND NEW ENGLAND REGIONS. COMPLEX TERRAIN RESULTS IN DRAMATIC INCREASES OR DECREASES IN WIND SPEED THAT MAKE WIND ENERGY ASSESSMENT IN THESE AREAS ESPECIALLY DIFFICULT. THE COMPLETE METHODOLOGY IS SYSTEMATIC AND SHOULD PROVE USEFUL IN ALL MOUNTAINOUS REGIONS IN PROVIDING A COST-EFFECTIVE DOCUMENTATION OF THE WIND RESOURCE.

77-0173 HYDRAULIC WIND TURBINE PATENTED.
WIND POWER DIG. 1(9): 21-22, SUMMER 1977.

A SYSTEM IS DESCRIBED FOR DERIVING USEFUL ENERGY FROM A WINDMILL IN WHICH A LIQUID PUMP IS DRIVEN BY THE WINDMILL. USEFUL ENERGY IS OBTAINED BY EITHER A FLUID DRIVEN GENERATOR OR A FRICTION HEATER. THE OUTPUT OF THE PUMP AND THE SPEED OF THE WINDMILL ARE CONTROLLED BY A CONSTANT VOLUME VALVE IN THE FLUID CIRCUIT.

77-0174 HARDY D M
WIND STUDIES IN COMPLEX TERRAIN.
NTIS, MAY 1977. 39P.
UCRL-79430

THIS PAPER WAS PRESENTED AT THE AMERICAN WIND ENERGY ASSOCIATION MEETING IN BOULDER, COLORADO, MAY 13, 1977. THE DEVELOPMENT AND APPLICATION OF GENERAL METHODS OF WIND ENERGY ASSESSMENT FOR HILLY OR MOUNTAINOUS AREAS IS DESCRIBED. THE ISLAND OF OAHU, HAWAII IS BEING USED AS AN INITIAL STUDY AREA TO DEVELOP PROCEDURES USEFUL THERE AND IN OTHER MOUNTAINOUS REGIONS. NUMERICAL MODEL CALCULATIONS AND FIELD MEASUREMENTS ARE EMPLOYED IN STUDYING THE SPATIAL AND TEMPORAL VARIATIONS OF WIND ENERGY. FIELD MEASUREMENT AND MODEL RESULTS SHOW VERY SIGNIFICANT WIND ENERGY SPATIAL VARIATIONS OCCUR AS A RESULT OF COMPLEX TERRAIN. APPLICATIONS OF THE METHODOLOGY IN IDENTIFYING LOCATIONS OF WIND ENHANCEMENT WITH MULTI-MEGAWATT POWER COLLECTION POTENTIAL ARE DESCRIBED.

77-0175 HARDY D M, WALTON J J
WIND ENERGY ASSESSMENT.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, 1977. 29P.

THIS PAPER WAS PRESENTED AT THE MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, DECEMBER 5-7, 1977. MAJOR ASPECTS OF WIND ENERGY ASSESSMENT ARE DISCUSSED. REPRESENTATIVE EXAMPLES OF MODERN WIND TURBINE GENERATORS ARE BRIEFLY DESCRIBED IN TERMS OF SIZE, POWER, GENERAL DESIGN, AND OPERATING CHARACTERISTICS. SPATIAL AND TEMPORAL SCALES OF WIND VARIATIONS AND METEOROLOGICAL DATA REQUIREMENTS ARE DISCUSSED. METEOROLOGICAL CONDITIONS IN SEVERAL COASTAL AND MOUNTAINOUS AREAS WITH HIGH WIND ENERGY DENSITIES ARE SUMMARIZED. METHODS USED TO MAP WIND ENERGY VARIATIONS OVER THE ISLAND OF OAHU, HAWAII, ARE PRESENTED AS AN EXAMPLE OF WIND ENERGY ASSESSMENT IN COMPLEX TERRAIN. THE STUDY IS PRESENTLY DOCUMENTING WIND RESOURCES BY MEANS OF COORDINATED FIELD DATA COLLECTION AND NUMERICAL MODELING EFFORTS. A NUMERICAL WINDFIELD MODEL IS USED TO CALCULATE THREE-DIMENSIONAL VELOCITIES OVER THE ISLAND. DATA ARE COLLECTED FROM REMOTE FIELD MEASUREMENT STATIONS LOCATED TO IMPROVE MODEL INPUT DATA AND TO PROVIDE LOCAL WIND ENERGY MEASUREMENTS. A STATISTICAL ANALYSIS OF WIND OBSERVATIONS IS USED TO DETERMINE PREDOMINANT WIND PATTERNS. FIELD MEASUREMENT AND NUMERICAL MODEL RESULTS OBTAINED FOR OAHU, HAWAII, ARE GIVEN TO ILLUSTRATE HOW THIS GENERAL METHODOLOGY MIGHT BE APPLIED TO OTHER MOUNTAINOUS OR HILLY REGIONS.

77-0176 HARDY D M, ZALKIN R L, WALTON J J, HILL K L
KAHUKU, OAHU WIND SUMMARY. PERIOD COVERED: AUGUST - NOVEMBER 1976.

NTIS, FEBRUARY 1977. 11P.
UCID-17403

WIND-ENERGY MEASUREMENTS CONDUCTED BY THE LAWRENCE LIVERMORE LABORATORY ON THE ISLAND OF OAHU, HAWAII, ARE DISCUSSED BRIEFLY. MEASUREMENT LOCATIONS IN NORTHERN OAHU ARE IDENTIFIED. THE MEASUREMENT SITE AT KAHUKU, OAHU, IS DESCRIBED. DATA OBTAINED AT THE KAHUKU LOCATION ARE SUMMARIZED AS DAILY AND MONTHLY MEAN VELOCITIES FOR AUGUST THROUGH NOVEMBER, 1976. VELOCITY DURATION CURVES FOR EACH MONTH ARE ALSO GIVEN.

77-0177 PRINCE M, STODDARD W
UNIVERSITY OF MASSACHUSETTS SOLAR WIND HOUSE.
ALTERN. SOURCES ENERGY NO. 26: 26-27, JUNE 1977.

A UNIVERSITY OF MASSACHUSETTS PROJECT IS DESCRIBED WHICH JOINS A WINDMILL AND SOLAR COLLECTORS IN A UNIQUE HEATING SYSTEM.

77-0178 HARRIS G S, ELLIS M J, SCOTT G C, WOOD J R, PHILLIPS P H
ENERGY SCENARIOS FOR NEW ZEALAND.
AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, REPORT NO. 19, MARCH 1977. 140P.

THREE SCENARIOS ARE PRESENTED: (1) IMPLICATIONS FOR ENERGY THROUGH A CONTINUATION OF PAST POLICIES, ATTITUDES AND INSTITUTIONS; (2) SITUATION WHEN SOCIETY PLACES CONSIDERABLE VALUE ON THE QUALITY OF THE PHYSICAL ENVIRONMENT AND IMPOSES RESTRICTIONS ON THE HITHERTO UNMODIFIED GOAL OF A HIGHER MATERIAL STANDARD OF LIVING; AND (3) A "LIMITED GROWTH" SCENARIO.

77-0179 HAYES D
ENERGY: THE SOLAR PROSPECT.
WORLDWATCH INST. REP. NO. 11, MARCH 1977. 79P.

NO COUNTRY USES AS MUCH ENERGY AS THE SUNLIGHT CONTAINED WITHIN ITS BUILDINGS. THE INCREASING SOPHISTICATION OF SOLAR ENERGY TECHNOLOGY AND THE STEADY DECLINE IN THE EARTH'S FOSSIL RESOURCES, THUS, ASSURE A SIGNIFICANT POSITION FOR SOLAR ENERGY AS A WORLDWIDE SUPPLIER OF ENERGY. AT PRESENT THE DESIGN OF A FARSIGHTED ENERGY POLICY WOULD REQUIRE PAYING A PREMIUM FOR AN EARLY SWITCH TO SOLAR ENERGY. THE FEASIBILITY OF DEVELOPING OTHER RENEWABLE ENERGY SOURCES, SUCH AS WIND POWER, ARE REVIEWED.

77-0180 HEIER S
WIND ENERGY CONVERTER AND MECHANICAL ENERGY CONVERTER ADAPTATION AND CONTROL.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 187-222. (IN GERMAN)

THE OPERATING CHARACTERISTICS OF WIND ROTORS WITH HORIZONTAL AXES (WITH SLOW AND FAST SPEED OF ROTATION) ARE BRIEFLY OUTLINED, AND THE MOST IMPORTANT WORKING MACHINES FOR WIND ENERGY CONVERSION WITH TYPES OF CIRCUIT AND METHODS OF OPERATION OF THE WIND ENERGY PLANT WITH MUTUAL ADAPTION AND CONTROL ARE LISTED, AND THEIR OPERATING CONDITIONS ARE INDICATED.

77-0181 HEINEN C J
WATTS FROM THE WIND.
QST 61: 15-19, JULY 1977.

77-0182 HENNESSEY J P
SOME ASPECTS OF WIND POWER STATISTICS.
J. APPL. METEOROL. 16(2): 119-128, FEBRUARY 1977.

SOME OF THE PROBLEMS OF WIND POWER STATISTICS ARE EXAMINED. THE EXACT RELATIONSHIP BETWEEN THE MEAN WIND SPEED AND THE MEAN OF THE CUBE OF THE WIND SPEED IS DISCUSSED. THE WEIBULL PROBABILITY DENSITY FUNCTION, A GOOD MODEL FOR WIND SPEED DISTRIBUTIONS, LEADS TO A WEIBULL MODEL FOR DISTRIBUTION OF THE CUBE OF THE WIND SPEED. THIS MODEL FACILITATES THE COMPUTATION OF THE MEAN AND THE STANDARD DEVIATION OF THE TOTAL WIND POWER DENSITY, THE USABLE WIND POWER DENSITY, AND THE WIND POWER DENSITY DURING THE HOURS WHEN AN AEROGENERATOR IS OPERATING. THE WEIBULL MODEL IS APPLIED TO DATA FROM THREE OREGON WIND POWER SITES LOCATED IN RUGGED TERRAIN. IT IS CONCLUDED THAT THE MEAN AND STANDARD DEVIATION OF THE

WIND SPEED ARE THE MINIMUM STATISTICS NECESSARY FOR WIND POWER ESTIMATES, THAT THE WEIBULL MODEL FOR THE WIND POWER DENSITY HAS MANY COMPUTATIONAL ADVANTAGES, AND THAT THE EXISTING WIND POWER STUDIES BASED SOLELY ON THE TOTAL MEAN WIND POWER DENSITY OMIT MUCH VALUABLE INFORMATION ABOUT THE WIND POWER POTENTIAL OF A SITE.

77-0183 HERRERA G, WEINER H, NELSON D
AN ASSESSMENT OF WIND-POWERED GENERATORS FOR NAVIGATIONAL AIDS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1660-1667.

THIS STUDY EXAMINES ALTERNATIVE POWER SYSTEMS INCLUDING AN ASSESSMENT OF WIND-POWERED GENERATORS FOR USE ON NAVIGATIONAL AIDS. DATA FROM A TOTAL OF TWENTY-THREE SITES ON THE EAST, GULF AND WEST COASTS OF THE UNITED STATES WERE EVALUATED FOR THE ANNUAL WIND VELOCITY DISTRIBUTION. WIND ENERGY DATA FROM THE U.S. NAVAL WEATHER SERVICE COMMAND WERE PROCESSED AND ANALYZED WITH THE AID OF A COMPUTER PROGRAM DEVELOPED AT JPL. COMMERCIALLY AVAILABLE WIND-POWERED GENERATORS WERE ASSESSED TO DETERMINE EXISTING SYSTEMS APPLICABLE FOR MARINE USE. COMPARISONS WERE MADE WITH RESPECT TO INITIAL COST AND LIFETIME, BETWEEN WIND-POWERED GENERATORS AND OTHER POWER SYSTEMS APPLICABLE TO MINOR NAVIGATIONAL AIDS. SERVICE, OPERATION AND MAINTENANCE COSTS WERE NOT INCLUDED IN THIS STUDY. THE POWER SYSTEMS ANALYZED AND EVALUATED WERE: (1) WIND-POWERED GENERATORS, (2) SOLAR PHOTOVOLTAIC ARRAYS, (3) WIND-POWERED GENERATORS AND SOLAR PHOTOVOLTAIC ARRAYS IN COMBINATION, (4) ZINC-AIR PRIMARY BATTERIES, AND (5) A WAVE-MOTION POWERED GENERATOR. POWER SYSTEMS CORRESPONDING TO LIGHTHOUSE APPLICATIONS WERE EVALUATED BUT HAVE NOT BEEN INCLUDED IN THIS PAPER DUE TO SPACE LIMITATIONS.

77-0184 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. PHASE 1.
NTIS, JULY 1977. 68P.
RLO/2227-T24-77/2

THE OBJECTIVE OF THIS STUDY IS TO DEVELOP METHODS OF USING WIND DEFORMED VEGETATION FOR THE SELECTION OF OPTIMUM SITES FOR UTILIZATION OF WIND ENERGY. FIVE DIFFERENT INDICES OF WIND EFFECTS ON TREES HAVE BEEN DEVELOPED AND ARE PRESENTLY BEING CALIBRATED IN TERMS OF VARIOUS WIND CHARACTERISTICS. IN ADDITION WIND SHAPED COASTAL SHRUBS ARE BEING INVESTIGATED AS INDICATORS OF PERSISTENT STRONG WINDS. FIELD STUDIES ARE PRESENTLY BEING CONDUCTED IN THE COLUMBIA GORGE AND IN WESTERN OREGON. CONSIDERABLE EFFORT HAS BEEN DEVOTED TO THE DEVELOPMENT OF A COMPLETE REFERENCE LIST CONCERNED WITH WIND DEFORMED VEGETATION. PARTICULARLY USEFUL REFERENCES HAVE BEEN ABSTRACTED AND PRESENTED IN AN APPENDIX.

77-0185 HEWSON E W, BAKER R W, WADE J E
EXECUTIVE SUMMARY ON RESEARCH ON WIND POWER POTENTIAL IN SELECTED AREAS OF OREGON. FINAL REPORT.
OREGON STATE UNIVERSITY, REPORT NUMBER PUD77-5, JUNE 1977. 31P.

THE RESULTS OF A FIVE YEAR RESEARCH STUDY ARE SUMMARIZED AND THE FIFTH YEAR RESULTS DESCRIBED IN DETAIL. CONCLUSIONS ARE (1) SUFFICIENT WIND POWER IS AVAILABLE IN THE NORTHWEST; (2) THE TECHNOLOGY EXISTS; (3) THE ENVIRONMENTAL IMPACTS ARE MINIMAL IF GENERATORS ARE PLACED IN REMOTE AREAS; (4) WIND POWER PLUS HYDROPOWER CAN BE DEVELOPED MORE CHEAPLY THAN A COMBINATION OF HYDRO AND OIL OR GAS; AND (5) WIND POWER, OF ALL THE ALTERNATE ENERGY SOURCES, HAS THE GREATEST POTENTIAL AS A NEAR TERM SOURCE OF ENERGY.

77-0186 HEWSON E W
ENERGY FROM THE WIND; TESTIMONY BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH AND WATER RESOURCES OF THE INTERIOR COMMITTEE, U.S. SENATE, 2 MARCH 1976.
AMER. METEOROL. SOC. BULL. 58(1): 33-38, JANUARY 1977.

THE TESTIMONY IS ABOUT WIND ENERGY POTENTIAL IN THE PACIFIC NORTHWEST BASED ON RESEARCH BEGUN IN 1971 SPONSORED BY THE FOUR OREGON PUDS (PEOPLES UTILITY DISTRICTS).

77-0187 HIGHTOWER S J, WATTS A W
A PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.

MISSOURI BASIN SYSTEMS GROUP, ANNUAL MEETING, SIOUX FALLS, S.D., MARCH 9, 1977. PROCEEDINGS. DENVER, COLORADO, BUREAU OF RECLAMATION, LOWER MISSOURI REGION, 1977. 41P.

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED FOR A HIGH WIND REGION IN SOUTHERN WYOMING. THE STUDY WAS CARRIED OUT AS A PORTION OF THE WESTERN ENERGY EXPANSION STUDIES WHICH ARE BEING CONDUCTED BY THE BUREAU OF RECLAMATION TO LOOK INTO THE POSSIBILITIES OF UPRATING EXISTING HYDROELECTRIC FACILITIES AND TO PROVIDE OPTIMUM UTILIZATION OF THE HYDROELECTRIC RESOURCES AND THE POWER TRANSMISSION NETWORK IN THE WESTERN UNITED STATES.

77-0188 HILTON D J
SOME WINDPOWER DEVELOPMENTS IN KENYA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X75-X76.

RELIABLE WIND RESOURCES IN KENYA ARE TO BE FOUND MAINLY IN TWO AREAS, NAMELY THE FLAT, ARID NORTH EASTERN REGION AND IN THE WEST AROUND LAKE VICTORIA. IT HAS BEEN FOUND THAT THE WINDS IN THESE AREAS ARE MORE USEFUL THAN WAS FORMERLY THOUGHT. THE REASON FOR THIS IS THAT PREVIOUS WIND DATA IN THESE AREAS WAS SPARSE AND CONSISTED MAINLY OF DAY-TIME BEAUFORT ESTIMATES. IN AREAS WHERE LARGE TREES ARE ABSENT THIS LED TO AN UNDERESTIMATION OF WIND VELOCITY AND COMPLETELY IGNORED NIGHT WINDS, WHICH PARTICULARLY IN THE NORTH-EAST CAN BE VERY STRONG. CONVENTIONAL WATER-PUMPING MILLS OF THE MULTI-BLADE TYPE HAVE BEEN USED IN KENYA IN THE PAST BUT MAINLY IN THE HIGH-POTENTIAL FARMING AREAS WHERE THE WIND WAS NOT PARTICULARLY RELIABLE. WITH VERY FEW EXCEPTIONS THEY WERE NOT EMPLOYED IN THOSE AREAS OF GREATEST WIND POTENTIAL. ATTENTION IS NOW BEING GIVEN, HOWEVER, TO THE USE OF WINDPUMPS FOR SMALL-SCALE IRRIGATION AND IN THE RANCHING AREAS FOR WATERING CATTLE. A THIRD COMMON APPLICATION IS SEEN AS PUMPING WATER FROM AN EARTH DAM OR WELL THROUGH A SAND FILTER FOR HUMAN CONSUMPTION.

77-0189 KALKE S, GJERDING J, GUSTAFSSON F
TVIND POWER WINDMILL.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 323-327. (IN GERMAN)

THE POWER WINDMILL WHICH WAS CONSTRUCTED IN DENMARK DURING THE PERIOD 1975-1977 IS DESCRIBED. IT IS A FAST RUNNING TYPE AND CONSISTS OF A TOWER, A DOME OF A MILL AND THREE BLADES. THE HEIGHT OF THE TOWER IS 53 METRES, AND THE DIAMETER OF THE BLADES 54 METRES.

77-0190 HIRSCHFELD F
WIND POWER: PIPE DREAM OR REALITY?
MECH. ENG. 99(9): 20-28, SEPTEMBER 1977.

ON PAPER, ERDA'S CASE FOR WIND ENERGY CONVERSION SYSTEMS LOOKS GOOD. BUT PRIVATE ENTERPRISE IS TAKING A "SHOW-ME" ATTITUDE. ARE WIND MACHINES RELIABLE, ECONOMICAL, AND COMPATIBLE WITH EXISTING POWER-GENERATING AND DISTRIBUTION FACILITIES? THESE ARE SOME OF THE QUESTIONS THAT A SMALL BUT DEDICATED GROUP OF ENGINEERS AND SCIENTISTS AT THE WIND ENERGY CONVERSION BRANCH OF ERDA ARE TRYING TO ANSWER.

77-0191 HOFFMAN J A
COUPLED DYNAMICS ANALYSIS OF WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1977. 86P.
NASA-CR-135152, N77-20558

A QUALITATIVE DESCRIPTION OF ALL KEY ELEMENTS OF A COMPLETE WIND ENERGY SYSTEM COMPUTER ANALYSIS CODE IS PRESENTED. THE ANALYSIS SYSTEM ADDRESSES THE COUPLED DYNAMICS CHARACTERISTICS OF WIND ENERGY SYSTEMS, INCLUDING THE INTERACTIONS OF THE ROTOR, TOWER, NACELLE, POWER TRAIN, CONTROL SYSTEM, AND ELECTRICAL NETWORK. THE COUPLED DYNAMICS ARE ANALYZED IN BOTH THE FREQUENCY AND TIME DOMAIN TO PROVIDE THE BASIC MOTIONS AND LOADS DATA REQUIRED FOR DESIGN, PERFORMANCE VERIFICATION AND OPERATIONS ANALYSIS ACTIVITIES. ELEMENTS OF THE COUPLED ANALYSIS CODE WERE USED TO DESIGN AND ANALYZE CANDIDATE ROTOR ARTICULATION CONCEPTS. FUNDAMENTAL RESULTS AND CONCLUSIONS DERIVED FROM THESE STUDIES ARE

PRESENTED.

77-0192 HOHENEMSER K H
ENERGY: A COMMUNITY SOLAR AND WIND ENERGY SYSTEM.
ENVIRONMENT 19(2): 3-4, MARCH 1977.

A SUMMARY OF A THESIS BY A. H. P. SWIFT IS GIVEN PROPOSING AN ENERGY SYSTEM FOR A COMMUNITY OF 40 HOMES IN WHICH SOLAR AND WIND ARE USED FOR ELECTRICITY AND HEATING.

77-0193 HOHENEMSER K H, INGLIS D R
WINDPOWER UPDATE.
ENVIRONMENT 19(1): 5, 37, JANUARY-FEBRUARY 1977. REPLY WITH REJOINDER, D. R. INGLIS: ENVIRONMENT 19(4): 43-44, MAY 1977.

77-0194 HOLDEN C
NCAT: APPROPRIATE TECHNOLOGY WITH A MISSION.
SCIENCE 195(4281): 857-859, MARCH 4, 1977.

APPROPRIATE TECHNOLOGY IS GETTING A SMALL BUT SIGNIFICANT BOOST FROM THE FEDERAL GOVERNMENT, WHICH HAS AWARDED $3 MILLION TO A NEW NATIONAL CENTER FOR APPROPRIATE TECHNOLOGY IN BUTTE, MONTANA. THE MONEY COMES FROM THE COMMUNITY SERVICES ADMINISTRATION, THE AGENCY WITH THE LEFTOVERS OF THE OLD OFFICE OF ECONOMIC OPPORTUNITY. THE PEOPLE BEHIND THE CENTER COME FROM A BACKGROUND OF COMMUNITY ACTIVISM AND BELIEVE THE TIME HAS COME TO BRING APPROPRIATE TECHNOLOGY WHERE IT IS MOST NEEDED. THE BEST AVAILABLE EXAMPLE OF WHAT THE CENTER HOPES TO STIMULATE IS A WINDMILL AND SOLAR COLLECTION SYSTEM ON A DILAPIDATED BUILDING IN A POOR SECTION OF NEW YORK CITY.

77-0195 HOLGATE M J
CROSS FLOW WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B2.29-B2.38.

A THEORETICAL ANALYSIS IS PRESENTED OF THE OPERATION OF A TYPE OF CROSS FLOW TURBINE THAT DEPENDS FOR ITS ACTION ON ANGULAR MOMENTUM CONVERSION RATHER THAN AERODYNAMIC LIFT. EXPERIMENTAL RESULTS CONFIRM THE THEORETICAL PREDICTIONS TO A SATISFACTORY DEGREE. THESE ARE THAT WHILE THE TURBINE DOES DEVELOP A STARTING TORQUE AND HAS A STABLE TORQUE-SPEED CHARACTERISTIC, IT RUNS AT LOW VELOCITY RATIO AND HAS A LOW EFFICIENCY OF ENERGY CONVERSION.

77-0196 HOLMES J G, BALUSS J E, MIHLMESTER P E, MILLER S G, SUPER T L, THOMASANIAN J B
ENVIRONMENTAL AND SAFETY IMPLICATIONS OF SOLAR TECHNOLOGIES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. P. 285-289.

A SUMMARY OF AN EIGHT-VOLUME SERIES OF ENVIRONMENTAL REVIEWS (ERDA 77-47/1-8) PREPARED FOR THE ENVIRONMENTAL AND RESOURCE ASSESSMENTS BRANCH OF ERDA'S DIVISION OF SOLAR ENERGY BY ENERGY AND ENVIRONMENTAL ANALYSIS, INC., OF ARLINGTON, VIRGINIA IS PRESENTED. THE SERIES ANALYZED THE WIDE RANGE OF ENVIRONMENTAL IMPACTS EXPECTED TO OCCUR THROUGH THE IMPLEMENTATION OF THE EIGHT SOLAR TECHNOLOGIES CURRENTLY BEING FUNDED BY ERDA: HEATING/COOLING, SOLAR THERMAL ELECTRIC, TOTAL ENERGY SYSTEMS, INDUSTRIAL/AGRICULTURAL APPLICATIONS, PHOTOVOLTAICS, WIND, OCEAN THERMAL ENERGY CONVERSION, AND FUELS FROM BIOMASS.

77-0197 HOLME O
A CONTRIBUTION TO THE AERODYNAMIC THEORY OF THE VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C4-55 TO C4-72.

AN ANALYSIS IS MADE OF THE FLOW IN THE HORIZONTAL PLANE OF SYMMETRY OF A FAST RUNNING VERTICAL-AXIS WIND TURBINE HAVING A GREAT NUMBER OF STRAIGHT, VERY NARROW BLADES AND A HIGH HEIGHT-DIAMETER RATIO. THE ANALYSIS IS RIGOROUSLY VALID FOR ONLY VERY LIGHTLY LOADED TURBINES IN INCOMPRESSIBLE NONVISCOUS FLOW, BUT APPROXIMATIONS FOR HEAVIER LOADING

AND CORRECTIONS FOR VISCOUS EFFECTS ARE DERIVED. IT IS FOUND THAT HALF OF THE FLOW RETARDATION CAUSED BY THE TURBINE TAKES PLACE WITHIN THE TURBINE ITSELF. THUS BLADE INCIDENCE AND AERODYNAMIC LOAD ON THE BLADES ARE MUCH HIGHER ON THE WINDWARD THAN ON THE LEEWARD SIDE OF THE TURBINE. THE MAXIMUM VALUE OF THE POWER COEFFICIENT IN NON-VISCOUS FLOW FOR THIS TYPE OF TURBINE IS 92% OF THE THEORETICAL MAXIMUM FOR AN IDEAL WIND TURBINE.

77-0198 HOSLER C L
EXOTIC ENERGY SOURCES; THE PROMISE AND THE REALITY.
MIN. ENG. 29: 62+, MAY 1977.

77-0199 HOWE J W
ENERGY FOR THE VILLAGES OF AFRICA: RECOMMENDATIONS FOR AFRICAN GOVERNMENTS AND OUTSIDE DONORS.
WASHINGTON, D.C., OVERSEAS DEVELOPMENT COUNCIL, FEBRUARY 25, 1977. 145P.

THE SUBJECT OF VILLAGE SOURCE ENERGY FOR THE VILLAGES AND FARMS OF SUB-SAHARAN AFRICA IS EXAMINED, AND A COURSE OF ACTION FOR AFRICAN POLICYMAKERS AND OUTSIDE DONORS IS RECOMMENDED. VILLAGE SOURCE ENERGY INCLUDES THOSE FORMS OF PRIMARY ENERGY FOUND IN THE VILLAGES AND FARMS (SUN, WIND, FLOWING WATER, ANIMAL AND CROP WASTE, AND WOOD). THE FIRST QUESTION FOR AFRICANS TO RESOLVE IS WHETHER VILLAGE SOURCE ENERGY IS A FEASIBLE APPROACH - OR WHETHER RURAL AFRICANS MUST WAIT THE DECADES THAT WILL ELAPSE BEFORE A POWER GRID BRINGS THEM RELIABLE CENTRALLY GENERATED ELECTRICITY. THIS PAPER OUTLINES A COURSE OF ACTION FOR DEVELOPING THE INFORMATION NEEDED FOR AFRICANS TO MAKE TWO DECISIONS: (1) WHETHER VILLAGE-SOURCE ENERGY WARRANTS USE ON A WIDE SCALE AND, IF SO, (2) WHAT SYSTEM TO USE TO MATCH ENERGY HARDWARE WITH VILLAGE NEEDS AND TO INSTALL IT IN VILLAGES TOGETHER WITH A SUPPORT SYSTEM THAT WILL MAINTAIN IT, PROVIDE REPAIRS AND SPARE PARTS, AND GENERALLY KEEP IT OPERATING. THE COURSE OF ACTION CONSISTS OF THREE PARTS. 1. AFRICAN GOVERNMENTS, PERHAPS WORKING WITH OUTSIDE DONORS, SHOULD CONDUCT CERTAIN RESEARCH CALLED "SOFTWARE." 2. CREATE OR STRENGTHEN ENERGY-RELATED INSTITUTIONS. 3. IN THE FIELD OF HARDWARE RESEARCH, THREE THINGS ARE CALLED FOR: (A) INDUSTRIALIZED COUNTRIES' DOMESTIC ENERGY AND RESEARCH PROGRAMS SHOULD DEVOTE MORE ATTENTION TO SMALL-SCALE RENEWABLE ENERGY; (B) AID PROGRAMS SHOULD STRENGTHEN THEIR HELP TO AFRICAN RESEARCH ON HARDWARE BOTH TO APPLY AND ADAPT ENERGY TECHNOLOGIES DEVELOPED ELSEWHERE AND TO DEVELOP INDIGENOUS TECHNOLOGIES; AND (C) AID PROGRAMS SHOULD PROVIDE MORE HELP TO AFRICAN INSTITUTIONS TO DESIGN AND BUILD CHEAP, RELIABLE TOOLS, IMPLEMENTS AND APPLIANCES THAT CAN BE USED BY HAND OR POWERED BY VILLAGE SOURCE ENERGY TO PERFORM VILLAGE TASKS.

77-0200 HUGOSSON S
SWEDISH WIND ENERGY PROGRAMME.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 27-38. (IN GERMAN)

A SURVEY IS PRESENTED ON THE SWEDISH WIND ENERGY PROGRAM INITIATED IN 1973. AMONG OTHERS, ORGANIZATION OF THE PROGRAM, CHOICE OF APPLICATIONS, CHOICE OF TECHNOLOGY ARE DISCUSSED. IT WAS DECIDED TO DEVOTE MOST OF THE EFFORTS TO DEVELOP LARGE UNITS CONNECTED TO THE NATIONAL ELECTRIC POWER SYSTEM. HORIZONTAL AXIS PROPELLER-TYPE TURBINES ARE THE MAIN TECHNOLOGY CHOSEN FOR THE PROGRAM.

77-0201 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, JUNE 1977. 157P.
NTIS/PS-77/0400/OWE

THE BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR. WINDMILL AND WIND POWER FEASIBILITY, USE, AND ENGINEERING ARE DISCUSSED IN THESE CITATIONS OF WORLDWIDE RESEARCH. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH THE USE OF WIND POWER IN DEVELOPING COUNTRIES AND COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE STUDIES ON ENERGY STORAGE SYSTEMS.

77-0202 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE).

NTIS, JUNE 1977. 258P.
NTIS/PS-77/0399/4WE

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR. THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

77-0203 HUTTER U
OPTIMUM WIND-ENERGY CONVERSION SYSTEMS.
ANN. REV. FLUID MECH. 9: 399-419, 1977.

INFORMATION ON OPTIMUM CHARACTERISTICS OF WIND TURBINES IS PRESENTED CONCERNING THE ADVANTAGES OF HIGH SPECIFIC SPEED, LIMITATIONS FOR SPECIFIC SPEED, ROTOR CHARACTERISTICS AT STALL STATE, THE ROTOR'S DISC-VELOCITY COEFFICIENT, VORTEX-STATE PROBLEMS, THE NEAR CRITICAL OPERATING ROTOR (NCR), REFINEMENTS SIMPLIFICATIONS, AND OPTIMUM RATED POWER.

77-0204 HUTTER U
CHANCES OF WIND POWER.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 3-8, MAY 1977. (IN GERMAN)

THE ARTICLE PRESENTS A SURVEY OF THE POSSIBILITIES TO USE WIND POWER IN WESTERN EUROPE, IN PARTICULAR IN THE FRG. THE WIND POWER POTENTIAL OF THE FRG AMOUNTS TO 220 TWH/A, WHICH REPRESENTS ABOUT 70% OF THE ELECTRIC POWER USED IN 1973. ON A MEDIUM-TERM BASIS (I.E. UNTIL 1990), WIND POWER PLANTS COULD MEAN A NOTICEABLE RELIEF FOR PUBLIC UTILITIES. CONCEPTS OF WIND POWER PLANTS ARE DISCUSSED. IN THIS CONTEXT, A COMPROMISE BETWEEN PLANT CAPACITY AND WIND AVAILABILITY IS TO BE CONSIDERED. FINALLY, THE COSTS OF PLANTS OF THIS KIND ARE DISCUSSED.

77-0205 HUTTER U
WIND POWER.
NTIS, 1977. 4P.
AED-CONF-77-139-004

THIS PAPER WAS GIVEN AT THE ENERGY POLICIES FORUM, STUTTGART, WEST GERMANY, MAY 9, 1977. A SURVEY IS PRESENTED OF THE POSSIBILITIES TO UTILIZE WIND POWER. IN THE FRG, WIND POWER PLANTS COULD MEET ABOUT 70% OF THE ELECTRICITY DEMAND (APPROXIMATELY 200 TWH ON THE BASIS OF FIGURES OF 1973). INTERCONNECTED OPERATION BETWEEN WIND POWER CONVERTERS AND SOLAR ENERGY COLLECTORS FOR SUPPLYING REMOTE PROPERTIES OR VILLAGES SEEMS PARTICULARLY PROMISING.

77-0206 HUTTER U
POSSIBILITIES OF AND FUTURE FOR THE USE OF WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 1-15. (IN GERMAN)

THE POSSIBILITIES OF AND FUTURE FOR THE USE OF WIND ENERGY IN WEST GERMANY ARE DISCUSSED, BASED ON METEROLOGICAL DATA. TAKING INTO ACCOUNT VARIOUS TECHNICAL AND ECONOMIC FACTORS IT IS PROPOSED TO INSTALL WIND-POWERED CONVERTERS IN THE 2 MW TO 5 MW CLASS AT ABOUT 5 TIMES DIAMETRAL SPACING ALONG EXISTING REGIONAL ROADS.

77-0207 HWANG H H, GILBERT L J
RANDOM SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATORS WITH LARGE UTILITY NETWORKS.
NTIS, JULY 1977. 17P.
NASA-TM-X-73613, N77-19580

THE PROBLEM OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS. EXPERIMENTS HAVE BEEN RECENTLY PERFORMED ON THE ERDA-NASA 100 KW WIND

TURBINE. EXPERIMENTAL RESULTS MATCHED COMPUTER STUDY RESULTS VERY CLOSELY AND CONFIRMED THAT THE RANDOM SYNCHRONIZATION CAN BE ACCOMPLISHED BY MEANS OF THE EXISTING SPEED CONTROL SYSTEM AND THE AUTOMATIC SYNCHRONIZER.

77-0208 IGNATIUS N
GUIDE TO DEMONSTRATIONS OF ENERGY CONSERVATION, SOLAR ENERGY AND OTHER NEW TECHNOLOGIES: ENERGY EXTENSION SERVICE.
NTIS, SEPTEMBER 1977. 307P.
TID-28044

THIS GUIDE WAS COMPILED BY THE ENERGY EXTENSION SERVICE (EES) FOR USE BY STATE EES PLANNERS. IT IS INTENDED TO FACILITATE VIEWING OF SOLAR, CONSERVATION, AND OTHER ENERGY TECHNOLOGIES AT WORK. THE DEMONSTRATIONS LISTED IN THIS GUIDE HAVE GENERALLY BEEN LIMITED TO THOSE MOST APPLICABLE TO INDIVIDUAL HOMEOWNERS, SMALL BUSINESSES, SCHOOLS, AND FARMS. IN A FEW STATES, HOWEVER, MUNICIPAL SYSTEMS HAVE ALSO BEEN INCLUDED. MANY OF THESE PROJECTS HAVE RECEIVED FEDERAL FUNDING. THE MAJORITY OF PROJECTS DEMONSTRATE SOME FORM OF SOLAR ENERGY. IN ADDITION TO SOLAR HEATING AND COOLING FOR HOMES AND COMMERCIAL BUILDINGS, A NUMBER OF EXAMPLES OF FARM APPLICATIONS SUCH AS SOLAR CROP DRYING ARE LISTED, AS WELL AS DEMONSTRATIONS OF WIND ENERGY, BIOMASS, PHOTOVOLTAICS, ETC. SINCE ALL SUCCESSFUL SOLAR HEATING AND COOLING SYSTEMS INCORPORATE SENSIBLE ENERGY-CONSERVING DESIGN, EACH SOLAR HEATING AND/OR COOLING PROJECT IS AT THE SAME TIME AN ENERGY-CONSERVATION PROJECT. WHEN THESE CONSERVATION DESIGNS ARE OF SPECIAL INTEREST OR INVENTIVENESS, THIS HAS BEEN NOTED. IN A FEW CASES, PROJECTS DEMONSTRATE ONLY CONSERVATION MEASURES, SUCH AS THE CONSTRUCTION OF BUILDINGS UNDERGROUND.

77-0209 IGRA O
COMPACT SHROUDS FOR WIND TURBINES.
ENERGY CONVERS. 16(4): 149-157, 1977.

AS PART OF A LARGE PROJECT AIMED AT FINDING THE OPTIMAL CONFIGURATION FOR AN AEROGENERATOR TO EXPLOIT WIND POWER, AN INVESTIGATION WAS LAUNCHED TO FIND THE MOST COMPACT SHROUD POSSIBLE. THE DOMINANT CONTRIBUTOR TO THE SHROUD LENGTH IS THE STRUCTURE DOWNSTREAM OF THE TURBINE (THE DIFFUSER). THIS COMPONENT HAS AN EVER INCREASING CROSS-SECTION AS ONE PROGRESSES DOWNSTREAM. HOWEVER, FAST RATE OF AREA DIVERGENCE WILL CAUSE FLOW SEPARATION AND THE SIGNIFICANT REDUCTION IN OUTPUT POWER ASSOCIATED WITH IT. IT IS THE PURPOSE OF THE PRESENT PAPER TO DEMONSTRATE WAYS TO OVERCOME THIS DIFFICULTY. THIS CAN BE ACHIEVED EITHER BY PROPER DIVERSION AND INTRODUCTION OF THE SHROUD'S EXTERNAL FLOW INTO THE DIFFUSER'S INNER BOUNDARY LAYER OR, ALTERNATIVELY, BY THE USAGE OF A RING-FLAP.

77-0210 IGRA O
SHROUDED AEROGENERATOR.
ENERGY 2(4): 429-439, DECEMBER 1977.

EXPERIMENTAL STUDIES HAVE BEEN PERFORMED ON A SHROUDED AEROGENERATOR. THE DEVICE TESTED WILL PRODUCE ABOUT TWICE THE OUTPUT POWER OBTAINABLE FROM AN IDEAL WIND TURBINE WORKING UNDER THE SAME FREESTREAM CONDITIONS BUT WITHOUT A DUCT. THE AEROGENERATOR DOES NOT REQUIRE A DRIVING MECHANISM THAT WILL KEEP IT PARALLEL TO THE FREE-STREAM DIRECTION. A SIMPLE, TWO STAGE TURBINE WITH FIXED BLADE GEOMETRY WILL PROVIDE THE EXPECTED POWER OUTPUT OVER A FAIRLY WIDE RANGE OF FREE-STREAM VELOCITIES AND ROTATIONAL SPEEDS.

77-0211 IN THE WIND (OR SOON TO BE).
SCI. DIG. 82(4): 28-29. OCTOBER 1977.

77-0212 EVANS M
AN INFORMAL DIRECTORY OF U.S. WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND RESOURCE GROUPS.
MOTHER EARTH NEWS 46: 34-35, JULY/AUGUST 1977.

77-0213 INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH. PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. 1035P.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, WASHINGTON, D.C., AUGUST 28, 1977.

NINETY-SEVEN PAPERS ARE PRESENTED IN VOLUME II ON VARIOUS ASPECTS OF ENERGY CONVERSION. THOSE PAPERS ON WIND ENERGY ARE INDEXED SEPARATELY IN THIS BIBLIOGRAPHY.

77-0214 INTERVIEW WITH JIM MARTIN; BUILDING A WIND MACHINE.
WIND POWER DIG. 1(9): 48-55, SUMMER 1977.

77-0215 JACKSON P S
ASPECTS OF SURFACE WIND BEHAVIOUR.
WIND ENG. 1(1): 1-4, 1977.

THIS PAPER OUTLINES THE CURRENT UNDERSTANDING OF SOME OF THE PROBLEMS FACING THE ENGINEER IN CHOOSING A DESIGN WIND SPEED FOR A PARTICULAR SITE. FOR THE MOST PART THE COMPLEXITY OF THESE PROBLEMS DEFIES ANALYTIC TREATMENT OR COMPREHENSIVE MEASUREMENTS, BUT THERE ARE NOW SUFFICIENT STUDIES OF THE SIMPLER CASES TO MAKE THIS REVIEW WORTHWHILE. MOST OF THE RELEVANT MATERIAL HAS APPEARED SINCE 1970. THE BASIC MEAN WIND PROFILE ADOPTED IS THE LOG-LAW, SINCE IT CAN BE DERIVED FROM THE EQUATIONS OF MOTION UNDER IDEAL (BUT RATHER RESTRICTIVE) CONDITIONS. ALTHOUGH THESE CONDITIONS ARE RARELY MET IN PRACTICE, IT IS SHOWN THAT THE LOG-LAW FORMULATION NEVERTHELESS DESCRIBES A VERY USEFUL REFERENCE STATE OF THE WIND NEAR THE GROUND. THE EFFECTS OF CHANGES IN SURFACE ROUGHNESS AND VARIATIONS IN SURFACE SLOPE ARE DERIVED AS PERTURBATIONS TO THIS IDEAL STATE. TWO METHODS OF DESCRIBING EXTREME WIND GUSTS ARE ALSO DISCUSSED.

77-0216 JACOBS M
FEEDBACK.
WIND POWER DIG. 1(9): 5, SUMMER 1977.

THIS IS A SHARP REBUTTAL TO INFORMATION CONTAINED IN AN EARLIER ARTICLE IN WPD (1, #8, P. 6, SPRING 1977) ABOUT MARTIN JOPP'S WINDPLANT.

77-0217 JACOBS M
MARCELLUS JACOBS ON RAISING A TOWER.
ALTERN. SOURCES ENERGY NO. 29: 11-13, DECEMBER 1977.

77-0218 JANSEN W A M, SMULDERS P T
ROTOR DESIGN FOR HORIZONTAL AXIS WINDMILLS.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WINDENERGY IN DEVELOPING COUNTRIES, PUBLICATION SWD77-1, MAY 1977.

77-0219 JARASS L
STROMERZEUGUNG AUS WINDKRAFT: EIN ALTER TRAUM KANN WIRKLICHKEIT WERDEN.
ENERGIEWIRTSCH. TAGESFRAGEN 26(6): 357-365, 1978. (IN GERMAN)

77-0220 JOHANSON E E
STATUS OF WIND ENERGY CONVERSION SYSTEMS (WECS) FOR ELECTRIC UTILITY POWER GENERATION.
AM. NUCL. SOC. TRANS 26: 2, JUNE 1977.

77-0221 JOHNSON A W
APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS.
NTIS, 1977. P. 437-446.
CONF-770112

THE OVERALL PURPOSE OF THE PROGRAM, AS ORIGINALLY CONCEIVED, WAS TO OBTAIN SYSTEM-ORIENTED EVALUATIONS OF SELECTED CANDIDATE ENERGY STORAGE CONCEPTS FOR USE IN CONJUNCTION WITH PHOTOVOLTAIC AND WIND ENERGY CONVERSION SYSTEMS. INCLUDED ARE: (1) REVIEW OF ADDITIONAL CANDIDATE ENERGY STORAGE CONCEPTS (11 TOTAL); (2) EVALUATION OF THE INFLUENCE OF SELECTED PARAMETERS SUCH AS GENERATING SYSTEM OUTPUT, STORAGE CAPACITY, LOCATION AND EFFICIENCY ON ENERGY STORAGE COST GOALS; (3) EVALUATION OF THE EFFECT OF MULTIPLE-SOURCE STORAGE SYSTEM CHARGING ON THE WORTH OF PHOTOVOLTAIC AND WIND ENERGY SYSTEMS; AND (4) DETERMINATION OF THE VALUE OF TRANSIENT PHOTOVOLTAIC AND WIND ENERGY SYSTEM OUTPUT SMOOTHING USING ENERGY STORAGE TECHNIQUES.

77-0222 JOHNSON L R, SIMMONS G, PETERSON J
UNCONVENTIONAL ENERGY SOURCES. STUDY MODULE. (FINAL).
NTIS, 1977. 278P.
PB-268301

THIS REPORT REVIEWS AVAILABLE LITERATURE AND CURRENT STATE-OF-THE-ART ON UNCONVENTIONAL ENERGY SOURCES: GEOTHERMAL, BIOMASS, OCEAN, WIND, SOLAR. IT ESTIMATES QUANTITIES OF ENERGY AVAILABLE TO THE PACIFIC NORTHWEST (OREGON, WASHINGTON, IDAHO) AND THE COSTS OF RECOVERING AND UTILIZING ENERGY FROM THESE SOURCES. THE SUMMARY CONTAINS PROJECTIONS OF THE CONTRIBUTION OF UNCONVENTIONAL SOURCES TO NORTHWEST ENERGY NEEDS. AN ANNOTATED BIBLIOGRAPHY IS INCLUDED.

77-0223 JOHNSON L
WIND ENERGY UP-DATE.
RAIN III(9): 16-18, JULY 1977.

77-0224 JOHNSON L
WISE-WIND, DESIGNING FOR JOBS.
WIND POWER DIG. 1(9): 24-26, SUMMER 1977.

THE GEDSER WINDMILL, BUILT IN 1957 IN GERMANY, IS DESCRIBED AS AN EFFICIENT MACHINE WHICH COULD BE BUILT ECONOMICALLY, CREATING JOBS AS WELL AS AN ENERGY PRODUCING DEVICE.

77-0225 JONES B W, MORETTI P M
ECONOMIC ANALYSIS OF WIND GENERATION AND ENERGY STORAGE FOR ELECTRIC UTILITY SYSTEMS.
ANNUAL CONFERENCE ON ENERGY, 3D, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL CO., 1977. P. 255-263.

IF WIND GENERATORS ARE BEING EVALUATED AS PART OF A LARGER ELECTRIC UTILITY GENERATION SYSTEM, THE ECONOMIC ANALYSIS SHOULD CONSIDER ALL OF THEIR EFFECTS UPON THE MAKE-UP AND OPERATION OF THE REST OF THE SYSTEM. THE INTRODUCTION OF WIND GENERATORS CHANGES THE CHARACTERISTICS OF THE EFFECTIVE LOAD SEEN BY THE REST OF THE SYSTEM AND CONSEQUENTLY SHIFTS THE OPTIMAL MIX OF BASE, SWINGING, AND PEAKING CAPACITY AND THEIR OPERATION. STORAGE SYSTEMS USED IN CONJUNCTION WITH WIND GENERATORS MUST ALSO BE EVALUATED. THE STORAGE CAN ALSO BE EVALUATED BY DETERMINING ITS EFFECT UPON LOAD CHARACTERISTICS. IT IS SHOWN THAT THE STORAGE EVALUATION AND WIND-GENERATION EVALUATION CAN BE SEPARATED IN MOST CASES.

77-0226 MAGNIEN M
UTILIZING ALTERNATIVE ENERGY SOURCES IN FRANCE.
J. ENERGY RES. 1: 55-67, JANUARY - MARCH 1977.

THE RELATIVE MERITS OF VARIOUS ALTERNATIVE-ENERGY SOURCES ARE DISCUSSED WITH PARTICULAR REFERENCE TO THEIR SUITABILITY IN THE FRENCH CONTEXT. THE CASE IS PRESENTED FOR DECENTRALIZED SOLAR POWER AS AGAINST CENTRALIZED SOLAR-POWER PRODUCTION, AND SOME TEST INSTALLATIONS IN FRANCE ARE DESCRIBED. THE POTENTIAL FOR GEOTHERMAL POWER IS EXAMINED, AND IT IS SHOWN THAT THE RESOURCE IS ESSENTIALLY NONRENEWABLE. A HISTORY OF WIND GENERATION IN FRANCE IS PRESENTED, AND POWER EXTRACTION FROM THE SEAS IS DISCUSSED, WITH PARTICULAR REFERENCE TO THE RANCE TIDAL-POWER SCHEME. WHILE THE PUBLIC ROMANCE WITH ALTERNATIVE-ENERGY SCHEMES IS ACCEPTED, IT IS POINTED OUT THAT THIS MAY ONLY LAST FOR AS LONG AS THEIR IMPLEMENTATION IS ON A SMALL SCALE.

77-0227 JORDAN P F, GOLDMAN R L
SEGMENTED AND SELF-ADJUSTING WIND TURBINE ROTORS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1676-1683.

AN EXPLORATION HAS BEEN MADE OF THE CONCEPT OF AEROELASTICALLY SELF-ADJUSTING ROTOR BLADES DESIGNED WITH TWO GOALS IN MIND: ONE, TO KEEP (AT CONSTANT ROTOR RPM) THE ROTOR TORQUE OUTPUT ESSENTIALLY CONSTANT AUTOMATICALLY OVER A LARGE RANGE OF WIND SPEEDS; TWO, TO HAVE THE UNSTEADY AERODYNAMIC FORCES ACT AS DAMPING FORCES (RATHER THAN AS FLUTTER-PRODUCING FORCES). PRACTICAL CONSIDERATIONS LEAD TO A SEGMENTED BLADE DESIGN. THE PRELIMINARY RESULTS CONCERNING BOTH PERFORMANCE AND STABILITY OF SUCH BLADES ARE ENCOURAGING.

77-0228 MARIER D
TOWER RAISING WITH A GIN POLE.
ALTERN. SOURCES ENERGY NO. 24: 23, FEBRUARY 1977.

PHOTOGRAPHS AND DESCRIPTIONS SHOW HOW THE AUTHOR RAISED A 60-FOOT WINDMILL TOWER USING A GIN POLE.

77-0229 MARIER D
WIND TOWER.
ALTERN. SOURCES ENERGY NO. 26: 32-34, JUNE 1977.

STEP-BY-STEP ILLUSTRATED INSTRUCTIONS ARE PROVIDED FOR SETTING UP A WIND TOWER.

77-0230 JUSTUS C G
THE POTENTIAL FOR POWER PRODUCTION BY LARGE DISPERSED ARRAYS OF WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A2.23-A2.38

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500 KW - 1500 KW WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO NEW ENGLAND (U.S.) UTILITY DISTRIBUTION GRID. THESE STUDIES SHOW THAT IN MODERATE-TO-GOOD WIND ENVIRONMENTS THE 500 KW GENERATORS CAN AVERAGE (ON AN ANNUAL BASIS) 190 TO 240 KW MEAN POWER OUTPUT, AND THE 1500 KW GENERATORS (WHICH MUST HAVE HIGHER WINDS TO OPERATE AT FULL CAPACITY) CAN AVERAGE 240 TO 340 KW MEAN POWER OUTPUT. THE BENEFICIAL EFFECT OF OPERATING LARGE DISPERSE ARRAYS OF WIND TURBINES IS THAT RELIABLE POWER OUTPUT CAN BE INCREASED - IF WINDS ARE NOT BLOWING OVER ONE PART OF THE ARRAY, CHANCES ARE THEY WILL OVER SOME OTHER PART OF THE ARRAY. THESE STUDIES INDICATE THAT 100 KW PER 500 KW GENERATOR CAN BE ACHIEVED WITH ABOUT 70% TO 85% RELIABILITY (DEPENDING ON SEASON) WITH NO STORAGE INVOLVED, BY SPREADING THE WIND TURBINES OVER A DISPERSE GRID ABOUT 500 KM SIZE. THE 1500 KW UNITS PRODUCE 100 KW EACH WITH ABOUT 55% TO 75% RELIABILITY FOR THE SAME SIZE ARRAY. RELIABILITY LEVELS OF 200 KW PER 500 KW GENERATOR WERE SIMILARLY FOUND TO BE 45% TO 65%, DEPENDING ON THE SEASON, WITH 200 KW PER 1500 KW GENERATOR HAVING 40% TO 60% RELIABILITY. THE ARRAY STUDIES ALSO SHOW THE LEVELS OF RELIABILITY WHICH CAN BE ACHIEVED WITH STORAGE OF VARIOUS DESIGN DURATION. A STORAGE TIME OF 24 TO 48 HOURS WOULD INCREASE THE 200 KW PER GENERATOR POWER OUTPUT TO ABOUT 95% RELIABILITY. REASONABLY STEADY HIGH WIND POWER IN WINTER AND HIGH AFTERNOON PEAK WIND POWER IN SUMMER (CORRESPONDING TO PEAK AIR CONDITIONING LOAD) MEANS HOWEVER, THAT SIGNIFICANT PEAK LOAD DISPLACEMENT CAN BE ACHIEVED WITHOUT USE OF STORAGE.

77-0231 JUSTUS C G, HARGRAVES W R, MIKHAIL A
REFERENCE WIND SPEED STATISTICS FOR WIND TURBINE DESIGN.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, P. 11-15.

REFERENCE OR STANDARD WIND SPEED DISTRIBUTION STATISTICS ARE PRESENTED BASED ON REPRESENTATIVE LOW, AVERAGE, AND HIGH VARIANCE CASES OF MEASURED WEIBULL DISTRIBUTION PARAMETERS. RESULTS ARE ALSO PRESENTED OF A SENSITIVITY ANALYSIS OF THE DEPENDENCE OF WIND TURBINE PERFORMANCE ON WIND TURBINE PARAMETERS AND WIND SPEED DISTRIBUTION PARAMETERS.

77-0232 KALS W S
THE RIDDLE OF THE WINDS.
GARDEN CITY, N.Y., DOUBLEDAY, 1977.

CHAPTER 17 IS ENTITLED "POWER FROM THE WIND." THE HISTORY AND CURRENT STATUS OF WIND POWER ARE BRIEFLY COVERED.

77-0233 KAMAN WIND PROJECTS.
WIND POWER DIG. 1(8): 20-21, SPRING 1977.

77-0234 KAMINSKY F C
FOUR PROBABILITY DENSITIES (LOG-NORMAL, GAMMA, WEIBULL, AND RAYLEIGH) AND THEIR APPLICATION TO MODELLING AVERAGE HOURLY WIND SPEED.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, P. 6-10.

FOUR PROBABILITY DENSITY FUNCTIONS (THE LOG-NORMAL, THE GAMMA, THE WEIBULL, AND THE RAYLEIGH) AND PROCEDURES FOR ESTIMATING THE PARAMATERS OF EACH DENSITY FUNCTION ARE DESCRIBED. THE MODELS ARE THEN USED TO DESCRIBE AVERAGE HOURLY WIND SPEED FOR SELECTED MONTHS AT MT. TOM, HOLYOKE, MASSACHUSETTS. CHI-SQUARE GOODNESS OF FIT TESTS ARE THEN CONDUCTED TO DETERMINE THE APPROPRIATENESS OF EACH MODEL. THE RESULTS INDICATE THAT THE GAMMA AND THE WEIBULL DENSITY FUNCTIONS ARE MORE APPROPRIATE MODELS FOR THE DESCRIPTION OF AVERAGE HOURLY WIND SPEED.

77-0235 KIESSLING F
AEROELASTIC PROBLEMS FOR WIND ENERGY CONVERTERS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 133-164. (IN GERMAN)

A SURVEY IS PRESENTED ON THE AEROELASTIC RELATIONSHIP IN WIND ENERGY CONVERTERS. THE DESIGN IS CONCENTRATED ON UNITS WITH HORIZONTAL AXES. THE BASIC DYNAMIC CONDITIONS ARE EXPLAINED. SUBSEQUENTLY THE NATURAL FREQUENCIES OF OSCILLATION ARE CONSIDERED WHICH PLAY AN IMPORTANT PART IN AEROELASTIC PROCESSES. ONE MUST DISTINGUISH BETWEEN PROBLEMS OF STABILITY AND OF DYNAMIC RESPONSE. THE IMPORTANCE OF AEROELASTIC INVESTIGATION IS UNDERLINED BY EXPERIENCE IN OPERATING WIND ENERGY CONVERTERS AND EXAMPLES OF CALCULATION.

77-0236 KINDEREN W J G J DER, MEEL J J E A VAN, SMULDERS P T
EFFECTS OF WIND FLUCTUATIONS ON WINDMILL BEHAVIOUR.
WIND ENG. 1(2): 126-240, 1977.

A SYSTEM-ANALYTICAL APPROACH IS PROPOSED TO DESCRIBE THE OUTPUT, I.E., POWER AND FORCES, OF A WIND MACHINE FOR THE STOCHASTIC INPUT SIGNAL, THE WIND. A SIMPLE MODEL IS PRESENTED TO DESCRIBE THE FLUCTUATIONS OF WIND SPEED AND DIRECTION BY MEANS OF AVERAGE WIND SPEED AND WIND DIRECTION, THEIR VARIANCES AND TIME CONSTANTS. THESE INPUT SIGNALS ARE USED TO CALCULATE THE INFLUENCE OF WIND FLUCTUATIONS ON WINDMILL PERFORMANCE, INCLUDING THE EFFECTS OF NONUNIFORMITY OF THE FLOW IN THE ROTOR PLANE, ROTOR INERTIA AND YAWING OF THE ROTOR HEAT. EXPERIMENTAL RESULTS FOR A SMALL 2-BLADED WINDGENERATOR (DIAMETER ABOUT 4 M) ARE REPORTED.

77-0237 KLING A
VARIABLE SPEED WIND TURBINES FOR HIGH WIND ENERGY CONVERSIONS.
WIND ENG. 1(2): 141-149, 1977.

THIS STUDY COMPARES VARIABLE SPEED AND CONSTANT SPEED ROTOR GENERATOR SYSTEMS, AND SHOWS THAT UNDER CERTAIN CONDITIONS THE FORMER MAY EXTRACT MORE THAN TWICE AS MUCH USEFUL ENERGY AS THE LATTER. ALSO SUGGESTED ARE A ROTOR CONFIGURATION HAVING LESS VIBRATIONAL PROBLEMS THAN THE PROPELLER AND A HIGH FREQUENCY GENERATOR SPECIALLY ADAPTABLE TO VARIABLE SPEED SYSTEMS.

77-0238 KLING A
WIND POWER PLANT.
GERMAN (FRG) PATENT NO. 2,524,360/A/, JANUARY 13, 1977. 37P. (IN GERMAN)

THE WIND POWER PLANT DESCRIBED HAS AT LEAST ONE ROTOR WHICH IS COUPLED TO AN ELECTRICITY GENERATOR. THE SYSTEMS ARE FIXED TO A SUSPENDED BODY SO THAT IT IS POSSIBLE TO SET UP THE WIND POWER PLANT AT GREATER HEIGHT WHERE ONE CAN EXPECT STRONGER AND MORE UNIFORM WINDS. THE ANCHORING ON THE GROUND OR ON A FLOATING BODY IS DONE BY MOORING CABLES WHICH CAN SIMULTANEOUSLY HAVE THE FUNCTION OF AN ELECTRIC CABLE. THE WHOLE SYSTEM CAN BE STEERED BY FINS. THE ROTOR SYSTEM ITSELF CONSISTS OF AT LEAST ONE PAIR OF CONTRAROTATING, MOMENTUM BALANCED ROTORS.

77-0239 KONIGSBERG A S
HOW WIND VARIABILITY AFFECTS THE POTENTIAL POWER AVAILABLE FROM WIND GENERATORS.
WIND TECHNOL. J. 1(3): 8-10, FALL 1977.

77-0240 KROTH G J
CONTROL SYSTEM FOR WIND POWERED GENERATORS.
NTIS, MAY 1977. 15P.
SAND-77-0287

IN A SYSTEM OF WIND-POWERED GENERATORS, A RELIABLE YET INEXPENSIVE

CONTROL SYSTEM IS DESIRABLE. SUCH A SYSTEM WOULD BE COMPLETELY AUTOMATIC SO IT COULD BE LEFT UNATTENDED FOR LONG PERIODS. IT WOULD RESPOND TO ELECTRICAL REPRESENTATIONS OF DATA SUCH AS BEARING TEMPERATURE, VIBRATION, WIND VELOCITY, TURBINE VELOCITY, TORQUE, OR ANY OTHER PERTINENT DATA. IT WOULD RESPOND BY STARTING OR STOPPING THE TURBINE, CONTROLLING THE LOADING, OR SOUNDING AN ALARM. A MICROPROCESSOR-BASED CONTROLLER CAPABLE OF THESE FUNCTIONS IS DESCRIBED.

77-0241 LANEVILLE A
STUDY OF THE FEASIBILITY OF EXPLOITING THE GALLOPING PHENOMENON AS ENERGY SOURCE.
CAN. SOC. MECH. ENG. TRANS. 4(1): 23-26, 1976-1977. (IN FRENCH)

AEROELASTIC GALLOPING, OR VIBRATIONS OF AN AERODYNAMICALLY UNSTABLE PRISM, IS EXPLORED AS A POTENTIALLY USEFUL CONVERSION MECHANISM FOR EXPLOITING WIND ENERGY. VIBRATIONS ASSOCIATED WITH SHEDDING OF VORTICES ARE ASSUMED PRESENT. THE SHED VORTICES GENERATE OSCILLATIONS OF THE GALLOPING PRISM ONLY WHEN THE STROUHAL FREQUENCY CORRESPONDS TO THE PRISM NATURAL FREQUENCY (AT A SINGLE WIND VELOCITY). THE EFFICIENCY OF THE MECHANISM IS FOUND QUESTIONABLE FOR THE APPLICATION IN MIND. THE ORIENTATION OF THE PRISM IN A WIND FIELD CONSTANTLY CHANGING IN DIRECTION, TURBULENCE SPECTRA, AND CONVERSION OF THE CONSTANT FREQUENCY GENERATED TO 60 HZ BY AN APPROPRIATE SET OF MASSES AND SPRINGS, ARE CONSIDERED.

77-0242 LAPEYSEN E H
WIND POWER SYSTEMS. A SELECT BIBLIOGRAPHY.
NTIS, JANUARY 1977. 58P.
N78-14627

THE LIST INCLUDES 331 REPORTS, ARTICLES, CONFERENCE PAPERS, AND OTHER DOCUMENTS CONCERNING WIND ENERGY POLICY, CONVERSION, TECHNOLOGY, AND TRANSFER. A SUBJECT INDEX IS INCLUDED.

77-0243 LAPIN E E
ECONOMIC COMPETITIVENESS OF WINDMILLS.
ENERGY CONVERS. 16(4): 213-220, 1977.

THE CONDITIONS UNDER WHICH WINDMILLS BECOME COMPETITIVE WITH THE GENERATION OF ELECTRIC POWER FROM FOSSIL FUELS ARE EXAMINED. THE INFLUENCE OF COST OF CONSTRUCTION, FINANCING ARRANGEMENTS, AND THE FUTURE COST OF FUELS IS SHOWN. ENERGY STORAGE AND NETWORK ARRANGEMENTS FOR MILLS ARE CONSIDERED BRIEFLY, AS ARE ALTERNATE USES FOR MILLS, E.G., THE UTILIZATION OF MILL OUTPUT DIRECTLY FOR HEATING OR FOR THE PRODUCTION OF A FUEL.

77-0244 LINSCOTT B S, GLASGOW J, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
NTIS, 1977. 22P.
DOE/NASA/1028-78/15

EXPERIMENTAL TEST DATA HAVE BEEN CORRELATED WITH ANALYSES OF TURBINE LOADS AND COMPLETE SYSTEM BEHAVIOR OF THE ERDA--NASA 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

77-0245 LEHNER G
POSSIBILITIES OF OPENING UP NEW NON-NUCLEAR AND NON-FOSSIL ENERGY SOURCES.
TECH. MITT. 70(6/7): 349-354, JUNE 1977. (IN GERMAN)

AS POSSIBLE NONNUCLEAR AND NONFOSSIL NEW ENERGY SOURCES ONE CAN DISCUSS THREE ESSENTIALLY DIFFERENT OPTIONS: TIDAL ENERGY, GEOTHERMAL ENERGY, AND SOLAR ENERGY. THE WORD SOLAR ENERGY IS USED HERE IN A BROAD SENSE INCLUDING THE DIRECT USE OF SOLAR RADIATION AND THE INDIRECT USE OF SECONDARY ENERGIES DERIVED FROM SOLAR RADIATION. A DISCUSSION OF THE NATURAL ENERGY RESOURCES OF THE EARTH LEADS TO AN EVALUATION OF THE FUTURE POSSIBILITIES FOR THE DIFFERENT OPTIONS. THE POTENTIAL OF TIDAL ENERGY IS VERY SMALL. GEOTHERMAL ENERGY HAS A MUCH LARGER POTENTIAL, BUT

ONLY IF ONE CONSIDERS THE HEAT STORED IN "HOT DRY ROCKS". THE TECHNOLOGY FOR ITS USE IS NOT YET AVAILABLE. IT MAY MEET ECONOMIC AND ENVIRONMENTAL DIFFICULTIES. THUS THE FUTURE IMPORTANCE OF GEOTHERMAL ENERGY IS NOT CLEAR NOW. SOLAR ENERGY FINALLY HAS AN EXTREMELY LARGE POTENTIAL. TECHNOLOGIES FOR SEVERAL METHODS OF ITS MORE OR LESS DIRECT USE ARE AVAILABLE. THE MAIN PROBLEMS ARE ECONOMIC ONES. IN THE LONG RUN SOLAR ENERGY SHOULD BE ABLE TO CONTRIBUTE SIGNIFICANTLY TO THE SOLUTION OF THE ENERGY PROBLEM IF THE ECONOMIC PROBLEMS CAN BE SOLVED. IN THE SHORT RUN AN APPRECIABLE CONTRIBUTION IS, HOWEVER, NOT TO BE EXPECTED.

77-0246 LEWIS R I, WILLIAMS J E, ABDELGHAFFAR M A
A THEORY AND EXPERIMENTAL INVESTIGATION OF DUCTED WIND TURBINES.
WIND ENG. 1(2): 104-125, 1977.

PRACTICAL WIND TURBINE DESIGNS ARE EXAMINED AND COMPARED, WITH THE OBJECT OF SELECTING THE ONE BEST SUITED TO DOMESTIC USE IN LOW-LEVEL TECHNOLOGY. ATTENTION IS FOCUSED IN THIS PAPER ON DUCTED (OPEN) WIND TURBINES. WIND TURBINE (WT) IDEAL EFFICIENCY (DUCTED OR UNSHROUDED), TOTAL WIND THRUST ON THE SYSTEM, DESIGN OF A THEORETICAL WT DUCT, DIFFUSER DESIGN AND TURBINE DESIGN (BLADING AND IMPELLER) ARE DESCRIBED. RESULTS SHOW THAT A GAIN IN POWER OUTPUT CAN BE OBTAINED FROM A WT OF SPECIFIED DIAMETER BY USING A SUITABLY SHAPED DUCT. THE OPTIMUM DIFFUSER AREA RATIO IS FOUND TO BE ROUGHLY 10% LARGER THAN THE THEORETICALLY PREDICTED VALUE. POWER OUTPUT IS MAXIMIZED WHEN SOME STALL EXISTS AT THE DIFFUSER OUTLET.

77-0247 LILLEY G M
THE AERODYNAMIC EFFICIENCY OF WINDMILLS.
AERONAUT. Q. 29(1): 1-17, FEBRUARY 1978.

THE PAPER REPRODUCES THE RESULTS OF AN EARLIER REPORT ON THE VORTEX THEORY OF WINDMILLS AND FOLLOWS THAT THEORY THROUGH TO ESTABLISH THE AERODYNAMIC DESIGN PROCEDURE FOR A HORIZONTAL AXIS WINDMILL. THE RESULTS ARE SHOWN TO DIFFER CONSIDERABLY FROM THOSE GIVEN IN A RECENT PAPER BY GRIFFITH AND THE DIFFERENCES ARE EXPLAINED. THE MAIN CONCLUSION IS THAT, WHEN FULL ALLOWANCE IS MADE FOR THE DRAG OF THE BLADES, HUB AND TIP LOSSES, AND LOSSES DUE TO INTERFERENCE WITH THE SUPPORT TOWER, THE POWER OUTPUT COEFFICIENT OR EFFICIENCY OF A HORIZONTAL AXIS WINDMILL CANNOT EXCEED 30 TO 35 PER CENT, AS COMPARED TO AN IDEAL EFFICIENCY OF 59 PER CENT.

77-0248 LIMAYE D R
OZARKS REGION ENERGY ALTERNATIVES STUDY. WORKING PAPER XIII.
NONCONVENTIONAL ENERGY SOURCES.
LITTLE ROCK, ARKANSAS, REGIONAL COMMISSION, 1977. 18P.

THE OZARKS REGION ENERGY ALTERNATIVES STUDY FOCUSED ON POLICY OPTIONS AT THE STATE AND REGIONAL LEVELS FOR THE PERIOD 1977 TO 1985. SINCE IT IS UNLIKELY THAT NONCONVENTIONAL ENERGY SOURCES WOULD MAKE SIGNIFICANT CONTRIBUTIONS TO THE STATE OR REGIONAL TOTAL ENERGY SUPPLY, THE STUDY DID NOT DEVOTE A LARGE AMOUNT OF RESOURCES TO THE EVALUATION OF POTENTIAL NONCONVENTIONAL ENERGY SOURCES. NEVERTHELESS, NONCONVENTIONAL ENERGY SOURCES ARE IMPORTANT FROM A POLICY PERSPECTIVE BECAUSE OF THEIR POTENTIAL CONTRIBUTIONS AT A LOCAL LEVEL AND THEIR POTENTIAL FOR THE 1985 TO 2000 TIME FRAME. SINCE SOME POLICY DECISIONS MAY BE FACED NOW TO ACHIEVE A SIGNIFICANT CONTRIBUTION FROM NONCONVENTIONAL ENERGY SOURCES, AN IDENTIFICATION OF THOSE SOURCES WITH PROMISING POTENTIAL WAS MADE. A BRIEF DISCUSSION OF SOLAR, GEOTHERMAL, WIND, AND BIOMASS APPEARS IN THIS PAPER.

77-0249 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT. VOL. 2, FINAL REPORT.
NTIS, FEBRUARY 1977. 204P.
SAN/1101-76/2

A STUDY WAS MADE OF THE FEASIBILITY OF USING WIND MACHINES TO PROVIDE PART OF THE ENERGY REQUIRED TO PUMP WATER IN THE CALIFORNIA AQUEDUCT. THE NEED FOR ADDITIONAL PUMPING POWER FOR THE AQUEDUCT WILL BE ESPECIALLY FELT IN 1983 WHEN EXISTING ARRANGEMENTS WHICH ASSURE DELIVERIES OF LOW-COST ENERGY FROM FOUR CALIFORNIA UTILITIES TERMINATE. THE DEVELOPMENT AND PRODUCTION SCHEDULE FOR THE ERDA/NASA 1500 KW WIND MACHINE DESIGN AS NOW UNDERSTOOD COULD SUPPORT THE INSTALLATION OF A WIND ENERGY SYSTEM TO MEET A SIGNIFICANT PORTION OF THE AQUEDUCT NEEDS BY THAT DATE IF FEW DELAYS ARE ENCOUNTERED. THIS APPLICATION OF WIND ENERGY WAS

FOUND TO BE TECHNICALLY FEASIBLE, BUT WOULD INVOLVE SOME OPERATIONAL PROBLEMS. THE AQUEDUCT APPLICATION MAY BE ATTRACTIVE FOR AN EARLY WIND ENERGY PILOT OR DEMONSTRATION PROJECT BECAUSE OF THE NEAR-TERM ABILITY OF THE AQUEDUCT TO ADAPT ITS DEMAND TO THE VARIABILITY OF THE WIND.

77-0250 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT. VOL 1. EXECUTIVE SUMMARY.
NTIS, MARCH 1977. 22P.
SAN/1101-76/1

THIS REPORT IS AN EXAMINATION OF THE APPLICABILITY OF WIND SYSTEMS TO MEET PART OF THE PUMPING NEEDS OF THE CALIFORNIA AQUEDUCT, A 684-MILE LONG WATER SYSTEM THAT DELIVERS WATER FROM THE MOUNTAINS IN NORTHERN CALIFORNIA TO ARID AREAS OF SOUTHERN CALIFORNIA. RESEARCHERS FOUND THE LOCATION OF THE MAJOR PUMPING LOAD TO BE IN THE MOUNTAINOUS REGIONS WHERE THE TOPOGRAPHY NATURALLY LENDS ITSELF TO POTENTIAL WIND RESOURCES. USING ERDA/NASA DESIGN STUDIES FOR A 1500 KW WIND TURBINE IT WAS FOUND THAT WIND ENERGY COULD BE SUPPLIED TO THE AQUEDUCT AT THE SANDBERG CA STATION FOR A COST OF 1.3 TO 1.7 CENTS PER KWH, APPROXIMATELY EQUAL TO COAL AND NUCLEAR-FUELED BASELOAD PLANTS. IT IS ANTICIPATED THAT ADDITIONAL, FAVORABLE SITES FOR WECS WILL BE DETERMINED AT A LATER DATE. NO SIGNIFICANT ENVIRONMENTAL IMPACT BY WECS IS ANTICIPATED.

77-0251 LINDLEY D
WIND ENERGY RESEARCH IN NEW ZEALAND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X10-X19.

THOUGH THERE HAS BEEN A LONG STANDING INTEREST BY THE NEW ZEALAND METEOROLOGICAL SERVICE IN THE STRUCTURE OF THE WIND OVER NEW ZEALAND AND A WORKING INTEREST BY THE UNIVERSITIES OF AUCKLAND AND CANTERBURY AND THE MINISTRY OF WORKS IN WIND MODELLING OF STRUCTURES, IT WASN'T UNTIL TWO YEARS AGO THAT A COORDINATED WIND ENERGY RESEARCH PROGRAM WAS ESTABLISHED. AT THAT TIME THE NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE (NZERDC) WAS FORMED UNDER THE CHAIRMANSHIP OF DR. C. J. MAIDEN, TO COORDINATE ENERGY RESEARCH AND DEVELOPMENT. OF THE $918,000 EXPENDED SO FAR, APPROXIMATELY 10% HAS GONE TO SUPPORT WIND ENERGY RESEARCH.

77-0252 LINDLEY D, CHIN S W
WIND ENERGY POTENTIAL IN NEW ZEALAND - ASPECTS OF THE RESOURCE ASSESSMENT AND ITS UTILISATION.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3D, WASHINGTON, D.C., SEPTEMBER 19-21, 1977. 26P.

A WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND IS BRIEFLY DESCRIBED WHILST COMPUTATIONS OF CAPACITY FACTOR FOR SEVERAL WIND TURBINE DESIGNS DEMONSTRATE A SIMPLE WAY OF ASSESSING SPECIFIC OUTPUT GIVEN ONLY THE ANNUAL MEAN WIND SPEED FOR THE SITE. COMPARISIONS ARE MADE OF POWER DEMAND VERSUS WIND ENERGY AVAILABILITY ON A DIURNAL AND SEASONAL BASIS FOR NEW ZEALAND'S FOUR LARGEST POPULATION CENTRES AND SOME PRELIMINARY WORK ON THE MEASUREMENT OF WIND STRUCTURE AND TOPOGRAPHICAL EFFECTS AS THEY AFFECT TURBINE DESIGN AND PERFORMANCE IS DESCRIBED.

77-0253 LINDSLEY E F
CLARENCE KENNEY: WIND POWER FOR HOME HEATING.
POP. SCI. 211(5): 62, 65, NOVEMBER 1977.

77-0254 LINSCOTT B S, GLASGOW J, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1633-1650.

PART OF THE COOPERATIVE EFFORT BETWEEN NASA AND ERDA HAS BEEN THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER. THIS 100 KW TURBINE, DESIGNATED THE MOD-0, IS LOCATED AT THE NASA PLUM BROOK SITE NEAR SANDUSKY, OHIO. EXPERIMENTAL TEST DATA HAVE BEEN CORRELATED WITH ANALYSES OF TURBINE LOADS AND COMPLETE SYSTEM BEHAVIOR OF THE 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT

STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

77-0255 LISSAMAN P B S
GENERAL PERFORMANCE THEORY FOR CROSSWIND AXIS TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C2.21-C2.38

PRINCIPLES OF ENERGY EXTRACTION BY WIND MACHINES ARE REVIEWED, IT IS SHOWN THAT USUALLY THE BETZ LIMIT APPLIES. HOWEVER, POWER COEFFICIENTS (BASED ON FRONTAL SWEPT AREA) EXCEEDING THE BETZ LIMIT ARE POSSIBLE WITH AUGMENTATION SYSTEMS PRODUCING A DUCT-LIKE FLOW. THE INVISCID THEORY WITH THE VISCOUS CORRECTION IS COMPARED WITH EXPERIMENT; FOR LOW C THE CORRELATION IS EXCELLENT FOR A WIDE CLASS OF ROTORS. FOR HIGH C DEVICE, ALTHOUGH THE LIMITED CORRELATION IS GOOD, THE DATA COVER TOO RESTRICTED A RANGE FOR DEFINITIVE VALIDATION. WIND TUNNEL DATA FOR HIGH C REQUIRE CORRECTIONS FOR BOTH DRAG AND LIFT WALL CONSTRAINTS; THE LATTER HAS APPARENTLY BEEN IGNORED TO DATE. THE ANALYSES PROVIDE AN ENGINEERING BASIS FOR PERFORMANCE ESTIMATION OF CROSS-WIND MACHINES, WITH SUFFICIENT STRUCTURE FOR OPTIMIZATION OF BLADE DESIGN. THE CONSEQUENCES OF NEGLECTING UNSTEADY TERMS ARE DISCUSSED, WITH SUGGESTIONS FOR IMPROVED HIGH C ANALYSIS.

77-0256 LJUNGSTROM O
LARGE SCALE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN AND INSTALLATION AS AFFECTED BY SITE WIND ENERGY CHARACTERISTICS, GROUPING ARRANGEMENT AND SOCIAL ACCEPTANCE.
WIND ENG. 1(1): 36-59, 1977.

77-0257 LJUNGSTROM O
LARGE SCALE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN AND INSTALLATION AS AFFECTED BY SITE WIND ENERGY CHARACTERISTICS, GROUPING ARRANGEMENT AND SOCIAL ACCEPTANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A1-1 TO A1-22.

THE SWEDISH WIND ENERGY PROSPECTING PROGRAM INCLUDES SPECIAL FEATURES OF DETERMINING SITE WIND CHARACTERISTICS AND DESIGN OF WECS GROUP STATIONS, WHICH ARE DESCRIBED BRIEFLY, SUCH AS APPLICATIONS OF NORMALIZED WDP - WIND DURATION PROFILES, WHP - WIND HEIGHT PROFILES AND HOW THESE ARE AFFECTED BY SITE LOCATION AND TERRAIN ROUGHNESS. A SET OF WEC - WIND ENERGY CLASSES (1-4) IS INTRODUCED AS AN AID IN TERRITORIAL WIND ENERGY SURVEYS. A SURVEY OF SWEDEN'S WEPA - WIND ENERGY PRODUCING AREAS - WITH ASSOCIATED DISTRIBUTION OVER WEC - 2-4 IS PRESENTED. IN ORDER TO DETERMINE THE CORRESPONDING WIND ENERGY PRODUCTION CAPACITY, THE PROBLEM OF OPTIMIZING WECS GROUP STATION DESIGN FOR COST EFFECTIVE ENERGY PRODUCTION PER LAND USUAGE MUST BE SOLVED. THIS PRELIMINARY STUDY INDICATES THAT THE LIKELY MAGNITUDE OF COST EFFECTIVE, SOCIALLY ACCEPTABLE (NON-CRITICAL) INSTALLATIONS OF LARGE SCALE WECS IN SWEDEN WILL RANGE FROM 5 000 - 10 000 MW, PRODUCING 15-25 TWH OF ELECTRIC ENERGY PER YEAR, IN THE 1990'S, UTILIZING ONLY 0,2 - 0,5% OF THE COUNTRY'S LAND AREA. FINALLY, ASPECTS OF TECHNOLOGY ASSESSMENT AS AN AID IN SELECTING VIABLE WECS SYSTEM ALTERNATIVES FOR THE FUTURE AND IN PRESENTING THESE TO THE DECISION MAKERS ARE DISCUSSED.

77-0258 LJUNGSTROM O
NEW DEVELOPMENTS IN WIND TURBINES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 165-186. (IN GERMAN)

A SHORT SURVEY IS PRESENTED OF THE CONDITIONS FOR THE CHOICE OF TYPES OF UNITS AND THE SIZE OF WIND TURBINES. THEN THE DESIGN OF A WIND TURBINE OF THE AXIAL FLOW TYPE WITH OUTPUTS OF 1 TO 10 MW, USING VARIOUS MATERIALS, IS CONSIDERED. THE INFLUENCE OF SIZE ON WEIGHT AND COSTS IS DISCUSSED. SOME EXAMPLES OF ACTUAL WIND TURBINE PROJECTS IN SWEDEN ARE BRIEFLY DESCRIBED.

77-0259 LOCKHEED PLANS WIND PLANTS.
WIND POWER DIG. 1(8): 20, SPRING 1977.

LOCKHEED PLANNERS PROPOSE USING ON-SITE, WIND GENERATED ELECTRICITY TO EXTRACT HYDROGEN AND NITROGEN FROM WATER AND AIR, AND ULTIMATELY RECOMBINING THOSE TWO CHEMICALS TO PRODUCE NITROGEN BASED FERTILIZERS.

77-0260 LOCKHEED STUDY PROPOSES WECS FERTILIZER PRODUCTION UNITS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P. 12, SPRING 1977.

77-0261 LOTH J L
WVU WIND ENERGY CONCENTRATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. E2.17-E2.30.

THREE WIND TURBINE CONFIGURATIONS WHOSE PERFORMANCE IS NOT RESTRICTED BY THE BETZ LIMIT ARE DESCRIBED. ALL ARE PLACED PARTIALLY OR ENTIRELY INSIDE A REGION OF LOW PRESSURE AND HIGH VELOCITY. IT IS THE CONFIGURATION OF THE TURBINE OR ITS ASSOCIATED NONROTATING DEVICE WHICH CREATES A LOW PRESSURE REGION AROUND THE TURBINE. THIS CAUSES A CONCENTRATION OF THE WIND ENERGY BY ACCELERATING IT TO HIGHER THAN FREE STREAM VELOCITIES. THREE TYPES OF CONCENTRATORS ARE DESCRIBED: THE CYLINDRICAL OBSTRUCTION, THE CYLINDRICAL DARRIEUS ROTOR, AND THE WING TIP VORTEX TYPE. THE VENTURI OR SHROUDED WIND TURBINE IS NOT INCLUDED.

77-0262 LOTH J L
BETZ TYPE LIMITATION OF VORTEX WIND MACHINES.
WEST VIRGINIA. UNIVERSITY. DEPT. AEROSP. ENG. TR-54, MAY 1977.

77-0263 LYSEN E H
WIND ENERGY FOR THE DEVELOPING COUNTRIES.
INGENIEUR 89(2): 233-239, MARCH 24, 1977. (IN DUTCH)

THE ECONOMIC PROGRESS OF MANY THIRD WORLD COUNTRIES DEPENDS ON THEIR AGRICULTURAL DEVELOPMENT, NOW HIT BY THE OIL CRISIS. WIND ENERGY IS THUS OF GREAT POTENTIAL IMPORTANCE. APPLICATIONS CAN BE DIVIDED INTO TWO GROUPS; POWER LESS THAN 1 KW, WATER PUMPING AND SMALL SCALE LIGHTING; AND POWER 1-10 KW DRIVING MACHINERY, GENERATING ELECTRICITY AND GRINDING GRAIN. THE DUTCH R + D PROGRAMME, "WIND ENERGY IN THE DEVELOPING COUNTRIES", EMBRACES R AND D INTO WIND ENERGY SYSTEMS UP TO THE PROTOTYPE STAGE; THE HANDING OVER OF INFORMATION; AND THE ESTABLISHMENT AND GUIDANCE OF NATIONAL PROJECTS.

77-0264 PERSPECTIVES: VIEWS ON THE FUTURE OF WIND ENERGY.
WIND POWER DIG. 1(9): 36-41, SUMMER 1977.

A SERIES OF INTERVIEWS ARE PRESENTED WITH PARTICIPANTS OF THE AMERICAN WIND ENERGY CONFERENCE IN BOULDER IN 1977. THOSE INTERVIEWED ARE ROBERT MERONEY, BOB THRESHER, FRANK ELDRIDGE, MICHAEL DUBEY AND DON MAYER.

77-0265 MCGEORGE J
PROGRESS ON THE KING SCHOOL WINDMILL.
ALTERN. SOURCES ENERGY NO. 29: 24-28, DECEMBER 1977.

77-0266 MCGEORGE J
TRANSFORMATION OF AN 1880'S WIND PUMP TO A WIND GENERATOR AT KING SCHOOL.
ALTERN. SOURCES ENERGY NO. 24: 18-22, FEBRUARY 1977.

A PROJECT CONDUCTED BY JOHN CARLSON, A PHYSICS AND CHEMISTRY TEACHER AT A PRIVATE SCHOOL IN CONNECTICUT, IS DESCRIBED IN WHICH AN OLD WATER PUMPING MILL IS CONVERTED TO A WIND GENERATOR.

77-0267 MCGILL R A, IANNUCILLI M, MARSHAL J, SUNUNU J H, ESCHBACH J E, ANSON J, WARK D, STOCK D E
1976 ENERGY RESOURCE ALTERNATIVES II COMPETITION. FINAL REPORT.
NTIS, OCTOBER 1977. 260P.
COO/2698-2

DESCRIPTIONS OF ALL THE ENTRIES IN THE COMPETITION ARE PRESENTED. COMPETITION RULES AND JUDGING PROCEDURES ARE DESCRIBED. ENTRIES CONSISTED OF TEAM EFFORTS FROM COLLEGES AND UNIVERSITIES. THE COMPETITION CALLED FOR THE STUDENT TEAMS TO DEVELOP MEANS FOR PRODUCING ELECTRICAL POWER SUFFICIENT TO MEET THE NEEDS OF A SINGLE FAMILY HOME, USING AN ENERGY SOURCE OTHER THAN OIL OR NATURAL GAS. THE ELECTRIC POWER PRODUCED HAD TO BE ECONOMICALLY REALISTIC WHEN COMPARED TO PRESENT ENERGY

SOURCES.

77-0268 MCGUIGAN D
HARNESSING THE WIND FOR HOME ENERGY.
CHARLOTTE, VERMONT, GARDEN WAY PUBLISHING, 1977. 128P.

WIND POWER OFFERS AN INCREASINGLY POPULAR HOME ENERGY OPTION. THIS BOOK SHOWS HOW, WHERE, WHEN, WHY.

77-0269 MCLAIN L
WIND POWER INTO HYDROGEN TO LIGHT ISLAND.
ENGINEER 244: 6, MARCH 3, 1977.

A SCHEME TO PROVIDE ELECTRICITY FOR THE HEBRIDEAN ISLAND OF COLONSAY USING WIND POWER IS DESCRIBED. THE WINDMILL WILL TURN GENERATORS WHOSE OUTPUT WILL BE USED TO ELECTROLYSE WATER, PRODUCING HYDROGEN GAS. THIS WILL BE STORED AND WILL DRIVE MODIFIED INTERNAL COMBUSTION ENGINES LINKED TO ALTERNATING CURRENT GENERATORS. ENOUGH HYDROGEN WILL BE STORED TO PROVIDE POWER FOR SEVERAL WINDLESS DAYS.

77-0270 SHARP D J
AERODYNAMIC PERFORMANCE THEORY FOR THE DARRIEUS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X46-X53.

THE BLADE ELEMENT AND MOMENTUM THEORIES ARE EMPLOYED TO PREDICT THE FORM OF THE INDUCED VELOCITY DISTRIBUTION OVER THE VERTICAL HEIGHT OF THE TURBINE. THE AEROFOIL DATA FOR A WIDE RANGE OF REYNOLDS NUMBERS HAS BEEN USED AND THEREFORE THE CHANGES IN RELATIVE WIND VELOCITY FROM POINT TO POINT ON THE BLADES ARE ACCOUNTED FOR.

77-0271 SHEPHERD D G
WHAT PRICE WIND POWER.
AWARE, P. 11-15, MAY 1977.

BASIC CONSIDERATIONS IN ADAPTING WIND POWER SYSTEMS FOR DIFFERENT USES AND LOCATIONS ARE DISCUSSED. THE ROLE OF SUCH FACTORS AS AVERAGE WIND VELOCITY AND WIND VARIATION IN THE SELECTION OF A WIND SYSTEM DESIGN IS EXAMINED. THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF WIND POWER SYSTEMS, INCLUDING LIFT OR DRAG TYPES AND HORIZONTAL OR VERTICAL AXIS TYPES, ARE DISCUSSED AND COMPARED. WIND CONCENTRATION DEVICES ARE BRIEFLY DESCRIBED. APPLICATIONS OF SMALL WIND ENERGY SYSTEMS ARE DISCUSSED, AND PROPOSALS FOR LARGE-SCALE WIND-BASED POWER SYSTEMS ARE CONSIDERED.

77-0272 SIMMS D
GO DIRECTLY TO WINDMILL. DO NOT ENTER PUBLIC UTILITIES. DO NOT COLLECT MONTHLY WINDBILL.
HARROWSMITH 1(6): 28-33, 93, MARCH/APRIL 1977.

THE AUTHOR DESCRIBES HIS EXPERIENCE, AND COSTS, IN RECYCLING AN OLD JACOBS WIND PLANT FOR USE IN PROVIDING ELECTRICITY TO HIS HOME.

77-0273 MARRS R W, MARVITZ J
LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATION OF EOLIAN GEOMORPHOLOGY AND TOPOGRAPHY.
NTIS 1977. 23P.
RLO/2343-5

THE PURPOSE OF RESEARCH UNDER ERDA CONTRACT EY-76-S-06-2343 IS TO DEVELOP AN EFFICIENT PROCEDURE FOR INFERRING WIND CHARACTERISTICS THROUGH INTERPRETATION OF EOLIAN LANDFORMS. AN AREA IN CENTRAL WYOMING WAS CHOSEN AS THE TEST SITE. THE SITE CONTAINS MANY WELL-DEVELOPED EOLIAN LANDFORMS AND IS NOTED FOR ITS HIGH WINDS. WHILE SOME MEMBERS OF THE RESEARCH TEAM INTERPRETED SATELLITE IMAGERY AND AERIAL PHOTOS AND GATHERED FIELD DATA IN REGIONS OF DUNES AND BLOWOUTS, OTHERS COMPILED ALL AVAILABLE CLIMATIC INFORMATION AND COLLECTED ADDITIONAL DATA VIA LOW-ALTITUDE FLIGHTS WITH A SPECIALLY INSTRUMENTED AIRCRAFT. OBSERVED CHARACTERISTICS OF EOLIAN FEATURES WERE THEN CORRELATED WITH THE WIND DATA. CAUSE-AND-EFFECT INTERRELATIONSHIPS WERE IDENTIFIED AND THEORETICAL MODELS WERE TESTED AS POSSIBLE EXPLANATIONS TO THE OBSERVED RELATIONSHIPS. RELATIONSHIPS WHICH PROVED USEFUL IN THE WYOMING TEST

AREA WERE THEN APPLIED OVER A BROADER REGION AND IN OTHER AREAS OF THE COUNTRY TO TEST FOR REGIONAL APPLICABILITY OF EACH PREDICTOR.

77-0274 MAYER-SCHWINNING W
MAXIMUM USE OF WIND ENERGY BY UNIT WIND TURBINES EWT (DBPA).
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 341-344. (IN GERMAN)

THE CONSTRUCTIONAL PRINCIPLE OF UNIT WIND TURBINES, WHICH MAKES OPTIMUM USE OF WIND ENERGY POSSIBLE IS DESCRIBED. USING A COMBINATION OF UNIT WIND TURBINES, A PLANT OF ANY REQUIRED SIZE CAN BE ASSEMBLED. THE ARRANGEMENT OF THESE WIND TURBINES TAKES PLACE ON SWIVEL ARMS FOR LARGE UNITS, WHICH CAN BE TURNED IN THE DIRECTION OF THE WIND.

77-0275 MAYO L H
LEGAL INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS). EXECUTIVE SUMMARY REPORT.
NTIS, SEPTEMBER 1977. 39P.
PB-273006

THE LEGAL ISSUES PRESENTED BY WIND ENERGY CONVERSION SYSTEMS (WECS) UTILIZATION ARE OFTEN CLOSELY RELATED TO ITS STRUCTURAL AND TECHNOLOGICAL FEATURES, AS WELL AS TO ITS ECONOMIC AND SOCIAL IMPLICATIONS. SOME INFORMATION ABOUT WIND SYSTEMS, THEIR LIKELY APPLICATIONS AND PROBLEMS, ARE BRIEFLY STATED. THE FEATURES OF THE EXISTING LEGAL STRUCTURE WHICH MAY FACILITATE THE IMPLEMENTATION OF SUCH SYSTEMS ARE NOTED. THE AUTHORS SUMMARIZE THE WAYS IN WHICH THE LEGAL SITUATION VARIES WITH PARTICULAR APPLICATIONS AND WHICH APPLICATIONS POSE THE GREATEST LEGAL DIFFICULTIES. THE COMPLEX SUBJECT OF OFFSHORE WIND SYSTEMS IS DISCUSSED.

77-0276 MAYO L H
LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENRGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, SEPTEMBER 1977. 332P.
NSF/RA-77-0204

A STATEMENT OF THE PRINCIPAL OVERALL CONCLUSIONS OF THE REPORT IS PRESENTED. BECAUSE OF THE INTERPLAY BETWEEN TECHNICAL, ECONOMIC, SOCIAL, AND LEGAL FACTORS, SOME INFORMATION ABOUT WIND SYSTEMS, THEIR LIKELY APPLICATIONS, AND THE PROBLEMS RAISED THEREBY IS PRESENTED. THE MOST SIGNIFICANT LEGAL OBSTACLES TO THE UTILIZATION OF LAND-BASED WECS ARE DESCRIBED. THE FEATURES OF THE EXISTING LEGAL STRUCTURE WHICH MAY FACILITATE THE IMPLEMENTATION OF SUCH SYSTEMS ARE DISCUSSED. THE WAYS IN WHICH THE LEGAL SITUATION VARIES WITH PARTICULAR APPLICATIONS, AND WHICH APPLICATIONS POSE THE GREATEST AND FEWEST LEGAL DIFFICULTIES ARE SUMMARIZED. A SEPARATE SECTION IS DEVOTED TO THE COMPLEX SUBJECT OF OFFSHORE WIND SYSTEMS.

77-0277 MAYO L H
LEGAL-INSTITUTIONAL ARRANGEMENTS FACILITATING OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) UTILIZATION. FINAL REPORT.
NTIS, SEPTEMBER 1977. 93P.
DOE/NSF/19137-77/3

CONCERN FOR THE CONTINUING SUFFICIENCY OF ENERGY SUPPLIES IN THE U.S. HAS TENDED TO DIRECT INCREASING ATTENTION TO UNCONVENTIONAL SOURCES OF SUPPLY, INCLUDING WIND ENERGY. SOME OF THE MORE STRIKING PROPOSALS FOR THE UTILIZATION OF WIND ENERGY RELATE TO OFFSHORE CONFIGURATIONS. THIS PAPER EXAMINES LEGAL-INSTITUTIONAL ARRANGEMENTS FOR FACILITATING THE UTILIZATION OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) BY POSITING THREE PROGRAM ALTERNATIVES AND ANALYZING THE INSTITUTIONAL SUPPORT REQUIRED FOR THE IMPLEMENTATION OF EACH.

77-0278 MELARAGNO M
WINDPOWER.
ENGINEERING 217(1): 38-39, JANUARY 1977.

A 100 KW WIND GENERATOR HAS BEEN BUILT AND INSTALLED AT THE PLUM BROOK STATION NEAR SANDUSKY, OHIO, BY THE NASA LEWIS LAB., AS PART OF A U.S. PROGRAM TO DEVELOP WIND ENERGY SYSTEMS. THE GENERAL ELECTRIC CO. AND KAMAN AEROSPACE CORP. HAVE COMPLETED STUDIES FOR SELECTING APPROPRIATE WIND GENERATOR SYSTEMS. WIND ENERGY COULD PROVIDE ONLY A RELATIVELY

SMALL PERCENTAGE OF THE TOTAL AMOUNT OF ENERGY NEEDED IN COUNTRIES WITH HIGH ENERGY DEMAND, SUCH AS THE U.S. HOWEVER, IT COULD BE A MAJOR RESOURCE FOR OTHER COUNTRIES WITH SMALLER NEEDS AND DIFFERENT ECONOMIC STRUCTURE. THE THEORETICAL AMOUNT OF KINETIC ENERGY PER UNIT OF TIME CONTAINED IN A COLUMN OF AIR STRIKING A WIND TURBINE IS CALCULATED. THE HISTORY OF AMERICAN RESEARCH INTO WIND POWER IS SURVEYED.

77-0279 MELISS M
REGENERATIVE ENERGIEQUELLEN. (REGENERATIVE ENERGY RESOURCES).
BRENNST WAERME KRAFT 29(4): 136-142, APRIL 1977. (IN GERMAN)

AN OUTLINE OF THE SOLAR AND GEOTHERMAL RESOURCES, UTILIZATION AND PROSPECTS FOR LARGER EXPLOITATION IS GIVEN. TRENDS IN DESIGN AND CONSTRUCTION OF WIND-DRIVEN POWER PLANTS ARE ALSO PRESENTED.

77-0280 MELISS M
RESULTS OF GERMAN WIND ENERGY STUDIES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 47-69. (IN GERMAN)

THE RESULTS ARE PRESENTED OF AN INVESTIGATION OF THE POSSIBILITY OF UTILIZING WIND ENERGY IN WEST GERMANY. THE INVESTIGATION IS BASED ON THE FOLLOWING CATEGORIES: PHYSICAL BASIS AND THEORETICAL POTENTIAL OF WIND ENERGY, WIND ENERGY PLANT AND THEORETICALLY/TECHNICALLY FEASIBLE POTENTIAL, ASPECTS OF UTILIZATION AND ECONOMIC POTENTIAL, RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT WORK.

77-0281 MERONEY R N, SANDBORN V A, BOUWMEESTER R, RIDER M
WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A6.89-A6.104.

THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF MODELLING AND ANALYTIC TECHNIQUES. PAST EXPERIENCE WITH LARGE POWER MILLS INDICATES THAT PERHAPS THE SINGLE MOST IMPORTANT FACTOR CONTROLLING SUCCESS OR FAILURE OF THESE SYSTEMS IS SITE SELECTION. MEASUREMENTS HAVE BEEN COMPLETED OVER TRIANGULAR AND SINUSOIDAL SHAPE HILLS OF WIND SPEED, STATIC PRESSURE VARIATION, TURBULENCE INTENSITY, WALL SHEAR, AND WIND DEFLECTION. HILL ASPECT RATIOS STUDIED RANGE FROM 1/2 TO 1/6 WITH SOME DATA AVAILABLE AT 1/20. MEASUREMENTS OF WIND OVERSPEED, STREAMLINE PATTERNS, AND TURBULENCE CHANGES OVER THE TOPOGRAPHY ARE COMPARED WITH RESULTS FROM BOUNDARY LAYER THEORY AND RAPID DISTORTION THEORIES. LARGE OVERSPEED EFFECTS OVER THE HILLS ARE FOUND FOR THE SHEAR LAYERS INVESTIGATED.

77-0282 MERONEY R N
RURAL ENERGY NEEDS COULD AGAIN BE MET BY WIND.
ENERGY SOURCES 77/78, DENVER, COLORADO, ENERCOM, 1977. P. 131-135.

A GREAT DEAL OF DEVELOPMENT NEEDS TO BE DONE ON THE DESIGN OF SMALL TO MEDIUM SCALE MACHINES FOR RURAL USE; THE DESIGN OF SIMPLE YET RELIABLE TOWERS; AND THE MATCHING OF WIND MACHINE PERFORMANCE TO THE REQUIREMENTS OF SPECIFIC APPLICATIONS. PROGRAMS HAVE BEEN DEVELOPED BY GOVERNMENT AGENCIES TO EXPLOIT WIND MACHINES IN RURAL AND REMOTE AREAS. THE PROGRAMS WILL HOPEFULLY GUIDE AND ACCELERATE THE RE-USE OF THE ANCIENT ART OF MANUFACTURING POWER FROM THE WIND.

77-0283 MERRIAM M F
WIND ENERGY USE IN THE UNITED STATES TO THE YEAR 2000.
WASHINGTON, D.C., FEDERAL ENERGY ADMINISTRATION, OCTOBER 1977. 58P.

THE OBJECT OF THIS STUDY IS TO DEVELOP A SET OF PROJECTIONS FOR THE USE OF WIND ENERGY IN THE UNITED STATES DURING THE YEARS 1985, 1990, AND 2000. THESE PROJECTIONS ARE TO BE USED, ALONG WITH OTHER STUDIES, IN DELINEATING THE POLICY OPTIONS AVAILABLE TO THE UNITED STATES AS IT ENDEAVORS TO AVOID ENERGY IMBALANCES IN THE NEXT QUARTER CENTURY.

UNCERTAINTIES IN PREDICTING THE FUTURE USE OF WIND ENERGY IN THE UNITED STATES ARE LARGE, AND THE RELIABILITY OF PREDICTIONS IS LOW. TO SAY WHAT CAN BE DONE (GIVEN THE RIGHT GOVERNMENT ACTIONS AND OVERLOOKING COST PROBLEMS) IS RELATIVELY EASY, BUT TO SAY WHAT WILL OCCUR IS ANOTHER MATTER.

77-0284 MERRIAM M F
WIND ENERGY FOR HUMAN NEEDS.
TECHNOL. REV. 79(3): 28-39, JANUARY 1977.

FOLLOWING A DESCRIPTION OF ANCIENT WINDMILLS, THE PAPER PRESENTS AN ECONOMIC AND TECHNOLOGICAL OUTLOOK INTO WIND ENERGY EXTRACTION POSSIBILITIES. THE DIFFICULTIES IN THE UTILIZATION OF THE WIND ENERGY, LIKE THE LOW AIR DENSITY AND THE IMPOSSIBILITY OF EFFECTIVE CHANNELIZATION OF THE AIR STREAM, ARE POINTED OUT AND THE PHYSICS AND TECHNOLOGY OF WIND MACHINES ARE DISCUSSED TOGETHER WITH THE THEORY, WHICH SHOWS THAT THE WINDPOWER IS PROPORTIONAL TO THE CUBE OF THE VELOCITY OF THE WIND. THE POSSIBILITY OF SUPPORTING THE WINDMILLS IN THE AIR STREAM IS PROPOSED AND THE WIDELY USED VERTICAL-AXIS WINDMILLS ARE DESCRIBED TOGETHER WITH THE LARGE WIND GENERATORS FOR ELECTRIC POWER INCLUDING THE SMITH-PUTMAN WIND TURBINE WITH A TWO-BLADE PROPELLER DRIVING A 1,250 KW SYNCHRONOUS GENERATOR, AND 175 FT. DIAMETER. THE URGENT NEEDS FOR POWER WINDMILLS, AND A SYSTEMATIC SEARCH FOR GOOD SITES WHERE THE WINDMILLS WILL BE COST-EFFECTIVE, ARE STRESSED. THE POSSIBILITY OF OBTAINING 300-350 MILLION MEGAWATT-HOURS PER YEAR, FROM WELL-ENGINEERED WIND GENERATORS, IS PREDICTED.

77-0285 MERRITT B T
AN ASYNCHRONOUS AC/DC/AC LINK FOR WIND POWER APPLICATION. PH.D. THESIS.
ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NO. 77-17842, 1977. 311P.

IT IS PROVEN THAT AN ASYNCHRONOUS AC/DC/AC ELECTRIC LINK IS A PRACTICAL WAY OF CONVERTING THE KINETIC ENERGY IN THE WIND TO ELECTRICAL ENERGY. THE AC/DC/AC LINK TERMED A WIND ENERGY CONVERSION SYSTEM (WECS) CONSISTS OF A WIND DRIVEN POLYPHASE ALTERNATOR, RECTIFIER, INDUCTOR, AND AN INVERTER TIED TO THE EXISTING UTILITY GRID. THE LABORATORY INVESTIGATIONS STUDIED VARIOUS ALTERNATOR TYPES, TYPES OF INVERTERS, AND TYPES OF INVERTER CONTROL. BASED ON THESE LABORATORY TESTS, A WECS CONSISTING OF A MODIFIED COMMERCIAL AEROGENERATOR, A THREE PHASE, SIX PULSE BRIDGE RECTIFIER, A BUS STABILIZER, AND A SINGLE PHASE, FOUR PULSE, BRIDGE INVERTER WAS DESIGNED, BUILT AND INSTALLED.

77-0286 METZ W D
WIND ENERGY - LARGE AND SMALL SYSTEMS COMPETING.
SCIENCE 197: 971-973, SEPTEMBER I, 1977.

WINDPOWER, WHICH IS AVAILABLE ON AN ANNUAL BASIS IN AMOUNTS COMPARABLE TO THE AVERAGE ENERGY FLUX OF SUNLIGHT IN MANY AREAS, OFFERS ONE OF THE MOST INEXPENSIVE MEANS OF PRODUCING ENERGY. THE POSSIBILITIES ARE INVESTIGATED FOR UTILIZING FEATURES AVAILABLE IN MANY WINDY REGIONS, SUCH AS HYDROELECTRIC SYSTEMS, CAPABLE OF PRODUCING ENERGY STORAGE BY HOLDING BACK WATER WHILE THE WIND IS BLOWING, AND UNDERGROUND GAS FORMATIONS, SUITABLE FOR COMPRESSED AIR STORAGE. POSSIBLE INTERFERENCE WITH TELEVISION RECEPTION CONSTITUTES ONE OF THE MAJOR OBJECTIONS TO WIND INSTALLATIONS, AS TELEVISION'S SYNCHRONIZATION SPEED, 30 CYCLES PER SECOND, IS NEAR THE ROTATION SPEED OF LARGE WIND SYSTEMS. THE USE OF FIBER-GLASS BLADES IS SUGGESTED AS A PARTIAL REMEDY FOR THE PROBLEM. SEVERAL EXISTING WIND MACHINE PROGRAMS ARE DISCUSSED WITH REGARD TO CONSTRUCTION, COST EVALUATION, EFFECTIVENESS, AND STORAGE CAPACITIES. IT IS CONCLUDED THAT BOTH LARGE AND SMALL WIND SYSTEMS HAVE THE POTENTIAL TO COMPETE WITH CONVENTIONAL ELECTRIC SYSTEMS.

77-0287 MIRANDY L P
ROTOR/GENERATOR ISOLATION FOR WIND TURBINES.
STRUCTURES, STRUCTURAL DYNAMICS AND MATERIALS CONFERENCE, 18TH, MARCH 21-23, 1977, AND DYNAMICS SPECIALIST CONFERENCE, SAN DIEGO, MARCH 24-25, 1977. TECHNICAL PAPERS. VOL. B. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 25-37.

THIS PAPER ANALYZES THE INTERFACE DYNAMICS BETWEEN THE ROTOR AND ELECTRICAL GENERATOR FOR HORIZONTAL-AXIS CONSTANT-RPM WIND TURBINE SYSTEMS. COUPLED EQUATIONS OF MOTION FOR THE ROTOR, DRIVE SHAFT, AND GENERATOR ARE DEVELOPED AND SOLVED TO OBTAIN THE SYSTEM'S NATURAL

FREQUENCY AND FORCED-RESPONSE CHARACTERISTICS. IT IS CONCLUDED THAT ISOLATION VIA A SOFT DRIVE SHAFT SHOULD BE USED TO KEEP VIBRATORY TORQUE INPUTS TO THE GENERATOR WITHIN ACCEPTABLE LEVELS. IT IS ALSO SHOWN THAT THIS ISOLATION CAN BE ACCOMPLISHED WITH REALISTIC DESIGNS. SAMPLE CALCULATIONS ARE CARRIED THROUGH FOR A TWO-BLADED 265-FOOT-DIAMETER 1,000-KW SYSTEM.

77-0288 MIRANDY L
ROTOR/GENERATOR ISOLATION FOR WIND TURBINES.
J. ENERGY 1(3): 180-188, MAY-JUNE 1977.

THIS PAPER ANALYZES THE INTERFACE DYNAMICS BETWEEN THE ROTOR AND ELECTRICAL GENERATOR FOR HORIZONTAL-AXIS CONSTANT-RPM WIND TURBINE SYSTEMS. COUPLED EQUATIONS OF MOTION FOR THE ROTOR, DRIVE SHAFT, AND GENERATOR ARE DEVELOPED AND SOLVED TO OBTAIN THE SYSTEM'S NATURAL FREQUENCY AND FORCED-RESPONSE CHARACTERISTICS. IT IS CONCLUDED THAT ISOLATION VIA A SOFT DRIVE SHAFT SHOULD BE USED TO KEEP VIBRATORY TORQUE INPUTS TO THE GENERATOR WITHIN ACCEPTABLE LEVELS. IT IS ALSO SHOWN THAT THIS ISOLATION CAN BE ACCOMPLISHED WITH REALISTIC DESIGNS. SAMPLE CALCULATIONS ARE CARRIED THROUGH FOR A TWO-BLADED, 265-FT-DIAM, 1000-KW SYSTEM.

77-0289 MIRUS G L
FULLY AUTOMATIC 125/220 V 4KVA WINDPOWER PLANT.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 335-339. (IN GERMAN)

THE PAPER DESCRIBES A FULLY AUTOMATIC WIND POWER PLANT IN NORTHERN GERMANY WHICH IS USED FOR SPACE HEATING. THE FUNCTIONING OF THE ADJUSTABLE PROPELLER, THE GENERATOR, THE SWITCHBOARD, THE CONTROL AUTOMATIC, AND THE STORM PROTECTION SYSTEM ARE DESCRIBED.

77-0290 A MODEST WINDFALL.
NAT. WILDL. 16(1): 46, DECEMBER 1977 - JANUARY 1978.

OWNERS OF A N.Y.C. APARTMENT BUILDING EQUIPPED WITH WIND AND SOLAR ENERGY SYSTEMS WON A RULING FROM THE STATE'S PUBLIC SERVICE COMMISSION ORDERING CON ED TO BUY THE WINDMILL'S SURPLUS POWER.

77-0291 MOLLY J P
BALANCING POWER SUPPLY FROM WIND ENERGY CONVERTING SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F1-1 TO F1-12.

THE RANDOM POWER FLUCTUATION OF A WIND ENERGY CONVERTER CAN BE DECREASED BY ELECTRICAL CONNECTION OF SEVERAL WECS LOCATED AT LARGE DISPERSED SITES. IT IS SHOWN THE EFFECT ON ZERO OUTPUT TIME PER YEAR, THE VARIATION OF STORAGE CAPACITY AND THE INFLUENCE OF THE WEC COMPOUND ON SMALLER MEAN POWER FLUCTUATIONS COMPARED WITH STORAGE CAPACITIES OF THE SAME SMOOTHING EFFECT. IN ADDITION, IT IS INVESTIGATED, IN WHICH WAY MEAN POWER FLUCTUATION VARIES IF MOMENTARY DEMAND IS CHOSEN FOR REFERENCE.

77-0292 MOLLY J P
BALANCING POWER SUPPLY FROM WIND ENERGY CONVERTING SYSTEMS.
WIND ENG. 1(1): 57-66, 1977.

THE RANDOM POWER FLUCTUATION OF A WIND ENERGY CONVERTER CAN BE DECREASED BY THE ELECTRICAL CONNECTION OF SEVERAL WECS LOCATED AT LARGE DISPERSED SITES. IT IS SHOWN THAT SUCH A COMBINATION REDUCES THE ZERO OUTPUT TIME PER YEAR AND LEADS TO SMALLER MEAN POWER FLUCTUATIONS THAN THOSE OF A SINGLE WEC WITH AN EQUIVALENT STORAGE SYSTEM. IN ADDITION, THE WAY IN WHICH MEAN POWER FLUCTUATION VARIES IF MOMENTARY DEMAND IS CHOSEN FOR REFERENCE IS INVESTIGATED.

77-0293 MOLLY J P
POSSIBILITY OF DEMAND-ORIENTED GENERATION FROM WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 223-250. (IN GERMAN)

THE ENERGY YIELD OF A POWER STATION CONSISTING OF A WIND ENERGY CONVERTER AND STORE IS CONSIDERABLY AFFECTED BY THE CHOICE OF SPECIFIC CHARACTERISTICS OF BOTH COMPONENTS. BOUNDARY CONDITIONS OF THE OPTIMISATION PROCESS INCLUDE SITE, CONSUMER CHARACTERISTICS AND A MINIMUM REQUIREMENT OF SECURITY OF SUPPLY. IF THE COSTS OF THE POWER STATION COMPONENTS ARE KNOWN, THEN TAKING INTO ACCOUNT THE BOUNDARY CONDITIONS, THE WIND POWER STATION SHOWING THE MOST FAVOURABLE COSTS CAN BE DETERMINED. THE CONDITIONS AND THE METHOD OF CALCULATING THE OPTIMUM ROTOR SPEED, THE BEST SPECIFIC ROTOR SURFACE OUTPUT AND THE STORAGE CAPACITY REQUIRED FOR A CERTAIN SECURITY OF SUPPLY ARE SHOWN IN THE PAPER.

77-0294 MONTANA RENEWABLE ENERGY HANDBOOK. ALTERNAT. ENERGY RESOURCES ORGANIZATION.
HELENA, MONTANA, MONTANA ENERGY ADVISING COUNCIL, CAPITOL STATION, 1977.

THIS HANDBOOK IS AVAILABLE FREE ON REQUEST. IT CONTAINS INFORMATION SPECIFIC TO MONTANA ON SOLAR, WIND, BIOGAS, SMALL-SCALE HYDROPOWER, WIND AND GEOTHERMAL ENERGY. IT ALSO CONTAINS A REFERENCE SECTION LISTING BOOKS, PERIODICALS, PEOPLE, AS WELL AS OTHER GOOD SOURCES OF INFORMATION.

77-0295 MORAN K E
ROTOR FOR WIND-DRIVEN MACHINE.
U.S. PATENT NO. 4,025,233, MAY 24, 1977. 6P.

IN THE ROTOR OF A WINDMILL ELECTRIC GENERATOR, BLADES ARE SECURED TO A HUB BY MEANS OF INDIVIDUAL TAB-RECEIVING SLOTS AND A COMMON "KNOCK-OFF" HUBCAP, THIS MOUNTING MEANS PROVIDING FOR RAPID ASSEMBLY AND DISASSEMBLY. THE MOUNTING STRUCTURE ITSELF ESTABLISHES A PREDETERMINED PITCH AT THE BLADE ROOT, THUS PERMITTING THE ADVANTAGES OF AN OPTIMUM TWISTED BLADE TO BE OBTAINED WITHOUT THE NEED FOR AN EXCESSIVELY COMPLEX BLADE CONFIGURATION. THE RESULT IS A COMPACT GENERATOR UNIT THAT CAN BE USED EASILY IN REMOTE AREAS AND STOWED WITH CAMPING EQUIPMENT.

77-0295 MORAN W A
GIROMILL WIND TUNNEL TEST AND ANALYSIS. FINAL REPORT FOR THE PERIOD JUNE 1976 - OCTOBER 1977. VOLUME I, EXECUTIVE SUMMARY. VOLUME II, TECHNICAL DISCUSSION.
NTIS, OCTOBER 1977. VOLUME I, 19P. VOLUME II, 96P.

COO/2617-4/1, COO/2617-4/2

A WIND TUNNEL TEST OF A GIROMILL ROTOR WAS CONDUCTED. THE OBJECTIVE OF THIS TEST WAS TO SUBSTANTIATE THE PERFORMANCE COMPUTED BY THE LARSEN CYCLOGIRO VORTEX THEORY. ADDITIONAL OBJECTIVES WERE TO OBTAIN PERFORMANCE COMPARISON DATA BETWEEN THE GIROMILL, A SINUSOIDAL BLADE MODULATION GIROMILL, A DARRIEUS ROTOR, AND A MODIFIED DARRIEUS ROTOR THAT FLIPS THE BLADES A FEW DEGREES. A THREE BLADED GIROMILL ROTOR HAVING A DIAMETER OF 2.13 M (7 FT) AND A SPAN OF 1.52 M (5 FT) WAS TESTED IN THE MCDONNEL AIRCRAFT COMPANY 15 X 20 FT. MINI SPEED WIND TUNNEL. THE BLADE MODULATIONS WERE ACCOMPLISHED THROUGH USE OF A CAM AND PUSH ROD ARRANGEMENT. REPLACEABLE CAMS PROVIDED THE DESIRED BLADE MODULATION AT THE VARIOUS OPERATING POINTS. VARIOUS OPERATING CONDITIONS WERE ACHIEVED BY ADJUSTING THE ROTOR RPM AND TUNNEL SPEED. A TOTAL OF 36 DATA RUNS WERE CONDUCTED AT THREE NOMINAL ROTOR RPM VALUES; 80 AND 100 RPM WERE USED FOR THE GIROMILL TEST MODE, AND 120 RPM FOR THE DARRIEUS TEST MODE. A TORQUE METER MEASURED THE ROTOR TORQUE AND TOGETHER WITH THE MEASURED RPM PROVIDED THE ROTOR POWER. THE RESULTS SHOW THAT THE GIROMILL HAS GOOD PERFORMANCE, EQUAL TO OR MUCH BETTER THAN THAT PREDICTED BY THEORY, AND OUTPERFORMS THE OTHER TYPES OF VERTICAL AXIS WIND TURBINES TESTED. CONTINUED USE OF THE THEORETICALLY COMPUTED PERFORMANCE APPEARS WARRANTED.

77-0297 MORASH R T
EXACT 60 CYCLE POWER GENERATION AT ANY SPEED.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 1, P. 498-504.

A NEW ELECTRICAL POWER GENERATOR PRODUCES ANY EXACT FREQUENCY, AT ANY SHAFT RPM. THE SPEED CAN VARY OVER A WIDE RANGE WITHOUT AFFECTING THE OUTPUT FREQUENCY OR VOLTAGE. THIS CAPABILITY HAS BEEN DEVELOPED ON OPERATING UNITS FOR PRECISE FREQUENCY CONVERTERS AND FLYWHEEL ENERGY STORAGE UNITS IN UNINTERRUPTABLE POWER SYSTEMS. OTHER USEFUL

APPLICATIONS ARE: 60 CYCLE POWER DIRECTLY FROM A VARYING SPEED WINDMILL SHAFT; AUXILIARY POWER TAKE-OFF FROM A MOBILE UNIT VARIABLE SPEED PRIME MOVER; UP-RATING DIESEL-GENERATOR SETS BY ALLOWING THE DIESEL TO RUN AT OPTIMUM DESIGN SPEEDS; ENERGY CONSERVATION IN ON-SITE OR SMALL POWER SYSTEMS BY USING VARIABLE SPEED TO MATCH LOAD REQUIREMENT; PRECISE POWER FOR PORTABLE OR REMOTE LOCATIONS SUCH AS GEODETIC SURVEY WORK OR VIDEO APPLICATIONS, UNUSUAL FREQUENCY REQUIREMENTS, AND SIMPLE PARALLEL OPERATION OF NUMEROUS GENERATORS PRODUCING IDENTICAL FREQUENCY. A TYPICAL UNIT IS DESCRIBED. UNITS FROM KILOWATT TO MEGAWATT SIZES CAN BE BUILT.

77-0298 MOTHER PUTS UP A 2-KW WINDPLANT IN TWO HOURS.
MOTHER EARTH NEWS NO. 43: 86-87, JANUARY - FEBRUARY 1977.

THE INSTALLATION OF A 2-KW DUNLITE ON A 50-FOOT TOWER IN TWO HOURS IS DESCRIBED.

77-0299 MURPHY J M, BAUMGARTNER F W
WIND POWERED DRIVE AGGREGATE.
GERMAN (FRG) PATENT NO. 2,639,886/A/, MARCH 10, 1977. 15P. (IN GERMAN)

THE PATENT APPLICATION CONCERNS A WIND DRIVE AGGREGATE WITH VERTICAL ROTATION AXIS. THE DRUM-SHAPED ROTOR CARRIES A NUMBER OF VERTICALLY POSITIONED PARTS ON ITS CIRCUMFERENCE, WHICH HAVE A WING-SHAPED PROFILE IN THEIR HORIZONTAL CROSS-SECTION, THE CHORD OF WHICH FORMS AN ANGLE OF ATTACK WITH THE TANGENT ON THE PERIPHERY. THE ROTOR IS SURROUNDED BY AN EQUALLY CYLINDRICAL STATOR LIKE A CAGE WHICH HAS SEVERAL VERTICAL ROD-SHAPED PARTS OF SUITABLE CROSS-SECTION. BY THESE MEANS THE SPEED OF THE RADIALLY ENTERING WIND CURRENT IS INCREASED ON CONTACT WITH THE ROTOR WING AND MOVES IT DIAGONALLY TO THE AIR CURRENT, SO THAT THE ROTOR IS SET IN MOTION. IN ANOTHER DESIGN, THE ROTOR AND THE STATOR ARE OF SPHERICAL DESIGN, ALSO WITH VERTICAL AXIS.

77-0300 MUSGROVE P J
ENERGY FROM THE WIND. POTENTIAL FOR POWER.
NTIS, JANUARY 1977. P. 4.1-4.9.
CONF-770155

AN ASSESSMENT IS MADE OF THE AMOUNT OF POWER/ENERGY IN THE WIND WITH EMPHASIS ON CALCULATIONS FOR THE UNITED KINGDOM. WINDMILLS MUST BE DEPLOYED OVER A GIVEN AREA IN A PATTERN THAT TAKES ACCOUNT OF THE DISTRIBUTION OF DIRECTIONS FROM WHICH THE WIND CAN BE EXPECTED. IN THE U.K., ONE SUCH ARRAY CAN BE PROVIDED IN THE WESTERN ISLES. THE AUTHOR RECOMMENDS DEPLOYING SUCH AN ARRAY IN THE SHALLOW WATERS OF THE SOUTHERN NORTH SEA. HE CONCLUDES THAT DEPLOYING SUCH AN ARRAY IN THE SHALLOW OFFSHORE REGION WOULD HAVE THE POTENTIAL FOR PROVIDING A VERY SIGNIFICANT PART OF THE TOTAL ELECTRICITY REQUIREMENTS. HE ALSO CONCLUDES THAT SUCH A WIND-POWER SYSTEM APPEARS COMPETITIVE WITH NUCLEAR POWER SYSTEMS.

77-0301 MUSGROVE P J
THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C7-87 TO C7-100.

THE DARRIEUS VERTICAL AXIS WINDMILL DEVELOPED IN RECENT YEARS BY RANGI, SOUTH AND TEMPLIN AT THE N.R.C., OTTAWA, HAS BEEN SHOWN TO HAVE AN EFFICIENCY COMPARABLE WITH THE BEST CONVENTIONAL, HORIZONTAL-AXIS. VERTICAL AXIS WINDMILLS DO NOT REQUIRE ORIENTATION INTO THE WIND AND THEIR LOAD CAN BE LOCATED AT GROUND LEVEL, DIRECTLY BENEATH THE ROTATING VERTICAL AXIS OF THE MACHINE. NRC CALCULATIONS INDICATE THAT THESE FEATURES LEAD TO AN OVERALL WINDMILL DESIGN THAT IS SIGNIFICANTLY LIGHTER AND CHEAPER THAN CONVENTIONAL WINDMILLS. TO AVOID EXCESSIVE BLADE STRESSES THE DARRIEUS/NRC WINDMILL HAS TROPOSKIEN SHAPED BLADES, FITTED WITH AIR BRAKES, BUT THESE ARE DIFFICULT AND EXPENSIVE TO MAKE. ALSO THE TOWER HEIGHT OF THIS WINDMILL IS APPRECIABLY GREATER THAN THAT OF CONVENTIONAL WINDMILLS. THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL (VGVAW), RECENTLY DEVELOPED AT READING UNIVERSITY, USES STRAIGHT BLADES WHICH ARE HINGED TO A HORIZONTAL CROSS-ARM. IN LOW WIND SPEEDS THE BLADES REMAIN UPRIGHT, GIVING MAXIMUM EFFICIENCY WHEN IT IS MOST NEEDED. IN HIGH WIND SPEEDS CENTRIFUGAL FORCES, REACTED BY A CENTRAL SPRING WHICH IS ATTACHED VIA TIE-WIRES TO THE BLADES, MAKE THE BLADES INCLINE OUTWARDS. THE BLADE INCLINATION PROGRESSIVELY INCREASES WITH INCREASING

WIND SPEED; THIS PREVENTS EXCESSIVE BLADE STRESSES, REGARDLESS OF THE WIND SPEED, AND LIMITS THE MAXIMUM POWER OUTPUT TO A SMALL MULTIPLE OF THE AVERAGE POWER OUTPUT. THESE FEATURES FURTHER SIMPLIFY THE VERTICAL AXIS WINDMILL DESIGN AND SHOULD LEAD TO A FURTHER REDUCTION IN COST. THIS PAPER DESCRIBES IN SOME DETAIL THE DESIGN OF THE VGVAW AND INDICATES HOW ITS PREDICTED PERFORMANCE VARIES WITH WIND SPEED AND LOAD. A 3 METRE DIAMETER PROTOTYPE VGVAW HAS RECENTLY BEEN CONSTRUCTED AT READING, AND INITIAL OBSERVATIONS OF ITS PERFORMANCE ARE REPORTED.

77-0302 MUSGROVE P J
THE VARIABLE GEOMETRY WINDMILL.
WIND POWER DIG. 1(8): 27-29, SPRING 1977.

THE DARRIEUS ROTOR, VERTICAL AXIS DESIGN HAS INTRIGUED RESEARCHERS AND DESIGNERS FOR DECADES EVEN THOUGH IT HAS EXHIBITED AN INABILITY TO SELF-START UNDER MOST WIND CONDITIONS. IN THIS ARTICLE THE AUTHOR DESCRIBES HIS WORK TO OVERCOME THE SELF-STARTING AND OTHER AERODYNAMIC PROBLEMS USUALLY ASSOCIATED WITH THE DARRIEUS DESIGN. HIS CHOICE OF A STRAIGHT-BLADE CONFIGURATION PARALLELS THE THINKING OF HERMAN DREES, DESIGNER OF THE CYCLOTURBINE.

77-0303 MUSGROVE P J
WIND POWER ENGINE.
GERMAN (FRG) PATENT NO. 2,632,697/A/, FEBRUARY 10, 1977. 17P. (IN GERMAN)

THE DEVICE IS A WIND-POWER ENGINE WITH VERTICAL AXIS AND WITH ONE OR SEVERAL WINGS WITH AIRFOIL PROFILE FIXED ON A FRAME WHICH IS PIVOTED AT THE VERTICAL AXIS. EACH WING FORMS AT LEAST ON ONE PART OF ITS LENGTH AN ANGLE OF INCLINATION WITH THE VERTICAL. THE ANGLE INCREASES UNDER THE INFLUENCE OF THE CENTRIFUGAL FORCE WHEN THE RPM EXCEED A NORMAL OPERATION RANGE. THIS METHOD HELPS TO REDUCE MECHANICAL LOADS OCCURRING WITH HIGH WIND SPEEDS WITHOUT REQUIRING A COMPLICATED CONSTRUCTION.

77-0304 NATHAN G K, RAJASOORIA G P D
STUDY ON THE USE OF WINDMILLS IN SINGAPORE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A5.75-A5.88.

THE PURPOSE OF THIS STUDY IS TO INVESTIGATE THE PROSPECT OF USING WIND POWER IN THE NUMEROUS ISLANDS IN THE REGION OF SINGAPORE AND TO DESIGN A SUITABLE WINDMILL. THE WIND DATA FURNISHED BY THE METEOROLOGICAL SERVICES OF SINGAPORE FOR THE MAINLAND AND THE PORT OF SINGAPORE AUTHORITY FOR THE OFF-SHORE ISLANDS ARE ANALYZED. THE ANALYSIS OF WIND DATA IS BASED ON HOURLY MEAN SPEED AND A STATISTICAL ANALYSIS OF THE DATA IS REPORTED. ALSO, OVERALL ESTIMATE OF THE TOTAL AND THE DISTRIBUTION PATTERN OF AVAILABLE ENERGY IS MADE. A NEW CONCEPT IS PROPOSED TO DESIGN WINDMILLS AND EXPERIMENTAL STUDIES HAVE BEEN CONDUCTED IN THE WIND TUNNEL TO VERIFY THE EFFECTIVENESS OF THE DESIGN METHOD. ALSO, THE FEASIBILITY OF APPROXIMATING THE "IDEAL" BLADE DESIGN BY FLEXIBLE "SAILWING" TYPE BLADE IS INVESTIGATED. RESULTS OF THE STUDIES ARE REPORTED.

77-0305 NELSON V, GILMORE E, BARIEAU R E
MODEL OF WIND IRRIGATION PUMPING SYSTEMS.
WIND TECHNOL. J. 1(2): 17-23, SUMMER 1977.

TWO WIND POWERED IRRIGATION SYSTEMS, ROTARY PUMP AND AIRLIFT PUMP, WERE INVESTIGATED BY CALCULATING THE TIME CORRELATION OF WIND ENERGY AND WATER PUMPED. THE ANNUAL EFFICIENCIES OF THE ROTARY AND AIRLIFT SYSTEMS WERE 24% AND 6%, RESPECTIVELY. THE COST-BENEFIT ANALYSIS OF THE ROTARY SYSTEM INDICATES A THIRTEEN YEAR PAYOUT. A POSSIBLE SOLUTION TO THE TECHNICAL AND ECONOMICAL PROBLEMS OF WIND IRRIGATION SYSTEMS IS TO OPERATE WIND UNIT CONNECTED IN PARALLEL WITH AN ELECTRIC MOTOR OR INTERNAL COMBUSTION ENGINE.

77-0306 NELSON V
ANOTHER WINDMILL LANE.
WIND POWER DIG. 1(9): 4, SUMMER 1977.

J. B. BUCHANAN'S COLLECTION OF RESTORED OLD WINDMILLS IS DESCRIBED.

77-0307 NEW MEXICO UTILITY WILL TEST 200-KW WIND TURBINE UNIT: EXPERIMENTAL

POWER WINDMILL WILL BE BUILT ON CLAYTON MUNICIPAL SYSTEM.
PUBLIC POWER 35(1): 23, 1977.

A 200-KILOWATT WIND TURBINE UNIT WILL BE TESTED AT CLAYTON, NEW MEXICO, AS AN ERDA DEMONSTRATION PROGRAM OF A DUAL-FUEL UNIT FOR POWER GENERATION. BETWEEN 5 AND 15 PERCENT OF LOCAL POWER IS EXPECTED TO BE SUPPLIED ON A WINDY DAY. MODIFICATIONS WERE MADE IN THE SANDUSKY, OHIO, PROTOTYPE TO MAKE IT STRONGER AND THE BLADE DESIGN MORE EFFICIENT. A MAXIMUM OF 200 KW WILL BE PRODUCED, ENOUGH TO SERVE 60 FAMILIES. NEW FEATURES IN THE DESIGN WILL ALLOW THE UNIT TO RESPOND TO CHANGING WIND SPEEDS AND DIRECTION. TWIN ALUMINUM BLADES WILL MAINTAIN A CONSTANT ROTOR SPEED OF 40 REVOLUTIONS PER MINUTE. AFTER TESTS AT THE CLAYTON SITE, FOUR MORE SITES WILL BE SELECTED FOR SIMILAR AND LARGER INSTALLATIONS. POSSIBLE LOCATIONS ARE LISTED ALONG WITH THE NAME OF THE ADMINISTERING UTILITY.

77-0308 NEWMAN B G
SPACING OF WIND TURBINES IN LARGE ARRAYS.
ENERGY CONVERS. 16(4): 169-171, 1977.

THE EFFECT OF SPACING ON THE POWER OUTPUT OF WIND TURBINES IN LARGE ARRAYS HAS BEEN DETERMINED THEORETICALLY. FOLLOWING TEMPLIN, THE EFFECT IS ASSESSED BY DETERMINING THE INCREASE IN ROUGHNESS OF THE EARTH'S BOUNDARY LAYER DUE TO THE DRAG OF THE TURBINES. THE THICKNESS OF THE BOUNDARY LAYER IS ASSUMED TO CHANGE IN PROPORTION TO THE SQUARE ROOT OF THE SKIN FRICTION, WHICH IS APPROPRIATE FOR A TURBULENT EKMAN LAYER, AND DIFFERS FROM THE ASSUMPTIONS MADE BY TEMPLIN. THE LOSS OF POWER FOR BOTH FLAT-OPEN COUNTRY AND ROUGH-WOODED COUNTRY IS DETERMINED AS A FUNCTION OF THE AREA DENSITY OF THE TURBINES, AND IT IS FOUND THAT QUITE LARGE SPACINGS ARE REQUIRED TO AVOID A SIGNIFICANT LOSS OF POWER.

77-0309 NICHOLS L
WIND-DRIVEN ALTERNATORS.
WIND POWER DIG. 1(8): 34-36, SPRING 1977.

77-0310 NIGHTINGALE D, RAMSEY R, ROWE L
HOW TO MAXIMIZE YOUR WIND GENERATOR'S OUTPUT.
ALTERN. SOURCES ENERGY 24:15-17, FEBRUARY 1977.

THE AUTHORS DESCRIBE A CIRCUIT THEY DESIGNED TO CONTROL THE OUTPUT FROM A WINDMILL.

77-0311 PIEPERS G G
NETHERLAND'S NATIONAL RESEARCH PROGRAMME ON WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 17-22. (IN GERMAN)

A SURVEY IS PRESENTED ON THE NETHERLAND'S NATIONAL RESEARCH PROGRAM ON WIND ENERGY APPROVED IN FEBRUARY 1976 BY THE DUTCH GOVERNMENT. THE OBJECTIVE OF THE PROGRAM IS TO STUDY THE TECHNICAL AND ECONOMICAL FEASIBILITY OF LARGE-SCALE UTILIZATION OF WIND ENERGY IN THE NETHERLANDS.

77-0312 NITSCH J
CONCEPTS ON THE INTERMEDIATE STORAGE OF WIND-GENERATED SECONDARY ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 251-274. (IN GERMAN)

THE STORAGE OF WIND ENERGY IS SUBSTANTIALLY INDENTICAL TO THE PROBLEM OF ELECTRICITY STORAGE. POSSIBILITIES OF STORAGE FOR THIS SECONDARY ENERGY CARRIER ARE LISTED. THE ADDITIONAL BOUNDARY CONDITIONS ASSOCIATED WITH THE USE OF WIND ENERGY LEAD TO PARTICULARLY CLOSE COUPLING OF WIND POWER PLANT AND STORAGE SYSTEM. THIS IS ILLUSTRATED BY EXAMPLES. FOR ONE OR SEVERAL LARGE UNITS, STORAGE CONCEPTS ARE INTRODUCED WHICH PERMIT THE OPERATION OF PEAK LOAD POWER STATION WITH 300 MW OUTPUT. OF THE STORAGE POSSIBILITIES IN QUESTION, INCLUDING HYDRAULIC PUMPED STORAGE, COMPRESSED AIR STORAGE, FLYWHEEL STORAGE AND THE PRODUCTION OF HYDROGEN, FLYWHEEL STORAGE IS PARTICULARLY ATTRACTIVE ON CONDITION THAT AN APPROXIMATION TO THE THEORETICAL STORAGE CHARACTERISTICS IS POSSIBLE, WHICH IS REALIZED WITH SOLID SOLUTIONS TO THE FLYWHEEL PROBLEM.

77-0313 NOBLE H

THE NOBLE WINDGENERATOR.
ALTERN. SOURCES ENERGY NO. 24: 4-10, FEBRUARY 1977.

A DESCRIPTION IS GIVEN OF HOW THE AUTHOR BUILT HIS WIND GENERATOR. DRAWINGS AND SPECIFICATIONS ARE INCLUDED.

77-0314 NOYES R
OFFSHORE AND UNDERGROUND POWER PLANTS.
PARK RIDGE, N.J., NOYES DATA CORP., 1977. 318P.

INFORMATION IS PRESENTED ON THE DESIGN, SITING, CONSTRUCTION, ECONOMICS, SAFETY, AND ENVIRONMENTAL EFFECTS OF UNDERGROUND PUMPED STORAGE HYDROELECTRIC POWER PLANTS; UNDERGROUND NUCLEAR POWER PLANTS; FLOATING, SEABED, AND ISLAND-SITUATED NUCLEAR POWER PLANTS; OFFSHORE FOSSIL-FUEL POWER PLANTS; WAVE POWER, OCEANIC WIND POWER; TIDAL POWER; AND SYSTEMS OF RECOVERING ENERGY FROM SALINITY GRADIENTS OR THERMAL GRADIENTS IN THE OCEANS.

77-0315 OLSSON L E
APPLICATIONS OF METEOROLOGY TO THE DEVELOPMENT OF ATMOSPHERIC ENERGY SOURCES. REPORT TO COSAMC VII BY RAPPORTEUR ACC. TO RES. 13 COSAMC VI AND LETTER FROM WMO (NO. 1382/M/CL.MB.2) 16 JANUARY 1974.
NORRKOPING, SWEDEN, MARCH 1977. 57P.

77-0316 OMAN R A, FOREMAN K M, GILBERT B L
INVESTIGATION OF DIFFUSER-AUGMENTED WIND TURBINES. PART I. EXECUTIVE SUMMARY.
NTIS, JANUARY 1977. 21P.
COO/2616-2 (PART I)

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION. THE PROJECT IS AIMED AT INCREASING THE OUTPUT AND REDUCING THE COST, THE OFF-DUTY TIME, AND THE TECHNICAL RISK OF WIND ENERGY CONVERSION SYSTEMS (WECS). THE DAWT APPEARS TO BE BEST SUITED TO LARGE WECS FOR COMMERCIAL POWER PRODUCTION BECAUSE IT PERMITS A SIGNIFICANT INCREASE IN THE UNIT POWER OUTPUT WITHOUT EXTENDING THE SIZE OF ROTATING MACHINERY INTO THE RANGE WHERE ROTOR DYNAMICS CAUSE EXCESSIVE COSTS.

77-0317 OMAN R A, FOREMAN K M, GILBERT B L
INVESTIGATION OF DIFFUSER-AUGMENTED WIND TURBINES. PART II. TECHNICAL REPORT.
NTIS, JANUARY 1977. 105P.
COO/2616-2 (PART II)

INFORMATION ON DIFFUSER-AUGMENTED WIND TURBINES IS PRESENTED CONCERNING THE DEVELOPMENT OF EFFICIENT AND COMPACT DIFFUSERS, ECONOMIC ANALYSIS, AND ANALYTICAL DEMONSTRATION OF TWO-STAGE CONSTANT SPEED ROTOR CONCEPTS.

77-0318 OPFOLZER G
NEW TYPE OF WIND TURBINE -- THE INVENTION OF A VIENNESE ENGINEER. THE FAN PRINCIPLE GIVES SEVERAL TIMES THE PREVIOUS USEFUL OUTPUT.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 228. (IN GERMAN)

THE CONSTRUCTION OF A NEW TYPE OF WIND TURBINE IS DESCRIBED, WHICH HAS TWO HORIZONTALLY POSITIONED PROPELLERS. THE PROPELLERS ARE AT AN ANGLE TO EACH OTHER AND OPERATE ON THE "FAN" PRINCIPLE, FOR WHICH A PATENT HAS BEEN APPLIED. THIS PRODUCES APPRECIABLY HIGHER OUTPUTS THAN WITH PREVIOUS WIND TURBINES. AT A WIND SPEED OF 15 METRES/SEC, AN OUTPUT OF 55.4 KW WAS ACHIEVED. THIS WIND TURBINE WAS INTRODUCED BY MEANS OF A DEMONSTRATION MODEL.

77-0319 ORGILL M M
SURVEY OF WIND MEASUREMENT FIELD PROGRAMS.
NTIS, MAY 1977. 53P.
BNWL/WIND-03

ONE OF THE TASKS IN THE SITE SELECTION PROGRAM AREA OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS TO IDENTIFY AND CATALOG EXISTING METEOROLOGICAL DATA SETS WHICH MIGHT BE USED FOR MODEL VALIDATION AND FOR OTHER WCPE STUDIES. THIS REPORT IDENTIFIES AND

BRIEFLY SUMMARIZES 139 FIELD PROGRAMS THAT HAVE USED WIND NETWORKS (2 TO 60 WIND MEASUREMENT SITES). IN GENERAL THESE STUDIES WERE MESOSCALE IN AREAL EXTENT; HOWEVER, THERE IS REFERENCE TO SOME MICRO- AND SUBSYNOPTIC SCALE STUDIES. THE SURVEY COVERED THE TIME PERIOD FROM 1940 TO PRESENT.

77-0320 OUTLOOK. THE ARK; HOW TO BIOENGINEER HUMAN HABITATS.
ENV. SCI. TECHNOL. 11(8): 744-746, AUGUST 1977.

A CANADIAN SOLAR HOME, WITH A WINDMILL, IS DESCRIBED.

77-0321 PANTALONE D K
EFFECTS OF LARGE INTERCONNECTED WIND GENERATORS ON THE ELECTRIC POWER SYSTEM. PH.D. THESIS.
ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 78-05966, 1977. 135P.

WHEN ONE CONSIDERS THE DIRECT INTERFACING OF WIND GENERATOR SYSTEMS (WGSS) WITH THE ELECTRIC POWER SYSTEM, THERE IS AN INTEREST IN WGS DYNAMICS AND COMPATIBILITY WITH THE POWER SYSTEM. TWO GENERAL EFFECTS THAT MAY OCCUR AS A RESULT OF THE PRESENCE OF MANY LARGE WGSS IN THE SYSTEM WERE CONSIDERED. THE FIRST EFFECT DEALS WITH THE POSSIBILITY OF CONTRIBUTING TO DYNAMIC INSTABILITY IN THE LARGE INTERCONNECTED POWER SYSTEM. A MODAL ANALYSIS OF A SET OF WGSS ON A RADIAL LINE WAS USED TO EXAMINE THIS POSSIBILITY. THE EFFECT OF CERTAIN COMPONENTS, PARAMETERS, AND CONDITIONS ON THE EIGENVALUES WAS STUDIED. THE SECOND EFFECT DEALS WITH A LOAD TRACKING CONSTRAINT IN AUTOMATIC GENERATION CONTROL AS AFFECTED BY THE POWER SPECTRUM OF THE WIND. A FREQUENCY RESPONSE ANALYSIS WAS USED TO DETERMINE THE FREQUENCY CONTENT OF THE WGS OUTPUT.

77-0322 PLANNING A WIND-POWERED GENERATING SYSTEM.
NORWICH, VERMONT, ENERTECH CORPORATION, 1977.

THIS IS A SHORT PRIMER IN THE BASIC PRINCIPLES OF WIND MACHINES, THEIR COMPONENTS, AND SITING REQUIREMENTS. IT INCLUDES ESTIMATIONS OF POWER REQUIREMENTS AND DETAILS OF SITE, TOWER, AND BATTERY STORAGE SELECTIONS. IT IS A COOKBOOK FOR THE HANDYMAN.

77-0323 PARKER N, WALTON H
WIND ENERGY CONVERSION SYSTEMS MANUFACTURING AND SALES ACTIVITY, 1975 AND 1976.
NTIS, APRIL 1977. 11P.
PB-265823

THIS REPORT CONTAINS THE RESULTS OF AN ANNUAL SURVEY OF PRIVATE FIRMS ENGAGED IN THE MANUFACTURING AND DISTRIBUTION OF WIND ENERGY CONVERSION SYSTEMS IN THE UNITED STATES DURING THE YEARS 1975 AND 1976. IMPORTS OF SYSTEMS MANUFACTURED ABROAD FOR DISTRIBUTION IN THE UNITED STATES ARE ALSO INCLUDED.

77-0324 PARKES M E, VAN DE LAAK F J M
WIND POWER INSTALLATIONS FOR WATER PUMPING IN DEVELOPING COUNTRIES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F3.31-F3.40.

IN DEVELOPING COUNTRIES WINDMILLS MAY BE USED FOR PUMPING IN RURAL WATER SUPPLIES, SMALLHOLDER IRRIGATION OR CATTLE WATERING. POSSIBLE APPLICATIONS ARE EXAMINED BY CONSIDERING WIND POWER POTENTIAL AND DESIGN CRITERIA IN ONE COUNTRY, TANZANIA. WIND ROTORS AND ASSOCIATED PUMPS ARE REVIEWED WITH REFERENCE TO LOW COST IRRIGATION PURPOSES. A TECHNIQUE IS PRESENTED FOR ASSESSING THE MINIMUM STORAGE REQUIREMENTS TO PROVIDE UNIFORM WATER SUPPLIES FROM WIND-POWERED INSTALLATIONS. AN ECONOMIC COMPARISON OF WIND AND ENGINE-POWERED WATER SUPPLIES IS GIVEN.

77-0325 POTENTIAL FOR POWER. SYMPOSIUM ON THE PROSPECTS FOR POWER FROM CURRENTLY UNCONVENTIONAL ENERGY SOURCES.
NTIS, 1977. 94 P.
SYMPOSIUM ON THE PROSPECTS FOR POWER FROM CURRENTLY UNCONVENTIONAL ENERGY SOURCES, SOUTHAMPTON, ENGLAND, JANUARY 6, 1977.
CONF-770155

77-0326 PAYNE P R
AEOLIAN WINDMILL.

U.S. PATENT NO. 4,024,409, MAY 17, 1977. 8P.

A SYSTEM IS DISCLOSED WHICH UTILIZES A MEMBER WHICH OSCILLATES IN RESPONSE TO MOVEMENT OF A FLUID PAST IT AND A MEANS FOR UTILIZING THE ENERGY GENERATED BY THE OSCILLATION. IN ONE EMBODIMENT THE OSCILLATING MEMBER IS A CABLE UTILIZING WIND OR WATER AS GENERATOR OR PUMP. IN A SECOND EMBODIMENT, THE OSCILLATING MEMBER IS AN AIRFOIL HAVING EITHER PITCH CONTROL OR ACTIVE CIRCULATION CONTROL.

77-0327 PEA SOUP MILL IN OPERATION.
WIND POWER DIG. 1(9): 22, SUMMER 1977.

A RESTAURANT IN CALIFORNIA HAS AN OLD DUTCH STYLE WINDMILL WHICH MAKES ELECTRICITY AS WELL AS PROVIDING DECOR.

77-0328 PEDERSEN N F
PRACTICAL APPROACH TO VORTEX AUGMENTATION OF WIND TURBINES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19. P. 20-24.

THE CASE FOR VORTEX AUGMENTATION IS BUILT BY REVIEWING THE LIMITATIONS IMPOSED ON THE EXTRACTION OF ENERGY FROM THE WIND BY MEANS OF A CONVENTIONAL IMPULSE TURBINE. THE VORTEX AUGMENTED REACTION WIND TURBINE IS ANALYZED BY MEANS OF THE IDEAL GAS LAWS AND CONVENTIONAL EMPIRICAL FLOW COEFFICIENTS. THE RESULTS ARE PLOTTED TO SHOW THE RELATIONS BETWEEN TURBINE SIZE AND TURBINE OUTPUT AS A FUNCTION OF WIND VELOCITY. COSTS OF CONSTRUCTION ARE ESTIMATED AND THE RELATION TO TURBINE OUTPUT SHOWN.

77-0329 PEDERSEN N F, ELLIS G O
WIND TURBINE.
U.S. PATENT NO. 4,021,135, MAY 3, 1977. 4P.

A WIND TURBINE IS DESCRIBED WHICH INCLUDES A REACTION TYPE TURBINE WHEEL INSTEAD OF AN IMPULSE TYPE TURBINE. AN AUGMENTER PROVIDES A VORTEX DOWNSTREAM OF THE TURBINE AT THE EXIT OF THE TURBINE TO INCREASE THE PRESSURE DIFFERENTIAL ACROSS THE TURBINE THEREBY INCREASING THE POWER THAT MAY BE EXTRACTED FROM THE WIND.

77-0330 PEED P V
WIND DRIVEN ELECTRICAL GENERATOR.
U.S. PATENT NO. 4,061,926, DECEMBER 6, 1977. 4P.

AN ELECTRIC GENERATING SYSTEM IS DESCRIBED IN WHICH OPPOSITELY ROTATING WIND DRIVEN WHEELS ARE USED, ONE TO DRIVE THE ROTOR AND ONE TO DRIVE THE STATOR OF AN ELECTRIC GENERATOR.

77-0331 PENNY M M, BOURGEOIS S V
DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS. FINAL REPORT DECEMBER 1975 - FEBRUARY 1976.
NTIS, JUNE 1977. 111P.
PB-272759

THE REPORT GIVES A REVIEW OF THE DEVELOPMENT STATUS OF SEVERAL ADVANCED ENERGY CONCEPTS AND DISCUSSES THE PRIMARY ENVIRONMENTAL HAZARDS OF EACH SYSTEM. SYSTEMS REVIEWED INCLUDE POTENTIAL NEW SOURCES OF ENERGY AND IMPROVED ENERGY CONVERSION. EACH SYSTEM IS EVALUATED WITH RESPECT TO ITS DEVELOPMENT STATUS, AND ESTIMATES MADE AS TO WHEN EACH WILL BEGIN TO CONTRIBUTE SIGNIFICANTLY TO U.S. ENERGY NEEDS. APPRAISALS WERE MADE OF THE ENVIRONMENTAL IMPACT OF EACH SYSTEM INCLUDING ASSESSMENT OF THE ADEQUACY OF POLLUTION CONTROL TECHNOLOGY AND POTENTIAL GROSS ECOLOGICAL IMPACT. CONSIDERING BOTH THE EXPECTED ENVIRONMENTAL IMPACT AND PERIOD OF TECHNOLOGY BREAK THROUGH/COMMERCIALIZATION, THE FOLLOWING ORDER OF R AND D PRIORITIES ON THE CANDIDATE ENERGY SYSTEMS HAS BEEN DEVELOPED: HIGH TEMPERATURE TURBINES, OCEAN THERMAL GRADIENTS, WINDMILLS, MAGNETOHYDRODYNAMICS, METAL VAPOR (POTASSIUM) RANKINE TOPPING CYCLES, HYDROGEN FUEL CELLS, THERMIONICS, ELECTROGASDYNAMICS, AND THERMOELECTRIC CONVERSION.

77-0332 PENNY M M, BOURGEOIS S V, CAIN W C
DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS.

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 1, P. 646-654.

A REVIEW OF THE DEVELOPMENT STATUS AND ANTICIPATED PRIMARY ENVIRONMENTAL HAZARDS OF NINE ADVANCED ENERGY SYSTEMS IS PRESENTED. A SUMMARY OF FEDERALLY-FUNDED R AND D FOR THESE ENERGY SYSTEMS IS ALSO PRESENTED. EACH OF THESE ENERGY SYSTEMS HAS A NEGLIGIBLE OR MILD DIRECT ENVIRONMENTAL IMPACT WHEN COMPARED WITH CONVENTIONAL FOSSIL FUEL AND NUCLEAR SYSTEMS. INDIRECT IMPACTS FOR SOME OF THE ENERGY SYSTEMS COULD BE SEVERE, HOWEVER, AND THESE SYSTEMS NEED FURTHER STUDY TO QUANTIFY THEIR IMPACTS. CONSIDERING BOTH EXPECTED ENVIRONMENTAL IMPACT AND PERIOD OF TECHNOLOGY BREAKTHROUGH/COMMERCIALIZATION, THE SYSTEMS ARE RANKED IN ORDER OF DECREASING RESEARCH PRIORITY AS FOLLOWS: HIGH TEMPERATURE TURBINES, OCEAN THERMAL GRADIENTS, WINDMILLS, MAGNETOHYDRODYNAMICS, METAL VAPOR RANKINE TOPPING CYCLES, HYDROGEN FUEL CELLS, THERMIONICS, ELECTROGASDYNAMICS AND THERMOELECTRIC CONVERSION.

77-0333 PUBLIC REACTIONS TO WIND ENERGY DEVICES. FINAL REPORT.
NTIS, OCTOBER 1977. 215P.
NSF/RA-77-0026

THIS STUDY WAS UNDERTAKEN BY THE SURVEY RESEARCH LABORATORY OF THE UNIVERSITY OF ILLINOIS TO EXPLORE REACTIONS OF THE GENERAL PUBLIC TOWARD DIFFERENT TYPES OF WIND ENERGY DEVICES FOR GENERATING ELECTRIC ENERGY. MORE SPECIFICALLY, THE OBJECTIVES OF THE STUDY WERE TWOFOLD: TO PROVIDE SUBSTANTIVE INFORMATION ON PUBLIC ACCEPTANCE OF DIFFERENT TYPES OF WIND ENERGY DEVICES IN DIFFERENT SETTINGS; AND TO FURNISH A METHODOLOGICAL BASE FOR MORE INTENSIVE STUDIES OF PUBLIC ACCEPTANCE OF SUCH DEVICES. THE STUDY WAS CARRIED OUT BY CONDUCTING PERSONAL INTERVIEWS WITH STATISTICAL RANDOM SAMPLES OF ADULTS IN SIX DIFFERENT PARTS OF THE COUNTRY, WITH PRIMARY EMPHASIS ON RURAL AND SMALLER URBAN AREAS. THE LOCATIONS SELECTED WERE WESTERN MICHIGAN, SOUTHEASTERN WYOMING, WESTERN WASHINGTON, EASTERN RHODE ISLAND, THE CHICAGO AREA, AND THE SANDY HOOK UNIT OF THE GATEWAY NATIONAL RECREATION AREA IN NEW JERSEY. THOSE INTERVIEWED WERE QUESTIONED ON A NUMBER OF TOPICS, INCLUDING THEIR ATTITUDES TOWARD SOURCES OF ENERGY, THEIR KNOWLEDGE OF WIND ENERGY DEVICES, AND THEIR OPINIONS ON PAYING EXTRA FOR POLLUTION-FREE SOURCES OF ENERGY. IN ADDITION, THEY WERE SHOWN SLIDES OF DIFFERENT WIND ENERGY MACHINES IN VARIOUS SETTINGS AND WERE ASKED TO INDICATE THEIR PREFERENCES FROM AN AESTHETIC POINT OF VIEW.

77-0334 POWE R E
WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE AIRFOIL CONCEPT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B3.39-B3.54.

A UNIQUE MOMENTUM INTERCHANGE DEVICE FOR EXTRACTION OF ENERGY FROM THE WIND IS DESCRIBED. IT IS SHOWN THAT THE MAXIMUM POSSIBLE ENERGY EXTRACTION WITH THIS TRACKED-VEHICLE AIRFOIL DEVICE IS GREATER THAN THAT FOR A CONVENTIONAL WINDMILL. A COMPREHENSIVE MATHEMATICAL MODEL IS DEVELOPED FOR THE DEVICE, AND THIS MODEL IS PROGRAMMED FOR SOLUTION ON A DIGITAL COMPUTER. THIS PROGRAM IS WRITTEN SO THAT WIND SPECTRUM DATA FOR ANY GEOGRAPHIC LOCATION CAN BE USED TO DETERMINE THE MONTHLY ENERGY OUTPUT FOR THAT LOCATION. RESULTS FROM THIS PROGRAM INDICATE THAT THIS DEVICE COULD MAKE SIGNIFICANT CONTRIBUTIONS TO ELECTRICAL POWER REQUIREMENTS. FOR EXAMPLE, A SYSTEM 8 KM LONG AND CONSISTING OF AIRFOILS 12 METERS IN LENGTH WITH A 3 METER CHORD COULD SUPPLY THE ELECTRICAL ENERGY NEEDS OF ABOUT 15,000 PEOPLE. THESE RESULTS ARE PRESENTED IN A FORM WHICH INDICATES THE EFFECT OF CHANGING VARIOUS DESIGN PARAMETERS. IN ADDITION, COMPARISONS OF THE ENERGY OUTPUT OF THE TRACKED-VEHICLE AIRFOIL SYSTEM WITH TYPICAL WINDMILLS ARE MADE.

77-0335 PRELIMINARY OFFICE REPORT. ROMERO OVERLOOK. WIND ENERGY SURVEY.
SACRAMENTO, CALIFORNIA, CALIFORNIA DEPARTMENT OF WATER RESOURCES, DECEMBER 1977. 91P.

THE WIND MEASUREMENTS RECORDED FOR THREE YEARS AT THE ROMERO OVERLOOK NEAR THE SAN LUIS RESERVOIR WERE EVALUATED TO DETERMINE THE WIND ENERGY POTENTIAL OF THE AREA. THE EVALUATION SHOWED THAT DURING THESE THREE YEARS THE OVERALL AVERAGE WIND VELOCITY WAS 5.9 METERS PER SECOND (13.3

MPH) WITH MAXIMUM WIND VELOCITIES OCCURRING DURING THE SUMMER MONTHS. ALSO, THE MEASUREMENTS INDICATE THAT A WIND TURBINE-GENERATOR SYSTEM ASSUMED TO BE DESIGNED TO DELIVER FULL RATED POWER AT 11.2 M/S (25 MPH) WIND COULD OPERATE AT AN AVERAGE ANNUAL OUTPUT OF 30 PERCENT OF ITS RATED CAPACITY. THE PACHECO PASS ABOVE THE SAN LUIS RESERVOIR WAS SELECTED AS A POTENTIAL SITE FOR DEVELOPING A WIND ENERGY SYSTEM. RECOMMENDATION WAS MADE THAT FURTHER WIND MEASUREMENTS BE MADE AT PACHECO PASS TO DETERMINE THE WIND ENERGY POTENTIAL AND THE CRITERIA FOR OPTIMIZING A WIND TURBINE SYSTEM FOR THE AREA.

77-0336 PRENIS J
ENERGYBOOK 2: MORE NATURAL SOURCES AND BACKYARD APPLICATIONS.
PHILADELPHIA, RUNNING PRESS, 1977. 125P.

THIS IS A CONTINUATION OF ENERGYBOOK, PROVIDING A SURVEY OF SOME ALTERNATIVES TO CONVENTIONAL SOURCES OF ENERGY. IT IS DESIGNED FOR BOTH THE CASUAL READER AND THE SERIOUS PRACTITIONER, SCIENCE STUDENTS, AND BACKYARD TINKERERS. USING A FORMAT SIMILAR TO THAT OF THE WHOLE EARTH CATALOG, IT PROVIDES A SURVEY OF PRESENT APPLICATIONS; FUTURE POSSIBILITIES; A REVIEW OF SCIENTIFIC AND TECHNICAL VOCABULARY, CONCEPTS, AND DATA; AND A SAMPLING OF EXPLORATIONS IN LOW TECHNOLOGY. THE SECTION ON SOLAR ENERGY INCLUDES USEFUL INFORMATION ON FLAT PLATE AND PLASTIC PIPE COLLECTORS, AND AN EXCELLENT SURVEY OF SOLAR-HOUSE DESIGN. LESS CONVENTIONAL ENERGY SOURCES, SUCH AS METHANE GENERATORS, METHANE AS AN AUTO FUEL, OCEAN KELP FARMING, AND TRASH POWER, ARE TREATED BRIEFLY. A GLOSSARY OF TERMS IS INCLUDED, ALTHOUGH UNFORTUNATELY NOT ALL OF THE SCIENTIFIC TERMS ARE CORRECTLY DEFINED. THE BRIEF BIBLIOGRAPHY COVERS ONLY PRACTICAL APPLICATIONS.

77-0337 PREUSS R D, SUCIU E O, MORINO L
TWO GENERAL METHODS FOR THE UNSTEADY AERODYNAMIC ANALYSIS OF HORIZONTAL-AXIS WINDMILLS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1618-1623.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL EMBEDDED IN INCOMPRESSIBLE, INVISCID FLOW IS CONSIDERED. THE VORTICITY FIELD PRESENT IN THE UNDISTURBED FLOW IS ASSUMED TO BE UNPERTURBED BY THE PRESENCE OF THE WINDMILL, ENABLING THE USE OF A POTENTIAL FORMULATION. TWO INTEGRAL EQUATION METHODS (FOR FINITE THICKNESS AND ZERO THICKNESS BLADES) ARE PRESENTED. BOTH METHODS ARE FORMULATED IN A FRAME OF REFERENCE RIGIDLY ROTATING AT CONSTANT ANGULAR VELOCITY RELATIVE TO THE GROUND. FULLY UNSTEADY TRANSIENT ANALYSIS IS PERFORMED BY NUMERICAL SOLUTION OF THE EQUATIONS AT DISCRETE TIME STEPS WHILE A SIMPLER OSCILLATORY UNSTEADY ANALYSIS IS PERFORMED BY EXPRESSING THE POTENTIAL AND ITS NORMAL DERIVATIVE AS COMPLEX SERIES IN TIME. THE WAKE, TREATED AS A DOUBLET LAYER, IS OF PRESCRIBED GEOMETRY. NUMERICAL RESULTS ARE PRESENTED SHOWING A GOOD COMPARISON OF THE METHODS.

77-0338 QAZI A Q
TRANSIENT BEHAVIOR OF WIND DRIVEN SYNCHRONOUS MACHINES. PH.D. THESIS. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERISTY. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, 1977. 156P. U.M. ORDER NO. 78-11064.

THE TRANSIENT BEHAVIOR OF WIND DRIVEN SYNCHRONOUS MACHINES UNDER CONDITIONS OF WIND GUSTS AND FAULTS FOR VARIOUS SYSTEM CONFIGURATIONS WERE INVESTIGATED AND DESIGN RECOMMENDATIONS FROM THE VIEW POINT OF ELECTRICAL STABILITY AND ENERGY DELIVERED TO THE UTILITY GRID WERE MADE. THIS TASK WAS PERFORMED IN THE FOLLOWING STEPS: (1) FORMULATE THE MATHEMATICAL MODEL FOR EACH IDENTIFIED AND SELECTED SYSTEM CONFIGURATION, (2) SOLVE THE SETS OF NON-LINEAR DIFFERENTIAL EQUATIONS BY EMPLOYING AN APPROPRIATE NUMERICAL TECHNIQUE AND DIGITAL SIMULATION, (3) PRESENT THE RESULTS IN THE FORM OF CURVES, (4) INTERPRET THESE CURVES, (5) DRAW SOME USEFUL CONCLUSIONS AND (6) SUGGEST AREAS FOR FUTURE RESEARCH WORK.

77-0339 QAZI A Q, RAMAKUMAR R
BEHAVIOR OF WIND DRIVEN SYNCHRONOUS GENERATORS UNDER WIND GUSTS.
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A + M UNIVERSITY, MARCH 14-16, 1977. CONFERENCE RECORD. NEW YORK, IEEE, NO. 77CH1168-4REG5, 1977. P.20-25.

THIS PAPER PRESENTS THE RESULTS OF A COMPUTER SIMULATION CONDUCTED FOR AN

AEROTURBINE-DRIVE SYNCHRONOUS GENERATOR OPERATING IN PARALLEL WITH A LARGE UTILITY GRID. COUPLED NONLINEAR DIFFERENTIAL EQUATIONS DESCRIBING THE DYNAMIC BEHAVIOR OF SUCH A SYSTEM ARE SOLVED NUMERICALLY BY EMPLOYING FOURTH ORDER RUNGE-KUTTA TECHNIQUE. THE SIMULATION TAKES INTO ACCOUNT INSTANTANEOUS VARIATIONS IN THE COEFFICIENT OF PERFORMANCE OF THE AEROTURBINE DUE TO CHANGES IN THE TIP SPEED TO WIND SPEED RATIO. INFLUENCE OF PARAMETERS SUCH AS SYSTEM INERTIA, DAMPING COEFFICIENT, EXTERNAL REACTANCE, MACHINE REACTANCE AND GENERATOR EXCITATION ARE EXAMINED UNDER CONDITIONS OF SHORT AND LONG DURATION WIND GUSTS BY SIMULATING A GENERATOR TORQUE ANGLE, AS A FUNCTION OF TIME.

77-0340 RANN: RESEARCH APPLIED TO NATIONAL NEEDS. WIND ENERGY CONVERSION RESEARCH.
NTIS, MARCH 1977. 23P.
PB-271942

THE NSF/RANN WIND ENERGY RESEARCH REPORTS LISTED IN THIS BULLETIN ARE AVAILABLE FOR READING BY THE GENERAL PUBLIC. FOURTEEN REPORTS, LISTED SEPARATELY, ARE INDICATED BY RANN NUMBER, TITLE, PERFORMING ORGANIZATION, AUTHOR, DATE, GRANT NUMBER, ABSTRACT, DESCRIPTORS, AND AVAILABILITY. ALSO INCLUDED IN THIS BULLETIN IS A LIST OF 14 SANDIA LABORATORY REPORTS WHICH ADDRESS PRIMARILY THE DARRIEUS VERTICAL AXIS SYSTEM AND WIND DATA. AUTHOR, TITLE, REPORT NUMBER, DATE, LENGTH, AND PRICE ARE INDICATED FOR EACH. NINE OTHER SOLAR ENERGY PUBLICATIONS WITH WIND ENERGY SECTIONS ALSO ARE INDICATED BY TITLE, PERFORMING ORGANIZATION, GRANT NUMBER, DATE AND AVAILABILITY.

77-0341 RAHMER B A
ALTERNATIVE ENERGY: MAJOR NEW EFFORTS AT DEVELOPMENT.
PET. ECON. 44(2): 56-57, FEBRUARY 1977.

EUROPEAN COUNTRIES HAVE SO FAR BEEN RATHER MORE CONSERVATIVE IN THEIR APPROACH TOWARDS ALTERNATIVE ENERGY DEVELOPMENT THAN THE U.S. AND JAPAN HAVE. CONSTRUCTION OF FLAT PLATE SOLAR COLLECTORS FOR WATER AND SPACE HEATING HAS BECOME A GROWTH INDUSTRY. WIND POWER RESEARCH HAS BEEN MAINLY A U.S. PREROGATIVE, BUT THE U.K. COULD PROVIDE MORE THAN ONE-FIFTH OF ITS ELECTRICITY REQUIREMENTS BY DEPLOYING MILLS OVER JUST 2% OF THE AREA OF THE SOUTHERN NORTH SEA. WAVE POWER IS BEING STUDIED WITH GOVERNMENTAL SUPPORT IN THE U.K., WHERE CONDITIONS ARE FAVORABLE OFF THE NORTHWESTERN COAST. EXPLOITATION OF GEOTHERMAL ENERGY IS PROGRESSING TENTATIVELY, AND ENERGY OF THE TIDES REPRESENTS A COMPARATIVELY SMALL, IF USEFUL, ADDITIONAL POWER RESERVE.

77-0342 RAILLY J W
A POSSIBLE SATURATION CRITERION FOR WIND ENERGY EXTRACTION.
WIND ENG. 1(1): 23-35, 1977.

TWO HYPOTHESES ARE ADVANCED FOR PREDICTING THE POSSIBLE POWER OUTPUT FROM A DISTRIBUTION OF WIND TURBINES OVER A LARGE GROUND AREA. WHEN THE TURBINE HEIGHT IS SMALL COMPARED WITH THE HEIGHT OF THE PLANETARY BOUNDARY LAYER, THE ROLE OF SHEAR STRESS IN DETERMINING THE POWER LEVEL IS DEMONSTRATED AND THE MODIFICATION TO THE WIND STRUCTURE IS PREDICTED. ON THIS BASIS, REALISTIC VALUES OF THE RATIO OF DISK AREA TO GROUND AREA ARE CALCULATED. THE IMPORTANCE OF THE STABILITY OF THE PBL AS IT EFFECTS THE POWER LEVEL IS DEMONSTRATED.

77-0343 SMEDMAN-HOEGSTROEM A S, HOEGSTROEUM U
PRACTICAL METHOD FOR DETERMINING WIND FREQUENCY DISTRIBUTIONS FOR THE LOWEST 200 METERS FROM ROUTINE METEOROLOGICAL DATA.
NTIS, 1977. 27P.
UUIM-47

A METHOD IS DESCRIBED FOR DETERMINING WIND SPEED FREQUENCY DISTRIBUTIONS AT ANY HEIGHT UP TO CA. 200 M ABOVE GROUND FOR A METEOROLOGICAL STATION WHERE WIND SPEED AND DIRECTION ARE MEASURED AT A LOW REFERENCE LEVEL (USUALLY 10 M) AND WHICH REPORTS ROUTINE METEOROLOGICAL DATA AT LEAST ONCE EVERY 3D HOUR. THE ROUGHNESS CHARACTERISTICS OF THE TERRAIN SURROUNDING THE STATION MUST BE KNOWN IN DETAIL, BECAUSE THE MODEL CALCULATES THE RATE OF GROWTH OF INTERNAL BOUNDARY LAYERS RESULTING FROM DISCONTINUITIES IN ROUGHNESS AS WELL AS THE SHAPE OF THE WIND PROFILE IN THE VARIOUS LAYERS. THE RATE OF GROWTH OF THE INTERNAL BOUNDARY LAYERS HAS BEEN DETERMINED FROM A WORK BY PASQUILL (1972). THE SHAPE CHARACTERISTICS OF THE PROFILE ARE DETERMINED AS A FUNCTION OF ROUGHNESS

LENGTH AND OF STABILITY BY THE AID OF MEASUREMENTS FROM THREE SWEDISH 100 M HIGH MASTS. THE METHOD IS SUCCESSFULLY TESTED AGAINST AN INDEPENDENT SET OF DATA FROM A 100 M MAST. ALSO GIVEN ARE SOME RESULTS FROM APPLICATION OF THE METHOD TO SWEDISH DATA. THE METHOD HAS BEEN DEVELOPED FOR RURAL CONDITIONS AND IS NOT VALID FOR URBAN CONDITIONS.

77-0344 SMOLUK G R
DESIGN IDEA INSPIRES DO-IT-YOURSELF WINDMILL.
DESIGN NEWS 33: 68-69, APRIL 4, 1977.

77-0345 RANDOLPH W
FINDING AND RECYCLING BATTERIES.
WIND POWER DIG. 1(8): 17-19, SPRING 1977.

77-0346 RANDOLPH W
POWER TO THE PEOPLE. (WINCHARGER STYLE).
WIND POWER DIG. 1(8): 10-14, SPRING 1977.

77-0347 RAO D M
POTENTIAL APPLICATION OF RADIAL SPLITTER DIFFUSER TO SHROUDED WIND TURBINES.
J. ENERGY 1(2): 134-136, MARCH-APRIL 1977.

A SHORT DIFFUSER UTILIZING RADIAL SPLITTERS IS PROPOSED AS A MEANS OF ACHIEVING A COMPACT AND EFFICIENT WIND-TURBINE SHROUD, SIMPLE IN DESIGN AND HAVING UNIQUE PRACTICAL FEATURES FAVORABLE TO COST-EFFECTIVENESS. CONSERVATIVE PROJECTS OF THE SHROUD PERFORMANCE BASED ON DATA RELATING SEPARATELY TO THE INTERNAL AND EXTERNAL FLOW CHARACTERISTICS APPEAR SUFFICIENTLY ATTRACTIVE TO WARRANT TESTING OF SHROUD MODELS DESIGNED ON THE PRINCIPLES HEREIN DISCUSSED.

77-0348 REBUILDING A TOWER.
ALTERN. SOURCES ENERGY NO. 26: 35, JUNE 1977.

THE WIND TOWER AT MARTIN JOPP'S FARM WAS KNOCKED OVER DURING A TORNADO IN 1973. PHOTOS SHOW THE DESTROYED TOWER AND THE REPAIRED TOWER BEING RERAISED.

77-0349 REED J W
ENERGY STORAGE NEEDS FOR WIND POWER SYSTEMS.
NTIS, 1977. 20P.
SAND-76-9058

WIND VARIES ON ALL TIME SCALES, BUT HOURLY AND LONGER TERM OSCILLATIONS ARE MOST IMPORTANT TO ECONOMICAL WIND ENERGY EXTRACTION SCHEMES. PERIODIC VARIATIONS IN AVAILABLE WIND ENERGY, OF DIURNAL, SYNOPTIC, ANNUAL, AND LARGER SCALES, ARE NOT OFTEN CORRELATED WITH DEMAND SO THAT SOME FORM OF ENERGY STORAGE IS NEEDED. MOST CURRENT ERDA-SPONSORED RESEARCH IN WIND ENERGY ASSUMES CONNECTION TO AN EXISTING POWER NETWORK AND RESOURCE STORAGE IN THE FORM OF SAVED FOSSIL FUELS. LONG TERM HOURLY WIND OBSERVATIONS AT SEVERAL REPRESENTATIVE U.S. LOCATIONS HAVE BEEN USED TO SHOW THAT A TOTALLY INDEPENDENT AND PERFECTLY RELIABLE WIND ENERGY SYSTEM WOULD REQUIRE AN IMPRACTICALLY LARGE STORAGE CAPACITY, PRIMARILY TO COVER YEAR-TO-YEAR AND ANNUAL CYCLES OF AVAILABLE WIND ENERGY. AS RELIABILITY IS ALLOWED TO DECREASE, A CONSIDERABLE REDUCTION IN STORAGE CAPACITY IS POSSIBLE. THIS IS DEMONSTRATED BY STATISTICAL RESULTS FOR SEVERAL CLIMATIC REGIMES.

77-0350 REED J W
NEW DETAILS ON WIND POWER CLIMATOLOGY.
NTIS, 1977. 26P.
SAND-77-6960

THE NATIONAL ISODYN MAP OF AVERAGE AVAILABLE WIND POWER WAS USED TO HELP SELECT FIFTEEN STATIONS, REPRESENTATIVE OF INTERESTING WIND POWER CLIMATIC REGIMES, FOR DETAILED ANALYSES OF TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS. THESE LONG TIME SERIES HAVE BEEN CORRECTED FOR OBSERVER BIAS, HOMOGENIZED TO CONSTANT ANEMOMETER EXPOSURES, AND EXTRAPOLATED TO SELECT HEIGHTS 10M, 20M, AND 50M ABOVE FLAT TERRAIN. VARIOUS ANALYSES HAVE SHOWN THAT CORRECTION GENERALLY GAVE RESULTS IN EXCELLENT AGREEMENT WITH THE NATIONAL ISODYN CONTOURS, TURBINE CUT-IN AND CUT-OFF SPEED SELECTIONS WERE NOT CRITICAL TO POWER RECOVERY EFFICIENCY, TURBINE RATED SPEED NEEDS TO BE TAILORED TO THE REGIONAL WIND CLIMATE,

STAND-ALONE SYSTEMS REQUIRE HUGE STORAGE FILTERS TO SMOOTH ANNUAL AND INTER-ANNUAL VARIATIONS IN SUPPLY, AND MODEST STORAGE WILL EFFECTIVELY FILTER PERIODICITIES OF A FEW DAYS IN BOTH SUPPLY AND DEMAND.

77-0351 REED J W
METEOROLOGICAL STUDIES FOR WIND POWER: A PROGRESS REPORT.
NTIS, AUGUST 5, 1977. 13P.
SAND-77-1255

THIS PAPER WAS PRESENTED AT THE THIRD BIENNIAL WIND ENERGY CONVERSION SYSTEMS CONFERENCE, WASHINGTON D.C., SEPTEMBER 19, 1977. TEN-YEAR TIME SERIES OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED STATIONS HAVE BEEN USED TO GENERATE TIME SERIES OF AVAILABLE WIND POWER. THESE HAVE BEEN RUN THROUGH COMPUTER-SIMULATED TURBINE SYSTEMS TO STUDY LONG TERM, PARTICULARLY ANNUAL AND LONGER, VARIATIONS IN POTENTIAL SUPPLY. THESE VARIATIONS WERE SO LARGE THAT STAND-ALONE GENERATING SYSTEMS WOULD REQUIRE HUGE, UNECONOMICAL STORAGE CAPACITIES TO PROVIDE RELIABLE SERVICE.

77-0352 RENNER-SMITH S
VERTICAL WINDMILL GENERATES KILOWATTS FROM MONSOONS.
POP. SCI. 210(6): 99, JUNE 1977.

A DARRIEUS WINDMILL IN BANGALORE, INDIA, IS DESCRIBED.

77-0353 REPORT ON THE WESTERN ENERGY EXPANSION STUDY.
WASHINGTON, D.C., BUREAU OF RECLAMATION, FEBRUARY 1977.

THIS REPORT CONTAINS THE RESULTS OF AN ASSESSMENT BY THE BUREAU OF RECLAMATION OF OPPORTUNITIES TO RESPOND TO URGENT NEEDS FOR ADDITIONAL ELECTRICAL POWER AND ENERGY IN THE WEST WHICH CAN MAKE AN EFFECTIVE CONTRIBUTION TO CONSERVATION OF DWINDLING OIL AND NATURAL GAS RESOURCES. THE WEES WAS CONDUCTED TO IDENTIFY AND EVALUATE OPPORTUNITIES FOR INCREASED ELECTRICAL POWER AND ENERGY GENERATION IN THE 17 WESTERN STATES WHICH WARRANT FURTHER, MORE DETAILED STUDY IN THE IMMEDIATE FUTURE. FOCUS OF THE STUDY WAS PRIMARILY ON DEVELOPMENT OF HYDROELECTRIC POWER, INCLUDING PUMPED STORAGE, AT BOTH NEW SITES AND EXISTING FACILITIES. OTHER OPPORTUNITIES RELATE TO DEVELOPMENT OF ELECTRICAL ENERGY USING SOLAR (DIRECT RADIATION AND WIND) AND GEOTHERMAL RESOURCES. IN ADDITION TO DEVELOPMENTAL OPPORTUNITIES, SEVERAL MATTERS OF A POLICY NATURE ARE DISCUSSED AND EVALUATED.

77-0354 REUTER R C, SHELDAHL R E
SANDIA VERTICAL AXIS WIND TURBINE PROJECT. TECHNICAL QUARTERLY REPORT. APRIL - JUNE 1976.
NTIS, JANUARY 1977. 79P.
SAND-76-0581

THIS REPORT SUMMARIZES ACTIVITIES WITHIN THE SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROJECT THAT OCCURRED DURING THE FOURTH QUARTER OF FISCAL YEAR 1976. INCLUDED ARE HIGHLIGHTS FOR THE QUARTER AND STATUS REPORTS ON ACTIVITIES IN AREAS OF SYSTEMS STUDIES AERODYNAMICS, ELECTRICAL SYSTEMS, STRUCTURES, AND MECHANICAL DESIGN. SUBHEADINGS IN EACH SECTION COVER GENERAL DEVELOPMENT ACTIVITIES AND ACTIVITIES RELATED TO THE 17-METER TURBINE AND THE 5-METER TURBINE. ALSO INCLUDED IN THIS REPORT IS THE PROGRAM OF THE SANDIA VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, A LIST OF WORKSHOP ATTENDEES, AND A LIST OF PROJECT-RELATED SANDIA PUBLICATIONS.

77-0355 REUTER R C
VERTICAL AXIS WIND TURBINE TIE-DOWN DESIGN WITH AN EXAMPLE.
NTIS, DECEMBER 1977. 35P.
SAND-77-1919

DESIGN OF CABLE TIE-DOWN SYSTEMS FOR VERTICAL AXIS WIND TURBINES IS DISCUSSED AND GUIDELINES ARE FURNISHED. TOPICS SUCH AS THE NUMBER, SIZE AND MATERIAL OF THE CABLES, CABLE ELEVATION ANGLE, TENSIONING, AND THERMOELASTIC EFFECTS ARE DISCUSSED IN DETAIL. THE TIE-DOWN SYSTEM OF THE EXISTING SANDIA 17 METER VAWT IS USED THROUGHOUT AS A NUMERICAL EXAMPLE.

77-0356 REUTER R C
TIE-DOWN CABLE SELECTION AND INITIAL TENSIONING FOR THE SANDIA 17 METER

VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1977. 18P.
SAND-76-0616

THE RATIONALE USED FOR SELECTION OF TIE-DOWN CABLES FOR THE SANDIA 17-METER TURBINE IS PRESENTED, DISCUSSED AND IMPLEMENTED. THE EFFECT OF INITIAL CABLE TENSION ON THE RESPONSE OF THE TIE-DOWN SYSTEM IS EVALUATED AND DISCUSSED IN TERMS OF RESULTING SAG, BLADE INTERFERENCE AND RESPONSE LINEARITY.

77-0357 ROGERS P
WIND ROTOR IMPROVES HYPERBOLIC COOLING TOWER EFFICIENCY.
POWER ENG. 81(3): 48-50, MARCH 1977.

A RECENTLY DEVELOPED SYSTEM FOR IMPROVING THE EFFICIENCY OF A HYPERBOLIC COOLING TOWER USES A WIND ROTOR WHICH HAS BEEN INSTALLED ON THE OUTSIDE OF THE STRUCTURE TO PRODUCE A FORCED UPDRAFT AROUND THE INSIDE PERIMETER OF THE COOLING TOWER. THIS UPDRAFT ELIMINATES THE POSSIBLE DOWNDRAFT AND, IN GENERAL, INCREASES AIR FLOW. THE INCREASED EFFICIENCY PERMITS A CLOSER APPROACH, AND/OR ALLOWS A SMALLER SIZED TOWER TO BE USED BECAUSE THE EFFECT OF THE PERIPHERAL JETS IS SIMILAR TO THE MECHANICAL INDUCED-DRAFT TYPE OF COOLING TOWER.

77-0358 RIEDER W G
WIND POWERED ARTIFICIAL AERATION OF NORTHERN PRAIRIE LAKES. RESEARCH REPORT.
NTIS, DECEMBER 1977. 121P.
PB-281562

MOST NORTHERN PRAIRIE LAKES SUFFER FROM REOCCURRING OXYGEN DEPLETION, AND, ALTHOUGH ARTIFICIAL AERATION SEEMS TO HELP, OPERATING COSTS ARE BECOMING HIGH BECAUSE OF INCREASING ENERGY COSTS. AN ALTERNATE SOURCE OF COMPRESSED AIR FOR OPERATING THE AERATION SYSTEMS IS WIND-POWERED COMPRESSORS. A DETAILED ASSESSMENT OF THE FEASIBILITY OF THIS APPROACH IN NORTH DAKOTA SETTINGS WAS COMPLETED. A LARGE NUMBER OF WIND-TURBINE AND COMPRESSOR COMBINATIONS WAS INVESTIGATED. METHODOLOGY FOR MATCHING COMMERCIAL COMPRESSORS TO VARIOUS WIND TURBINES AND PREDICTING OUTPUT RATES BASED ON WIND SPECTRUM INPUTS WAS DEVELOPED AND VERIFIED. OPTIMUM GEAR-UP RATIOS EXIST FOR MAXIMUM AIR OUTPUT RATES. A SMALL EXPERIMENTAL WIND-POWERED COMPRESSED-AIR SYSTEM WAS BUILT AND OPERATED SUCCESSFULLY AT A NON-LAKE SITE. ECONOMIC ANALYSES WERE COMPLETED. FINDINGS INDICATE THAT THE USE OF WIND TO POWER SMALL COMPRESSORS (LESS THAN ABOUT 15 SCFM) FOR ARTIFICIAL AERATION IN NORTH DAKOTA IS TECHNICALLY AND ECONOMICALLY FEASIBLE WITHIN CERTAIN CONSTRAINTS. RECOMMENDATIONS INCLUDE PROCEEDING INTO PROTOTYPE SYSTEM INSTALLATIONS AT LAKE SITES IN NORTH DAKOTA FOR PERFORMANCE AND COST MONITORING OVER SEVERAL YEARS.

77-0359 ROTH R
METEOROLOGY AND UTILIZATION OF WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 71-79. (IN GERMAN)

ECONOMIC UTILIZATION OF WIND ENERGY BY WECS (WIND ENERGY CONVERTING SYSTEMS) PRESUPPOSES AS EXACT A KNOWLEDGE OF THE WIND FIELD AS POSSIBLE. THE TASK OF PROVIDING THIS BELONGS TO THE SUBJECT OF METEOROLOGY. THE REQUIRED INFORMATION IS EXPLAINED AND THE PRESENT DAY STATE OF KNOWLEDGE IS DISCUSSED. THIS APPLIES ABOVE ALL TO LARGE PLANT (GREATER THAN 1 MW (ELEC) RATED OUTPUT) AS GREAT METEOROLOGICAL PROBLEMS OCCUR HERE.

77-0360 ROTHMAN E A, DEABLER H E
MATERIALS AND PROCESSING APPROACHES TO COST COMPETITIVE WIND TURBINE ROTOR BLADES.
SAMPE Q. 8(2): 13-21, JANUARY 1977.

A STUDY WAS MADE OF MATERIALS AND PROCESSES USING METALLICS AND COMPOSITES OR COMBINATION OF BOTH FOR THE FABRICATION OF LOW COST WIND TURBINE BLADES. AS A RESULT OF THESE STUDIES THE FILAMENT WINDING PROCESS WAS SELECTED AS OFFERING THE POTENTIAL FOR LOW COST FABRICATION WHILE REQUIRING THE MINIMUM COMPROMISES IN AERODYNAMIC SHAPE, OPTIMUM STRUCTURE, AND WEIGHT. THE PROCESS IS DESCRIBED WHICH IS COMPATIBLE WITH EXISTING WINDING FACILITIES AND EQUIPMENT AND WHICH RESULTS IN NEAR OPTIMUM STRUCTURAL FIBER ORIENTATION. FIBERGLASS MATERIAL IS USED WITH A

RESIN SYSTEM APPROPRIATE FOR THE PROCESS AND REQUIRING MINIMUM CURING TIME AND EQUIPMENT.

77-0361 RYLE M
ECONOMICS OF ALTERNATIVE ENERGY SOURCES.
NATURE 267(5607): 111-117, MAY 12, 1977.

AN IMPORTANT PART OF THE OIL AND NATURAL GAS AT PRESENT CONSUMED IN THE UK IS USED FOR THE HEATING OF BUILDINGS, A DEMAND WHICH SHOWS LARGE DIURNAL, DAY-TO-DAY AND ANNUAL FLUCTUATIONS. THE REPLACEMENT OF THIS ENERGY BY NUCLEAR-GENERATED ELECTRICITY, AS AT PRESENT ENVISAGED, WOULD REQUIRE THE CONSTRUCTION OF SOME 250 GW OR ADDITIONAL CAPACITY BY THE END OF THE CENTURY, A PROGRAMME WHICH DOES NOT SEEM FEASIBLE. BY INCORPORATING RELATIVELY CHEAP, SHORT TERM STORAGE IN THE FORM OF LOW-GRADE HEAT, THE GENERATING CAPACITY REQUIRED TO FULFIL PEAK DEMAND COULD BE REDUCED BY MORE THAN 50%. AS SOON AS SUCH STORAGE IS PROVIDED, HOWEVER, OTHER SOURCES OF ENERGY BECOME VIABLE AND ATTRACTIVE ALTERNATIVES, AND THE UK IS WELL SITUATED TO MAKE USE OF WIND, WAVE, AND TIDAL POWER.

77-0362 SAAB-SCANIA HEADS SWEDISH WIND PROGRAM.
WIND POWER DIG. NO. 10: 22, FALL 1977.

A SWEDISH PROJECT ON LARGE-SCALE WIND TURBINE DESIGN IS DESCRIBED.

77-0363 SALIEVA R B
SIMULATION ALGORITHMS AND THEIR REALIZATION BY DIGITAL COMPUTER FOR CALCULATION OF WIND- AND SOLAR-PLANT STORAGE-SERVICE CAPACITY.
GELIOTEKHNIKA, NO. 2: 75-83, 1977. TRANSLATION: APPL. SOLAR ENERGY 13(2): 53-58, 1977.

A METHOD OF CALCULATING THE CAPACITY OF STORAGE DEVICES IS DISCUSSED. THE MATHEMATICAL MODEL IS BASED ON A STATISTICAL MODEL. FOR DIGITAL-COMPUTER MODELING, APPROPRIATE SIMULATION ALGORITHMS HAVE BEEN WRITTEN THAT MAKE IT POSSIBLE TO DETERMINE STORAGE-DEVICE CAPACITY, TOTAL THROUGHPUT, DISPOSAL OF IDLE UNUSED OUTPUT, ENERGY DEFICIT, AND OTHER CHARACTERISTICS.

77-0364 SANDBORN V A
ATMOSPHERIC BOUNDARY LAYER MODELING FOR WIND POWER SITES.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS25, 1977.

THIS DISCUSSION COVERS MAINLY THE EVALUATION OF WIND POWER SITES DETERMINED FROM WIND TUNNEL EXPERIMENTS.

77-0365 SANDBORN V A
PLACEMENT OF WIND-POWER SYSTEMS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS14, 1977. 13P.

A BRIEF REVIEW OF THE EFFECT OF WIND SPEED-VARIATION OVER RIDGES, ISOLATED MOUNTAINS AND HILLS IS GIVEN. FROM WIND-TUNNEL TESTS IT IS FOUND THAT LONG RIDGES WITH SHARP CRESTS PRODUCE THE MOST SPEEDUP OF THE WIND. FLATTOPPED AND STEEP OR BLUFF RIDGES DO NOT PRODUCE AS LARGE AN INCREASE IN WIND SPEED. WIND POWER SITES DOWNWIND OF HILLS, BUILDINGS AND TOWERS SHOULD BE AVOIDED.

77-0366 SANDBORN V A
SITES FOR WIND-POWER INSTALLATION.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS15, 1977. 7P.

AN EXPERIMENTAL STUDY OF AIR FLOW OVER TWO-DIMENSIONAL RIDGES HAS BEEN MADE IN AN ATMOSPHERIC SIMULATION WIND TUNNEL. THE RESULTS INDICATE THAT SHARP OR ROUND CRESTED RIDGES ARE PREFERRED TO FLAT TOPPED RIDGES AS A MEANS OF INCREASING LOCAL WIND SPEED. THE FLOW OVER THE SHARP CRESTED RIDGES CAN BE PREDICTED REASONABLY ACCURATELY WITH INVISCID FLOW RELATIONS. THE UPSTREAM REGION OF THE SHARP CRESTED RIDGE DOES NOT AMPLIFY THE APPROACH TURBULENCE.

77-0367 SARIN R K, NAIR K
SOLAR ELECTRIC-ENERGY MARKET PENETRATION.

AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19. P. 20-24.

A BAYESIAN APPROACH WAS EMPLOYED TO FORECAST THE SOLAR ELECTRIC MARKET PENETRATION BY THE YEARS 1990 AND 2000. THE STUDY IDENTIFIED A MULTITUDE OF FACTORS, INCLUDING RELATIVE COST OF COMPETITIVE ENERGY SYSTEMS, GOVERNMENT INCENTIVES, FUTURE ENVIRONMENTAL REGULATIONS, AND NEW TECHNOLOGIES, THAT WOULD AFFECT THE SOLAR MARKET SHARE. THE JUDGMENTS OF SEVERAL EXPERTS FROM UTILITY COMPANIES, GOVERNMENT AGENCIES, AND RESEARCH LABORATORIES WERE UTILIZED IN A SYSTEMATIC MANNER TO QUANTIFY THE PROBABILITY DISTRIBUTIONS OF FUTURE SOLAR MARKET SHARE AS A FUNCTION OF THE VARIOUS FACTORS. THE LIKELIHOOD OF THE OCCURRENCE OF THESE FACTORS WAS ALSO ASSESSED, AND THE SOLAR MARKET SHARE WAS FORECASTED FOR THE MOST-LIKELY FUTURE SCENARIOS.

77-0368 SAVINO J M
BRIEF SUMMARY OF THE ATTEMPTS TO DEVELOP LARGE WIND-ELECTRIC GENERATING SYSTEMS IN THE U.S.
NTIS, 1977. 18P.
DOE/NASA/1004-77/7

INTEREST IN DEVELOPING LARGE WIND-ELECTRIC GENERATING SYSTEMS IN THE UNITED STATES WAS STIMULATED PRIMARILY BY ONE MAN, PALMER C. PUTNAM. HE WAS RESPONSIBLE FOR THE CONSTRUCTION OF THE LARGEST WIND-POWER SYSTEM EVER BUILT - THE 1250 KILOWATT SMITH-PUTNAM WIND-ELECTRIC PLANT. THE EXISTENCE OF THIS SYSTEM PROMPTED THE U.S. FEDERAL POWER COMMISSION TO INVESTIGATE THE POTENTIAL OF USING THE WINDS AS A SOURCE OF ENERGY. ALSO, IN 1933 PRIOR TO PUTNAM'S EFFORT, THERE WAS AN ABORTIVE ATTEMPT BY J D MADARAS TO DEVELOP A WIND SYSTEM BASED ON THE MAGNUS EFFECT. THESE THREE PROJECTS COMPRISE THE ONLY SERIOUS EFFORTS IN AMERICA TO DEVELOP LARGE WIND DRIVEN PLANTS. IN THIS PAPER THE HISTORY OF EACH PROJECT IS BRIEFLY DESCRIBED. ALSO DISCUSSED ARE SOME OF THE REASONS WHY WIND ENERGY WAS NOT SERIOUSLY CONSIDERED AS A MAJOR SOURCE OF ENERGY FOR THE U.S.

77-0369 SCHMIDT-KUESTER W J, WAGNER H F
DEVELOPMENT OF NEW TECHNOLOGIES FOR ENERGY PRODUCTION IN THE FEDERAL REPUBLIC OF GERMANY.
BRENNST.-WARME-KRAFT 29(9): 377-383, SEPTEMBER 1977. (IN GERMAN)

IN THE INTRODUCTION, THIS SURVEY OF THE DEVELOPMENT OF NEW ENERGY TECHNOLOGIES EMPHASIZES THE IMPORTANCE OF THE NUCLEAR ENERGY IN VIEW OF ITS SHORT-TERM AVAILABILITY. THEN THE RELEVANT DEVELOPMENTS FOR THE MEDIUM- AND LONG-TERM AVAILABILITY FOR COVERING THE ENERGY DEMAND ARE PRESENTED, AND ESPECIALLY THE THERMAL APPLICATION OF SOLAR ENERGY IS DEALT WITH. R AND D WORK FOR THE ELECTRICAL USE OF WIND AND WAVE ENERGY, OF SEA CURRENTS AND HYDRO POWER, AND OTHERS ARE DESCRIBED. IN THE AREA OF DEVELOPING THE RATIONAL USE OF ENERGY, THE AUTHORS REFER PARTICULARLY TO THE PRACTICAL TECHNIQUES OF APPLICATION IN HOUSEHOLDS AND OTHER SMALL USERS, AS WELL AS TO THE POWER AND HEATING COUPLING IN CONNECTION WITH DISTRICT HEATING. A SURVEY OF THE PRESENT STAGE AND ACTIVITIES IN RESPECT OF DEVELOPMENT OF CONTROLLED NUCLEAR FUSION CONCLUDES THE ARTICLE.

77-0370 SELZER H, COHRT C
METHOD OF OPERATION AND CHARACTERISTICS OF DARRIEUS ROTORS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P.111-124. (IN GERMAN)

SOME OF THE PROBLEMS ARE DESCRIBED WHICH ARE CONNECTED WITH THE WIND ROTOR WITH VERTICAL AXIS (DARRIEUS-ROTOR). THE ADVANTAGE OF THIS ROTOR COMPARED WITH UNITS WITH HORIZONTAL AXES LIES IN THE FACT THAT THEY ARE INDEPENDENT OF THE WIND DIRECTIONS. THE FOLLOWING ASPECTS ARE CONSIDERED: LOAD FACTOR, BEHAVIOUR ON STARTING, METHOD OF CONSTRUCTION, ENERGY CONVERSION, OUTPUT OF WIND ENERGY AND DURATION OF UTILIZATION, EXAMPLES OF DESIGN.

77-0371 SENIOR T B A, SENGUPTA D L, FERRIS J E
TV AND FM INTERFERENCE BY WINDMILLS. FINAL REPORT, JANUARY 1, 1976 - DECEMBER 21, 1976.

NTIS, FEBRUARY 1977. 159P.
COO/2846-76/1

THIS REPORT DESCRIBES A PRELIMINARY BUT WIDE RANGING INVESTIGATION OF THE EFFECTS OF A HORIZONTAL AXIS WINDMILL ON THE RECEPTION OF TV AND FM SIGNALS IN ITS VICINITY. IT IS SHOWN THAT THE ROTATING BLADES PRODUCE A TIME VARYING AMPLITUDE MODULATION OF THE OTTAL SIGNAL RECEIVED, AND THAT FOR AN ANTENNA SO LOCATED AS TO PICK UP THE SPECULAR OR FORWARD SCATTERING OFF THE BLADES, THE MODULATION CAN PRODUCE SEVERE DISTORTION OF THE VIDEO PORTION OF A TV SIGNAL REPRODUCTION. THE DISTORTION IS WORST AT THE HIGHER FREQUENCIES, AND THEREFORE POSES MORE OF A PROBLEM AT UHF THAN VHF. NO INTERFERENCE TO THE AUDIO SIGNAL NOR TO ANY FM TRANSMISSION HAS BEEN OBSERVED. BASED ON LABORATORY STUDIES AS WELL AS FIELD TESTS, A MODULATION LEVEL HAS BEEN ESTABLISHED AT WHICH THE VIDEO INTERFERENCE IS JUDGED SEVERE OR OBJECTIONABLE, AND THIS THRESHOLD OF INTERFERENCE IS SUBSTANTIALLY INDEPENDENT OF THE PRIMARY FIELD STRENGTH. A THEORY HAS BEEN DEVELOPED TO COMPUTE THE INTERFERENCE ZONE ABOUT A WINDMILL FOR ANY GIVEN TV TRANSMITTER, AND THE RESULTS ARE IN GOOD AGREEMENT WITH THOSE OBTAINED FROM FIELD TESTS USING THE OPERATIONAL WINDMILL AT THE NASA PLUM BROOK FACILITY.

77-0372 TETRA-HELIX INTRODUCED.
WIND POWER DIG. 1(8): 24-25, SPRING 1977.

ZEPHYR WINDS' NEW PROTOTYPE IS A STARTLINGLY SIMPLE, LOW TECH DESIGN.

77-0373 SFORZA P M
VORTEX AUGMENTORS FOR WIND ENERGY CONVERSION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.E1-1 TO E1-76.

A DISCUSSION OF RESEARCH, DESIGN, AND DEVELOPMENT ON AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH POWER DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF RELATIVELY LOW POWER DENSITY. PROPERLY DESIGNED TURBINES ARE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED VORTEX FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC).

77-0374 SHELDAHL R E, BLACKWELL B F
FREE-AIR PERFORMANCE TESTS OF A 5 METRE-DIAMETER DARRIEUS TURBINE.
NTIS, DECEMBER 1977. 37P.
SAND-77-1063

A 5-METRE-DIAMETER VERTICAL-AXIS WIND TURBINE HAS BEEN TESTED AT THE SANDIA LABORATORIES WIND TURBINE SITE. THE RESULTS OF THESE TESTS AND SOME OF THE PROBLEMS ASSOCIATED WITH FREE-AIR TESTING OF WIND TURBINES ARE PRESENTED. THE PERFORMANCE DATA OBTAINED FOLLOW THE GENERAL TREND OF DATA OBTAINED IN EXTENSIVE WIND TUNNEL TESTS OF A 2-METRE-DIAMETER TURBINE. HOWEVER, THE POWER COEFFICIENT DATA ARE SLIGHTLY LOWER THAN ANTICIPATED. THE REASONS FOR THIS DISCREPANCY ARE EXPLORED IN THE PAPER, ALONG WITH COMPARISONS BETWEEN EXPERIMENTAL DATA AND A COMPUTERIZED AERODYNAMIC PREDICTION MODEL.

77-0375 SHEPERDSON W
W.T.G. ENERGY SYSTEMS: 200 KW FOR CUTTYHUNK ISLAND.
WIND POWER DIG. NO. 10: 6-11, FALL 1977.

A 200 KW WIND TURBINE GENERATOR BUILT BY W.T.G. ENERGY SYSTEMS, INC., IS DESCRIBED. IT IS LOCATED ON CUTTYHUNK ISLAND, NEAR NEW BEDFORD, MASSACHUSETTS, AND IS EXPECTED TO MEET THE ELECTRIC POWER NEEDS OF THE ENTIRE ISLAND COMMUNITY THREE QUARTERS OF THE YEAR.

77-0376 SISTERSON D L
A NOTE ON THE POWER-LAW WIND PROFILE AND ITS USE BY THE WIND-ENERGY COMMUNITY. RADIOLOGICAL AND ENVIRONMENTAL RESEARCH DIVISION ANNUAL REPORT, JANUARY-DECEMBER 1976. ARGONNE NATIONAL LABORATORY.
NTIS, 1977. P.158-159.
ANL-76-88

77-0377 SUCIU E O, PREUSS R D, MORINO L

POTENTIAL AERODYNAMIC ANALYSIS OF HORIZONTAL-AXIS WINDMILLS.
AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AEROSPACE SCIENCES MEETING, 15TH, LOS ANGELES, CALIFORNIA, JANUARY 24-26, 1977. PAPER 77-132. 11P.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL IN STEADY, INCOMPRESSIBLE, POTENTIAL FLOW IS CONSIDERED. THE PROBLEM IS FORMULATED IN A FRAME OF REFERENCE RIGIDLY CONNECTED WITH THE ROTOR. TWO DIFFERENT INTEGRAL EQUATIONS ARE PRESENTED. THE FINITE-THICKNESS INTEGRAL EQUATION RELATES THE VALUES OF THE POTENTIAL ON THE SURFACE OF THE WINDMILL TO THE VALUES OF THE NORMAL DERIVATIVE, WHICH ARE KNOWN FROM THE BOUNDARY CONDITIONS. THE WAKE IS TREATED AS A DOUBLET LAYER OF PRESCRIBED HELICOIDAL GEOMETRY. IN ORDER TO SOLVE THE INTEGRAL EQUATION, THE WINDMILL SURFACE IS DIVIDED INTO SMALL QUADRILATERAL SURFACE ELEMENTS. THE VALUES OF THE POTENTIAL AND ITS NORMAL DERIVATIVE WITHIN EACH ELEMENT ARE ASSUMED TO BE CONSTANT AND EQUAL TO THE VALUES AT THE CENTROID OF THE ELEMENT. THIS YIELDS A SET OF LINEAR ALGEBRAIC EQUATIONS IN THE UNKNOWN VALUES OF THE POTENTIAL. THE ZERO-THICKNESS INTEGRAL EQUATION AND THE CORRESPONDING NUMERICAL FORMULATION ARE OBTAINED AS THE LIMIT OF THE FINITE-THICKNESS ONE. NUMERICAL RESULTS ARE PRESENTED. DATA SUMMARY: PERTURBATION VELOCITY POTENTIAL DIFFERENCE DISTRIBUTIONS ARE PLOTTED FOR ONE-BLADE WINDMILLS FOR DIFFERENT RADIAL DISTANCES IN THE RANGE 0-70; VARIABLES ARE PERTURBATION VELOCITY POTENTIAL DIFFERENCE, RADIAL DISTANCE, POWER COEFFICIENT, AND BLADE ANGULAR VELOCITY-ROTOR RADIUS/FIXED FRAME WIND VELOCITY RATIO; SIX FIGURES INCLUDE NUMERIC DATA.

77-0378 SOLAR PROGRAM ASSESSMENT; ENVIRONMENTAL FACTORS, WIND ENERGY CONVERSION.
NTIS, MARCH 1977. 42P.
ERDA-77-47/6

THE PURPOSE OF THIS REPORT IS TO PRESENT AND PRIORITIZE THE MAJOR ENVIRONMENTAL ISSUES ASSOCIATED WITH THE FURTHER DEVELOPMENT OF WIND ELECTRIC CONVERSION (WEC) SYSTEMS, ONE OF THE EIGHT FEDERALLY-FUNDED SOLAR TECHNOLOGIES. TO PROVIDE A BACKGROUND FOR THIS ENVIRONMENTAL ANALYSIS, THE BASIC CONCEPTS OF THE TECHNOLOGY ARE REVIEWED, AS ARE ITS RESOURCE REQUIREMENTS. THE POTENTIAL EFFECTS OF THIS NEW TECHNOLOGY ON THE FULL RANGE OF ENVIRONMENTAL CONCERNS (I.E., AIR AND WATER QUALITY, BIOSYSTEMS, SAFETY, SOCIAL/INSTITUTIONAL STRUCTURES, ETC.) ARE THEN DISCUSSED IN TERMS OF BOTH THEIR RELATIVE SIGNIFICANCE AND POSSIBLE SOLUTIONS. ALTHOUGH THE DEVELOPMENT OF WEC WILL IN SOME WAYS CONTRIBUTE TO ENVIRONMENTAL PROBLEMS COMMON TO ANY CONSTRUCTION PROJECT OR ENERGY PRODUCING TECHNOLOGY, ONLY THOSE IMPACTS UNIQUE TO THE SOLAR/WIND PORTION OF THE TECHNOLOGY WILL BE DISCUSSED IN DEPTH.

77-0379 SOLAR ENERGY: UNSUNG POTENTIAL FOR WIND AND BIOMASS.
SCIENCE 200(4342): 636-637, MAY 12, 1978.

A BRIEF REVIEW OF DOE-SPONSORED RESEARCH IN SOLAR ENERGY IS GIVEN.

77-0380 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL BASED SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.D2-7 TO D2-14.

IT IS SHOWN THAT THE ADDITION OF AN ENERGY STORAGE SYSTEM OF MODEST CAPACITY, TO A WIND ENERGY GENERATOR, PROVIDES A TOTAL WIND ENERGY ELECTRICITY GENERATING SYSTEM AS DEPENDABLE AS CURRENT ALTERNATIVE MEANS OF PRODUCING ELECTRICITY. IT IS FURTHER SHOWN, BASED ON PROJECTIONS OF THE MASS PRODUCTION COSTS OF WIND ENERGY GENERATORS AND ENERGY STORAGE SYSTEMS, THAT SUCH COMBINED SYSTEMS, AS WELL AS FUEL SAVING GENERATORS WITHOUT STORAGE, APPEAR ECONOMICALLY COMPETITIVE TO THE ALTERNATIVES, PROVIDED THE COMPARISON IS MADE OVER THE ENTIRE LIFE CYCLE OF THE SYSTEMS. FINALLY, A NUMBER OF ECONOMICALLY LESS TANGIBLE ASPECTS ARE TOUCHED UPON, ALL OF WHICH SEEM TO FAVOR THE USE OF FUEL-LESS ENERGY SYSTEMS.

77-0381 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL BASED SYSTEMS.
WIND ENG. 1(1): 15-22, 1977.

SEE 77-0380

77-0382 SOULES C
WIND DRIVEN PRIME MOVER.
U.S. PATENT NO. 4,004,861, JANUARY 25, 1977. 4P.

A WIND DRIVEN PRIME MOVER IS DESCRIBED WHICH IS DRIVEN BY A PLURALITY OF ARCUATELY SHAPED WIND VANES PIVOTALLY MOUNTED ON A ROTATABLE TURNTABLE. THE WIND VANES ARE PIVOTALLY MOUNTED ON THE TURNTABLE WITH THEIR PIVOT AXLE DISPOSED IN A VERTICAL PLANE. THE PIVOTS ARE POSITIONED ADJACENT THE PERIPHERY OF THE TURNTABLE, WITH THE PIVOTS BEING SPACED EQUI-DISTANT FROM EACH OTHER AND EQUI-DISTANT FROM THE AXIS OF ROTATION OF THE TURNTABLE. THE BOTTOMS OF THE VANES ARE ARCUATELY SHAPED, WITH THE LENGTH OF THE ARC BEING SLIGHTLY LONGER THAN THE SPACE BETWEEN THE PIVOTS SO THAT THERE IS AN OVERLAP BETWEEN ADJACENT VANES. THE CONVEX SURFACE OF THE VANES FACE OUTWARDLY TO PROVIDE A CONCAVE INNER SURFACE.

77-0383 SPERA D A, JANETZKE D C, RICHARDS T R
DYNAMIC BLADE LOADING IN THE ERDA/NASA 100KW AND 200KW WIND TURBINES.
NTIS, 1977. 14P.
N77-31599, ERDA/NASA/1004-77/2

DYNAMIC BLADE LOADS, INCLUDING AERODYNAMIC, GRAVITATIONAL, AND INERTIAL EFFECTS, ARE PRESENTED FOR TWO LARGE HORIZONTAL-AXIS WIND TURBINES: THE ERDA-NASA 100 KW MOD-0 AND 200 KW MOD-0A WIND POWER SYSTEMS. CALCULATED AND MEASURED LOADS ARE COMPARED FOR AN EXPERIMENTAL MOD-0 MACHINE IN OPERATION. PREDICTED BLADE LOADS ARE ALSO GIVEN FOR THE HIGHER POWER MOD-0A WIND TURBINE NOW BEING ASSEMBLED FOR OPERATION AS PART OF A MUNICIPAL POWER PLANT. TWO MAJOR STRUCTURAL MODIFICATIONS HAVE BEEN MADE TO THE MOD-0 WIND TURBINE FOR THE PURPOSE OF REDUCING BLADE LOADS. A STAIRWAY WITHIN THE TRUSS TOWER WAS REMOVED TO REDUCE THE IMPULSIVE AERODYNAMIC LOADING CAUSED BY THE TOWER WAKE ON THE DOWNWIND ROTOR BLADES. ALSO, THE TORSIONAL STIFFNESS OF THE YAW DRIVE MECHANISM CONNECTING THE TURBINE NACELLE TO THE TOWER WAS DOUBLED TO REDUCE ROTOR-TOWER INTERACTION LOADS. MEASURED REDUCTIONS IN LOAD OBTAINED BY MEANS OF THESE TWO MODIFICATIONS EQUALED OR EXCEEDED PREDICTIONS.

77-0384 SPERA D A
COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
NTIS, 1977. 40P.
DOE/NASA/1028-78/16, NASA-TM-73773, CONF-770921-7

SEVEN COMPUTER CODES FOR ANALYZING PERFORMANCE AND LOADS IN LARGE, HORIZONTAL-AXIS WIND TURBINES WERE USED TO CALCULATE BLADE BENDING MOMENT LOADS FOR TWO OPERATIONAL CONDITIONS OF THE 100 KW MOD-0 WIND TURBINE. RESULTS ARE COMPARED WITH TEST DATA ON THE BASIS OF CYCLIC LOADS, PEAK LOADS, AND HARMONIC CONTENTS. FOUR OF THE SEVEN CODES INCLUDE ROTOR-TOWER INTERACTION AND THREE ARE LIMITED TO ROTOR ANALYSIS. WITH A FEW EXCEPTIONS, ALL CALCULATED LOADS WERE WITHIN 25 PERCENT OF NOMINAL TEST DATA.

77-0385 SPERA D A, JANETZKE D C
EFFECTS OF ROTOR LOCATION, CONING, AND TILT ON CRITICAL LOADS IN LARGE WIND TURBINES.
WIND TECHNOL. J. 1(20): 5-10, SUMMER 1977.

THREE LARGE (1500 KW) HORIZONTAL ROTOR CONFIGURATIONS WERE ANALYZED TO DETERMINE THE EFFECTS ON DYNAMIC LOADS OF UPWIND AND DOWNWIND ROTOR LOCATIONS, CONED AND RADIAL BLADE POSITIONS, AND TILTED AND HORIZONTAL ROTOR AXIS POSITIONS. LOADS WERE CALCULATED FOR A RANGE OF WIND VELOCITIES AT THREE LOCATIONS IN THE STRUCTURE: THE BLADE SHANK, THE HUB SHAFT, AND THE YAW DRIVE. BLADE AXIS CONING AND ROTOR AXIS TILT WERE FOUND TO HAVE LITTLE EFFECT ON LOADS. HOWEVER, LOCATING THE ROTOR UPWIND OF THE TOWER SIGNIFICANTLY REDUCED LOADS AT ALL LOCATIONS ANALYZED.

77-0386 SPURGEON D
SUPPORT FOR ALTERNATIVES.
NATURE 266(5598): 110-111, MARCH 10, 1977.

TIDAL ENERGY FROM THE BAY OF FUNDY, BIOMASS FROM CROP RESIDUES, AND WIND AND SOLAR POWER ARE BEING ASSESSED BY CANADIAN SCIENTISTS AS POSSIBLE SOURCES OF RENEWABLE ENERGY. BY 1990, TIDAL ENERGY FROM THE BAY OF FUNDY

COULD DISPLACE ABOUT 4000 GWH OF OIL-FIRED ELECTRICITY GENERATION AND 500 GWH OF COAL-FIRED ELECTRICITY GENERATION. THIS WOULD MEAN AN ANNUAL SAVINGS OF SOME 6 MILLION BBL OF OIL AND 300,000 TONS OF COAL. THE SCHEME HAS CONSIDERABLE APPEAL FOR NOVA SCOTIANS, WHO HAVE BEEN HIT HARD BY RECENT OIL INCREASES. IN OTHER AREAS OF RESEARCH, BIOMASS HOLDS A COMBINED ENERGY POTENTIAL FOR SUPPLYING 18.92 PERCENT OF CANADA'S NATIONAL ENERGY REQUIREMENT.

77-0387 STAMPA U
WIND ENERGY TECHNIQUES ONCE AND NOW.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 12-15, MAY 1977. (IN GERMAN)

THE ARTICLE IS ARRANGED IN TWO PARTS. THE FIRST PART DEALS WITH THE HISTORY OF THE WINDMILLS. VARIOUS TYPES OF WINDMILLS ARE DESCRIBED. THE SECOND PART IS CONCERNED WITH MODERN WIND POWER PLANTS. THE ADVANTAGES AND DISADVANTAGES OF THE VARIOUS SYSTEMS ARE DISCUSSED. FINALLY, ECONOMIC ASPECTS OF WIND POWER PLANTS ARE DEALT WITH.

77-0388 STANLEY D
THE ARUSHA WINDMILL: A CONSTRUCTION MANUAL.
STANFORD, CALIFORNIA, VOLUNTEERS IN ASIA, DECEMBER 1977. 58P.

THIS IS A MANUAL FOR THE CONSTRUCTION AND MAINTENANCE OF AN INNOVATIVE DEEP-BOREHOLE, WATER-PUMPING WINDMILL. THE WINDMILL IS MADE OF STANDARD WATER PIPE AND GALVANIZED SHEET METAL; IT CAN BE MADE AND REPAIRED IN ANY SMALL METAL-WORKING SHOP. COST OF THE COMPLETED WINDMILL IN TANZANIA IS ESTIMATED AT $275, INCLUDING ABOUT $150-175 IN MATERIALS. THIS COMPARES VERY FAVORABLY WITH THE $4000 PRICE TAG OF AN IMPORTED AMERICAN WINDMILL OF COMPARABLE CAPACITY. RECOMMENDED FOR CIRCUMSTANCES OF DEEP WELLS WHERE A LOW-COST BUT DURABLE WINDMILL IS PRACTICAL. NOT RECOMMENDED FOR TYPHOON OR HURRICANE REGIONS.

77-0389 STEPHENS H S, PATEL M P, COLES N G
WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. 496P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976.
CONF-760909

TWENTY-SIX PAPERS ON WIND POWER AVAILABILITY AND WIND TURBINE SYSTEMS ARE INCLUDED.

77-0390 STOLT S, KIRLAN R L
EMPIRICAL AND THEORETICAL STATISTICS OF WINDCHARGER HOME HEATING POTENTIAL.
WIND TECHNOL. J. 1(2): 21-25, FALL 1977.

APPLICATION OF WIND ENERGY TO HOME HEATING HAS DRAWN CONSIDERABLE INTEREST RECENTLY AND SEVERAL WINDCHARGERS ARE CURRENTLY AVAILABLE AT A SMALL FRACTION OF THE AVERAGE COST OF A NEW HOME. THE PERFORMANCE AND ECONOMICS OF ONE OF THESE IS STUDIED BY USING WEATHER AND HOME HEATING STATISTICS AT TWO GEOGRAPHICAL LOCATIONS. IT IS SHOWN THAT FOR THE EXAMPLE CHOSEN, WIND ENERGY IS NOT QUITE ECONOMICAL. DUE TO THE COOLING EFFECT OF THE WIND, A STATISTICAL CORRELATION BETWEEN POWER AVAILABILITY AND POWER DEMAND WAS SOUGHT. HOWEVER, THIS WAS NOT SHOWN TO BE THE CASE. THE IMPLICATION IS THAT HEAT STORAGE CAPABILITY IS NECESSARY FOR HIGH EFFICIENCY.

77-0391 STRICKLAND J H
PERFORMANCE PREDICTION MODEL FOR THE DARRIEUS TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C3.39-C3.54.

AN ANALYTICAL PERFORMANCE PREDICTION MODEL IS DESCRIBED FOR THE DARRIEUS TURBINE. THIS MODEL IS SHOWN TO PREDICT THE PERFORMANCE OF SMALL SCALE ROTORS, FOR WHICH TEST DATA IS AVAILABLE, WITH REASONABLE ACCURACY. IT DISPLAYS A MARKED IMPROVEMENT OVER OLDER METHODS IN WHICH THE "INDUCED VELOCITY" THROUGH THE ROTOR IS CONSIDERED TO BE CONSTANT. THE MODEL IS CAPABLE OF PREDICTING THE OVERALL ROTOR POWER OUTPUT AND THE DISTRIBUTION

OF AERODYNAMIC FORCES ALONG THE ROTOR BLADES. THE MODEL CAN BE USED TO STUDY THE EFFECTS OF ROTOR GEOMETRY VARIATIONS SUCH AS BLADE SOLIDARITY, BLADE TAPER, AND VARIATIONS IN ROTOR HEIGHT TO DIAMETER RATIOS. IN ADDITION, SPACIAL VARIATIONS IN FREESTREAM VELOCITY SUCH AS THAT PRODUCED BY ATMOSPHERIC WIND SHEAR CAN BE HANDLED BY THE MODEL. THIS MODEL SHOULD BE PARTICULARLY USEFUL IN THE DESIGN AND OPTIMIZATION OF LARGE SCALE ROTORS FOR WHICH TEST DATA IS NOT AVAILABLE. SCALE EFFECTS CAN BE PREDICTED BASED UPON HIGH REYNOLDS NUMBER AIRFOIL DATA.

77-0392 SULLIVAN T L, CAHILL T P, GRIFFEE D G, GEWEHR H W
WIND TURBINE GENERATOR ROTOR BLADE CONCEPTS WITH LOW COST POTENTIAL.
NTIS, DECEMBER 1977. 40P.
DOE/NASA/1028-77/13, CONF-780502-1

THIS PAPER WAS PRESENTED AT THE 23RD NATIONAL SAMPE SYMPOSIUM, ANAHEIM, CALIFORNIA, MAY 2, 1978. FOUR PROCESSES FOR PRODUCING BLADES ARE EXAMINED. TWO USE FILAMENT WINDING TECHNIQUES AND TWO INVOLVE FILLING A MOLD OR FORM TO PRODUCE ALL OR PART OF A BLADE. THE PROCESSES ARE DESCRIBED AND A COMPARISION IS MADE OF COSTS, MATERIAL PROPERTIES, DESIGNS AND FREE VIBRATION CHARACTERISTICS. CONCLUSIONS ARE MADE REGARDING THE FEASIBILITY OF EACH PROCESS TO PRODUCE LOW COST, STRUCTURALLY ADEQUATE BLADES.

77-0393 SULLIVAN T L, MILLER D R, SPERA D A
DRIVE TRAIN NORMAL MODES ANALYSIS FOR THE ERDA/NASA 100 KILOWATT WIND TURBINE GENERATOR.
NTIS, JULY 1977. 32P.
N77-30611, ERDA/NASA/1028-77/1

NATURAL FREQUENCIES AS A FUNCTION OF POWER WERE DETERMINED USING A FINITE ELEMENT MODEL. OPERATING CONDITIONS INVESTIGATED WERE OPERATION WITH A RESISTIVE ELECTRICAL LOAD AND OPERATION SYNCHRONIZED TO AN ELECTRICAL UTILITY GRID. THE INFLUENCE OF CERTAIN DRIVE TRAIN COMPONENTS ON FREQUENCIES AND MODE SHAPES IS SHOWN. AN APPROXIMATE METHOD FOR OBTAINING DRIVE TRAIN NATURAL FREQUENCIES IS PRESENTED.

77-0394 SULLIVAN W N
PRELIMINARY BLADE STRAIN GAGE DATA ON THE SANDIA 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, 1977. 20P.
SAND-77-1176

RESULTS ARE SUMMARIZED FROM BLADE STRAIN MEASUREMENTS MADE DURING THE INITIAL OPERATING PERIOD OF THE SANDIA 17 METER VERTICAL AXIS WIND TURBINE. THE MEASUREMENTS INDICATE THAT THE BLADE STRUCTURE IS OPERATING ADEQUATELY, WITHOUT ANY APPARENT FATIGUE, LIFE CONSUMPTION OR EXCESSIVE VIBRATION. THE TEST RESULTS COVER A RANGE OF TURBINE SPEEDS (FROM 29.6-59.3 RPM) AND WIND SPEEDS (FROM NEGLIGIBLE TO 50MPH.)

77-0395 SUMMARY OF CURRENT COST ESTIMATES OF LARGE WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1977. 64P.
DSE/2521-1

THE FEDERAL WIND ENERGY PROGRAM HAS, OVER THE PAST TWO YEARS, SUBSTANTIALLY EXTENDED THE STATE OF KNOWLEDGE ABOUT THE COSTS AND PERFORMANCE OF LARGE WIND ENERGY CONVERSION SYSTEMS (WECS). MUCH OF THIS PROGRESS HAS BEEN ACHIEVED AS A RESULT OF A SERIES OF ERDA-SPONSORED STUDIES DEALING WITH THE SYSTEM DESIGN, MISSION ANALYSIS, AND REGIONAL APPLICABILITY OF WECS. THIS REPORT REVIEWS THESE STUDIES, SUMMARIZES THE MOST PERTINENT RESULTS, AND PROVIDES A VIEW OF THE CURRENT STATUS AND UNCERTAINTIES SURROUNDING THE ECONOMICS OF GENERATING ENERGY FROM THE WIND FOR ELECTRIC UTILITY APPLICATIONS.

77-0396 SUMMARY OF INTERNATIONAL ENERGY RESEARCH AND DEVELOPMENT ACTIVITIES, 1974-1976.
NTIS, NOVEMBER 1977.
HCP/U2639

THIS DIRECTORY INCLUDES INFORMATION COVERING 3017 ONGOING AND RECENTLY COMPLETED ENERGY RESEARCH PROJECTS CONDUCTED IN CANADA, ITALY, THE FEDERAL REPUBLIC OF GERMANY, FRANCE, THE NETHERLANDS, THE UNITED KINGDOM, DENMARK, SWEDEN, ISRAEL, AND 18 OTHER COUNTRIES. THIS INFORMATION WAS REGISTERED WITH THE SMITHSONIAN SCIENCE INFORMATION EXCHANGE (SSIE) BY

SUPPORTING ORGANIZATIONS IN THE NINE COUNTRIES LISTED AND BY INTERNATIONAL ORGANIZATIONS SUCH AS THE INTERNATIONAL ATOMIC ENERGY AGENCY.

77-0397 SURVEY OF HISTORICAL AND CURRENT SITE SELECTION TECHNIQUES FOR THE PLACEMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, DECEMBER 1977. 80P.
BNWL/WIND-09

INDIVIDUALS AND GROUPS WHO PURCHASE AND INSTALL WIND ENERGY CONVERSION SYSTEMS (WECS) FOR EITHER GENERATION OF ELECTRICITY OR PUMPING WATER HAVE TO GO THROUGH A PROCESS BY WHICH A SPECIFIC LOCATION IS SELECTED FOR EACH WECS. THE PURPOSE OF THIS STUDY WAS TO IDENTIFY AND DOCUMENT METHODS AND PRACTICES USED IN SITING OF WECS. THE STUDY COVERS THE PERIOD FROM EARLY 1900S TO THE PRESENT DAY.

77-0398 SWAMY N V C, FRITZSCHE A A
AERODYNAMIC STUDIES ON VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C5.73-C5.80.

SOME STUDIES ON DARRIEUS TYPE ROTORS UNDERTAKEN AT DORNIER SYSTEM, FRIEDRICHSHAFEN, GERMANY AND I.I.T., MADRAS ARE DESCRIBED. AS A FIRST STEP, THE ACTUAL SHAPE OF THE ROTOR BLADES IN A CENTRIFUGAL FORCE FIELD IS COMPARED WITH A QUADRATIC PARABOLA AND A CATENARY FOR DIFFERENT ROTOR HEIGHT-DIAMETER RATIOS. THE OPTIMUM RATIO OF ARC LENGTH AND SWEPT AREA IS CONSIDERED. FOR A QUADRATIC PARABOLA, THE CONTRIBUTION TO THE TORQUE FROM THE VARIOUS SEGMENTS OF THE ROTOR HAS BEEN DETERMINED. IT IS FOUND THAT THE CENTRAL 60 PERCENT OF THE ROTOR CONTRIBUTES MORE THAN 95 PERCENT OF THE TOTAL TORQUE. A COMPARISON WITH A CORRESPONDING CYLINDRICAL ROTOR SHOWS THAT THE LATTER OF IDENTICAL MAXIMUM DIAMETER GENERATES ABOUT 2 TO 3 TIMES AS MUCH TORQUE AS THE BEND ROTOR. PRELIMINARY CALCULATIONS SHOW THAT USING A SMALL SEGMENT OF THE CENTRAL PART OF THE ROTOR AS A SPOILER REGULATES THE CIRCUMFERENTIAL SPEED OF THE ROTOR AT HIGH WIND SPEEDS. FURTHER STUDIES IN THIS DIRECTION ARE UNDER PROGRESS.

77-0399 SWIFT A H P
COMPUTER-AIDED DESIGN OF A CONTINUOUS DUTY ENERGY SYSTEM.
ANNUAL CONFERENCE ON ENERGY, 3RD, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL COMPANY, 1977. P.81-90.

IN MANY AREAS OF THE UNITED STATES, THE AVERAGE MONTHLY SOLAR AND WIND ENERGY DENSITY PROFILES COMPLEMENT EACH OTHER, WHICH SUGGESTS UTILIZATION OF A POWER SYSTEM THAT EMPLOYS BOTH SOLAR AND WIND ENERGY. THE PROBLEMS OF IDENTIFYING THESE AREAS FROM WEATHER DATA, AND DEVELOPING A COMPUTER-AIDED METHOD FOR THE DESIGN OF SUCH COMBINED SOLAR AND WIND SYSTEMS ARE STUDIED. THE ECONOMICS OF COMBINED SYSTEMS AS COMPARED TO SOLAR OR WIND ONLY SYSTEMS IS EXAMINED.

77-0400 TAYLOR F J, PRIES T H, HUANG C H
OPTIMAL WIND VELOCITY ESTIMATION.
AUTOMATICA 13(1): 3-10, JANUARY 1977.

A NEW APPROACH TO REMOTE WIND VELOCITY SENSING IS PROPOSED, DEVELOPED AND TESTED. WIND ESTIMATES WERE OBTAINED FROM THE SPECTRAL SIGNATURE OF AN OPTICAL SIGNAL SOURCE. THE SIGNAL WAS DERIVED FROM THE RANDOM SCATTERING OF A LASER BEAM IN THE LOWER ATMOSPHERE. A QUASI-SUPERVISED LEARNING MACHINE, USING A MINIMAL VARIANCE LINEAR ESTIMATOR, WAS USED TO PRODUCE THE WIND VELOCITY ESTIMATE. NEW STOPPING RULES, USED TO GUARANTEE THE CONVERGENCE OF THE LEARNING PROCESS, WERE ALSO DEVELOPED. FIELD EXPERIMENTATION INDICATES THAT THE NEW SYSTEM WILL PERFORM WELL, EVEN UNDER EXTREME OPTICAL NONLINEAR CONDITIONS DUE TO SEVERE TURBULENCE.

77-0401 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF WIND SYSTEMS FOR FARM, REMOTE AND RURAL USE.
ROCKY FLATS, COLORADO, ROCKWELL INTERNATIONAL, OCTOBER 1977. 123P.

THIS ANNUAL REPORT DETAILS PROGRESS DURING FY1977, THE FIRST FULL YEAR OF THE ROCKY FLATS PROGRAM ENTITLED "TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF WIND SYSTEMS FOR FARM, REMOTE AND RURAL USE". THE PRIMARY GOAL IS TO STIMULATE THE MANUFACTURE AND SALE OF SMALL WIND

ENERGY CONVERSION SYSTEMS (SWECS) BY PRIVATE SECTOR INDUSTRY TO INCREASE USE OF SWECS BY THE GENERAL PUBLIC. THIS GOAL WILL BE MET BY REDUCING THE COST OF ENERGY PRODUCED BY WIND TURBINE GENERATORS (WTG'S). ENERGY COSTS CAN BE REDUCED BY DECREASING SYSTEM CAPITAL COST, BY IMPROVING PERFORMANCE AND/OR BY IMPROVING SYSTEM RELIABILITY AND LIFETIME.

77-0402 TEMPLIN R J, SOUTH P
SOME DESIGN ASPECTS OF HIGH-SPEED VERTICAL-AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C1.1-C1.20.

THE AERODYNAMIC, MECHANICAL AND ECONOMIC REASONS ARE DISCUSSED FOR THE CHOICE OF THE VARIOUS DESIGN PARAMETERS (ROTOR HEIGHT TO DIAMETER RATIO, SOLIDITY, NUMBER OF BLADES, ETC.) FOR HIGH-SPEED VERTICAL-AXIS WIND TURBINES FROM KILOWATT TO MEGAWATT SIZES. IT IS SHOWN THAT VERY LARGE TURBINES ARE THEORETICALLY FEASIBLE. VARIOUS METHODS TO PREVENT OVERSPEEDING, TO IMPROVE THE STARTING CHARACTERISTICS, AND TO ALLEVIATE THE EFFECTS OF CYCLIC TORQUE AND DRAG LOADS ARE DESCRIBED. THE OPERATION OF THE TURBINE AT CONSTANT EFFICIENCY IS COMPARED WITH OPERATION AT CONSTANT SPEED TO SHOW THAT AS LONG AS THE ROTOR SPEED IS PROPERLY SELECTED THE CONSTANT SPEED MODE PRODUCES NEARLY AS MUCH AVERAGE POWER AS THE CONSTANT EFFICIENCY MODE. FINALLY, THE ECONOMICS OF A LARGE TURBINE FEEDING ELECTRICAL ENERGY INTO AN EXISTING THERMAL SYSTEM ARE CONSIDERED TO SHOW THAT UNDER THE RIGHT CIRCUMSTANCES THE USE OF WIND ENERGY MAKES CONSIDERABLE FINANCIAL SAVINGS POSSIBLE.

77-0403 TEWARI S K
WIND POWER FOR INDIA.
SUNWORLD NO. 4: 7-9, MAY 1977.

THE TECHNICAL AND ECONOMIC FEASIBILITY OF WIND POWER FOR RURAL CONDITIONS IN INDIA IS ASSESSED. EARLY AND CURRENT WIND POWER AND WINDMILL DEVELOPMENT ARE SURVEYED, AND WIND MEASUREMENTS ON RECORD ARE MENTIONED. THE RELATIVE ECONOMICS OF WIND POWER AND POWER TAKEN FROM THE GRID (FOR AREAS WHERE SUCH POWER IS ACCESSIBLE) ARE COMPARED FOR RURAL ELECTRIFICATION, WITH BASE PRICES FOR POWER AND DISTANCE (OF VILLAGE) FROM GRID CONNECTIONS TAKEN INTO ACCOUNT. WIND DATA ARE PROVIDED FOR VARIOUS LOCATIONS IN INDIA (DESIGN WIND SPEED FOR ENERGY MAXIMUM; POWER DENSITY FOR DESIGN WIND SPEED; WINDMILL HOURS OF OPERATION BASED ON DESIGN SPEED).

77-0404 THEORY PREDICTS PERFORMANCE OF DARRIEUS WINDMILL.
NEW SCI. 73(1044): 700, MARCH 24, 1977.

WIND TUNNEL TESTS ON DARRIEUS TURBINES AT KINGSTON POLYTECHNIC, ENGLAND, ARE DESCRIBED.

77-0405 THOMAS R L, RICHARDS T R
ERDA/NASA 100-KILOWATT MOD-0 WIND TURBINE OPERATIONS AND PERFORMANCE.
NTIS, SEPTEMBER 1977. 18P.
NASA-TM-73825, N78-15563, ERDA/NASA/1028-77/9

THIS PAPER WAS PRESENTED AT THE CONFERENCE ON WIND ENERGY CONVERSION SYSTEMS, WASHINGTON, D.C., SEPTEMBER 19-21, 1977. THE ERDA/NASA 100 KW MOD-0 WIND TURBINE BECAME OPERATIONAL IN SEPTEMBER 1975 AT THE NASA PLUM BROOK STATION NEAR SANDUSKY, OHIO. THE OPERATION OF THE WIND TURBINE HAS BEEN FULLY DEMONSTRATED AND INCLUDES START-UP, SYNCHRONIZATION TO THE UTILITY NETWORK, BLADE PITCH CONTROL FOR CONTROL OF POWER AND SPEED, AND SHUT-DOWN. ALSO, FULLY AUTOMATIC OPERATION HAS BEEN DEMONSTRATED BY USE OF A REMOTE CONTROL PANEL, 50 MILES FROM THE SITE, SIMILAR TO WHAT A UTILITY DISPATCHER MIGHT USE. THIS REPORT BRIEFLY DESCRIBES THE OPERATION SYSTEMS AND EXPERIENCE WITH THE WIND TURBINE LOADS, ELECTRICAL POWER AND AERODYNAMIC PERFORMANCE OBTAINED FROM TESTING.

77-0406 VERHOLEK M G
SUMMARY OF WIND DATA FROM NUCLEAR POWER PLANT SITES.
NTIS, MARCH 1977. 342P.
BNWL/WIND-04

OUR COUNTRY'S URGENT NEED TO DEVELOP ALTERNATE ENERGY SOURCES HAS SPAWNED FEDERAL SUPPORT FOR A NATIONAL WIND ENERGY CONVERSION PROGRAM (WECP). THIS PROGRAM IS SPONSORED BY THE U.S. ENERGY RESEARCH AND DEVELOPMENT

ADMINISTRATION (ERDA) THROUGH THE WIND SYSTEM BRANCH OF THE DEPARTMENT OF SOLAR ENERGY. THE PRIMARY GOAL OF THE WECP IS THE DEVELOPMENT AND COMMERCIALIZATION OF DURABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS). IN ORDER TO DETERMINE WHERE WECS TURBINES COULD BE EFFECTIVELY USED AND HOW MUCH ENERGY IS AVAILABLE FOR EXPLOITATION, SPECIAL WIND CLIMATOLOGY STUDIES ARE REQUIRED. WHILE SEVERAL SUCH STUDIES HAVE BEEN CONDUCTED ALREADY, FURTHER WORK IS NEEDED TO EXPAND AND IMPROVE OUR EXISTING DATA BASE. THIS STUDY IS INTENDED TO PROVIDE ADDITIONAL DATA FOR INCLUSION IN ASSESSMENTS OF AVAILABLE WIND ENERGY.

77-0407 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRIC POWER GENERATION FROM THE WIND.
NTIS, AUGUST 1977. 34P.
PB-273582

THE IDEA OF GENERATING WINDPOWER AT THE WINDIEST AVAILABLE SITES (WIND FARMS) IS EXAMINED FOR ITS EFFECT ON FEASIBILITY OF LARGE-SCALE WINDPOWER INPUT TO THE NATIONWIDE ELECTRIC POWER NETWORK. WINDPOWER IS CONSIDERED IN ASSOCIATION WITH PUMPED-STORAGE HYDROELECTRIC PLANTS FOR LOAD LEVELING AND EXISTING TYPES OF TRANSMISSION LINES FOR INTERCONNECTING THE WIND FARMS AND ENERGY-STORAGE SITES WITH LOAD CENTERS UP TO 2000 KM AWAY. POTENTIAL ENERGY HARVEST FROM WIND FARM SITES IN THE 17 WESTERN STATES IS ESTIMATED AT WELL OVER 100 GW, AND MANY TIMES THIS IN ARTIC NORTH AMERICA. AT THE 100-GW LEVEL OF DEVELOPMENT, BUS BAR COST AT THE WIND FARM WOULD BE ABOUT 3 MILLS/MJ (10 MILLS/KWH). ENERGY STORAGE REQUIRED FOR LOAD LEVELING WOULD ADD ABOUT 1.8 MILLS/MJ AND TRANSMISSION COST ANOTHER 2.1 MILLS/MJ, FOR A TOTAL COST AT THE LOAD CENTER OF 6 MILLS/MJ (21 MILLS/KWH), ALL IN 1976 DOLLARS. THIS WOULD BE COMPETITIVE WITH ENERGY GENERATED NEAR LOAD CENTERS BY NEW NUCLEAR OR FOSSIL-FUEL POWERPLANTS. WINDPOWER APPEARS ENVIRONMENTALLY ACCEPTABLE AND AVOIDS MANY OF THE ENVIRONMENTAL LIABILITIES OF CONVENTIONAL SOURCES. LARGE-SCALE WINDPOWER IMPLEMENTATION WILL REQUIRE MAJOR ADVANCE COMMITMENT OF CAPITAL, ABOUT $1 BILLION, TO LOWER BUS BAR COSTS TO 4.4 MILLS/MJ (16 MILLS/KWH). THE TIMETABLE WILL THEREFORE LIKELY DEPEND ON FEDERAL INCENTIVES.

77-0408 TODD R W
USE OF THERMAL STORAGE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.X73-X74.

THE USE OF WIND POWER FOR GENERATING HEAT FOR SPACE HEATING THROUGH HYDRAULIC RESISTANCE IS DESCRIBED. THE USE OF WIND POWER FOR ELECTRIC RESISTANCE HEATING AND HEATED WATER STORAGE SYSTEMS IS ALSO DESCRIBED.

77-0409 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRICAL POWER GENERATION FROM THE WIND.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESSION B.2. 5P.

WIND ENERGY CONVERSION SYSTEMS (WECS) NOW BEING DEVELOPED ARE EXPECTED TO BE ABLE TO PROVIDE LARGE AMOUNTS OF ELECTRICAL ENERGY AT SELECTED WINDY SITES AT COSTS COMPETITIVE WITH ENERGY FROM NEW COAL AND NUCLEAR POWERPLANTS. WECS AND HYDROELECTRIC FACILITIES FOR STORAGE CONNECTED TO THE SAME LARGE-SCALE TRANSMISSION GRIDS ARE EXPECTED TO PUT LARGE ENERGY RESOURCES WITHIN REACH OF LOAD CENTERS UP TO 2000 KM FROM THE WIND SITES. DIVERSITY OF WIND SITES REDUCES THE COST OF STORAGE REQUIRED TO SMOOTH FLUCTUATIONS IN WIND ENERGY. TRANSMISSION FROM THE BEST SITES TO LOAD CENTERS IS EXPECTED TO BE PREFERABLE TO LOCAL GENERATION FROM THE WIND AND SUN AT INFERIOR SITES. ALL ELEMENTS OF THE INTEGRASYSTEM ARE WITHIN THE PRESENT STATE OF THE ART.

77-0410 TODD F
HAVING TO LOOK AT COAL, TIDES, STEAM, WIND.
ALASKA IND. 9(6): 34-40, JUNE 1977.

ALASKA NOT ONLY HAS THE GREATEST PETROLEUM RESERVES OF ALL 50 STATES, BUT ALSO HAS THE GREATEST POTENTIAL FOR GENERATING ENERGY FROM SEVERAL ALTERNATIVE AND AS YET BARELY EXPLOITED SOURCES SUCH AS COAL,

HYDROELECTRICITY, TIDAL CURRENTS, AND THE POWERFUL AND CONSISTENT WINDS THAT BLOW ALONG THE ALASKAN COAST. AT PRESENT, THE STATE'S LARGEST SOURCE OF NONCONVENTIONALLY GENERATED ELECTRICITY IS BEING PRODUCED AT TWO SOUTHEASTERN ALASKAN PULP MILLS THAT BURN A COMBINATION OF SAWDUST, BARK, OIL, AND A BY-PRODUCT OF PULP MANUFACTURING CALLED RED LIQUOR. OF PARTICULAR PROMISE ARE THE STATE'S ABUNDANT COAL RESOURCES. COAL MAY ONE DAY BE EXPORTED FROM ALASKA TO JAPAN OR EVEN TO SOUTHERN CALIFORNIA. THE POTENTIAL OF WIND POWER IS DISCUSSED ALSO.

77-0411 TOMPKINS L L
TEMPERATURE CONTROL SYSTEM UTILIZING NATURALLY OCCURRING ENERGY SOURCES.
U.S. PATENT NO. 4,015,962, APRIL 5, 1977. 10P.

A TEMPERATURE CONTROL SYSTEM FOR AN ENCLOSED STRUCTURE IS DISCLOSED WHICH UTILIZES TWO CIRCUITS, ONE FOR HEATING AND ONE FOR COOLING THE STRUCTURE. THE SYSTEM MAKES MAXIMUM USE OF NATURALLY OCCURRING SOURCES OF ENERGY, SUCH AS WIND AND SOLAR HEAT TO PROVIDE THE REQUISITE HEATING OR COOLING. WIND DRIVEN COMPRESSORS, ONE IN EACH CIRCUIT, PROVIDE THE MOTIVE FORCE FOR THE HEATING AND COOLING FLUID IN THE CLOSED LOOP CIRCUITS. THE COOLING CIRCUIT TRANSFERS HEAT TO THE HEATING CIRCUIT TO MINIMIZE UNUTILIZED ENERGY. A STORAGE UNIT IS PROVIDED TO STORE HEAT OR LOW TEMPERATURE FLUID WHEN HEATING OR COOLING OF THE STRUCTURE IS NOT IMMEDIATELY REQUIRED.

77-0412 VUKOVICH F M, CLAYTON C A
ON A TECHNIQUE TO DETERMINE WIND STATISTICS IN REMOTE LOCATIONS, FINAL REPORT.
NTIS, DECEMBER 1977. 124P.
RLO-2445-78/1

A TECHNIQUE HAS BEEN DEVELOPED TO PREDICT WIND STATISTICS IN REMOTE LOCATIONS WHERE WIND DATA ARE USUALLY NOT AVAILABLE. THE TECHNIQUE USES HISTORICAL WIND DATA FROM A SYNOPTIC WEATHER STATION TOGETHER WITH A STATISTICAL PREDICTION MODEL TO OBTAIN DATA FROM WHICH WIND STATISTICS CAN BE DEVELOPED. THE FORM OF THE STATISTICAL MODEL AND ITS PARAMETER ESTIMATES WERE DEVELOPED FROM SIMULATIONS FOR THE REGION OF INTEREST THAT, IN TURN, WERE BASED ON A HYDRODYNAMIC MODEL. PREDICTIONS AND EVALUATIONS WERE MADE IN AND AROUND THE CITY OF ST. LOUIS. THE BEST PREDICTIONS OF WIND STATISTICS WERE MADE AT LOCATIONS NEAR THE CENTER OF THE CITY WHERE THE SIMULATIONS WERE THE BEST. THE ACCURACY OF THE SIMULATIONS DEPENDED ON THE PARAMETERS USED TO DESCRIBE THE FORCING FUNCTIONS. CONSIDERABLY MORE INFORMATION WAS AVAILABLE ON THESE PARAMETERS FOR THE CENTRAL CITY THAN FOR THE SURROUNDING AREAS.

77-0413 200 KW TURBINES SITES SELECTED.
WIND POWER DIG. 1(9): 20, SUMMER 1977.

TWO 200 KW TURBINES WILL BE INSTALLED AS PART OF ERDA'S WIND POWER RESEARCH ACTIVITIES. THEY WILL BE ON BLOCK ISLAND (RHODE ISLAND) AND CULEBRA ISLAND (PUERTO RICO).

77-0414 TRACI R M, PHILLIPS G T, PATNAIK P C, FREEMAN B E
DEVELOPMENT OF A WIND ENERGY SITE SELECTION METHODOLOGY. FINAL REPORT, MAY 3, 1976--JUNE 3, 1977.
NTIS, JUNE 1977. 206P.
RLO-2440-11

THIS REPORT DESCRIBES PROGRESS ACHIEVED DURING THE SECOND PHASE OF A PLANNED THREE-PHASE PROGRAM TO DEVELOP AN IMPROVED WIND ENERGY CONVERSION SYSTEM (WECS) SITING METHODOLOGY. THE GOAL OF THE PROGRAM IS THE DEVELOPMENT OF A PRACTICAL AND WORKABLE WIND ENERGY PROSPECTING AND SURVEYING TOOL. THE METHODOLOGICAL APPROACH CONSISTS OF COMBINING DATA ANALYSIS PROCEDURES FOR ANALYZING AND COMPACTING HISTORICAL METEOROLOGICAL DATA FOR A MESOCALE (APPROXIMATELY 100 KM) REGION OF INTEREST WITH MATHEMATICAL WINDFIELD MODELING TO DEFINE THE WIND CHARACTERISTICS OF POTENTIAL WIND ENERGY SITES WITHIN THE REGION. THE SECOND PHASE, DISCUSSED HEREIN, INVOLVES MODEL IMPROVEMENT, DEVELOPMENT OF THE METHODOLOGY AND A PRELIMINARY SITE SURVEY DEMONSTRATION STUDY.

77-0415 UPMALIS A
WIND-POWER ELECTRICITY FOR HIGH-RISE FLATS.
ELEKTROTECH. Z. (ETZ) B. 29(11): 355-357, MAY 20, 1977. (IN GERMAN)

THE TECHNICAL AND ECONOMICAL FEASIBILITY OF SUPPLYING THE ELECTRICITY REQUIREMENTS OF A HIGH RISE BLOCK OF FLATS FROM AC GENERATORS CONNECTED TO THE GRID AND DRIVEN BY VARIABLE-PITCH PROPELLERS MOUNTED ON THE ROOF OF THE BUILDING AT A HEIGHT OF ABOUT 120 M ABOVE GROUND LEVEL IS INVESTIGATED FOR CERTAIN LOCATIONS ON THE BELGIAN, GERMAN AND ENGLISH COASTAL BELT. IT IS CONCLUDED THAT DEMAND COULD BE MET COMPETITIVELY BUT THAT PEAK DEMAND WOULD NEED SUPPLEMENTATION FROM THE GRID.

77-0416 URBANEK A
GOOD OUTLOOK FOR WIND ENERGY CONVERTERS.
ELEKTROTECHNIK 59(17): 24, SEPTEMBER 9, 1977. (IN GERMAN)

BRIEF PARTICULARS ARE GIVEN OF SOME OF THE LARGE WIND ENERGY CONVERTER PROJECTS DESCRIBED AT THE JUNE 1977 CONFERENCE OF THE GERMAN SOLAR ENERGY SOCIETY IN BREMEN.

77-0417 VAN HOLTEN T
MODERN RESEARCH IN THE FIELD OF WIND ENERGY.
INGENIEUR 89(7): 129-136, FEBRUARY 17, 1977. (IN DUTCH)

THIS ARTICLE CONSIDERS THE FACTORS WHICH LED TO THE SETTING UP IN MARCH 1976 OF THE NETHERLANDS FIVE YEAR NATIONAL WIND ENERGY RESEARCH PROGRAMME. PROBLEMS FOR STUDY INCLUDE NOT ONLY PURE WINDMILL TECHNOLOGY BUT ALSO METEOROLOGICAL QUESTIONS AND THE COUPLING TO THE ELECTRICITY NETWORK OF A FLUCTUATING ENERGY SOURCE. AN HISTORICAL SURVEY FROM CIRCA 1900 IS FOLLOWED BY A DISCUSSION OF THE POTENTIAL CONTRIBUTION OF WIND ENERGY IN THE LIGHT OF RECENT INVESTIGATIONS.

77-0418 VAN HOLTEN T
WINDMILLS WITH DIFFUSER EFFECT INDUCED BY SMALL TIPVANES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.E3.31-E3.46.

BETZ'S FORMULA FOR THE MAXIMUM POWER OUTPUT OF WINDMILLS IS VALID ONLY FOR WINDMILL TYPES EXERTING A STEADY, AXIAL FORCE ON THE AIR. TYPES NOT COVERED BY BETZ'S ANALYSIS, SUCH AS WINDMILLS APPLYING RADIAL AS WELL AS AXIAL FORCES TO THE AIR, MAY HAVE A MUCH LARGER POWER OUTPUT. THIS REPORT DEALS WITH A TYPE OF WINDMILL WHERE RELATIVELY SMALL VANES, ATTACHED TO THE TIPS OF THE MILLBLADES, DEFLECT THE AIR RADIALLY OUTWARDS. THE DIFFUSER EFFECT CAUSED BY THE TIPVANES DOWNSTREAM OF THE WINDMILL IS ASSOCIATED WITH A GENERAL TYPE OF FLOW RESEMBLING A VENTURI-FLOW, WHERE THE WINDMILL IS PLACED NEAR THE NARROWEST PART OF THE STREAMTUBE. THE RESULTING INCREASED MASS FLOW THROUGH THE DISC PLANE OF THE WINDMILL CAUSES A LARGER POWER OUTPUT PER UNIT AREA SWEPT BY THE MILLBLADES.

77-0419 VANDERPLAATS G, FUHS A E
AERODYNAMIC DESIGN OF A CONVENTIONAL WINDMILL USING NUMERICAL OPTIMIZATION.
J. ENERGY 1(2): 132-134, MARCH-APRIL 1977.

THE PURPOSE OF THIS TECHNICAL NOTE IS TO IDENTIFY NUMERICAL OPTIMIZATION TECHNIQUES AS AN EFFECTIVE TOOL FOR AUTOMATED SYNTHESIS OF WINDMILL DESIGN. SEVERAL SIMPLE DESIGN EXAMPLES ARE PRESENTED TO SHOW THE EFFICIENCY AND GENERALITY OF THESE METHODS. THE EXTENSION TO MORE SOPHISTICATED DESIGN PROBLEMS IS DISCUSSED, AND THE ADVANTAGES AND LIMITATIONS OF THESE TECHNIQUES ARE IDENTIFIED.

77-0420 VENDOLSKY I
POSSIBILITIES OF USING WIND ENERGY IN THE COUNTRIES OF THE THIRD WORLD.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 305-322. (IN GERMAN)

THE FIELDS OF APPLICATION FOR THE USE OF WIND POWER IN COUNTRIES OF THE THIRD WORLD DO NOT NECESSARILY COINCIDE WITH THOSE OF THE INDUSTRIAL COUNTRIES. IN THE INDUSTRIAL COUNTRIES ONE IS CONCERNED WITH PRODUCING MORE ENERGY ECONOMICALLY, BUT IT IS THE AIM OF THE THIRD WORLD COUNTRIES SIMPLY TO OBTAIN ENERGY, BECAUSE OF THE LOW STAGE OF DEVELOPMENT OF THE INFRA-STRUCTURE, WHERE FOR IRRIGATION AND DRINKING WATER PROJECTS, SECURE OUTPUT IS NOT OF SUCH IMPORTANCE AS THE PROVISION OF A CERTAIN AMOUNT OF WORK (ENERGY) IN A CERTAIN SPACE OF TIME. A POSSIBILITY IS SHOWN WHERE IN

CONDITIONS OF LACK OF FOSSIL FUELS ON AN ISLAND WITH RELATIVELY GOOD INFRA-STRUCTURE THE USE OF WIND ENERGY FOR ELECTRICITY GENERATION APPEARS TO BE VERY SUITABLE.

77-0421 SEVEN-STORY-HIGH EGGBEATER DELIVERS 65 KW.
MECH. ENG. 99: 45, AUGUST 1977.

A LARGE VERTICAL AXIS WIND TURBINE BEING TESTED AT SANDIA LABORATORIES IS DESCRIBED.

77-0422 HARNESSING THE WIND: A WAY OF LIFE.
ORG. GARD. FARM. 24: 36+, OCTOBER 1977.

MARTIN JOPP'S LIFE-LONG INVOLVEMENT WITH WIND ENERGY IS DESCRIBED.

77-0423 1930S WIND-POWERED PLANT RE-EVALUATED.
MECH. ENG. 99: 56, JANUARY 1977.

THE MADARAS ROTOR POWER PLANT, DEVELOPED IN THE 1930'S BY J. D. MADARAS, IS BEING INVESTIGATED BY THE UNIVERSITY OF DAYTON RESEARCH INSTITUTE ON A GRANT FROM ERDA. THE POWER PLANT CONSISTED OF A CIRCULAR TRACK, AN ENDLESS TRAIN OF VERTICAL, CYLINDRICAL ROTOR UNITS MOUNTED ON STREAMLINED FLAT CARS, A POWER COLLECTION AND DISTRIBUTION SYSTEM, AND A CONTROL AND MAINTENANCE BUILDING, ALL LOCATED ON AN 80-ACRE SITE. THE UNIVERSITY OF DAYTON INVESTIGATION WILL INCLUDE WIND TUNNEL TESTS, AN EVALUATION OF STRUCTURAL, ELECTRICAL, AND MECHANICAL COMPONENTS, COMPUTERIZED SIMULATIONS OF THE UPDATED MADARAS PLANT'S PERFORMANCE, AND ECONOMIC EVALUATION OF THE PLANT AND THE WAY IT COULD BE USED AS PART OF A LARGE PUBLIC SYSTEM.

77-0424 MCCONNELL R D, VAN SANT J H, FORTIN M, PICHE B
EOLIENNES POUR LES ILES-DE-LA-MADELEINE.
ENG. J. 60(1): 20-22, JANUARY 1977. (IN FRENCH)

77-0425 WALTERS R E
INNOVATIVE WIND TURBINES.
ANNUAL CONFERENCE ON ENERGY, 3D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL COMPANY, 1977. P. 268-275.

THE INITIAL INVESTIGATION OF TWO INNOVATIVE CONCEPTS IN WIND ENERGY CONVERSION TURBINES IS PRESENTED. THE FIRST CONCEPT IS A VORTEX CONCENTRATOR, A DEVICE WHICH CREATES A STRONG VORTEX IN THE AMBIENT WIND. THE ENERGY PER UNIT AREA IN THE VORTEX REGION IS MUCH HIGHER THAN FOR THE UNDISTURBED WIND, ALLOWING THE ENERGY TO BE MORE EFFICIENTLY CONVERTED TO MORE USEFUL FORMS. THE SECOND CONCEPT IS A VERTICAL AXIS WIND TURBINE WHICH USES STRAIGHT BLADES COMPOSED OF AIRFOIL SHAPES HAVING HIGH EFFICIENCY. THIS WOULD BE ATTAINED BY USING CIRCULATION CONTROLLED (C.C.) AIRFOILS FOR THE BLADES; THESE AIRFOILS CONTAIN SLOTS NEAR THE ROUNDED TRAILING EDGES THROUGH WHICH A SMALL AMOUNT OF COMPRESSED AIR IS BLOWN TO OBTAIN HIGH LIFT FORCES. STRAIGHT BLADES ALLOW CYCLIC PITCH CONTROL, AS WELL AS LOCATING EACH BLADE ELEMENT AT A LARGER RADIUS FROM THE SHAFT SO THAT MAXIMUM ROTOR TORQUE IS PRODUCED.

77-0426 WARNER W L, KOSSA M M
UPDATING AN ANCIENT ART: RESEARCH AND DEVELOPMENT TOWARD MODERN WIND POWERED CARGO SHIPS.
SHIP TECHNOLOGY AND RESEARCH (STAR) SYMPOSIUM, 2D, SAN FRANCISCO, CALIFORNIA, MAY 25, 1977. PROCEEDINGS. NEW YORK, SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS, 1977. P.1-20.

THE DRAMATIC INCREASE OF FUEL COSTS DURING THE LAST FEW YEARS HAS RENEWED INTEREST IN SAIL POWERED COMMERCIAL SHIPS. THIS PAPER REVIEWS RESEARCH AND DEVELOPMENT EFFORTS, SINCE THE 1950'S, APPLICABLE TO THE DESIGN OF LARGE EFFICIENT SAILING VESSELS. DATA APPLICABLE TO SHIPS IN THE 15,000 TO 25,000 DEADWEIGHT TON RANGE IS EMPHASIZED SINCE A "UNIVERSAL BULKER" OF THIS SIZE IS THE MOST PROMISING APPLICATION FOR A MODERN SAILING SHIP. AERODYNAMIC, HYDRODYNAMIC AND PRACTICAL CONSIDERATIONS FOR SUCH A SHIP ARE DISCUSSED.

77-0427 WARREN A W, EDSINGER R W, CHAN Y K
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 1: TECHNICAL REPORT. FINAL REPORT.

NTIS, AUGUST 1977. 101P.
N78-20802

A COMPREHENSIVE COMPUTER PROGRAM FOR THE MODELING OF WIND ENERGY AND STORAGE SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL AND PNEUMATIC) WAS DEVELOPED. THE LEVEL OF DETAIL OF SIMULATION MODEL FOR WIND ENERGY STORAGE (SIMWEST) IS CONSISTENT WITH A ROLE OF EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND ENERGY SYSTEMS. THE SOFTWARE PACKAGE CONSISTS OF TWO BASIC PROGRAMS AND A LIBRARY OF SYSTEM, ENVIRONMENTAL, AND LOAD COMPONENTS. THE FIRST PROGRAM IS A PRECOMPILER WHICH GENERATES COMPUTER MODELS (IN FORTRAN) OF COMPLEX WIND SOURCE STORAGE APPLICATION SYSTEMS, FROM USER SPECIFICATIONS USING THE RESPECTIVE LIBRARY COMPONENTS. THE SECOND PROGRAM PROVIDES THE TECHNO-ECONOMIC SYSTEM ANALYSIS WITH THE RESPECTIVE I/O, THE INTEGRATION OF SYSTEMS DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES. SIMWEST PROGRAM, AS DESCRIBED, RUNS ON THE UNIVAC 1100 SERIES COMPUTERS.

77-0428 WARREN A W, EDSINGER R W, CHAN Y K
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 2: OPERATION MANUAL. FINAL REPORT.
NTIS, AUGUST 1977. 421P.
N78-20803

A COMPREHENSIVE COMPUTER PROGRAM (SIMWEST) DEVELOPED FOR THE MODELING OF WIND ENERGY/STORAGE SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL, AND PNEUMATIC) IS DESCRIBED. FEATURES OF THE PROGRAM INCLUDE: A PRECOMPILER WHICH GENERATES COMPUTER MODELS (IN FORTRAN) OF COMPLEX WIND SOURCE/STORAGE/APPLICATION SYSTEMS, FROM USER SPECIFICATIONS USING THE RESPECTIVE LIBRARY COMPONENTS; A PROGRAM WHICH PROVIDES THE TECHNO-ECONOMIC SYSTEM ANALYSIS WITH THE RESPECTIVE I/O THE INTEGRATION OF SYSTEM DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES; AND CAPABILITY TO EVALUATE ECONOMIC FEASIBILITY AS WELL AS GENERAL PERFORMANCE OF WIND ENERGY SYSTEMS. THE SIMWEST OPERATION MANUAL IS PRESENTED AND THE USAGE OF THE SIMWEST PROGRAM AND THE DESIGN OF THE LIBRARY COMPONENTS ARE DESCRIBED. A NUMBER OF EXAMPLE SIMULATIONS INTENDED TO FAMILIARIZE THE USER WITH THE PROGRAM'S OPERATION IS GIVEN ALONG WITH A LISTING OF EACH SIMWEST LIBRARY SUBROUTINE.

77-0429 WARREN A W, EDSINGER R W, BURROUGHS J D
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 3: PROGRAM DESCRIPTIONS. FINAL REPORT.
NITS, AUGUST 1977. 234P.
N78-20804

PROGRAM DESCRIPTIONS, FLOW CHARTS, AND PROGRAM LISTINGS FOR THE SIMWEST MODEL GENERATION PROGRAM, THE SIMULATION PROGRAM, THE FILE MAINTENANCE PROGRAM, AND THE PRINTER PLOTTER PROGRAM ARE GIVEN.

77-0430 WASSERMAN H
ENERGY'S POINT OF NO RETURN; INDUSTRY HIDES FROM THE SUN.
NATION 224(9): 263-266, MARCH 5, 1977.

THE TECHNOLOGY TO HARNESS SOLAR ENERGY ON A MASS SCALE ALREADY EXISTS. POLITICAL AND SOCIAL BARRIERS, HOWEVER, STAND IN THE WAY OF THE DEVELOPMENT OF ANY COMPREHENSIVE PROGRAM. ANY MAJOR SHIFT TO SOLAR POWER WOULD COMPROMISE ENERGY CORPORATION'S INVESTMENTS IN NUCLEAR ENERGY. MOREOVER, PRIVATE HOMES AND SMALL INDUSTRIES EQUIPPED WITH SOLAR HEATERS WOULD MEAN LESS DEPENDENCE ON LARGE UTILITIES TO MEET ENERGY NEEDS. SOLAR POWER INSTALLATION WOULD ALSO PROVIDE MORE, NOT LESS, JOBS AS MANY UNION LEADERS BELIEVE.

77-0431 WEBER W
INFLUENTIAL FACTORS IN COST ANALYSIS OF WIND ENERGY CONVERTERS WITH HORIZONTAL AXES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 99-110. (IN GERMAN)

A CAPITAL INVESTMENT CALCULATION IS CARRIED OUT WITH REGARD TO POSSIBLE ELECTRICAL POWER GENERATION, WHICH IS PRODUCED BY THE OPERATION OF WIND ENERGY CONVERTERS (WEK) WITH HORIZONTAL AXES, WHICH EXAMINES THE

OPERATION OF WEK'S SO AS TO COVER COSTS. THE IMPORTANT PARAMETERS ARE VARIED AND THEIR EFFECT ON THE PRODUCTION AND COST SITUATION IS SHOWN.

77-0432 WEBER W
THE OPTIMUM CONFIGURATION OF ROTOR BLADES FOR HORIZONTAL WIND ENERGY CONVERTERS.
Z. FLUGWISS. 23(12): 443-447, FEBRUARY 1977. TRANSLATION: NTIS, 1977. 17P.
NASA-TT-F-17379

CONSIDERATIONS, PROCEDURES AND SOME RESULTS RELATING TO THE PROBLEM OF THE AERODYNAMIC CONFIGURATION OF ROTOR BLADES FOR WIND ENERGY CONVERTERS ARE PRESENTED.

77-0433 WEIMER G A
ANOTHER ENERGY SOURCE IS BLOWING IN THE WIND.
IRON AGE 220: 27-29, JULY 4, 1977.

DOZENS OF WIND ENERGY R+D EFFORTS, LARGELY FEDERALLY FINANCED, ARE UNDERWAY THROUGHOUT THE U.S., EUROPE, JAPAN, AND EVEN THE USSR. MOST PROJECTS HAVE A COMMON OBJECTIVE: MAKING WIND ENERGY CONVERSION SYSTEMS FINANCIALLY COMPETITIVE WITH OTHER ELECTRIC POWER GENERATING PLANTS. BY FAR THE LARGEST WIND TURBINE PROGRAM INVOLVES CONSTRUCTION OF GIGANTIC WINDMILLS THAT ARE INTENDED TO PRODUCE ENOUGH POWER TO DRIVE A 3000 KW TURBINE.

77-0434 WEISBRICH A L
TOROIDAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
WIND TECHNOL. J. 1(3): 11-20, FALL 1977.

PRESENTED IS A TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) DESIGN FOR WIND ENERGY CONVERSION SYSTEMS (WECS) APPLICATION. A TARP WECS IS ANALYZED FOR PERFORMANCE AND ECONOMIC VIABILITY USING BOTH EXPERIMENTAL RESULTS AND ANALYTICAL APPROACHES. RESULTS INDICATE A TARP WECS TO HAVE UNUSUAL PROMISE AND POTENTIAL FOR MEETING THE DIVERSE PREREQUISITES FOR A WECS TO BECOME A VIABLE ENERGY SYSTEM ALTERNATIVE. THESE ARE REDUCED ENERGY COST, APPLICABILITY AND INTERFACE ADAPTABILITY TO A BROAD RANGE OF USES, ENVIRONMENTS AND STRUCTURES, AS WELL AS AESTHETIC DESIGN WITH MINIMAL ENVIRONMENTAL IMPACT. AS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR, A TARP GENERATES LOW PRESSURE, HIGH KINETIC WIND ENERGY REGIONS AT ITS ROTOR DISK SITES. ROTOR PERFORMANCE IS THUS ENHANCED VIA FLOW AUGMENTATION WHICH IS CALCULATED TO YIELD POWER OUTPUT LEVELS PER UNIT DISC AREA AT LEAST THREE TIMES THAT OF A CONVENTIONAL WECS. AUGMENTATION OF FLOW ALSO PERMITS HIGHER ROTOR RPM, REDUCING DRIVE SYSTEM COST, AND EXTENDS POWER GENERATION CAPABILITY TO LOWER AMBIENT WIND VELOCITIES. DUE TO A TARP'S UNIQUE DESIGN FEATURES, IT MAY BE ADAPTABLE FOR INTERFACE WITH MANY COMMON STRUCTURES AND ENVIRONMENTS FOR MULTI-PURPOSE USE. THE ABOVE MAY INCLUDE BUILDINGS IN AN URBAN ENVIRONMENT, FARM SILOS, COMMUNICATION TOWERS, POLLUTION CONTROL STACKS, WATER TOWERS, ETC. ALSO, SUBSYSTEM PROTECTION FROM THE ELEMENTS AND EASE OF SERVICEABILITY ARE INHERENT IN A TARP WECS DESIGN. THE ABOVE FEATURES ARE PROJECTED TO YIELD SIGNIFICANT IMPROVEMENT IN ENERGY COST.

77-0435 WEISBRICH A L
VARIABLE GEOMETRY WINDTURBINE.
U.S. PATENT NO. 4,021,140, MAY 3, 1977. 4P.

AN OMNIDIRECTIONAL TURBINE IS DESCRIBED WHICH PROVIDES A ROTATIONAL OUTPUT OF ONE SENSE IN RESPONSE TO FLUID FLOW APPROACHING THE TURBINE FROM ANY DIRECTION PARALLEL TO ITS PLANE OF ROTATION. THE INVENTION IS CONTEMPLATED FOR USE IN CONJUNCTION WITH ELECTRIC GENERATORS OR POWER GENERATING SYSTEMS IN GENERAL CAPABLE OF UTILIZING POWER OUTPUT FROM THE TURBINE.

77-0436 WHERE THERE'S A WIND THERE COULD BE A WALL.
NEW SCI. 76(1077): 348, NOVEMBER 10, 1977.

A "WINDWALL", SAID TO BE CHEAPER AND VISUALLY LESS OBTRUSIVE THAN A WINDMILL, IS DESCRIBED IN CONNECTION WITH A HOUSING DEVELOPMENT IN PEACEHAVEN, SUSSEX, ENGLAND.

77-0437 WIEDERHOLD H
DO-IT-YOURSELF WIND POWER PLANT. REPORT OF THE ASSOCIATION FOR WIND

ENERGY RESEARCH AND APPLICATIONS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 329-334. (IN GERMAN)

A FULLY AUTOMATIC WIND ENERGY PLANT IN NORTH GERMANY, WHICH IS USED FOR SPACE HEATING IS DESCRIBED. THE FOLLOWING DETAILS ARE TREATED IN THE REPORT: THE FUNCTION OF THE ADJUSTABLE PROPELLER, THE FUNCTION OF THE GENERATOR AND THE ELECTRICAL CIRCUIT, THE FUNCTION OF THE AUTOMATIC CONTROL WITH PROTECTION AGAINST STORMS.

77-0438 WILLEM R A
CYLINDRICAL ARRAYS OF VERTICAL-AXIS WIND TURBINES.
WIND TECHNOL. J. 1(2): 11-16, SUMMER 1977.

THIS PAPER PRESENTS THE CONCEPT OF WIND ENERGY CONVERSION USING TALL CYLINDRICAL ARRAYS OF VERTICAL-AXIS TURBINES. THIS CONCEPT PROVIDES AN ALTERNATIVE TO THE LARGE SINGLE TURBINE APPROACH FOR ECONOMICAL WIND POWER CONVERSION. VARIOUS ASPECTS OF THE CONCEPTS ARE CONSIDERED AND A COMPARISON IS MADE WITH RESPECT TO GROUND-MOUNTED TURBINE SYSTEMS.

77-0439 WILLIAMS J R, CHRISTIANSON F, HUDSON W T
DEVELOPMENT OF A TOTAL ENERGY SYSTEM FOR THE CEDAR GAP CHRISTIAN RETREAT CENTER.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 38, P. 27.

THE CEDAR GAP CHRISTIAN CENTER INCLUDES 2 LODGES OF 25 ROOMS EACH, A 5,300 SQ. FT. DINING HALL, 6 COTTAGES OF 1,200 SQ. FT. EACH, 6 COTTAGES OF 800 SQ. FT. EACH, A SHOWER AND LAUNDRY FACILITY OF ABOUT 800 SQ. FT., A 5,500 SQ. FT. RECREATIONAL BUILDING, AND A 1,200 SQ. FT. CHAPEL. THE DECISION WAS MADE TO PROVIDE ALL THE ENERGY NEEDS OF THE CHRISTIAN RETREAT WITH ON-SITE RENEWABLE SOURCES OF ENERGY. THE AVERAGE ELECTRIC POWER REQUIREMENTS OF THE RETREAT ARE PROJECTED TO BE AROUND 35 KW WITH PEAK POWER REQUIREMENTS IN EXCESS OF 100 KW. MUCH OF THIS POWER WILL BE PROVIDED BY HYDROELECTRIC UNITS ON STREAMS RUNNING ACROSS THE PROPERTY. THE REMAINDER WILL BE SUPPLIED BY WIND GENERATORS AND A SOLAR POWER PLANT OPERATED BY EXCESS HEAT FROM THE SOLAR COLLECTORS ON THE LODGES AND DINING HALL. AS A FINAL BACKUP, A WOOD BURNING BOILER IN THE SUBSTATION AT THE LODGE AND DINING HALL CAN SUPPLY ADDITIONAL HOT WATER FOR THIS FACILITY AS WELL AS HOT WATER TO RUN THE TURBINE-GENERATOR.

77-0440 WILSON R E, WALKER S N
PERFORMANCE-OPTIMIZED HORIZONTAL-AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B1.1-B1.28.

DESIGN PROCEDURES FOR OPTIMUM WIND TURBINES ARE SHOWN TO BE DIFFERENT FROM THOSE USED FOR PROPELLERS. AN OPTIMUM DESIGN GENERATION APPROACH FOR WIND TURBINES IS DEVELOPED FROM A MODIFIED STRIP THEORY THAT INCLUDES TIP-LOSS. THE APPROACH ENTAILS A LOCAL OPTIMIZATION OF BLADE ELEMENT PARAMETERS TO MAXIMIZE POWER OUTPUT. EXAMPLES ARE PRESENTED THAT ILLUSTRATE THE OPTIMUM DESIGN GENERATION PROCEDURE AND OFF-DESIGN PERFORMANCE.

77-0441 WIND CHARACTERISTICS WORKSHOP, BOSTON, JUNE 2-4.
AM. METEOROL. SOC. BULL. 58: 45-51, JANUARY 1977.

77-0442 WIND ENERGY DIRECTORY.
ROCKVILLE CENTRE, N.Y., WIND ENERGY WORKSHOP OF LONG ISLAND, 1977. 48P.

INCLUDED ARE NAMES AND ADDRESSES OF MANUFACTURERS AND DISTRIBUTORS OF WIND ENERGY SYSTEMS AND ADDRESSES OF ORGANIZATIONS, PUBLICATIONS, CONSULTANTS, SCIENTISTS, RESEARCHERS, AND PUBLIC OFFICIALS IN THE WIND ENERGY FIELD.

77-0443 WIND ENERGY FOR RURAL HEATING, AN INTERVIEW WITH DR. LEO SODERHOLM.
WIND POWER DIG. 1(9): 6-10, SUMMER 1977.

77-0444 WIND ENERGY MISSION ANALYSIS. EXECUTIVE SUMMARY.

NTIS, FEBRUARY 18, 1977. 28P.
COO/2578-1/1

THE PRINCIPAL OBJECTIVES OF THIS STUDY WERE (1) TO ASSESS THE POTENTIAL FOR WIND ENERGY CONVERSION SYSTEMS ON A NATIONAL SCALE, (2) IDENTIFY HIGH-POTENTIAL APPLICATIONS FOR WECS, (3)DEFINE FUNCTIONAL, PERFORMANCE, OPERATIONAL, AND COST GOALS FOR WECS, (4) EVALUATE THE IMPACT OF THE WIDE-SCALE DEPLOYMENT OF WECS ON ENERGY USERS, AND (5) IDENTIFY THE INSTITUTIONAL AND NON-TECHNICAL PROBLEMS ASSOCIATED WITH THE ACCEPTANCE OF WIND ENERGY SYSTEMS. THE STUDY CONCENTRATED ON BROAD APPLICATIONS OF WECS OVER LARGE GEOGRAPHIC AREAS ENCOMPASSING THE ENTIRE UNITED STATES. EMPHASIS WAS PLACED ON IDENTIFYING AND EXPLORING HIGH-AGGREGATE ENERGY USERS WHO HAVE SIGNIFICANT POTENTIAL TO UTILIZE WIND ENERGY IN PLACE OF OTHER ALTERNATIVES.

77-0445 WIND ENERGY MISSION ANALYSIS. FINAL REPORT.
NTIS, FEBRUARY 18, 1977. 252P.
COO/2578-1/2

THE DEVELOPMENT OF WIND ENERGY SYSTEMS IN THE U.S. IS DISCUSSED UNDER THE FOLLOWING HEADINGS: BASELINE POWER SYSTEMS; ASSESSMENT OF WIND POTENTIAL; IDENTIFICATION OF HIGH POTENTIAL APPLICATIONS; ELECTRIC UTILITIES; RESIDENTIAL APPLICATION; PAPER INDUSTRY APPLICATION; AGRICULTURE APPLICATION; AND REMOTE COMMUNITY APPLICATIONS.

77-0446 WIND ENERGY MISSION ANALYSIS. FINAL REPORT, APPENDICES A-J.
NTIS, FEBRUARY 18, 1977. 504P.
COO/2578-1/3

INFORMATION IS PRESENTED CONCERNING METEOROLOGICAL DATA AND SUPPORTING ANALYSES, GROSS ENERGY CONSUMPTION PATTERNS AND END-USE ANALYSIS, ANALYSIS FOR INDUSTRIAL APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS), ANALYSIS FOR RESIDENTIAL APPLICATIONS OF WECS, ANALYSIS FOR APPLICATION OF WECS TO COMMUNITIES REMOTE FROM UTILITY GRIDS, ANALYSIS FOR AGRICULTURAL APPLICATIONS OF WECS, REGIONAL EVALUATION OF THE ECONOMICS OF WIND TURBINE GENERATION TO THE U.S. ELECTRIC UTILITY DISTRICT, IMPACT OF STORAGE ON WECS, FINANCIAL ANALYSIS TECHNIQUES, AND SYSTEM SPACING.

77-0447 WIND POWER ACCESS CATALOG. NO.1
WIND POWER DIG. NO. 10: C1-C40, FALL 1977.

THIS IS A COMPREHENSIVE CATALOG OF WIND MACHINES AND ACCESSORIES, INCLUDING SPECIFICATIONS AND MANUFACTURERS' NAMES AND ADDRESSES.

77-0448 JONES W J, RUANE M
ALTERNATIVE ELECTRICAL ENERGY SOURCES FOR MAINE.
NTIS, DECEMBER 1977. 554P.
PB-287909

INCLUDED IS AN EVALUATION OF ELEVEN TECHNOLOGIES AS POSSIBLE ALTERNATIVES TO THE CONSTRUCTION OF A BASE-LOAD TYPE 600 MWE COAL-FIRED GENERATING PLANT, CENTRAL MAINE SEARS ISLAND NO. 1, IN 1986. CONSIDERED ALTERNATIVES ARE GEOTHERMAL, OCEAN THERMAL, OCEAN AND RIVERINE CURRENT, WAVE, WIND, AND SOLAR ENERGY CONVERSION; CONSERVATION, FUEL CELLS, CONVERSION OF BIOMASS AND SOLID WASTES, AND THE ENVIRONMENTAL IMPACTS OF THESE TECHNOLOGIES.

77-0449 WIND POWER ON A COMMERCIAL BASIS?
ELECTR. TIMES NO. 4412: 2, JANUARY 21, 1977.

THE HIGHLANDS AND ISLANDS DEVELOPMENT BOARD HAS TAKEN STEPS TO INSTALL TWO 10 KW WINDMILLS TO PROVIDE FOR HALF OF THE ISLAND OF COLONSAY. WIND PROFILES SUGGEST THERE IS SUFFICIENT WIND TO JUSTIFY THE SCHEME, WHICH WILL PROVIDE HYDROGEN, BY ELECTROLYSIS, FOR STORAGE AND POWERING A PETROL GENERATOR.

77-0450 WIND POWER PLANTS. A VARIETY OF PLANTS OFFERED IN THE POWER RANGE BETWEEN 30W AND 30KW.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 17, MAY 1977. (IN GERMAN)

A BRIEF SURVEY OF POSSIBLE USES FOR WIND POWER PLANTS IN POWER GENERATION IS FOLLOWED BY THE RANGE OF PLANTS THE VARIOUS FIRMS HAVE TO OFFER. THE

SUPPLY ENCOMPASSES 50 M PLANTS AS WELL AS 20 KW CONVERTERS.

77-0451 FRAENKEL P
WIND RESEARCH IN GREAT BRITAIN.
WIND POWER DIG. 1(8): 30-31, SPRING 1977.

REPORTED ARE A NUMBER OF PROJECTS CURRENTLY UNDER WAY IN GREAT BRITAIN.

77-0452 ZIMMERMAN J S
WIND ENERGY: A RENEWABLE ENERGY OPTION.
ASPE/MSFC SYMPOSIUM ON ENGINEERING AND PRODUCTIVITY GAINS FROM SPACE TECHNOLOGY, PROCEEDINGS. NASA, MAY 1977. P. 19-31. NTIS 1977.
N77-30275

WIND TURBINE GENERATOR RESEARCH PROGRAMS ADMINISTERED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION ARE EXAMINED. THE DESIGN AND OPERATION OF TURBINE DEMONSTRATION MODELS ARE DESCRIBED. WIND ASSESSMENTS WERE MADE TO DETERMINE THE FEASIBILITY OF USING WIND GENERATED POWER FOR VARIOUS PARTS OF THE COUNTRY.

77-0453 WIND-GENNI UNVEILED.
WIND POWER DIG. 1(8): 21-22, SPRING 1977.

THE WIND-GENNI, A HORIZONTAL-TO-VERTICAL AXIS DRIVE WIND GENERATOR IS DESCRIBED. DEVELOPED BY THE PRODUCT DEVELOPMENT INSTITUTE OF TOLEDO, OHIO, IT CAN BE PLUGGED DIRECTLY INTO THE CIRCUITRY OF MOST HOMES BY MEANS OF A 3-PRONG STOVE TYPE PLUG. A UNIQUE FEATURE OF THE TOTAL WIND-GENNI SYSTEM IS THE INCLUSION OF A "BASE LOAD INJECTOR" THAT ALLOWS THE OWNER TO USE THE UTILITY POWER GRID AS A SOURCE OF BACK-UP OR SUPPLEMENTARY POWER DURING PERIODS OF LOW WIND.

77-0454 ZIEGLER A
WIND POWER RESEARCH.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 8-12, MAY 1977. (IN GERMAN)

ON THE BASIS OF THE METEOROLOGICAL CONDITIONS A SURVEY IS PRESENTED OF THE REGIONS IN THE FRG, WHICH ARE SUITABLE FOR WIND POWER UTILIZATION. HOWEVER, IN ORDER TO DETERMINE THE POTENTIAL TECHNICALLY FEASIBLE, IT HAS TO BE DECIDED FIRST WITH WHICH TYPE OF PLANT WIND POWER IS TO BE CONVERTED INTO ELECTRIC POWER. OF ALL THE CONCEPTS PROPOSED SO FAR, THE "HUETTER" CONCEPT SEEMS TO BE THE MOST PROMISING AT THE MOMENT. IN ORDER TO MAKE A SUBSTANTIAL CONTRIBUTION TO THE ENERGY SUPPLY, ABOUT 400 WIND POWER PLANTS WITH A CAPACITY OF 3 MW EACH WOULD HAVE TO BE TAKEN INTO OPERATION BY 1985, SOMETHING WHICH CANNOT BE ACHIEVED AT THE PRESENT STATE OF THE MANUFACTURING CAPACITIES. UNSOLVED PROBLEMS OF WIND POWER CONVERSION ARE INVESTIGATED BY A NUMBER OF RESEARCH GROUPS AT THE MOMENT. THE VARIOUS PROJECTS ARE LISTED IN TABULAR FORM.

77-0455 WINDERL W R
WIND OPERATED GENERATOR.
U.S. PATENT NO. 4,039,848, AUGUST 2, 1977. 8P.

A WIND OPERATED GENERATOR IS DESCRIBED WHICH HAS COUNTERROTATING PROPELLERS WITH AN ALTERNATING CURRENT GENERATOR POSITIONED BETWEEN THE BLADES OF THE PROPELLERS AND SPACING THE SAME. THE PROPELLERS AND GENERATOR PARTS ARE MOUNTED ON CONCENTRIC SHAFTS SUPPORTED IN A POSITIVE DRIVE STRUCTURE IN WHICH THE SHAFTS ARE TIED TOGETHER THROUGH GEARING TO INSURE POSITIVE STARTING AND COUNTERROTATION OF THE PROPELLERS IN A POSITIVE EQUAL DRIVE SYSTEM. A GOVERNOR ASSOCIATED WITH ONE OF THE SHAFTS GOVERNS THE OPERATIONAL SPEED OF ROTATION OF BOTH PROPELLERS TO PROTECT THE PROPELLERS AND GENERATOR.

77-0456 WINDHEIM R
PROGRAMME FOR THE USE OF WIND ENERGY IN THE CONTEXT OF NON-NUCLEAR ENERGY RESEARCH.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 39-46. (IN GERMAN)

THE OUTLINE PROGRAMME ON ENERGY RESEARCH OF THE WEST GERMANY GOVERNMENT INCLUDES WIND POWER. A SURVEY IS PRESENTED ON THE PROGRAMME FOR THE USE OF WIND POWER. IN THE CONTEXT OF THIS PROGRAMME, THE CONSTRUCTION OF THE

GROWIAN (LARGE WIND POWER PLANT) PROTOTYPE EQUIPMENT WITH AN OUTPUT OF 2-3 MW IS TO BE CARRIED OUT.

77-0457 WINDMILL POWER FOR CITY PEOPLE: A DOCUMENTATION OF THE FIRST URBAN WIND ENERGY SYSTEM.
WASHINGTON, D.C., U.S. GOV. PRINT. OFFICE, SEPTEMBER 1977.

COVERED ARE ZONING, STRUCTURAL CALCULATIONS, PUBLIC UTILITY COMMISSION REGULATIONS AND TARIFFS, AS WELL AS BASIC WINDPOWER THEORY AND PRACTICE FOR ANYONE CONSIDERING A CITY OR SUBURBAN WIND ENERGY SYSTEM. THIS WAS WRITTEN BY THE PEOPLE WHO INSTALLED A 2 KW JACOBS WIND-ELECTRIC SYSTEM ATOP THE HOUSING COOPERATIVE AT 519 E. 11TH. STREET IN N.Y.C.

77-0458 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: BASIC CONSIDERATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. E4-47 TO E4-64.

A NEW CONCEPT IN WIND TURBINES IS DESCRIBED: THE TORNADO-TYPE WIND ENERGY SYSTEM. A BASIC THEROMODYNAMIC CONSIDERATION IS PRESENTED TO GAIN A PROPER PERSPECTIVE OF THE OVER-ALL PERFORMANCE OF THIS NEW DESIGN. SOME DETAILS OF WIND TUNNEL DATA, DERIVATION OF THE SCALING LAWS, AND SOME RECENT RESULTS IN FLOW VISUALIZATION ARE ALSO PRESENTED.

77-0459 WINDMILLS POSE THREAT TO TV PICTURE RECEPTION.
CHEM. ENG. NEWS 55(29): 40, JULY 18, 1977.

77-0460 WINDMILLS SPIN INTO ACTION.
NEW SCI. 73(1042): 574, MARCH 10, 1977.

ERDA'S ACTIVITIES IN WIND ENERGY RESEARCH ARE DESCRIBED, INCLUDING THEIR LARGEST PROJECT, A 100 KW WINDMILL IN SANDUSKY, OHIO, AND THEIR SMALLEST PROJECT, A 4 KW MACHINE AT THE ROCKY FLATS PLANT NEAR DENVER, COLORADO.

77-0461 WINDWORKS AWARDED CONTRACT.
WIND POWER DIG. NO. 10: 23, FALL 1977.

WINDWORKS, INC., HAS BEEN SELECTED BY DOE FOR NEGOTIATION OF A CONTRACT TO DEVELOP A HIGH-RELIABILITY 8 KW CAPACITY WIND GENERATOR FOR FARMS, RURAL HOMES AND OTHER USES.

77-0462 WISE C E
WIND ENERGY--BOUNTY IN THE BREEZE.
MACH. DES. 49: 20-22, 24-26, AUGUST 11, 1977.

WIND-GENERATED POWER IS DISCUSSED, AND DEVELOPMENT PROGRAMS FOR SEVERAL GENERATOR SYSTEMS ARE REVIEWED. LIMITATIONS ON THE WIDE-SCALE USE OF WIND-GENERATED POWER, INCLUDING THE VARIABLE AVAILABILITY OF THE ENERGY SOURCE AND THE INHERENTLY LOW POWER-CONVERSION COEFFICIENT OF WIND-ENERGY SYSTEMS, ARE CONSIDERED: ESTIMATES OF THE ROLE OF WIND-ENERGY IN FUTURE U.S. ENERGY CONSUMPTION ARE GIVEN. A NUMBER OF WIND-OPERATED ELECTRICAL GENERATORS HAVING POWER RATINGS OF 100 KW TO 2.5 MW ARE DESCRIBED. IT IS NOTED THAT THE HIGH CAPITAL COSTS OF LARGE SYSTEMS MAY RESTRICT THEIR DEVELOPMENT.

77-0463 WOLFF B
THE FEDERAL WIND ENERGY PROGRAM.
AMER. WIND ENERGY ASSOC. NEWSL., P. 8-11, SPRING 1977.

77-0464 WOLFF B
THE FEDERAL WIND PROGRAM.
WIND POWER DIG. 1(8): 42-44, SPRING 1977.

77-0465 WOOD J R
WIND UTILIZATION IN NEW ZEALAND.
N.Z.E.R.D.C., CONTRACT 3036, DRAFT FINAL REPORT. MARCH 1977.

77-0466 YAMAGIWA A
EXPERIMENTAL EVALUATION OF A SOLAR/WIND-POWERED SPACE HEATING AND HOT WATER HEATING SYSTEM IN THE PACIFIC NORTHWEST.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2,

P.1243-1249.

A REVIEW OF THE EXPERIMENTAL WORK CONDUCTED WITH A SOLAR/WIND-POWERED/HEAT PUMP HEATING SYSTEM ON A RESIDENCE LOCATED IN SEATTLE, WASHINGTON IS PRESENTED. THE SYSTEM WAS DESIGNED AND CONSTRUCTED BY THE DEPARTMENT OF LIGHTING, SEATTLE, WASHINGTON, TO OBTAIN ACTUAL TEST DATA ON THE OPERATION OF SOLAR/WIND-POWERED/HEAT PUMP SYSTEMS TO DETERMINE THE AMOUNT OF USEFUL ENERGY THAT COULD BE OBTAINED FROM THESE SOURCES. THE SYSTEM UTILIZES A CONVENTIONAL SOLAR SYSTEM INTEGRATED WITH HYDRONIC HEATING, A WATER-TO-AIR HEAT PUMP, AND A THERMAL ENERGY STORAGE SYSTEM FOR LEVELIZING THE DEMAND AND A WIND-GENERATOR. DATA ARE PRESENTED ILLUSTRATING THE PERFORMANCE AND COST EFFECTIVENESS OF THE SYSTEM. DATA WAS COLLECTED OVER ONE YEAR OF OPERATING THE SYSTEM AT A RESIDENCE UNDER ACTUAL LIVING CONDITIONS TO DETERMINE HOW SUCH A SOLAR/WIND-POWERED/HEAT PUMP SYSTEM WOULD ACTUALLY PERFORM.

77-0467 YEE S T, YUNG T, CHANGE P, SCAVUZZO R J, TIMMERMAN D H, FENTON J W
VIBRATION CHARACTERISTICS OF A LARGE WIND TURBINE TOWER ON NON-RIGID FOUNDATIONS.
NTIS, MAY 1977. 34P.
ERDA/NASA/1004-77/1

VIBRATION CHARACTERISTICS OF THE MOD-OA WIND TURBINE SUPPORTED BY NONRIGID FOUNDATIONS WERE INVESTIGATED FOR A RANGE OF SOIL RIGIDITIES. THE STUDY SHOWS THAT THE INFLUENCE OF FOUNDATION ROTATION ON THE FUNDAMENTAL FREQUENCY OF THE WIND TURBINE IS QUITE SIGNI ICANT FOR COHESIVE SOILS OR LOOSE SAND. THE REDUCTION IN NATURAL FREQUENCY CAN BE GREATER THAN 20 PERCENT. HOWEVER, FOR A FOUNDATION RESTING ON WELL GRADED, DENSE GRANULAR MATERIALS OR BEDROCK, SUCH EFFECT IS SMALL AND THE FOUNDATION CAN BE TREATED AS A FIXED BASE.

77-0468 TORREY V
THE WINDMILL RENAISSANCE.
SIERRA CLUB BULL. 62(3): 41-43, MARCH 1977.

77-0469 BURR N
THE WIND OF CHANGE IN POWER PRODUCTION. DEVELOPING THE NEW.
NEW CIVIL ENG. NO. 266: 27,28, OCTOBER 27, 1977.

JUXTAPOSED TO AN ARTICLE BY G. RIDGWAY ON THE RESTORATION OF AN OLD GRINDING MILL, BURR DESCRIBES CURRENT RESEARCH ON THE DEVELOPMENT OF MODERN TURBINES FOR ELECTRICITY PRODUCTION.

77-0470 RIDGWAY G
THE WIND OF CHANGE IN POWER PRODUCTION. RESTORING THE OLD.
NEW CIVIL ENG. NO. 266: 26,28, OCTOBER 27, 1977.

A PROJECT IS DESCRIBED WHERE BRITAIN'S TALLEST WINDMILL IS BEING RESTORED FOR GRINDING OF CORN AND FLOUR.

77-0471 WINDMILL WILL HAVE 300-FT.-DIA. BLADES.
DESIGN NEWS 33: 20, AUGUST 22, 1977.

ERDA HAS AWARDED A CONTRACT TO BOEING TO DESIGN, BUILD AND TEST A 2.5 MW WINDPOWER ELECTRICAL GENERATING STATION. SCHEDULED TO BE BUILT IN LATE 1979, THE WIND TURBINE WILL REPORTEDLY BE THE LARGEST IN HISTORY WITH BLADES SPANNING 300 FEET IN DIAMETER.

77-0472 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 24: 47, FEBRUARY 1977; NO. 25: 43-45, APRIL 1977; NO. 26: 42-43, JUNE 1977; NO. 27 37-38, AUGUST 1977; NO. 28: 46-47 OCTOBER 1977; NO. 29: 36-37, DECEMBER 1977.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WINDMILLS.

77-0473 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES. ANNUAL PROGRESS REPORT, MAY 1, 1976 - DECEMBER 31, 1976.
NTIS, JANUARY 1977. 36P.
RLO/2439-77-1

IN A MANNER SIMILAR TO THE ANALYSIS OF ARRAYS OF WIND TURBINES IN NEW ENGLAND AND THE CENTRAL U.S., ARRAY ANALYSES ARE BEING DONE FOR THE GREAT LAKES AREA, AND FOR THE PACIFIC COAST. IN ADDITION TO THE TYPES OF DATA COMPUTED FOR THE NEW ENGLAND AND CENTRAL U.S. ARRAYS (TIME AUTOCORRELATIONS, SPATIAL CROSS CORRELATIONS, MEAN WIND TURBINE POWER BY SEASON, OUTPUT POWER PROBABILITY DISTRIBUTIONS, AND SPEED AND POWER RUN TIME PROBABILITIES), ADDITIONAL ANALYSES OF WIND SPEED AND POWER BY TIME OF DAY AND WIND SPEED VERSUS HEATING OR COOLING DEGREE DAYS ARE ALSO BEING DONE. ALSO POWER OUTPUT CORRECTIONS FOR DENSITY MEAN WIND SPEED GUSTS, RMS DIRECTION FLUCTUATIONS AND FOR VERTICAL SHEAR ARE BEING INCORPORATED, AS DESCRIBED IN SUBSEQUENT SECTIONS OF THIS REPORT. AS EXAMPLES OF THE ARRAY ANALYSIS, RESULTS FROM THE GREAT LAKES ARRAY FOR 1971 ARE PRESENTED.

77-0474 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (GREAT LAKES AND PACIFIC COAST REGIONS). ANNUAL PROGRESS REPORT, MAY 1976 - APRIL 30, 1977.
NTIS, MAY 1977. 117P.
RLO/2439-77-2

ARRAYS OF SIMULATED 0.5 MW, 1.5 MW AND 2.0 MW WIND TURBINES IN THE GREAT LAKES AND PACIFIC COAST REGIONS ARE STUDIED. THE PARAMETERS ANALYZED ARE: BASIC WIND STATISTICS, TIME AND SPATIAL CORRELATIONS, MEAN WIND POWER OUTPUT, WIND POWER FREQUENCY (AVAILABILITY WITHOUT STORAGE), AND RUN DURATION OF WIND SPEED AND ARRAY POWER (PROBABILITIES OF WIND AND POWER LULLS OF VARIOUS DURATION, WITHOUT STORAGE). NEW ASPECTS OF THE PRESENT STUDY INCLUDE EVALUATION OF DIURNAL AS WELL AS SEASONAL VARIATIONS OF WIND AND WIND POWER, INCLUSION OF DENSITY, WIND SHEAR, WIND GUSTS AND OTHER FACTORS IN THE MODEL POWER OUTPUT CURVE SIMULATION, STUDY OF THE POSSIBLE RELATION BETWEEN WIND SPEED AND DEGREE DAYS (KNOWN TO AFFECT A PORTION OF UTILITY DEMAND), AND DEVELOPMENT AND VERIFICATION OF A SIMPLIFIED ARRAY SIMULATION MODEL.

77-0475 RAMSDELL J V
SEMI-ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, APRIL 1976 - DECEMBER 1976.
NTIS, JANUARY 1977. 92P.
BNWL/WIND-02

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) PROVIDES WIND INFORMATION, THROUGH THE WIND ENERGY CONVERSION PROGRAM (WECP), FOR THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND WECS OPERATIONS. CURRENTLY THE TECHNICAL WORK WITHIN THE WCPE IS DIVIDED AMONG FOUR PROGRAM AREAS. THESE AREAS ARE TO PROVIDE WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE EVALUATION; SITE SELECTION; RESOURCE ASSESSMENT; AND OPERATIONS. WORK IS BEING UNDERTAKEN IN THE FIRST THREE AREAS.

77-0476 RAMSDELL J V
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, APRIL 1976 - JUNE 1977.
NTIS, JULY 1977. 138P.
BNWL/WIND-10

BATTELLE, PACIFIC NORTHWEST LABORATORIES (PNL), HAS BEEN PROVIDING TECHNICAL AND MANAGEMENT SUPPORT FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE WIND ENERGY CONVERSION PROGRAM SINCE APRIL 1976. THIS FIRST ANNUAL REPORT TO THE WIND SYSTEMS BRANCH (WSB) OF ERDA'S DIVISION OF SOLAR ENERGY DESCRIBES THE TECHNICAL PROGRESS WITHIN THE PROGRAM ELEMENT FROM APRIL 1976 THROUGH JUNE 1977. WITHIN THE WIND ENERGY CONVERSION PROGRAM, THE WCPE IS A SERVICE ELEMENT TO PROVIDE INFORMATION ON WIND CHARACTERISTICS TO THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR INSTALLATION OF WECS, AND OPERATION OF WECS. TO IDENTIFY PERTINENT WIND CHARACTERISTICS AND COLLECT AND PRESENT THAT INFORMATION IN FORMATS THAT ARE USEABLE, THE WCPE HAS BEEN DIVIDED INTO FOUR TECHNICAL AREAS: DESIGN AND PERFORMANCE EVALUATIONS; SITE SELECTION; PRESITING EVALUATION; AND PLANNING AND OPERATION.

77-0477 BEN-DOV E, NAOT Y, RUDMAN P S

HYDROGEN FUEL PRODUCTION BY WIND ENERGY CONVERSION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 667-668.

WE CONCLUDE THAT HYDROGEN CAN BE PRODUCED BY WEC TECHNOLOGY AT A COST THAT IS LESS THAN THE CURRENT GASOLINE PRICE IN MOST PARTS OF THE WORLD, AT THE VERY PREVALENT WIND SITES WHERE THE MEAN WIND SPEED EXCEEDS ABOUT 5 M/S.

77-0478 CAMPBELL J S
THE CAMPBELL CHINESE-TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 863-864.

A NEW VERTICAL-AXIS WINDMILL USING THE SAME BASIC PRINCIPLE AS THE OVER-300-YEARS-OLD CHINESE WINDMILL HAS BEEN DEVELOPED. THE BASIC PRINCIPLE OF CHINESE WINDMILLS IS THE USE OF SAILS IN A MANNER SIMILAR TO SAILING. THESE SAILS, TRAVELING A HORIZONTAL CIRCULAR COURSE, ROTATE A CENTRAL VERTICAL SHAFT.

77-0479 DEVINE W D
AN ENERGY ANALYSIS OF A WIND ENERGY CONVERSION SYSTEM FOR FUEL DISPLACEMENT.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 669-680. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1901-1924.

ENERGY CONVERSION MACHINES WHICH UTILIZE RENEWABLE SUPPLIES OF ENERGY AS FUEL MAY DELIVER CONSIDERABLY MORE ENERGY TO ULTIMATE USERS THAN IS CONSUMED DURING MANUFACTURE, DEPLOYMENT, AND OPERATION OF THE MACHINE. AN INPUT/OUTPUT APPROACH IS EMPLOYED TO ESTIMATE THE ENERGY EMBODIED IN A 1,500 KW(E) HORIZONTAL-AXIS WIND ELECTRIC GENERATING STATION USED TO DISPLACE FOSSIL FUEL IN AN ELECTRIC UTILITY SYSTEM. FIVE RATIOS COMPARING DELIVERED ELECTRICAL ENERGY TO THE ENERGY REQUIREMENT OF THE WIND MACHINE ARE DISPLAYED. THE RESULTS INDICATE THAT THE SYSTEM CONSIDERED COULD BE A LARGE NET PRODUCER OF ENERGY AND SHOULD DISPLACE A QUANTITY OF FOSSIL ENERGY EQUIVALENT TO THAT EMBODIED IN THE MACHINE IN CONSIDERABLY LESS THAN ONE YEAR.

77-0480 DUBEY M
HYDROGEN FROM THE WIND - A CLEAN ENERGY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 663-666. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.8, P.3551-3562.

THE WIND IS A REGENERATIVE NON-POLLUTING ENERGY RESOURCE WHICH CAN BE CONVERTED TO HYDROGEN FUEL FOR REASONABLE COST. SUCH HYDROGEN SOURCES, INDEPENDENT OF FOSSIL FUELS, WILL HASTEN THE ADVENT OF THE HYDROGEN POWERED ECONOMY.

77-0481 FROST W
ANALYSIS OF WIND TURBINE GENERATOR ROTOR RESPONSE TO ONE-DIMENSIONAL TURBULENCE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 683-690.

THREE TURBULENCE MODELS ARE CONSIDERED FOR ANALYZING THE RESPONSE OF A WIND TURBINE GENERATOR, WTG, TO THE TURBULENT ATMOSPHERE. THE BEHAVIOR OF THE ROTOR UNDER TURBULENCE IS IMPORTANT TO DESIGN PROCEDURES FOR STRUCTURAL STRENGTH OF THE ROTOR, FOR SELECTING THE OPTIMUM CONSTRUCTION MATERIALS, FOR CONTROLS TO MAINTAINING SYNCHRONIZATION OF THE GENERATOR, AS WELL AS MANY OTHER DESIGN REQUIREMENTS. THE PAPER DESCRIBES THREE COMPARABLE METHODS OF ANALYZING THE ROTATIONAL FLUCTUATIONS OF A SIMPLE RIGID ROTOR TO ONE-DIMENSIONAL TURBULENCE.

77-0482 HARDY D M, WALTON J J
WIND ENERGY ASSESSMENT.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES. MIAMI

BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 669-672. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1835-1863.

A FRACTION OF OUR INCIDENT SOLAR RADIATION IS CONVERTED BY THE ATMOSPHERE INTO KINETIC ENERGY OF OUR WINDS. THIS NATURAL CONVERSION OF THE SOLAR FLUX PROVIDES A FORM OF MECHANICAL ENERGY WHICH HAS LONG SERVED MANKIND--PROVIDING POWER FOR TRANSPORTATION AT SEA FROM THE BEGINNING OF CIVILIZATION AND FOR AGRICULTURAL PURPOSES IN WESTERN EUROPE AS EARLY AS THE ELEVENTH CENTURY. PRESENT ESTIMATES OF WIND ENERGY AVAILABLE FOR MODERN USES VARY SIGNIFICANTLY BUT EVEN THE LOWEST REPRESENTS A SUBSTANTIAL ENERGY POTENTIAL.

77-0483 KENTFIELD J A C, NORRIE D H
AN AXIAL-FLOW WIND-TURBINE WITH DELTA-WING BLADES
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 695-697. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1615-1645.

RESULTS ARE REPORTED OF WIND-TUNNEL TESTS OF A SMALL SCALE, DYNAMOMETER EQUIPPED, MODEL WIND TURBINE REPRESENTING WHAT IS BELIEVED TO BE A UNIQUE CONCEPT FEATURING DELTA-WING BLADES (OR SAILS). IT IS SHOWN THAT THE INHERENT ADVANTAGES OF THIS BLADE FORM DERIVE FROM BOTH THE LOW SPEED AERODYNAMIC CHARACTERISTICS OF DELTA WINGS AND, FOR THE WIND-TURBINE APPLICATION, THE EASE WITH WHICH SUCH BLADES CAN BE CONSTRUCTED. EASE, AND CHEAPNESS, OF CONSTRUCTION ARE PARTICULARLY IMPORTANT FOR APPLICATIONS IN DEVELOPING NATIONS WHERE IT IS VERY DESIRABLE TO COMBINE LOCAL CONSTRUCTION WITH THE USE OF ONLY INDIGENOUS MATERIALS.

77-0484 KORNREICH T R
WIND ENERGY CONVERSION SYSTEMS (WECS) FOR CENTRAL STATION AND DISPERSED POWER APPLICATIONS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 845-846. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1865-1886.

A DISCUSSION OF THE PRESENT STATUS AND POTENTIAL FUTURE USE OF WIND ENERGY SYSTEMS FOR CENTRAL STATION AND DISPERSED POWER APPLICATIONS IS PRESENTED. AN ECONOMIC EVALUATION OF LARGE (MEGAWATT-SCALE) SYSTEMS FOR UTILITY USE IS DEVELOPED. THE EFFECTS OF UNCERTAINTIES IN WECS CAPITAL COST, THE PRODUCTION LEARNING CURVE, AND THE COST OF MONEY ARE DISCUSSED. THE ROLE OF WECS AS A FUEL SAVER IS DESCRIBED AND THE ECONOMIC BENEFITS ACCRUING FROM WECS CAPACITY CREDIT ARE EXPLORED.

77-0485 PYTLINSKI J T, ECKHOFF N D
ASSESSMENT OF ENERGY CONSERVATION BY USING ALTERNATE ENERGY SOURCES IN KANSAS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 779-784. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.9, P.4311-4321.

ESTIMATED ENERGY CONSERVATION DUE TO THE USE OF ALTERNATIVE ENERGY SOURCES, INCLUDING THE USE OF WINDMILLS FOR ELECTRICITY GENERATION, IS PRESENTED.

77-0486 RAMAKUMAR R
A REVIEW OF WIND-ELECTRIC CONVERSION TECHNOLOGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 841-844. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1811-1834.

THE EASE WITH WHICH AEROTURBINES TRANSFORM ENERGY IN MOVING AIR TO ROTARY MECHANICAL ENERGY SUGGESTS THE USE OF ELECTRICAL DEVICES TO CONVERT WIND ENERGY TO ELECTRICAL FORM FOR A VARIETY OF END USES. THE PURPOSE OF THIS PAPER IS TO PROVIDE A STATE-OF-THE-ART REVIEW OF WIND-ELECTRIC CONVERSION TECHNOLOGY.

77-0487 SMITH M C
WIND SITE SELECTION FOR OPTIMUM WIND POWER SYSTEMS.

MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 673-676. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P.1787-1808.

SITE SELECTION FOR WIND POWER SYSTEMS MUST BE MADE WITH REGARD FOR MANY VARIABLES INCLUDING SOCIAL AND ENVIRONMENTAL IMPACT, DISTANCES FROM USER AND FROM POINT OF MANUFACTURE AND WIND ENERGY POTENTIAL. THE DISCUSSION IN THIS PAPER IS CONCERNED, HOWEVER, ONLY WITH SELECTION OF TECHNICALLY OPTIMUM SITES; SITES WHICH WILL PRODUCE POWER AT A MINIMUM COST PER ANNUAL AVERAGE KILOWATT HOUR. THE DISCUSSION INCLUDES THE EFFECTS OF MINIMUM AND MAXIMUM USEABLE POWER OUTPUT AND EXAMPLES OF SITE SELECTION FOR REAL WIND DISTRIBUTIONS AND SPECIFIC WIND POWER SYSTEMS CHARACTERISTICS.

77-0488 TSAI S C, LUI C Y, TAN T H, TAY S L
FLAP-CONE CONTROL OF WINDMILL SPEED.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 681-682. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1681-1692.

ALTHOUGH THE WINDMILL HAS BEEN WITH US FOR QUITE SOME TIME, ITS APPLICATION IS YET RATHER LIMITED DUE MAINLY TO THE LACK OF AN EFFICIENT MEANS OF "COLLECTING" THE VARIABLE WIND ENERGY AND THE DIFFICULTY IN PROVIDING A STEADY POWER OUTPUT. IN ORDER THAT THE WINDMILL CAN BE EFFECTIVELY USED AS A POWER GENERATOR, ITS ROTATIONAL SPEED MUST BE PROPERLY CONTROLLED AND THE EFFICIENCY IN TRANSFORMING WIND ENERGY INTO USEFUL WORKING POWER INCREASED. THIS WORK IS AN ATTEMPT TRYING TO CONTROL THE ROTATIONAL SPEED OF THE WINDMILL WITH INCREASED POWER OUTPUT.

77-0489 VAN BUSSEL G J W
WINDMILLS WITH INCREASED POWER OUTPUT DUE TO TIPVANES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 691-694. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1647-1661.

BETZ'S FORMULA, YIELDING THE MAXIMUM POWER OUTPUT OF WINDMILLS, IS ONLY VALID UNDER THE ASSUMPTION THAT THE WINDMILL CAUSES A STEADY AXIAL FORCE ACTING ON THE AIR IN A DIRECTIN OPPOSITE TO THE UNDISTURBED STREAM VELOCITY. WHEN RADIAL AS WELL AS AXIAL FORCES ARE APPLIED TO THE AIR, THIS THEOREM IS NO LONGER VALID AND LARGER POWER OUTPUT MAY BE OBTAINED.

77-0490 WEISBRICH A L
FEATURE REVIEW OF SOME ADVANCED AND INNOVATIVE DESIGN CONCEPTS IN WIND ENERGY CONVERSION SYSTEMS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 847-860. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1663-1679.

SOME ADVANCED WIND ENERGY CONVERSION SYSTEM (WECS) CONCEPTS ARE PRESENTED AND THEIR FEATURES HIGHLIGHTED. ALTHOUGH OTHERS MAY BE PURSUING SIMILAR OR OTHER CONCEPTS, ONLY CERTAIN INDIVIDUALS AND ORGANIZATIONS ASSOCIATED WITH THESE CONCEPTS ARE SPECIFIED.

77-0491 WEISBRICH A L
TOROIDAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 799-806. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1735-1754.

TARP IS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR WHICH GENERATES LOW PRESSURE, HIGH KINETIC ENERGY REGIONS AT THE SITE OF THE ROTOR DISKS. THE TARP STRUCTURE IS SUBSTANTIALLY THE SHAPE OF AN INNER SECTION OF A HOLLOW TOROID. A TWIN ROTOR SYSTEM IS MOUNTED WITHIN THE PERIPHERAL CHANNEL ABOUT A TARP STRUCTURE SUCH THAT EACH ROTOR IS SITUATED IN THE OPTIMUM VELOCITY REGION OF THE SYMMETRICAL FLOW FIELDS ESTABLISHED WITHIN THIS CHANNEL AND ABOUT THE TARP STRUCTURE FOR BEST ENERGY RECOVERY. FLOW APPROACHING A TARP IS DIVERTED SYMMETRICALLY ABOUT IT WITHIN ITS PERIPHERAL CHANNEL AND IS, THEREBY, ACCELERATED ABOVE

AMBIENT VELOCITY.

77-0492 WIND-HYDRO SYSTEM PROPOSED.
WIND POWER DIG. 1(9): 23, SUMMER 1977.

77-0493 ZELBY L W
WIND SYSTEM WITH OFF-THE-SHELF COMPONENTS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 861-862.

A SELF-CONTAINED WIND SYSTEM WAS DESCRIBED SEVERAL YEARS AGO. SUCH A SYSTEM CAN BE BUILT WITH OFF-THE-SHELF COMPONENTS AND WOULD BE SUITABLE IN REGIONS OF THE U.S.A. IN WHICH THE AVERAGE WIND VELOCITY EXCEEDS 10 KM/H. THE SYSTEM CONSISTS OF THE FOLLOWING COMPONENTS: A WINDMILL, TOWER AND GENERATOR COMPRISING THE FRONT END OF THE SYSTEM; AND ELECTROLYTIC CELLS, A COMPRESSOR, A MODIFIED IC ENGINE AND POWER SPLITTERS COMPRISING THE STORAGE. THE ENTIRE SYSTEM IS DESIGNED TO PROVIDE ABOUT 30,000 KWH ANNUALLY FOR A 200 M2 LIVING AREA HOME, WITH 15 KW PEAK CAPACITY.

77-0494 PERRY A M, DEVINE W D, CAMERON A E, MARLAND G, PLAZA H, REISTER D B, TREAT N L, WHITTLE C E
NET ENERGY ANALYSIS OF FIVE ENERGY SYSTEMS.
NTIS, SEPTEMBER 1977. 156P.
ORAU/IEA(R)-77-12

A NET ENERGY ANALYSIS IS PERFORMED FOR EACH OF FIVE DEVELOPING ENERGY TECHNOLOGIES: OCEAN THERMAL ENERGY CONVERSION, WIND ENERGY CONVERSION, IN SITU OIL SHALE PROCESSING, FLUIDIZED-BED COAL COMBUSTION, AND MUNICIPAL SOLID WASTE UTILIZATION. ENERGY EXPENDITURES REQUIRED DURING CONSTRUCTION AND LIFE LONG OPERATION AND MAINTENANCE ARE ESTIMATED USING INPUT-OUTPUT AND PROCESS ANALYSES. THESE EXPENDITURES, INCLUDING BOTH DIRECT AND INDIRECT CONSUMPTION, ARE CLASSIFIED AS CAPITAL OR OPERATING EXPENDITURES AND AS EXPENDITURES FOR ELECTRIC OR NONELECTIRC INPUTS TO THE SYSTEMS. VARIOUS RATIOS THAT COMPARE THE ANTICIPATED ENERGY PRODUCT OF A SYSTEM TO ITS ESTIMATED ENERGY SUBSIDY ARE DEFINED. IT IS NOT, IN GENERAL, POSSIBLE TO COMPARE DISSIMILAR TECHNOLOGIES ON THE BASIS OT THESE PERFORMANCE INDICES. HOWEVER, THE INDICES DO INDICATE ALL OF THE SYSTEMS CONSIDERED HERE ARE NET PRODUCERS OF ENERGY AND DECISIONS TO PROCEED WITH DEVELOPMENT AND DEPLOYMENT SHOULD BE BASED ON OTHER CONSIDERATIONS.

77-0495 HIRSCH R L, MARVIN H H, BLASY J A
ERDA'S SOLAR ENERGY RESEARCH AND DEVELOPMENT PROGRAM.
ENERGY TECHNOLOGY CONFERENCE, 4TH, WASHINGTON, D.C., MARCH 14-16, 1977. P. 112-133.

A DESCRIPTION OF THE CHARACTERISTICS OF SOLAR ENERGY CONVERSION AND AN OUTLINE OF ERDA SOLAR RESEARCH AND DEVELOPMENT EFFORTS IS ILLUSTRATED WITH DIAGRAMS AND PHOTOGRAPHS OF SEVERAL PROJECTS. WHILE TECHNICALLY FEASIBLE, THE COST OF COLLECTING SIGNIFICANT AMOUNTS OF SOLAR ENERGY REMAINS THE MAJOR PROBLEM. ERDA, OPTIMISTIC THAT HEATING AND COOLING ARE CLOSE TO COMMERCIALIZATION, IS MAKING CONTINUING PROGRESS IN THE IDENTIFICATION OF SOLAR ENERGY APPLICATIONS AND POTENTIAL FUEL SUBSTITUTIONS. RESEARCH PROGRAMS INCLUDE DIRECT THERMAL, THERMAL POWER, PHOTOVOLTAIC, BIOMASS-DERIVED FUELS, WIND POWER, AND OCEAN TEMPERATURE GRADIENT SYSTEMS.

76-0215 ABDEL-HAMEED M F, EL-DEFRAWI A A
NEW FRONTIERS IN SOLAR AND OTHER ENERGY OPTIONS.
INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2, 1975. CAMBRIDGE, MASSACHUSETTS, DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. P. 525-540.

THE USE OF COAL MAY CONTINUE FOR A FEW HUNDRED YEARS, AND NUCLEAR POWER MAY SEEM AN ATTRACTIVE ALTERNATIVE, BUT THERE ARE SERIOUS PROBLEMS ESPECIALLY WITH NUCLEAR WASTE DISPOSAL. NON-POLLUTING OPTIONS SUCH AS SOLAR ENERGY AND RELATED APPROACHES ARE THE MOST LOGICAL CANDIDATES FOR FUTURE ENERGY SUPPLY. SEVERAL NEW FRONTIERS IN SOLAR TECHNOLOGY ARE QUITE PROMISING AND THESE INCLUDE: PHOTOSYNTHESIS, SYNTHETIC LEAF, HYDROGEN ENERGY, WIND POWER, ARTIFICIAL TORNADOS, SPACE COLONIZATION, AND COLONIZATION OF MARGINAL HABITATS ON EARTH.

76-0216 THE AIR-ELECTRIC CO.
WIND POWER DIG. 1(7): 46-47, DECEMBER 1976.

THIS ILLUSTRATED ARTICLE TRACES THE EVOLUTION OF THE AIR ELECTRIC WIND GENERATOR.

76-0217 ALEXANDER C K, LATIF F A
DESIGN AND STABILITY OF MASTER CONTROL SYSTEMS FOR ENERGY INDEPENDENT HOMES.
SOLAR COOLING AND HEATING; A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, DECEMBER 13, 1976. NTIS, 1976. P. 325-328. CONF-761220

A SYSTEM IS PRESENTED THAT WILL BE ABLE TO CONTROL MOST OF THE POSSIBLE INPUTS AND OUTPUTS OF A HOME USING SOLAR ENERGY TO MEET ANY COMBINATION OF THE FOLLOWING FUNCTIONS: SPACE HEAT, DOMESTIC HOT WATER, SPACE COOLING, AND ELECTRICITY. THE SYSTEM IS DISCUSSED FOR EITHER A WATER-BASED OR AN AIR-BASED TYPE. THE USE OF WIND ENERGY OR A PHOTOVOLTAIC CIRCUIT IS MENTIONED.

76-0218 ALLISON H J, SOUTHERLAND S R, GORDON C E
AN ENERGY CENTER IN SRI LANKA.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH, PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, 1976. VOL.1. SAE PAPER 769011, P. 58-63.

IN APRIL, 1975, THE GOVERNING COUNCIL OF THE UNITED NATIONS ENVIRONMENT PROGRAM ISSUED A DECISION WHICH ADDRESSED THE PROBLEM OF PROVIDING ENERGY TO REMOTE VILLAGES IN THE DEVELOPING WORLD. THE DECISION EXPRESSED THE BELIEF THAT EXISTING TECHNOLOGY COULD BE USED TO HARNESS RENEWABLE RESOURCES SUCH AS SOLAR AND WIND ENERGY, AND THE ENERGY WHICH CAN BE DERIVED FROM PLANT AND ANIMAL MATTER AS INPUTS TO AN ENERGY SYSTEM WHICH COULD PROVIDE RELIABLE POWER TO SUCH VILLAGES. AS A RESULT OF THAT DECISION, OKLAHOMA STATE UNIVERSITY WAS CHOSEN TO DEVELOP PLANS FOR A RURAL ENERGY CENTER, TO BE INSTALLED IN SRI LANKA, WHICH WOULD BE A MODEL FOR FUTURE CENTERS IN ASIAN VILLAGES. THIS PAPER DESCRIBES THE SYSTEM WHICH HAS BEEN DEVISED, THE CONSTRAINTS AND ECONOMICS ASSOCIATED WITH ITS DEVELOPMENT, AND THE POSSIBLE IMPACT IT MIGHT HAVE IN THE FUTURE IN DEVELOPING NATIONS OF THE WORLD.

76-0219 AMERICAN POWER CONFERENCE 1.
COMBUSTION 48(1): 8-24, JULY 1976.

ABSTRACTS OF SOME PAPERS GIVEN AT THE AMERICAN POWER CONFERENCE ARE INCLUDED. ONE PAPER IS ON WIND POWER POTENTIAL USING OFFSHORE SITES IN NEW JERSEY.

76-0220 ANTOGINI E
DEVICE FOR CONVERTING FLUID FLOW INTO KINETIC ENERGY.
U.S. PATENT NO. 3,976,396 AUGUST 24, 1976. 8P.

THE PRESENT INVENTION RELATES TO A DEVICE FOR CONVERTING FLUID FLOW KINETIC ENERGY INTO ROTATIONAL KINETIC ENERGY COMPRISING A BODY MOUNTED FOR VERTICAL ROTATION ABOUT A LONGITUDINAL AXIS THEREOF, A PLURALITY OF HORIZONTALLY SPACED VERTICALLY EXTENDING VANES PIVOTABLY MOUNTED ON THE BODY AND ROTATABLE BETWEEN AN OPEN POSITION IN WHICH THE VANE EXTENDS OUTWARDLY FROM THE BODY AND A CLOSED POSITION IN WHICH THE VANE LIES WITH ONE SURFACE THEREOF ADJACENT THE SURFACE OF THE BODY. THE PLURALITY OF

FEATHER MEMBERS ARE SPACEDLY MOUNTED LONGITUDINALLY OF EACH FRAME AND EXTEND OUTWARDLY AND TRANSVERSELY OF THE SURFACE OPPOSITE TO THE ONE SURFACE OF THE VANE. THE FEATHERS ARE DIMENSIONED TO ABUT THE BODY WHEN THE VANE IS IN THE OPEN POSITION TO PROVIDE STOP MEANS FOR EACH VANE.

76-0221 ARMBRUST S, KUSSMANN A, MOLLY J P
POSSIBILITIES OF UTILIZING WIND POWER.
DTSCH. FORSCH. VERSUCHSANST. LUFT-RAUMFAHRT NACHR. NO. 19: 765-770, NOVEMBER 1976. (IN GERMAN)

AN OUTLINE ON THE TECHNICAL POSSIBILITIES OF BUILDING WIND POWER PLANTS AND A REPORT ON COMPLETED AND PLANNED PLANTS ARE GIVEN. THE ECONOMIC UTILISATION OF WIND POWER IS DISCUSSED. SMALL PLANTS OF 10 TO 50 KW AND LARGE PLANTS INTEGRATED IN A SUPPLY NETWORK ARE DISTINGUISHED BETWEEN AS REGARDS THE MEGAWATT PERFORMANCE.

76-0222 AWANO S, MURAYAMA M, TAKEUCHI S
WIND ELECTRIC GENERATOR NU-101 DRIVEN BY AXIAL-FLOW AIR TURBINE WITH STATOR.
JAPAN. NAT. INST. POLAR RES. MEMOIRS, SER. F, LOGISTICS, NO. 2, JULY 1976. 47P.

GENERATORS DRIVEN BY AN AXIAL-FLOW AIR TURBINE WITH A STATOR ARE RELATIVELY SMALL IN SIZE AND CAN BE ADAPTED TO WITHSTAND VIOLENT BLIZZARDS. THEY ARE SUITABLE FOR ANTARCTIC USE, ESPECIALLY AS ENERGY SOURCES FOR UNMANNED OBSERVATION UNITS. AN ANALYSIS IS GIVEN OF THE PERFORMANCE OF AN AXIAL-FLOW AIR TURBINE CONSISTING OF A STATOR WITH STATIONARY BLADES AND A ROTOR WITH MOVING BLADES. CHANGES IN THE VELOCITY AND THERMODYNAMIC PROPERTIES OF THE AIRFLOW IN PASSING THROUGH THE TURBINE ARE DISCUSSED QUANTITATIVELY, AND THE EXPRESSION FOR THE OUTPUT POWER AND EFFICIENCIES OF THE TURBINE ARE GIVEN.

76-0223 BADE P
WIND AS A POWER SOURCE FOR OCEANOGRAPHIC PLATFORMS.
INTERNATIONAL CONFERENCE AND EXHIBITION, RESEARCH-TECHNOLOGY-ECONOMICS, 3RD, (INTEROCEAN 76). DUESSELDORF, F.R. GERMANY, 1976. NTIS, 1976. 10P. (IN GERMAN)
AED-CONF-76-203-005

THE ENERGY DEMAND OF PLATFORMS IN OCEAN ENGINEERING CAN BE SATISFIED BY WIND ENERGY CONVERTING SYSTEMS. THE RELATIVELY LOW AND CONTINUOUS POWER DEMAND OF SUCH STATIONS, AND THE GREAT AVERAGE WIND VELOCITIES IN THE OCEAN MAKES THE USE OF WIND ENERGY CONVERTERS ECONOMIC. ALTHOUGH THERE ARE SATISFACTORY RESULTS WITH NEW VERTICAL AXIS WIND ROTORS (DARRIEUS-ROTOR), THE WIND TURBINE WITH HORIZONTAL AXIS OF ROTATION AND HIGH TIP-SPEED RATIO OF THE ROTOR BLADES SEEMS TO BE THE MOST EFFECTIVE AND ECONOMIC SYSTEM. TO ENSURE THE POWER SUPPLY OF THE STATION ALSO DURING LONGER PERIODS OF NO WIND, THE WIND CONVERTER HAS TO WORK IN CONNECTION WITH STORAGE BATTERY BANKS. BOTH PARTS, WIND CONVERTER WITH ALTERNATOR AND THE STORAGE BATTERIES, HAVE TO BE AN INTEGRATED SYSTEM.

76-0224 BAILEY W
CAPTURING HYDRO POWER, EARTH POWER AND WIND POWER WITH MEANS AND METHODS OF STORING SAME.
U.S. PATENT NO. 3,974,394 AUGUST 10, 1976. 4P.

IN AREAS WHERE WIND POWER, HYDRO POWER AND EARTH HEAT POWER ARE ALL AVAILABLE AND ARE TO BE DEVELOPED, A COMMON MEANS AND METHOD OF STORING SUCH POWER DURING OFF PEAK PERIODS OF POWER USE ARE FREQUENTLY REQUIRED. HERE POWER STORAGE IS ACCOMPLISHED BY THE LIFTING OF UNDERGROUND WEIGHTS. EARTH POWER MAY BE GEOTHERMAL HEATS, VOLCANIC HEATS, HEATS FROM HOT SPRINGS, DEEP HOLES IN THE EARTH, OR HEATS FROM DEEP OIL OR GAS WELLS, SUCH AS COME TO THE SURFACE WHEN THEY BRING UP OIL OR NATURAL GAS. THESE ARE ALL HERE COMBINED AS A COMMON SOURCE OF POWER. ANY OR ALL MAY CONTRIBUTE POWER TO THE POWER STORAGE.

76-0225 BALANCED PROGRAM PLAN. VOL. 8. ANALYSIS FOR BIOMEDICAL AND ENVIRONMENTAL RESEARCH.
NTIS, OCTOBER 1976. 77P.
ERDA-116(VOL.8)

THE BALANCED PROGRAM PLANNING (BPP) EFFORT WAS INITIATED BY THE DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH (DBER) OF ERDA TO IDENTIFY AND

DEVELOP A RESEARCH PLAN FOR INVESTIGATING THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH ENERGY TECHNOLOGIES BEING DEVELOPED BY ERDA. "ENVIRONMENTAL IMPACTS" IS TAKEN HERE TO REFER TO POLLUTANTS, HEALTH EFFECTS, ECOLOGICAL EFFECTS, SOCIOECONOMIC AND LONG-TERM IMPACTS. AS DEFINED FOR THE BPP EFFORT, SOLAR ENERGY INCLUDES TIDAL AND HYDROELECTRIC AS WELL AS THE MORE USUAL CATEGORIES OF SOLAR THERMAL CONVERSION, PHOTOVOLTAIC CONVERSION, WIND ENERGY CONVERSION, OCEAN THERMAL CONVERSION, BIOCONVERSION, AND HEATING AND COOLING OF BUILDINGS.

76-0226 BANAS J
PERFORMANCE PREDICTION FOR THE 17-M TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.II.118 -- II.125.
SAND-76-5586

THE UTILIZATION OF AERODYNAMIC DATA IS DESCRIBED ALONG WITH MODELS FOR THE OTHER SYSTEM COMPONENTS TO ESTIMATE THE PERFORMANCE OF THE 17-M TURBINE SYSTEM, LEADING TO SELECTION OF THE GENERATOR CAPACITY AND THE GEAR RATIOS FOR THE SPEED INCREASER. INPUT/OUTPUT RELATIONSHIPS FOR THE COMPONENTS ARE COMBINED TO ESTIMATE MAXIMUM SYSTEM OUTPUT POWER AS A FUNCTION OF TURBINE ROTATIONAL SPEED. IN ADDITION, THE PERCENTAGES OF TIME THAT WIND SPEED WOULD BE EXPECTED TO EXCEED THE WIND SPEEDS REQUIRED FOR POSITIVE AND MAXIMUM POWER ARE CALCULATED. THE BASIC SYSTEM COMPONENTS ARE THE SYNCHRONOUS GENERATOR, THE SPEED INCREASER, AND THE WIND TURBINE. GENERATOR CAPACITIES OF 30 KW AND 60 KW ARE CONSIDERED FOR COMPARATIVE PURPOSES.

76-0227 BANAS J
ECONOMIC CONSIDERATINS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.II.19 --II.28.
SAND-76-5586

THE OBJECTIVES OF ECONOMIC STUDIES ARE TWOFOLD. FIRST, TO IDENTIFY TRADEOFFS AND TRENDS AMONG SYSTEM DESIGN PARAMETERS WHICH LEAD TO THE DEFINITION OF SCALE-UP SYSTEMS. SECOND, TO IDENTIFY THE COST OF OPTIMUM SYSTEMS IN ORDER TO DETERMINE THE ROLE OF THE VERTICAL-AXIS WINDTURBINE IN WIND POWER. SINCE THE VAWT IS IN EARLY STAGES OF DEVELOPMENT, AN ITERATIVE PROCESS IS VISUALIZED TO MEET THE ABOVE OBJECTIVES WHEREIN THE ECONOMICS OF VAWT SYSTEMS ARE CONTINUOUSLY UPDATED AS NEW PERFORMANCE AND COST DATA BECOMES AVAILABLE. ECONOMIC STUDIES PERFORMED TO DATE ARE SUMMARIZED WITH EMPHASIS ON TRENDS RELATED TO SYSTEM DESIGN, FOR EXAMPLE, IN THE AREAS OF AERODYNAMICS AND STRUCTURES. THE EFFECTS OF POTENTIAL COMPONENT COST SAVINGS ARE ALSO INDICATED.

76-0228 BANKWITZ H, FRITZSCHE A, SCHMELZLE J, WELTE D, SWAMY C N N
ENTWICKLUNG EINER WINDKRAFTANLAGE MIT VERTIKALER ACHSE (PHASE 1).
(DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE. PHASE 1).
BUNDESMINIST. FORSCH. TECHNOL. FORSCHUNGSBER. TECHNOL. FORSCH. ENTWICKL. T76-55, OCTOBER 1976. 123P. NTIS, 1976. (IN GERMAN)
N77-17112, BMFT-FB-T-76-55

THE AERODYNAMIC, MECHANICAL, OPERATIONAL, AND MANUFACTURING ASPECTS OF A VERTICAL AXIS WIND ENERGY CONVERTER (DARRIEUS ROTOR) ARE DEALT WITH. DESIGN TECHNIQUES AND DESIGN STUDIES ARE DESCRIBED. A PROSPECTIVE, BASED ON THE SYSTEM'S ADVANTAGES (INDEPENDENCE FROM WIND DIRECTION, SIMPLICITY OF MANUFACTURE, INSTALLATION, AND MAINTENANCE), IS MADE TO CONTINUE THE DEVELOPMENT WITH THE AIM OF A SERIES PRODUCTION OF THIS VERTICAL-AXIS WIND TURBINE IN A PERFORMANCE RANGE UP TO APPROXIMATELY 20 KW. FOR GREATER POWER RANGES THE DISADVANTAGES OF THIS DESIGN BECOME PREDOMINANT (COMPARATIVELY LOW ROTATING SPEED, LARGE AMOUNT OF MATERIAL FOR THE ROTOR BLADES). THE HORIZONTAL ROTOR AXIS DESIGN WITH A CONSIDERABLY MORE ADVANCED STATE OF DEVELOPMENT HAS TO BE PREFERRED IN A POWER RANGE ABOVE 20 KW FOR IRRIGATION PURPOSES AND POWER SUPPLY.

76-0229 BARZDA J J
BLADE DESIGN AND FABRICATION: 17-METER VAWT.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.II.205--II.221.
SAND-76-5586

SANDIA LABORATORIES IS PLANNING TO ERECT AND OPERATE AN EXPERIMENTAL 17-METER VERTICAL AXIS WIND TURBINE (VAWT) POWER GENERATION SYSTEM. THE SUBSYSTEMS ARE BEING DESIGNED FOR FABRICATION. THE DESIGN AND FABRICATION OF ROTOR BLADES FOR THE TURBINE ARE DESCRIBED. THE ROTOR WILL HAVE THREE BLADES WITH 0012 AIRFOIL AND 21-INCH CHORD. THE BLADES WILL BE STIFFENED WITH SUPPORT STRUTS. THE DESIGN CRITERIA, STRUCTURAL DESIGN, SUPPORTING ENGINEERING ANALYSIS AND FABRICATION METHODS ARE DISCUSSED.

76-0230 BECKER M, WICKS F, YERAZUNIS S
AN APPRAISAL OF ELECTRICAL ENERGY ALTERNATIVES AVAILABLE TO THE STATE OF NEW YORK. REPORT FOR SEPTEMBER 1, 1975--AUGUST 31, 1976.
NTIS, OCTOBER 1976. 210P.
PB-262573

THE DEVELOPMENT AND APPLICATION OF A MODEL FOR THE APPRAISAL OF ELECTRICAL ENERGY ALTERNATIVES AVAILABLE TO THE STATE OF NEW YORK IS DESCRIBED. PRIOR WORK RELATED TO THE ACQUISITION OF A DATA BASE REPRESENTATIVE OF THE CURRENT AND FUTURE SYSTEMS FOR ELECTRIC POWER GENERATION IS SUMMARIZED. THE IMPLICATIONS OF NEW STUDIES IN THE AREAS OF WIND TURBINES AS A MODE OF GENERATION, SOLID WASTES AS AN ALTERNATIVE FUEL, AND SOLAR ENERGY FOR RESIDENTIAL HEATING AND PASSIVE ENERGY CONSERVATION TO ELECTRICAL ENERGY GENERATION IN NEW YORK STATE ARE EVALUATED. A CALCULATIONAL SYSTEM THAT PERMITS THE APPRAISAL OF A BROAD RANGE OF SCENARIOS IN A CONSISTENT MANNER IS DEVELOPED.

76-0231 BERTOIA V
ELEKTROS: ANOTHER VIEW.
WIND POWER DIG. 1(6): 18, SEPTEMBER 1976.

76-0232 BIFFLE J H
SYSTEM STRUCTURAL RESPONSE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.168--II.179.
SAND-76-5586

THE 17 METER VERTICAL AXIS WIND TURBINE (VAWT) SYSTEM WAS ANALYZED TO DETERMINE THE MODE SHAPE AND FREQUENCIES OF THE STRUCTURE. CHANGES IN THE DESIGN SUCH AS TOWER STIFFNESS, 2 AND 3 BLADE CONFIGURATION, WITH AND WITHOUT STRUTS AND BEARING DESIGNS FOR THE TOWER ARE TO BE CONSIDERED. THE SIGNIFICANCE OF THE VARIOUS NATURAL MODES AND FREQUENCIES ARE TO BE DETERMINED BY COMPARISON TO THE FREQUENCY CONTENT OF THE APPLIED FORCES.

76-0233 BLACKWELL B F, REIS G E
SOME GEOMETRICAL ASPECTS OF TROPOSKIENS AS APPLIED TO VERTICAL-AXIS WIND TURBINES.
ASME PAPER 75-DET-42, SEPTEMBER 1976.

76-0234 BLACKWELL B F
STATUS OF THE ERDA/SANDIA 17-METER DARRIEUS TURBINE DESIGN.
ENERGY DIG. 5(6): 6, DECEMBER 1976.

THIS ARTICLE IS AN EXCEPTIONAL PAPER FROM AN INTERNATIONAL SYMPOSIUM: "WIND ENERGY SYSTEMS" HELD AT ST JOHN'S COLLEGE, CAMBRIDGE, ENGLAND. UNDER SPONSORSHIP OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) WIND ENERGY PROGRAM, SANDIA LABORATORIES HAS BEEN INVESTIGATING THE DARRIEUS WIND TURBINE AS AN ALTERNATIVE TO THE CONVENTIONAL HORIZONTAL AXIS WIND TURBINE. THE CURRENT EFFORT AT SANDIA LABORATORIES HAS BEEN DIRECTED TOWARD THE DESIGN AND FABRICATION OF A 17-METER DIAMETER DARRIEUS TURBINE. THE BASIC ROTOR CONFIGURATION CONSISTS OF THREE NACA 0012 BLADES, EACH BLADE BEING SUPPORTED BY TWO STRUTS THAT EXTEND FROM THE VERTICAL ROTATING SHAFT TO THE BLADES. THE ROTATING SHAFT, WHICH WILL BE FABRICATED FROM STEEL, HAS AN OUTER DIAMETER OF 0.508M (20-IN.) WITH 2.54CM (1-IN.) WALL THICKNESS. THE BLADES ARE REQUIRED TO OPERATE UP TO 75 RPM IN A 26.8 M/S (60 MPH) WIND WITHOUT PERMANENT DEFORMATION AND TO WITHSTAND 53.6 M/S (120MPH) WIND AT ZERO RPM. THE TURBINE BASE CONTAINS THE MEANS OF AXIAL SUPPORT OF THE TURBINE, THE POWER TRAIN (CONSISTING OF A SPEED INCREASER, SYNCHRONOUS GENERATOR, AND AN INDUCTIVE STARTER), AND A BRAKING SYSTEM. THE DESIGN ROTATIONAL SPEED IS 45.4 RPM AND MAXIMUM POWER IS 70 KW. DUE TO TURBINE COMPONENT INEFFICIENCIES, THE ELECTRICAL GENERATOR WILL SEE APPROXIMATELY

60 KW, WHICH IS ITS RATED CAPACITY.

76-0235 BLACKWELL B F, FELTZ L V, SHELDAHL R E
SELECTED WIND TUNNEL TEST RESULTS FOR THE DARRIEUS WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.II.59 -- II.71.
SAND-76-5586

IN ORDER TO VERIFY SOME EARLIER FINDINGS, EXPAND THE RANGE OF SOME OF THE PERTINENT PARAMETERS, AND PROVIDE A COMPREHENSIVE DATA BASE FOR THE DEVELOPMENT OF COMPUTER MODELS IN THE PREDICTION OF AERODYNAMIC PERFORMANCE AND LOADS, SANDIA LABORATORIES UNDERTOOK AN EXTENSIVE WIND TUNNEL TEST PROGRAM. THE PRIMARY RESULTS FROM THE TEST PROGRAM CONDUCTED ON THE DARRIEUS TURBINE AT THE VOUGHT CORPORATION, VOUGHT SYSTEMS DIVISION LOW SPEED WIND TUNNEL ARE SUMMARIZED.

76-0236 BLACKWELL B F, FELTZ L V, MAYDEW R C
WIND TURBINE.
GERMAN (FRG) PATENT 2,540,757/A/, APRIL 8, 1976. 23P. (IN GERMAN)

A VERTICAL-AXIS WIND TURBINE IS DESCRIBED. THE DRIVE ROTOR OF THE TURBINE HAS A NUMBER OF OBLONG BLADES, THE CENTRAL BENT PORTIONS OF WHICH ARE OF STREAMLINE SHAPE. THE PARTICULAR CURVED SHAPE OF THE BLADES ENSURES THAT MAINLY TENSILE STRESS WILL OCCUR IN THE BLADE. THE TURBINE IS OF THE SELF-STARTING TYPE. THIS IS ATTAINED BY STARTER ROTORS. EACH OF THESE ROTORS HAS A NUMBER OF HOLLOW BLADES WHICH ARE ARRANGED IN OPPOSITE DIRECTIONS, THE BLADES PARTLY OVERLAPPING EACH OTHER IN S SHAPE. THE SPEED RATIO OF THE TURBINE HAS A VALUE OF APPROXIMATELY 5 TO 7. IN PRACTICE, TURBINE PLANTS MAY BE BUILT WHICH CONSIST OF A NUMBER OF DRIVE ROTORS ARRANGED ONE ABOVE THE OTHER ON THE SHAFT. EACH FOLLOWING DRIVE ROTOR HAS A GREATER DIAMETER THAN THE ADJACENT LOWER ROTOR.

76-0237 BLAKE S
SAVONIUS ROTOR WIND TURBINES.
WIND POWER DIG. 1(6): 25-27, SEPTEMBER 1976.

THE SAVONIUS ROTOR (S-ROTOR) WAS INVENTED BY CAPTAIN SIGURD SAVONIUS, A FINN, IN 1924. SINCE THAT TIME, NO LESS THAN FOURTEEN RESEARCH GROUPS HAVE INVESTIGATED AND EVALUATED S-ROTORS OF VARIOUS SIZES AND CONFIGURATIONS BOTH IN FREE WIND AND IN WIND TUNNELS. THIS ARTICLE DISTILLS THE EXPERIENCES AND FINDINGS REPORTED BY THESE GROUPS AND OUR OWN EXPERIENCES AND FINDINGS. IT CONSIDERS IMPORTANT DESIGN PARAMETERS, ADVANTAGES AND DISADVANTAGES OF THE DESIGN, CERTAIN TECHNIQUES AND MATERIALS FOR SIMPLE ROTOR CONSTRUCTION, AND ROTOR OUTPUTS WHEN COUPLED WITH WATER PUMPS AND ELECTRICAL GENERATORS.

76-0238 BOCKRIS J O'M
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE.
LONDON, ARCHITECTURAL PRESS, 1976.

76-0239 BOGIE T
WINDMILL.
U.S. PATENT NO. 3,994,621, NOVEMBER 30, 1976. 6P.

A WINDMILL IS DESCRIBED WHICH COMPRISES A GENERALLY CYLINDRICALLY SHAPED HOUSING HAVING A VERTICAL AXIS, A VERTICAL SHAFT CONCENTRICALLY DISPOSED IN THE HOUSING AND A ROTOR FIXEDLY ATTACHED TO THE SHAFT AND COMPRISING A PLURALITY OF EQUALLY PERIPHERALLY SPACED, VERTICALLY EXTENDING TROUGH-SHAPED WIND SCOOPS. EACH SCOOP HAS A CLOSED BACK SURFACE WITH VERTICALLY EXTENDING LEADING AND FOLLOWING EDGES AND A VERTICALLY EXTENDING OPEN FRONT EXPOSED TO THE WIND. EACH SCOOP IS ATTACHED AT ITS EDGES TO THE ADJACENT SCOOPS TO FORM A GENERALLY CYLINDRICAL SCOOP ASSEMBLY. THE HOUSING COMPRISES A PLURALITY OF EQUALLY PERIPHERALLY SPACED APART STATIONARY WIND-DIRECTING AND CONCENTRATING VANES.

76-0240 BONNEFILLE R
LES PROGRAMMES ET LE DEVELOPPEMENT ACTUELS DE L'ENERGIE EOLIENNE DANS LE MUNDE. (THE CURRENT PROGRAMMES AND DEVELOPMENT OF WIND ENERGY IN THE WORLD).
ELECTRICITE DE FRANCE, REP. NO. E30/76/04, APRIL 1976. 18P. (IN FRENCH)

THIS REPORT REVIEWS THE WIND ENERGY RESEARCH PROGRAMS OF THE U.S.A.,

SWEDEN, DENMARK AND FRANCE. A LIST WITH THE MOST IMPORTANT MANUFACTURERS IS INCLUDED.

76-0241 BOS P B
SOLAR ENERGY: PERSPECTIVE AND PROSPECTS.
AM. POWER CONF. PROC. 38: 447-457, 1976.

WITH SOLAR ENERGY PROMISING TO SUPPLEMENT THE NATION'S ENERGY RESOURCES, ITS PROSPECTS ARE REVIEWED. THE FEDERAL GOVERNMENT THROUGH NSF AND SUBSEQUENTLY THROUGH ERDA, HAS BEEN SUPPORTING SOLAR RESEARCH. ALSO, THE UTILITY INDUSTRY HAS BEEN SUPPORTING RESEARCH THROUGH EPRI. THE PROGRAM AT EPRI IS SUMMARIZED BRIEFLY. TECHNOLOGY REVIEWS AND ASSESSMENTS OF SOLAR HEATING AND COOLING, SOLAR ELECTRIC POWER GENERATION, WIND ENERGY CONVERSION, OCEAN THERMAL ENERGY CONVERSION, PHOTOSYNTHESIS OF BIOMASS, AND ENVIRONMENTAL IMPACTS ARE INCLUDED. IT IS CONCLUDED THAT LARGE-SCALE UTILIZATION OF SOLAR APPLICATIONS FOR ELECTRIC POWER PRODUCTION IS NOT ANTICIPATED BEFORE THE YEAR 2000. COMPETITIVE ENERGY COSTS MUST BE DEMONSTRATED, REQUIRING MAJOR COST REDUCTIONS IN COLLECTORS, REFLECTORS, OR PHOTOVOLTAIC ARRAYS, AS WELL AS LONG SYSTEM LIFETIMES OF 15 TO 30 YEARS. SOLAR ENERGY SYSTEMS MUST BE ASSESSED UNDER THE SAME CONDITIONS OF RELIABILITY AS CONVENTIONAL POWER SYSTEMS.

76-0242 BOSSEL U
EUROPE'S LARGEST SOLAR THERMAL POWER PLANT.
MITTEILINGSBL. DTSCH. GES. SONNENENERGIE 1(2): 12-13, MARCH 1976. (IN GERMAN)

AN OVERVIEW IS GIVEN OF THE SOLAR HEATING PLANT WHICH HAS RECENTLY BEEN COMMISSIONED IN THE CAMARGUE (FRANCE). THIS IS THE LARGEST PLANT IN EUROPE, WITH A MEAN HEAT OUTPUT OF ABOUT 200 KW, FOR THE PRODUCTION OF THERMAL ENERGY FROM SOLAR ENERGY. THE PLANT CONSISTS OF 108 PARABOLIC COLLECTORS (200 SQ. METRES) AND 48 FLAT COLLECTORS (110 SQ. METRES). TWO WINDMILLS WITH OUTPUTS OF 10 KW EACH COMPLETE THE SYSTEM. THE HEAT ENERGY PRODUCED BY THE SOLAR COLLECTORS IS GIVEN UP TO 3 DIFFERENT STORES, WHICH IN TURN ARE CONNECTED TO VARIOUS CONSUMERS.

76-0243 BRAASCH R H
VERTICAL-AXIS WIND TURBINE PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.I.33--I.53.
SAND-76-5586

AN OVERVIEW OF THE DARRIEUS VERTICAL AXIS WIND TURBINE PROGRAM BEING CONDUCTED AT SANDIA LABORATORIES FOR ERDA IS PRESENTED.

76-0244 BRIGHT C
POWER GENERATING APPARATUS.
U.S. PATENT NO. 3,974,395, AUGUST 10, 1976. 10P.

A CONTROL SYSTEM FOR OBTAINING MAXIMUM POWER OUTPUT FROM ELECTRICAL GENERATING WATER PUMPING, FLYWHEEL STORAGE AND LIKE SYSTEMS COMPRISING A WIND-DRIVEN PRIME MOVER COUPLED TO AN ELECTRICAL GENERATOR OVER AN EXTENDED RANGE OF WIND VELOCITIES IS DESCRIBED. THE MAXIMUM ELECTRICAL OUTPUT POWER IS OBTAINED BY SYNCHRONIZING THE SPEED OF THE GENERATOR, AND HENCE THE SPEED OF THE PRIME MOVER, WITH THE MAXIMUM POWER OUTPUT OF THE PRIME MOVER. SINCE THE MAXIMUM OUTPUT POWER OF A WIND-DRIVEN PRIME MOVER IS PROPORTIONAL TO THE THIRD POWER OF THE WIND VELOCITY, AND IS A FUNCTION OF AN ANGULAR VELOCITY-DEPENDENT POWER COEFFICIENT, MEANS ARE PROVIDED FOR DETECTING THE ANGULAR VELOCITY OF THE PRIME MOVER AND GENERATING A SIGNAL PROPORTIONAL TO THE CUBE OF THE WIND VELOCITY. THE SIGNAL THUS GENERATED IS USED FOR CONTROLLING THE MAGNITUDE OF THE EXCITATION FIELD CURRENT IN THE ELECTRICAL GENERATING APPARATUS WHEREBY THE ELECTRICAL OUTPUT VARIES APPROXIMATELY AS A CUBIC FUNCTION OF THE WIND VELOCITY AND, CONSEQUENTLY, AS A LINEAR FUNCTION OF THE OUTPUT POWER OF THE PRIME MOVER. FOR THIS PURPOSE THE CONTROL-SIGNAL GENERATING MEANS EMPLOYS A SOLID STATE DEVICE OR THE LIKE WHICH IS BIASED TO OPERATE ALONG THE THIRD POWER PORTION OF ITS CHARACTERISTIC OPERATING CURVE.

76-0245 BROUNS R J
ENVIRONMENTAL IMPACTS OF NONFUSION POWER SYSTEMS.
NTIS, SEPTEMBER 1976. 130P.
BNWL-2027

DATA WERE COLLECTED ON THE ENVIRONMENTAL EFFECTS OF POWER SOURCES THAT MAY BE COMPETITIVE WITH FUTURE FUSION REACTOR POWER PLANTS. DATA ARE INCLUDED ON NUCLEAR POWER PLANTS USING HTGR, LMBR, GCFR, LMFBR, AND MOLTEN SALT REACTORS; FOSSIL-FUEL ELECTRIC POWER PLANTS; GEOTHERMAL POWER PLANTS; SOLAR ENERGY POWER PLANTS, INCLUDING SATELLITE-BASED SOLAR SYSTEMS; WIND ENERGY POWER PLANTS; OCEAN THERMAL GRADIENT POWER PLANTS; TIDAL ENERGY POWER PLANTS; AND POWER PLANTS USING HYDROGEN AND OTHER SYNTHETIC FUELS AS ENERGY SOURCES.

76-0246 BROWN R J
WINDMILLS OF ENGLAND.
LONDON, R. HALE, 1976. 256P.

76-0247 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.39--III.60.
SAND-76-5586

TWENTY-ONE DIFFERENT GIROMILL CONFIGURATIONS COVERING THREE SIZES OF GIROMILL SYSTEMS WERE ANALYZED, VARYING SUCH PARAMETERS AS ROTOR SOLIDITY, ROTOR ASPECT RATIO, RATED WIND VELOCITY, AND NUMBER OF ROTOR BLADES. THE PERFORMANCE, DESIGN, AND COST EFFECTIVENESS OF THESE 21 CONFIGURATIONS WERE DETERMINED. THE RESULTS OF THIS ANALYSIS FORMED THE BASE FOR SELECTING A CONFIGURATION THAT WAS OPTIMIZED FOR THE LEAST COST OF ENERGY.

76-0248 BUCK J A
WIND POWERED IRRIGATION IN KANSAS. A SYSTEMS DYNAMICS APPROACH.
NTIS, 1976. 138P.
AD-A052630

MANY OPTIONS HAVE BEEN PROPOSED FOR HARNESSING WIND POWER FOR IRRIGATION. HERE, TWO OPTIONS ARE INVESTIGATED USING A SYSTEM DYNAMICS APPROACH. THE FIRST OPTION USES MECHANICAL ENERGY EXTRACTED FROM THE WIND AS INPUT TO A MECHANICAL PUMP. A FLYWHEEL SERVES AS A BUFFER AND AS STORAGE FOR LOW WIND PERIODS. THE SECOND OPTION USES THE MECHANICAL OUTPUT FROM THE WINDMILL TO GENERATE ELECTRICITY. THIS ELECTRICITY IS THEN FED INTO AN ELECTROLYSIS CELL TO PRODUCE HYDROGEN GAS. THIS GAS IS THEN BURNED IN AN INTERNAL COMBUSTION ENGINE WHICH DRIVES THE PUMP. SURPLUS HYDROGEN IS STORED IN DEPLETED NATURAL GAS WELLS FOR USE DURING LOW WIND PERIODS. A BACK UP SYSTEM IS PROVIDED IN BOTH OPTIONS FOR WHEN THE WIND IS NOT BLOWING AND THE STORED ENERGY HAS BEEN EXHAUSTED. (THE DOCUMENT'S PARTIALLY ILLEGIBLE.)

76-0249 BURNSIDE D
SOUND OF THE WIND.
WIND POWER DIG. 1(6): 29-308 SEPTEMBER 1976.

THE ONLY WIND-POWERED RADIO STATION IN THE WORLD IS DESCRIBED: KFMU-FM IN OAK CREEK, COLORADO.

76-0250 BUTLER B L, BLACKWELL B F
APPLICATION OF LAMINATED WOODEN BLADES TO A TWO-METER DARRIEUS TYPE VERTICAL AXIS WIND TURBINE.
NTIS, DECEMBER 1976. 21P.
SAND-75-0284

THE USE OF LAMINATED LAUAN PLYWOOD IN A 2-METER-DIAMETER, 3-BLADE DARRIEUS WIND TURBINE IS DESCRIBED. THE MANUFACTURE, TESTING AND TENSILE STRESS ANALYSIS OF LAMINATED WOODEN BLADES ARE DESCRIBED. ALTHOUGH THE TENSILE STRENGTHS OF ALL CANDIDATE UNIDIRECTIONAL LAMINATES (LAUAN, MONALAVA, POPLAR AND MAPLE) EXCEEDED THE INDUCED BLADE STRESSES, LAUAN WAS CHOSEN FOR WIND TUNNEL TESTING BASED ON COST AND DIMENSIONAL STABILITY. TWO AIRFOIL SECTIONS, NACA 0012 AND NACA 0025, OF 7.39 CM CHORD LENGTH (I.E., LEADING TO TRAILING EDGE DIMENSION) WERE SHAPED FROM CURVED LAMINATED LAUAN BLANKS WHICH HAD THE GRAIN ORIENTED ALONG THE BLADE ARC. THE THICKER NACA 0025 AIRFOIL, WHERE THE THICKNESS IS 25 PERCENT OF THE CHORD LENGTH, PERFORMED NORMALLY IN THE WIND TUNNEL TEST. THE THIN NACA 0012 BLADE WAS EXCITED INTO RESONANCE WELL BELOW THE PEAK POWER RPM AND CONSTRAINED THE TURBINE TO LOW POWER OUTPUT. THE 2-METER

WIND TURBINE MODEL TESTS INDICATED THAT, WITH APPROPRIATE BLADE DESIGN, WOOD HAS POTENTIAL FOR SMALL VERTICAL AXIS WIND TURBINES.

76-0251 CAR POWERED BY THE WIND.
MECH. ILLUS. 72: 132, NOVEMBER 1976.

76-0252 CARTER E A
BASIC RELATIONSHIPS TO DETERMINE WIND POWER AND SOLAR RADIATION AVAILABLE FROM THE ATMOSPHERE.
SOUTHEASTERN CONFERENCE ON APPLICATION OF SOLAR ENERGY, BATON ROUGE, LA., APRIL 19, 1976. PROCEEDINGS. CONF-760423, P. 381-389.

THE NATIONAL WEATHER SERVICE HAS MANY YEARS OF RECORDS OF WIND SPEED AND SOLAR RADIATION FROM NUMEROUS LOCATIONS THROUGHOUT THE NATION. THE OPTIMUM AMOUNT OF ENERGY CONTAINED IN THE WIND AND SOLAR RADIATION AT THESE LOCATIONS CAN EASILY BE CALCULATED FROM THESE PAST WEATHER RECORDS. ONE SQUARE METER WAS ARBITRARILY SELECTED AS THE UNIT FOR COLLECTION OF THE ENERGY. A METHOD IS SHOWN TO CONVERT THE SUMMARIZED RECORDS TO POWER UNITS OF WATTS PER SQUARE METER. THIS WILL PROVIDE A MEASURE OF THE BASIC SUN AND WIND ENERGY IN FAMILIAR TERMS. THIS INFORMATION AND PROCEDURE MAY BE APPLIED TO OTHER SITUATIONS SUCH AS VARIATIONS IN LOCATION, SIZE, AND EFFICIENCY.

76-0253 CARTER J
EARLE RICH'S BIG WINDMILL: WIND POWER IN N.H.
WIND POWER DIG. 1(7): 27-30, DECEMBER 1976.

76-0254 CARTER J
ON THE ROAD.
WIND POWER DIG. 1(7): 21, DECEMBER 1976.

SEVERAL SMALL-SCALE APPLICATIONS OF WIND ENERGY ARE DESCRIBED.

76-0255 CARTER J
TESTING AN ELEKTRO-GEMINI WIND SUSTEM.
WIND POWER DIG. 1(6): 13-17, SEPTEMBER 1976.

76-0256 CARTER J
THE TRAVIS "NATURAL HOUSE."
WIND POWER DIG. 1(7): 24-25, DECEMBER 1976.

STEVE TRAVIS'S HOME INTEGRATES SOLAR AND WIND WITH OTHER UNIQUE LIVING AND SHELTER IDEAS.

76-0257 CARTER J
A VISIT WITH ZEPHYR WIND DYNAMO.
WIND POWER DIG. 1(7): 14-17, DECEMBER 1976.

76-0258 CHATEL B
SOLAR ENERGY PROGRAMMES OF THE UNITED NATIONS SYSTEM.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 30-36.

THE UNITED NATIONS SYSTEM IS CONDUCTING PROGRAMS FOR THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT. SOLAR ENERGY APPLICATIONS ARE OF PARTICULAR RELEVANCE TO THE ECONOMIC AND SOCIAL PROGRESS OF THE DEVELOPING COUNTRIES. SOME OF THE PROGRAMS CURRENTLY UNDERTAKEN IN THE UNITED NATIONS SYSTEM ARE REVIEWED, PARTICULARLY IN THE UNITED NATIONS, UNESCO, WMO, UNIDO, THE REGIONAL ECONOMIC COMMISSIONS, THE GLOBAL PROJECTS, UNEP, THE OFFICE FOR TECHNICAL CO-OPERATION, AND THE FINANCIAL INSTITUTIONS.

76-0259 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE. FINAL REPORT JUNE 3, 1975--JUNE 2, 1976.
NTIS, SEPTEMBER 1976. 62P.
COO/2614-76/1

THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT HAS BEEN SHOWN TO HAVE CHARACTERISTICS IDEALLY SUITED FOR WIND TURBINE APPLICATIONS. THIS ROTOR CONCEPT PROVIDES A FULLY SELF-REGULATING AND SELF-ALIGNING WIND TURBINE.

SUCH A SYSTEM WAS ACHIEVED WITHOUT THE NEED FOR AUXILIARY CONTROLS OR SENSORS. THESE FEATURES ALLOW SELF-STARTING FOR WIND INITIATING FROM ANY DIRECTION AND AUTOMATIC PITCH AND YAW VARIATIONS TO OPTIMIZE PERFORMANCE UNDER ALL NORMAL WIND CONDITIONS. THE WORK DESCRIBED IN THIS REPORT CONSISTS OF THE DESIGN OF A 4.5 FT DYNAMICALLY SCALED WIND TURBINE MODEL AND THE TESTING OF THIS MODEL IN THE UNITED TECHNOLOGIES LOW SPEED WIND TUNNEL. SEVERAL CONCEPTS WERE INVESTIGATED WHICH WERE DESIGNED TO ACHIEVE SELF-REGULATION. OF THESE, A SYSTEM WHICH CONSISTED OF A HUB SUPPORTED PENDULUM INTEGRATED WITH THE CBR BLADE PROVIDED THE FEATURES DESIRED. TESTING OF THIS CONFIGURATION CONSISTED OF STARTUPS FROM ANY WIND DIRECTION WITH WIND SPEEDS UP TO 30 MPH. STRESS AND STABILITY CHARACTERISTICS WERE INVESTIGATED DURING THE TEST PROGRAM AND THE CBR WIND TURBINE DEMONSTRATED LOW STRESS LEVELS AND HIGHLY STABLE RESPONSE CHARACTERISTICS UNDER ALL CONDITIONS TESTED.

76-0260 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE. EXECUTIVE SUMMARY, JUNE 3, 1975--JUNE 2, 1976.
NTIS, SEPTEMBER 1976. 13P.
COO/2614-76/2

AN INVESTIGATION WAS CONDUCTED INTO THE FEASIBILITY OF APPLYING THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT TO WIND TURBINES. THE CBR BLADE IS COMPRISED OF A CONVENTIONAL BLADE CONSTRUCTION OVER THE OUTBOARD SPAN, BUT INBOARD IS MADE UP SIMPLY FROM A FINITE LENGTH (ABOUT 15 PERCENT OF THE RADIUS) OF UNIDIRECTIONAL COMPOSITE MATERIAL. THIS MEMBER, CALLED THE FLEXBEAM, REPLACES THE HINGES AND BEARINGS NORMALLY LOCATED AT THE BLADE ROOT AND PROVIDES THE NECESSARY FLATWISE AND EDGEWISE STIFFNESS, BUT DUE TO THE UNIDIRECTIONAL FIBER ALIGNMENT, HAS LOW TORSIONAL STIFFNESS. BLADE PITCH CONTROL IS ACHIEVED BY APPLYING A MOMENT AT THE OUTBOARD END OF THE FLEXBEAM AND ELASTICALLY TWISTING IT. THE WORK DESCRIBED IN THE FINAL REPORT WAS CONDUCTED UNDER CONTRACT WITH ERDA AND CONSISTED OF THE DESIGN AND FABRICATION OF A DYNAMICALLY SCALED WIND TURBINE MODEL, THE WIND TUNNEL TESTING OF THIS MODEL, AND THE EVALUATION OF SEVERAL CONTROL CONCEPTS IN AN ATTEMPT TO ACHIEVE A SELF-REGULATING SYSTEM. SUCH A SYSTEM WAS ACHIEVED AND EXPERIMENTALLY DEMONSTRATED IN THE WIND TUNNEL. OPERATING CHARACTERISTICS AT WIND SPEEDS EXCEEDING 30 MPH WERE INVESTIGATED AND SIMULATED START UPS AND WIND DIRECTION CHANGES WERE SUCCESSFULLY EXECUTED.

76-0261 CHERRY N J
PRELIMINARY ANALYSIS OF METEOROLOGICAL DATA, WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND, REPORT NO.8.
UNIV. OF AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, 1976. 31P.

76-0262 CHERRY N J
WIND ENERGY RESOURCE ASSESSMENT.
NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE REPORT, APRIL 1976.

76-0263 CHERRY N J
WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND. PRELIMINARY ANALYSIS OF METEOROLOGICAL DATA.
NEW ZEALAND METEOROLOGICAL SERVICE FOR THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND, PROJECT FUNDED BY NZER AND DC, NEW ZEALAND, 1976. NEW ZEALAND, LINCOLN COLLEGE, APRIL 1976. 32P.

METEOROLOGICAL DATA ARE SUPPLIED IN THE FORM OF WIND SPEED FREQUENCY DISTRIBUTIONS AND TABLES OF AVERAGE WIND SPEED. THE MEASUREMENT NETWORK IS DESCRIBED. THIS ANALYSIS INDUCED THE CONCLUSION THAT IN LARGE PARTS OF NEW ZEALAND THE MEAN WIND ENERGY IS GREATER THAN 200 W/M2.

76-0264 CHERRY N J, EDWARDS P J, ROXBURGH A J
LOW COST INSTRUMENTATION FOR A WIND ENERGY SURVEY.
INTERNATIONAL INSTRUMENTATION SYMPOSIUM, 22D, SAN DIEGO, CAL., MAY 25-27, 1976. PROCEEDINGS. PITTSBURGH, PA., ISA, 1976. P. 109-115.

WIND-RUN, OR MEAN WIND SPEED, IS OBTAINED BY COUNTING ONE PULSE PER REVOLUTION OF THE ANEMOMETER ON A MODIFIED POCKET CALCULATOR. POWER REQUIREMENTS ARE REDUCED TO AN AVERAGE OF LESS THAN MA BY TURNING THE DISPLAY OFF WHEN IT IS NOT BEING READ. MEAN WIND SPEEDS OVER AVERAGING PERIODS OF AN HOUR OR SUBMULTIPLES OF AN HOUR DOWN TO A MINUTE OR LESS ARE RECORDED ELECTRONICALLY. ONE SYSTEM RECORDS A FREQUENCY PROPORTIONAL

TO THE WIND SPEED ON CHANNEL ONE AND A CLOCK PULSE TRAIN ON CHANNEL TWO. MEAN WIND SPEEDS OVER THE TIME INTERVALS AS SHORT AS THREE TO FIVE SECONDS OR AS LONG AS ONE MONTH CAN BE RETRIEVED. A SECOND SYSTEM USES A STANDARD CASSETTE TAPE TO RECORD DATA IN AN INCREMENTAL DIGITAL FORM, USING 12 BIT BINARY NUMBERS IN BIPHASE AUDIO TONES. AVERAGING PERIODS OF 1, 2, 5, 15, 30 OR 60 MINUTES MAY BE SELECTED.

76-0265 CHILCOTT R E
FOCUS ON RENEWABLE ENERGY IN NEW ZEALAND.
NEW ZEALAND ENERGY J. 49: 48-53, APRIL 25, 1976.

FOLLOWING A DISCUSSION OF THE FLOW OF RADIANT ENERGY IN THE BIOSPHERE, MEANS OF USING SOLAR ENERGY AND OTHER RENEWABLE ENERGY SOURCES TO SUPPLY THE ENERGY NEEDS OF ADVANCED COUNTRIES ARE CONSIDERED, WITH PARTICULAR REFERENCE TO THE AVAILABILITY OF THESE POTENTIAL ENERGY SOURCES IN NEW ZEALAND. IT IS ESTIMATED THAT ABOUT HALF OF THE TOTAL DOMESTIC HOT WATER CONSUMED IN NEW ZEALAND SHOULD BE HEATED BY SOLAR ENERGY. SOME RESULTS INDICATE THAT PRODUCTION OF ETHYL ALCOHOL FROM VEGETABLE SOURCES MAY BE FEASIBLE; HOWEVER, THE EXTENSIVE LAND AREA REQUIRED MUST BE CONSIDERED. THE AVERAGE ANNUAL WIND ELECTRIC ENERGY AVAILABLE IN NEW ZEALAND IS ABOUT 0.1 PERCENT OF THE ANNUAL AVERAGE SOLAR ENERGY INCIDENT ON THE HORIZONTAL PLANE. SMALL WINDMILLS HAVE BEEN IN WIDESPREAD USE FOR STOCK WATERING. A NATIONAL WIND ENERGY RESOURCE SURVEY IS UNDER WAY.

76-0266 COENE R
"CYCLOGYRO" ALS WINDTURBINE KAN LAAG BIJ DE GRUND FUNCTIONEREN.
("CYCLOGYRO" AS WIND TURBINE CAN OPERATE NEAR THE GROUND).
TECHNO-MAGAZINE, THD NIEUWS, DELFT UNIVERSITY OF TECHNOLOGY, DELFT, THE NETHERLANDS, JANUARY 1976. P. 6-8. (IN DUTCH)

76-0267 COLIN R
(A POWER PLANT OF THE AEROSOLEC TYPE).
INTERNATIONAL CONFERENCE ON SOLAR ELECTRICITY, TOULOUSE, FRANCE, MARCH 1-5, 1976. REPORTS. TOULOUSE, CENTRE NATIONAL D'ETUDES SPATIALES, 1976. P. 775-781. (IN FRENCH)

THE AEROSOLEC ELECTRIC POWER PLANT HAS BEEN DEVELOPED TO SUPPLY ISOLATED TELECOMMUNICATION CENTERS. POWER IS GENERATED BY WIND AND/OR SUN. THE PLANT COMPRISES A SOLAR GENERATOR, AN AEROGENERATOR, A STORAGE BATTERY AND CHEMICAL DRY BATTERIES, BOTH GENERATORS BEING IN PARALLEL AND SHARING IN PRODUCING POWER DEPENDING UPON WIND AND SUN CONDITIONS PREVAILING ON THE SITE. THE STORAGE BATTERY CATERS FOR THE STORAGE, REGULARITY AND CONTINUITY OF POWER SUPPLY. THE DRY BATTERIES ARE USED AS ULTIMATE STANDBY, WARRANTING PERMANENT SUPPLY EVEN IN CASE OF OUTAGE OF THE OTHER SOURCES. POWER RATINGS ANTICIPATED TODAY RANGE FROM 100 TO 400 WATTS FOR CONTINUED ROUND THE CLOCK SERVICE. WITH LACKING WIND AND/OR SUN, INDEPENDENT OPERATION FOR A FORTNIGHT IS FORESEEN ON STORAGE BATTERIES AND DRY BATTERIES.

76-0268 COMPARISON OF DIFFERENT WIND ENERGY CONVERSION SYSTEMS. PART 1. THE NOAH SYSTEM COMPARED WITH THE ULRICH HUTTER SYSTEM. TRANSLATION OF GERMAN REPORT.
NTIS, 1976. 10P.
RFP-TRANS-204

THE ANALYSIS IS BEING MADE WITHIN THE FRAMEWORK OF STRUCTURAL COMPONENTS WHICH ARE GENERALLY IMPORTANT FOR WIND ENERGY SYSTEMS. ADVANTAGES AND DISADVANTAGES ARE EVALUATED FROM TECHNICAL VIEWPOINTS (TYPE OF CONSTRUCTION, NOVELTY, SUSCEPTIBILTY TO FAILURE, EASE OF REPAIRS, MAINTENANCE REQUIREMENTS), AS WELL AS IN TERMS OF EXPECTED POWER, PERFORMANCE, MANUFACTURING COST AND ECONOMY.

76-0269 CONGRESSIONAL SEMINAR ON THE POTENTIAL FOR SOLAR AND WIND ELECTRIC POWER GENERATION.
NEW YORK, SCIENTIST'S INSTITUTE FOR PUBLIC INFORMATION, 1976. 53P.
CONGRESSIONAL SEMINAR ON THE POTENTIAL FOR SOLAR AND WIND ELECTRIC POWER GENERATION, WASHINGTON D.C., FEBRUARY 9, 1976.

REPRESENTATIVE RICHARD L. OTTINGER, THE MODERATOR OF THE SEMINAR, INITIALLY STATED THAT "IF SOLAR ENERGY IS TO ATTAIN COMMERCIAL STATUS BY THE YEAR 2000, SOLAR RESEARCH AND DEVELOPMENT SHOULD BE FUNDED AT A LEVEL CLOSER TO NUCLEAR RESEARCH AS IT IS FUNDED TODAY." REPRESENTING THE SCIENTISTS' INSTITUTE FOR PUBLIC INFORMATION WAS ALLAN MCGOWAN. SPEAKERS

FOLLOWING MR. MCGOWAN'S BRIEF REMARKS WERE FRANK ELDRIDGE, MITRE CORPORATION; JOSEPH LINDMAYER, SOLAREX CORPORATION; PIET BOS, EPRI; RON LARSON, GEORGIA INSTITUTE OF TECHNOLOGY; WILL SMITH, SCIENCE AND TECHNOLOGY COMMITTEE; AND DAN AHEARNE, CONSULTANT TO CONGRESSMAN HAROLD RUNNELS AND THE OFFICE OF TECHNOLOGY ASSESSMENT.

76-0270 COOK E
MAN, ENERGY, SOCIETY.
SAN FRANCISCO, CAL., W. H. FREEMAN, 1976. 487P.

WIND POWER IS DISCUSSED BRIEFLY AS A RENEWABLE ENERGY SOURCE.

76-0271 COROTIS R B
STOCHASTIC MODELLING OF SITE WIND CHARACTERISTICS. FINAL REPORT JANUARY 1975--SEPTEMBER 1976.
NTIS, NOVEMBER 1976. 311P.
PB-261178

THE ECONOMIC FEASIBILITY OF A WIND ENERGY CONVERSION SYSTEM DEPENDS ON AN ACCURATE ASSESSMENT OF THE WIND CHARACTERISTICS AT EACH SITE. STATISTICAL METHODS AND PROBABILITY MODELS ARE USED TO DETERMINE OPTIMAL EVALUATION PROCEDURES FOR SURVEY DATA. SEVERAL YEARS OF HOURLY RECORDS FROM SIX MIDWEST SITES AND ONE ROCKY MOUNTAIN SITE PROVIDE A DATA BASE TO DEVELOP THE MODELS AND PROCEDURES. (PORTIONS OF THIS DOCUMENT ARE NOT FULLY LEGIBLE.)

76-0272 COTY U A
WIND ENERGY MISSION ANALYSIS. EXECUTIVE SUMMARY.
NTIS, OCTOBER 1976.
TID-27698, SAN/1075-1/3

THE WIND ENERGY CONVERSION BRANCH OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION UNDERTOOK THE TASK OF DETERMINING THE ECONOMIC VIABILITY OF WIND ENERGY CONVERSION SYSTEMS (WECS). A CONTRACT, AT(04-3)-1075 "WIND ENERGY MISSION ANALYSIS," WAS AWARDED TO LOCKHEED EARLY IN 1975 AND COMPLETED EARLY IN 1976. THE RESULTS OF THIS STUDY ARE SEVERELY CONDENSED AND SUMMARIZED IN THIS EXECUTIVE SUMMARY TO PROVIDE AN OVERVIEW OF OVER 850 PAGES OF REPORT AND APPENDICES AND OVER 1,000 PAGES OF PROCESSED WIND DATA.

76-0273 COTY U A
WIND ENERGY MISSION ANALYSIS. FINAL REPORT.
NTIS, SEPTEMBER 1976. 608P.
SAN/1075-1/1

MAPS OF WIND POWER DENSITIES ARE PRESENTED COVERING THE UNITED STATES AND TERRITORIES. EACH REGION IS ASSESSED IN TERMS OF AVAILABLE WIND POWER, ITS DISTRIBUTION OVER THE LAND, AND ITS FREQUENCY, DEVIATION, AND STRENGTH. A MATRIX OF ENERGY USERS AND THEIR APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS IS ASSEMBLED AND EVALUATED TO SELECT THOSE COMBINATIONS WHICH HAVE THE HIGHEST POTENTIAL IN TERMS OF NATIONWIDE IMPACT. THE HIGH POTENTIAL APPLICATIONS ARE ANALYZED IN DEPTH TO DETERMINE DEGREE OF MARKET PENETRATION, PERFORMANCE AND COST GOALS, MARKETING CHANNELS, INCENTIVES TO IMPLEMENTATION, AND INSTITUTIONAL CONSTRAINTS. AN INITIAL ASSESSMENT OF PUBLIC ACCEPTANCE WAS PERFORMED DURING THE COURSE OF THE STUDY WHICH IS ANALYZED AND REPORTED. WIDELY VARYING SCENARIOS ARE POSTULATED TO DEVELOP EXTREME, YET POSSIBLE, LIMITS OF IMPLEMENTATION RATES. THE EFFECTS OF THESE IMPLEMENTATION RATES ARE DETERMINED AS THEY PERTAIN TO PRODUCTION RATES, SUPPLY OF CRITICAL MATERIALS, LAND USAGE, CAPITAL REQUIREMENTS, ENVIRONMENTAL POLLUTION, ELECTRICAL ENERGY GENERATED, FOSSIL FUEL SAVED, BALANCE OF TRADE, NET FLOW OF FREE ENERGY, AND ENERGY PAYBACK TIME.

76-0274 COTY U A, DUBEY M
HIGH POTENTIAL OF WIND AS AN ENERGY SOURCE.
LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2: ENERGY LA; TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. NORTH HOLLYWOOD, CAL., WESTERN PERIODICAL CO., 1976. P. 181-187.

WIND ENERGY IS AN ABUNDANT RESOURCE IN THE UNITED STATES. IT CAN BE CAPTURED ECONOMICALLY BY LARGE WIND TURBINE GENERATORS AND USED TO SUPPLEMENT ELECTRIC ENERGY PROVIDED FROM FOSSIL FUEL AND HYDROELECTRIC

RESOURCES. TODAY'S TECHNOLOGY IS MORE THAN ADEQUATE FOR WIND ENERGY TO MAKE AN IMMEDIATE CONTRIBUTION TO ALLEVIATING THE ENERGY CRUNCH. A RECENTLY COMPLETED STUDY SPONSORED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION SHOWS THAT THE FULL POTENTIAL OF THE WIND IS FAR GREATER THAN PREVIOUSLY ESTIMATED. FULL IMPLEMENTATION WOULD PRODUCE CLEAN ENERGY WITHOUT POLLUTION, AND WOULD MAKE A SIGNIFICANT CONTRIBUTION TO THE CONSERVATION OF OUR FOSSIL FUEL RESERVES.

76-0275 CROMACK D, DARKAZALLI G, HERONEMUS W, MCGOWAN J
ENERGY AND ECONOMIC PERFORMANCE OF WIND AND SOLAR HEATED HOUSES.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY, 1ST CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 533.

76-0276 CURVERS A
A GRAPHICAL METHOD FOR CALCULATING WIND-ROTOR CHARACTERISTICS.
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNVIERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, REPT. R-257-S, APRIL 1, 1976. 37P.

TO DETERMINE WINDROTOR CHARACTERISTICS ONE HAD TO GET THROUGH A LOT OF WORK. A RAPID METHOD IS DESCRIBED HERE OF MAKING CALCULATIONS BY MEANS OF GRAPHS. FOR SEVEN STANDARD RADII TWO GRAPHS ARE REQUIRED, VALID FOR ONLY ONE NUMBER OF BLADES, BUT OTHERWISE UNIVERSAL, SINCE THEY ARE INDEPENDENT OF SHAPE OF THE BLADE SECTION. THE GRAPHS ARE BASED ON THE GENERAL MOMENTUM THEORY.

76-0277 DARROW K, PAM R
APPROPRIATE TECHNOLOGY SOURCEBOOK.
STANFORD, CALIFORNIA, VOLUNTEERS IN ASIA, NOVEMBER 1976. 305P.

THIS BOOK IS A MUCH EXPANDED NEW EDITION OF 1975:91. IT CONTAINS INFORMATION AND REFERENCES TO BOOKS AND ARTICLES ON THE VARIOUS TECHNOLOGIES THAT WOULD BE VALUABLE TO THE VOLUNTEER IN THE FIELD IN LESSER-DEVELOPED COUNTRIES. THE SECTION ON WIND POWER IS 15 PAGES LONG.

76-0278 DAWSON J K
ALTERNATIVE ENERGY SOURCES FOR THE UK.
ATOM, P. 11-20, JANUARY 1976.

THE PAPER PRESENTS FORECASTS CONCERNING ALTERNATIVE ENERGY SOURCES IN THE UNITED KINGDOM. THESE ARE ALTERNATIVE SOURCES OF HEAT--SOLAR AND GEOTHERMAL ENERGY, AND ALTERNATIVE SOURCES OF ELECTRICITY--WIND, TIDES, AND WAVES. A TENTATIVE JUDGMENT OF THE POTENTIAL CONTRIBUTION OF ALTERNATIVE SOURCES TO UK ENERGY SUPPLIES IN THE YEAR 2000 IS PRESENTED.

76-0279 DEAN T
UPDATED HOMESTEADER.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 257-261.

THE DESIGN AND CONSTRUCTION OF A MINIMUM-ENERGY-DEPENDENT HOME FOR A MIDDLE-AGED AMERICAN COUPLE WHOSE ENVIRONMENTAL EXPECTATIONS ARE TYPICAL OF MANY PEOPLE ARE DESCRIBED. THE UTILIZATION OF SOLAR AND WIND ENERGY, TOGETHER WITH GARDENING AS A HOBBY, PRODUCED A HOST OF RELATED ACTIVITIES WHICH EFFECTIVELY CHANGED THEIR LIFE-STYLE. SURPRISINGLY, THIS UNASSUMING AND PERSONAL HOME HAS ELICITED WIDESPREAD PUBLIC ATTENTION. PRIMARY ENERGY FOR THE HOME IS PROVIDED BY A 570 SQUARE FOOT ROOF-MOUNTED FLAT-PLATE COLLECTOR, A 3.2-KW WIND GENERATOR, AND A WOOD-BURNING STOVE.

76-0280 DEPENDABILITY OF WIND ENERGY GENERATORS WITH SHORT-TERM ENERGY STORAGE.
SCIENCE 194(2468): 935-937, NOVEMBER 26, 1976.

POWER FLUCTUATIONS AND POWER DURATION CURVES FOR WIND ENERGY GENERATORS, INCLUDING ENERGY STORAGE FACILITIES OF A CERTAIN CAPACITY, ARE COMPARED TO THOSE OF TYPICAL NUCLEAR REACTORS. A STORAGE SYSTEM CAPABLE OF DELIVERING THE YEARLY AVERAGE POWER OUTPUT FOR ABOUT 10 HOURS ALREADY MAKES THE DEPENDABILITY OF THE WIND ENERGY SYSTEM COMPARABLE TO THAT OF A TYPICAL NUCLEAR PLANT.

76-0281 DESIGN STUDY OF WIND TURBINES 50KW TO 3000KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME 1 - SUMMARY REPORT.
NTIS, SEPTEMBER 1976. 65P.
ERDA/NASA/9403-76/1, NASA-CR-134934, N78-12529

THIS STUDY WAS ONE OF TWO PARALLEL EFFORTS CONDUCTED TO DEFINE THE WIND TURBINE CONFIGURATION THAT WOULD LEAD TO GENERATION OF ELECTRICAL POWER IN A COST EFFECTIVE MANNER. ALL POSSIBLE OVERALL SYSTEM CONFIGURATIONS, OPERATING MODES, AND SUBSYSTEM CONCEPTS WERE EVALUATED FOR BOTH TECHNICAL FEASIBILITY AND COMPATIBILITY WITH UTILITY NETWORKS, AS WELL AS FOR ECONOMIC ATTRACTIVENESS. A DESIGN OPTIMIZATION COMPUTER CODE WAS DEVELOPED TO DETERMINE THE COST SENSITIVITY OF THE VARIOUS DESIGN FEATURES, AND THUS ESTABLISH THE CONFIGURATION AND DESIGN CONDITIONS THAT WOULD MINIMIZE THE GENERATED ENERGY COSTS. THE PRELIMINARY DESIGNS OF BOTH A 500 KW UNIT AND A 1500 KW UNIT OPERATING IN A 12 MPH AND 18 MPH MEDIAN WIND SPEED RESPECTIVELY, WERE DEVELOPED. THIS REPORT SUMMARIZES BOTH THE RATIONALE EMPLOYED IN THIS STUDY AND THE KEY FINDINGS OF THIS STUDY, BUT DOES NOT PRESENT AN IN-DEPTH DETAILED DISCUSSION OF ALL DESIGN CONSIDERATIONS.

76-0282 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME II - ANALYSIS AND DESIGN.
PHILADELPHIA, GENERAL ELECTRIC COMPANY, DECEMBER 1976. 328P.
ERDA/NASA/9403-76/2, N78-17462

THIS STUDY WAS ONE OF TWO PARALLEL EFFORTS CONDUCTED TO DEFINE THE WIND TURBINE CONFIGURATION THAT WOULD LEAD TO GENERATION OF ELECTRICAL POWER IN A COST EFFECTIVE MANNER. ALL POSSIBLE OVERALL SYSTEM CONFIGURATIONS, OPERATING MODES, AND SUBSYSTEM CONCEPTS WERE EVALUATED FOR BOTH TECHNICAL FEASIBILITY AND COMPATIBILITY WITH UTILITY NETWORKS, AS WELL AS FOR ECONOMIC ATTRACTIVENESS. A DESIGN OPTIMIZATION COMPUTER CODE WAS DEVELOPED TO DETERMINE THE COST SENSITIVITY OF THE VARIOUS DESIGN FEATURES, AND THUS ESTABLISH THE CONFIGURATION AND DESIGN CONDITIONS THAT WOULD MINIMIZE THE GENERATED ENERGY COSTS. THE PRELIMINARY DESIGNS OF BOTH A 500 KW UNIT AND A 1500 KW UNIT OPERATING IN A 12 MPH AND 18 MPH MEDIAN WIND SPEED RESPECTIVELY, WERE DEVELOPED. THIS REPORT PRESENTS A DETAILED TECHNICAL DISCUSSION OF THE VARIOUS DESIGN FEATURES AND COMPONENTS EVALUATED, AND THE RATIONALE EMPLOYED TO SELECT THE FINAL DESIGN CONFIGURATION. ALL PERTINENT TECHNICAL PERFORMANCE DATA AND COMPONENT COST DATA IS INCLUDED. THE COSTS OF ALL MAJOR SUBASSEMBLIES ARE ESTIMATED AND THE RESULTANT ENERGY COSTS FOR BOTH THE 500 KW AND 1500 KW UNITS ARE CALCULATED.

76-0283 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME III - SUPPLEMENTARY DESIGN AND ANALYSIS TASKS.
NTIS, DECEMBER 1976. 55P.
NASA-CR-135121, N78-17463

THIS STUDY WAS CONDUCTED TO PROVIDE ADDITIONAL DESIGN AND ANALYSIS DATA TO SUPPLEMENT THE RESULTS OF THE TWO PARALLEL DESIGN STUDY EFFORTS. THE KEY RESULTS OF THE THREE SUPPLEMENTAL TASKS INVESTIGATED ARE: THE VELOCITY DURATION PROFILE HAS A SIGNIFICANT EFFECT IN DETERMINING THE OPTIMUM WIND TURBINE DESIGN PARAMETERS AND THE ENERGY GENERATION COST; MODEST INCREASES IN CAPACITY FACTOR CAN BE ACHIEVED WITH SMALL INCREASES IN ENERGY GENERATION COSTS AND CAPITAL COSTS; REINFORCED CONCRETE TOWERS THAT ARE ESTHETICALLY ATTRACTIVE CAN BE DESIGNED AND BUILT AT A COST COMPARABLE TO THOSE FOR STEEL TRUSS TOWERS. THE APPROACH USED, METHOD OF ANALYSIS, ASSUMPTIONS MADE, DESIGN REQUIREMENTS, AND THE RESULTS FOR EACH TASK ARE DISCUSSED IN DETAIL IN THIS REPORT.

76-0284 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. ANALYSIS AND DESIGN.
NTIS, FEBRUARY 1976. 535P.
DOE/NASA/9404-76/2, NASA-CR-134937

THIS REPORT PRESENTS COMPLETE DETAILS OF THE RESULTS OF A PROGRAM TO DEVELOP PRELIMINARY DESIGNS OF LOW POWER (50-500 KW) AND HIGH POWER (500-3000 KW) WIND GENERATOR SYSTEMS WGS) FOR ELECTRIC UTILITY APPLICATIONS. THESE DESIGNS PROVIDE THE BASES FOR DETAIL DESIGN, FABRICATION, AND EXPERIMENTAL DEMONSTRATION TESTING OF THESE UNITS AT SELECTED UTILITY SITES. THE PROGRAM INCLUDED FOUR TASKS: A CONCEPTUAL DESIGN TASK; AN OPTIMIZATION TASK; A PRELIMINARY DESIGN TASK; AND A UTILITY REQUIREMENTS EVALUATION TASK.

76-0285 DESIGN STUDY OF WIND TURBINES, 50 KW--3000 KW, FOR ELECTRIC UTILITY APPLICATIONS.
BLOOMFIELD, CONNECTICUT, KAMAN AEROSPACE CORPORATION, KAMAN AEROSPACE REPORT R-1382, FEBRUARY 1976.

76-0286 DICERTO J J
THE ELECTRIC WISHING WELL: THE SOLUTION TO THE ENERGY CRISIS.
NEW YORK, MACMILLAN PUBLISHING CO., 1976. 317P.

LONG-TERM ENERGY PRODUCTION IS EXAMINED, AND ALTERNATIVES TO THE CONVENTIONAL OIL AND NATURAL GAS SOURCES ARE PRESENTED. TOPICS INCLUDE THE USE OF HYDROGEN AS A FUEL; NUCLEAR, TIDAL, WIND, SOLAR, AND GEOTHERMAL POWER; AND BRIEFLY, MAGNETOHYDRODYNAMICS.

76-0287 DIVONE L V
FEDERAL WIND ENERGY PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.I.1--I.8.
SAND-76-5586

A BRIEF REVIEW OF THE U.S. WIND ENERGY PROGRAM IS PRESENTED.

76-0288 FOLEY W M
FROM DA VINCI TO THE PRESENT -- A REVIEW OF AIRSCREW THEORY FOR HELICOPTERS, PROPELLERS, WINDMILLS, AND ENGINES.
AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, FLUID AND PLASMA DYNAMICS CONFERENCE, 9TH, SAN DIEGO, CALIFORNIA, JULY 14-16, 1976. PAPER 76-367. 13P.

THE DEVELOPMENT OF AIRSCREW THEORY IS SUMMARIZED IN A CONVENIENT PERIODIZATION:INTUITIVE ERA FROM 400 BC TO MID-NINETEENTH CENTURY; THE MOMENTUM THEORY ERA FROM THE MID-NINETEENTH TO THE EARLY TWENTIETH CENTURY; THE CLASSICAL VORTEX WAKE ERA FROM THE EARLY TWENTIETH CENTURY TO CIRCA 1970; AND THE COMPUTER MODELED WAKE ERA FROM CIRCA 1960 TO THE PRESENT. THE MIX OF EXPERIMENTAL AND THEORETICAL METHOD CHARACTERISTIC OF THESE PERIODS IS REVIEWED AND EVALUATED. GREATEST PROGRESS IS SEEN IN THE FLEXIBLE METHODS AVAILABLE WITHIN THE LAST DECADE, WITH PROGRAMS HANDLED BY LARGE DIGITAL COMPUTERS, AND CAPABILITY OF PERFORMANCE PREDICTION. THE VALUE OF APPROXIMATE METHODS, RELYING ON PRESCRIBED EXPERIMENTAL WAKE MODELS, WIND TUNNEL DATA, CASCADE TUNNEL AIRFOIL DATA AND FLOW VISUALIZATION, WHEREVER EVEN COMPUTER CALCULATIONS BECOME EXORBITANTLY CUMBERSOME, IS STRESSED.

76-0289 DONALDSON W L
WIND POWER, FACT OR FANTASY.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.291--II.300.
SAND-76-5586

THE FEASIBILITY OF ECONOMICALLY USING WIND POWER FOR ELECTRIC POWER GENERATION IN THE U.S. IS DISCUSSED.

76-0290 DREES H M
WIND POWERED CYCLOTURBINE AND ITS POTENTIAL.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY, 1ST CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 535.

76-0291 DRUCKER E R
SOLAR POWER PLANT.
U.S. PATENT NO. 3,979,597, SEPTEMBER 7, 1976. 6P.

A SOLAR ENERGY POWERPLANT HAS A GROUP OF TALL, VERTICAL TOWERS OPEN AT BOTH ENDS AND CONTAINING A PLURALITY OF WIND-POWERED IMPELLERS MOUNTED IN VERTICALLY SPACED LOCATIONS WITHIN EACH TOWER, SUCH THAT THERMAL UPDRAFTS IN THE TOWER DRIVES THE IMPELLERS. VERTICALLY SPACED, RADIALLY PROJECTING HEATING CHAMBERS ARE MOUNTED EXTERNALLY ON EACH TOWER AND EACH CHAMBER HAS AN AIR INLET TO ADMIT AMBIENT AIR AND AN AIR OUTLET INTO THE TOWER FOR HEATED AIR. THE HEATED AIR ENTERING THE TOWER FROM THE SOLAR HEATING CHAMBERS ALSO CONTAIN HEAT EXCHANGE TUBES WHICH CONNECT WITH AN

INSULATED WATER RESERVOIR IN THE BASE FOR THE TOWERS.

76-0292 DUBEY M
CONVERSION AND STORAGE OF WIND ENERGY AS NITRATE FERTILIZER.
ERDA CONTRACTORS' REVIEW MEETING ON CHEMICAL ENERGY STORAGE AND HYDROGEN ENERGY SYSTEMS, PROCEEDINGS. NTIS, 1976. P. 83-86.
CONF-761134

76-0293 DUBIN F S
ANALYSIS OF ENERGY USAGE ON LONG ISLAND FROM 1975 TO 1995: THE OPPORTUNITIES TO REDUCE PEAK ELECTRICAL DEMANDS AND ENERGY CONSUMPTION BY ENERGY CONSERVATION, SOLAR ENERGY, WIND ENERGY, AND TOTAL ENERGY SYSTEMS.
NEW YORK, DUBIN-MINDELL-BLOOME ASSOCIATES, 1976. 91P. A CONDENSATION OF A COMPREHENSIVE STUDY DATED OCTOBER 31, 1975, DONE FOR THE DEPARTMENT OF ENVIRONMENTAL CONTROL, COUNTY OF SUFFOLK, NEW YORK.

THE LONG ISLAND LIGHTING COMPANY (LILCO) SERVES LONG ISLAND AND A SMALL SECTION OF QUEENS, NEW YORK, WITH ELECTRICITY AND GAS. THE COMPANY HAS UNDER CONSTRUCTION ONE NUCLEAR-POWERED, 830-MW ELECTRIC GENERATING PLANT, THE SHOREHAM, SCHEDULED TO COME ON-LINE LATE IN 1978; IN ADDITION, LILCO HAS MADE APPLICATION TO CONSTRUCT TWO NEW NUCLEAR PLANTS IN THE TOWN OF RIVERHEAD IN SUFFOLK COUNTY, LONG ISLAND; JAMESPORT I AND JAMESPORT II, EACH WITH A CAPACITY OF 1150 MW ARE PLANNED TO COME ON-LINE IN 1982 AND 1984, RESPECTIVELY. LILCO'S JUSTIFICATION FOR THESE TWO NEW PLANTS IS BASED ON THE SYSTEM REQUIRED TO MEET THE LOADS WHICH, ACCORDING TO THEIR FORECASTS, WILL OCCUR DURING THE PERIOD 1975-1995. THE PROJECTION OF THE PEAK ELECTRIC DEMAND AND THE YEARLY CONSUMPTION OF ELECTRICITY AND THE METHOD OF FORECASTING (EXPONENTIAL SMOOTHING ANALYSIS) BY LILCO ARE ANALYZED. AN INTENSIVE ENERGY CONSERVATION PROGRAM COUPLED WITH A MODEST SOLAR ENERGY SYSTEM FOR DOMESTIC HOT WATER AND SPACE HEATING AND COOLING IS SHOWN TO HAVE THE POTENTIAL OF REDUCING THE NORMAL LOADS TO THE EXTENT THAT NOT ONLY COULD THE JAMESPORT I AND II PLANTS BE CANCELLED, BUT ALSO THAT THE COMPLETION OF THE SHOREHAM PLANT COULD BE DELAYED. THE POTENTIAL OF THE WIND ENERGY AVAILABLE OVER LONG ISLAND IS SHOWN TO EXCEED ALL OF ITS ENERGY REQUIREMENTS FOR THE NEXT TWENTY YEARS. ON-SITE TOTAL ENERGY SYSTEMS AND THE USE OF SOLID WASTE FOR FUEL ARE CITED AS TWO ADDITIONAL MEASURES TO FURTHER REDUCE THE NEED FOR RAW SOURCE ENERGY (FOSSIL FUEL OR NUCLEAR), FOR CENTRAL ELECTRIC GENERATING PLANTS.

76-0294 DUC M
EQUIPMENT FOR UTILIZATION OF WIND ENERGY, PARTICULARLY FOR HEATING OF LIQUIDS.
GERMAN (FRG) PATENT NO. 2,545,951/A/. TO UNICUM S.A., 42 - SAINT-ETIENNE, FRANCE. APRIL 29, 1976. 31P. (IN GERMAN)

A PLANT FOR UTILIZING WIND ENERGY, WHICH IS PARTICULARLY USED FOR HEATING LIQUIDS, IS DESCRIBED. THE WIND TURBINE HAS EITHER A HORIZONTAL OR A VERTICAL AXIS. AN ELECTRIC GENERATOR IS ARRANGED DIRECTLY ON THE AXIS. THE ELECTRIC ENERGY SUPPLIED BY THE GENERATOR IS USED FOR HEATING ELEMENTS ARRANGED IN THE SUPPLY VESSEL OF THE LIQUID. DEPENDING ON THE ENERGY AMOUNT GENERATED, THE LIQUID OF THE HEATING SYSTEM (E.G. CENTRAL HEATING) IS HEATED EITHER PROPORTIONALLY OR COMPLETELY THROUGH THE WIND ENERGY EQUIPMENT. WITH CALM OR LOW WIND, THE LIQUID IS HEATED CONVENTIONALLY BY MEANS OF A NORMAL HEATING SYSTEM.

76-0295 DUFFY R
AN ANALYSIS OF THE FEASIBILITY OF WINDMILLS FOR POWER GENERATION IN NEW YORK STATE.
NTIS, OCTOBER 1976. 136P.
N77-26638, RPI-TA-17

THE POTENTIAL USE OF WIND ENERGY AS A SOURCE OF GENERATING ELECTRIC POWER AS A METHODOLOGY IS DESCRIBED FOR EVALUATING THE ECONOMIC VIABILITY AND ACCEPTABILITY OF WINDMILLS FOR WIND ENERGY CONVERSION IN A LARGE SIZE SUCH AS NEW YORK STATE. THE MINIMUM COST OF ENERGY PRODUCTION FOR A SYSTEM YIELDING HIGH LEVELS OF ENERGY IS DETERMINED. ELEMENTS IN THE EVALUATION INCLUDE: (1) AN ANALYSIS OF RECORDED WIND DATA FROM WHICH AVAILABLE WIND ENERGY LEVELS MAY BE DETERMINED; (2) AN ENGINEERING ANALYSIS OF KNOWN WINDMILL CONCEPTS TO DETERMINE THOSE SPECIFIC WINDMILLS WHICH HAVE THE GREATEST POTENTIAL FOR LARGE SCALE GENERATION OF SYNCHRONOUS AC CURRENT; AND (3) A COUPLING OF THE SELECTED MILLS AND THE AVAILABLE WIND ENERGY PROFILES WITH CAPITAL INVESTMENT AND OPERATING COST INFORMATION TO DETERMINE ISOECONOMIC CONTOUR LINES THROUGHOUT THE STATE.

76-0296 DUGUNDJI J
SOME DYNAMIC PROBLEMS OF ROTATING WINDMILL SYSTEMS.
ADVANCES IN ENGINEERING SCIENCE 2: 493-447, 1976. PAPERS PRESENTED AT THE 13TH ANNUAL MEETING OF THE SOCIETY OF ENGINEERING SCIENCE, HAMPTON, VIRGINIA, NOVEMBER 1-3, 1976. NTIS, 1976.
N77-10265

THE BASIC WHIRL STABILITY OF A ROTATING WINDMILL ON A FLEXIBLE TOWER IS REVIEWED. EFFECTS OF UNBALANCE, GRAVITY FORCE, GYROSCOPIC MOMENTS, AND AERODYNAMICS ARE DISCUSSED. SOME EXPERIMENTAL RESULTS ON A SMALL MODEL WINDMILL ARE GIVEN.

76-0297 ERDA WATCH. NEW TEST SITE SELECTED.
WIND POWER DIG. 1(7): 19, DECEMBER 1976.

THE MUNICIPAL UTILITY IN CLAYTON, NEW MEXICO, HAS BEEN SELECTED TO FIELD TEST A 200 KILOWATT WIND TURBINE GENERATOR FOR ERDA.

76-0298 ENERGY FOR RURAL DEVELOPMENT: RENEWABLE RESOURCES AND ALTERNATIVE TECHNOLOGIES FOR DEVELOPING COUNTRIES.
WASHINGTON, D.C., NATIONAL ACADEMY OF SCIENCES, 1976. 318P.

ENERGY R+D WITH POTENTIAL FOR SMALL-SCALE APPLICATION IS LISTED BY NATION, AND INSTITUTION OR ORGANIZATION, AND CONTACT INFORMATION IS INCLUDED. MANUFACTURERS OF SOLAR HEATING AND COOLING DEVICES AND TERRESTRIAL SOLAR PHOTOVOLTAIC DEVICES ARE TABULATED ALSO. EXTERNAL COMBUSTION ENGINES, THE RANKINE AND STERLING ENGINES, ARE DISCUSSED AS SMALL-SCALE POWER SOURCES FOR DEVELOPING NATIONS. CURRENTLY MANUFACTURED WINDMILL PUMPS AND GENERATORS AND COMMERCIAL DEVELOPERS OF WIND MACHINES ARE LISTED. WINDMILL TOWERS FOR CONSTRUCTION ON THE FARM ARE DESCRIBED. CURRENTLY MANUFACTURED SMALL-SCALE HYDROPOWER MACHINERY IS ILLUSTRATED WITH SPECIFICATIONS. THE HELICAL ROTARY SCREW EXPANDER AND ITS POTENTIAL FOR GEOTHERMAL APPLICATION ARE EXPLAINED.

76-0299 ENERGY RESEARCH AND DEVELOPMENT. NEW ZEALAND ENERGY
NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, AUCKLAND, NEW ZEALAND. NTIS, 1976. 15P.
NP-21435

THE NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE WAS FORMED IN 1974 TO PROMOTE AND SUPPORT ENERGY R AND D IN GOVERNMENT DEPARTMENTS, UNIVERSITIES, RESEARCH ASSOCIATIONS, AND THE PRIVATE SECTOR. THE COMMITTEE ESTABLISHED A SERIES OF PRIORITIES TO ASSIST IT IN DECIDING ON PROJECTS THAT SHOULD BE FUNDED. A CONSORTIUM HAS UNDERTAKEN A STUDY OF THE RAKAIA RIVER TO DETERMINE THE POTENTIAL OF THE RIVER FOR POWER GENERATION AND FOR IRRIGATION. FOUR CONTRACTS HAVE BEEN LET ON INVESTIGATIONS OF SOLAR ENERGY, AND TWO CONTRACTS HAVE BEEN LET ON THE POTENTIAL OF WIND ENERGY DEVELOPMENT. ENERGY DEMAND FROM THE MEAT, PULP, AND PAPER INDUSTRIES IS REPORTED. THE COMMITTEE IS CONCERNED WITH ENERGY POLICY AND WITH A SMALL GROUP CONDUCTING DETAILED STUDIES OF VARIOUS ENERGY SCENARIOS. THE COMMITTEE ADMINISTERS THE ENERGY RESEARCH THAT IS CONDUCTED UNDER THE JOINT US/NZ AGREEMENT FOR SCIENTIFIC AND TECHNOLOGICAL COOPERATION; SEVERAL JOINT PROJECTS ARE UNDERWAY, MAINLY ON GEOTHERMAL ENERGY.

76-0300 ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
SEMIANNUAL EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, FALMOUTH, MASSACHUSETTS, OCTOBER 6, 1976. PROCEEDINGS. P.5.1--5.41.
EPRI-ER-371-SR

THE FOLLOWING FOUR TOPICS ARE DISCUSSED: REFERENCE PLANT DESIGNS; REFERENCE SITE SELECTION; SOLAR THERMAL ENVIRONMENTAL ASSESSMENT; AND COST-EFFECTIVENESS ANALYSIS.

76-0301 ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
SEMIANNUAL EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, FALMOUTH, MASSACHUSETTS, OCTOBER 6, 1976. P.9.1--9.53.
EPRI-ER-283-SR(VOL. 2)

THE ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS IS DISCUSSED FOR THE FOLLOWING SOLAR ENERGY CONCEPTS: (1) SOLAR THERMAL, A CONCEPT BASED UPON CONCENTRATION OF THE THERMAL ENERGY AVAILABLE FROM DIRECT SOLAR INSOLATION FOR USE AS A HEAT SOURCE IN A THERMODYNAMIC CYCLE; (2)

PHOTOVOLTAIC, A CONCEPT BASED UPON DIRECT CONVERSION OF SOLAR INSOLATION (DIRECT AND DIFFUSE) TO ELECTRICITY UTILIZING SOLAR CELLS WHICH EXHIBIT PHOTOVOLTAIC CHARACTERISTICS; (3) WIND, A CONCEPT BASED UPON CONVERSION OF THE KINETIC ENERGY AVAILABLE IN THE MOVING ATMOSPHERE INTO ROTATING MECHANICAL ENERGY TO TURN ELECTRIC GENERATORS; (4) OCEAN THERMAL, A CONCEPT BASED UPON THE TEMPERATURE DIFFERENCE THAT EXISTS BETWEEN OCEAN SURFACE WATER AND DEEP WATERS; AND (5) PHOTOPRODUCTION, A CONCEPT BASED UPON THE UTILIZATION OF BIOMASS (VEGETATION) FORMED BY PHOTOSYNTHESIS AS A SOURCE OF ENERGY.

76-0302 ERDA, NASA SELECT TEAM TO BUILD LARGEST WINDMILL IN HISTORY.
SPACE WORLD M-11-155: 30-31, NOVEMBER 1976.

76-0303 FANUCCI J B, WALTERS R E
INNOVATIVE WIND MACHINES; THEORETICAL PERFORMANCE OF THE VERTICAL AXIS WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.III.61--III.96.
SAND-76-5586

THE PURPOSE OF THE PROJECT IS TO THEORETICALLY AND EXPERIMENTALLY STUDY TWO WIND MACHINE CONCEPTS. THE FIRST CONCEPT IS THAT OF A VORTEX CONCENTRATOR, I.E., A VERTICAL AIRFOIL IS USED TO FORM A STRONG WING TIP VORTEX, AND THE CONCENTRATED ENERGY IN THE VORTEX IS HARNESSED BY A RELATIVELY SMALL, HIGH-SPEED TURBINE LOCATED DOWNSTREAM OF THE WING TIP. THE SECOND MACHINE IS A VERTICAL-AXIS STRAIGHT-BLADED TURBINE WHICH UTILIZES HIGH-LIFT, VARIABLE ANGLE-OF-INCIDENCE CIRCULATION-CONTROLLED AIRFOILS TO FORM THE BLADES.

76-0304 FERNANDO A D N, SMULDERS P T
WIND ENERGY UTILIZATION IN SRI LANKA: POTENTIALITIES AND CONSTRAINTS.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE WIND ENERGY DEVELOPING COUNTRIES, DHV, CONSULTING ENGINEERS; IN COLLABORATION WITH THE NETHERLANDS ALUMNI ASSOCIATION OF SRI LANKA, COLOMBO, SRI LANKA, MAY 1976. 18P.

AFTER GIVING A BRIEF HISTORICAL REVIEW OF THE USE OF WIND ENERGY IN SRI LANKA, THE AUTHOR DISCUSSES THE AVAILABLE METEOROLOGICAL DATA. WATER RESOURCES IN TERMS OF GROUND WATER POTENTIAL, RAINFALL, SEEPAGE AND WATERDEPTH ARE GIVEN. WATERNEEDS FOR PURPOSE OF DRAINAGE, IRRIGATION, DAIRY FARMING ARE BRIEFLY ANALYZED. WITH THIS INFORMATION POSSIBLE AREAS WHERE WIND ENERGY COULD BE UTILIZED FOR WATER PUMPING ARE SUGGESTED. THE REPORT ALSO MENTIONS THE APPLICATION OF ELECTRICITY GENERATION. MAPS ARE INCLUDED.

76-0305 FINAL REPORT/ENERGY CONSERVATION STATION. THE NEW ENGLAND REGIONAL COMMISSION, CONTRACT NUMBER 10530670.
PROVIDENCE, RHODE ISLAND, REDE CORPORATION, 1976.

THIS NEW ENGLAND ENERGY CONSERVATION PROJECT EMPLOYED WORKING PROTOTYPES THAT DEMONSTRATED PRACTICAL ALTERNATIVE ENERGY STRATEGIES IN FOUR SPECIFIC AREAS: (1) SOLAR RETROFITTING OF BUILDINGS; (2) INNOVATIVE WIND GENERATORS; (3) ENERGY STORAGE SYSTEMS; AND (4) TASK-ORIENTED LIGHTING. ORIGINALLY DESIGNED TO BE DEMONSTRATED ON THE STILLMAN WHITE BRASS FOUNDRY RESTORATION IN DOWNTOWN PROVIDENCE, R.I., SUBSEQUENT INSTALLATION AND TESTING WAS COMPLETED AT THE FAMILY EDUCATION CENTER OF THE UNITED AUTO WORKERS INTERNATIONAL UNION IN NORTHERN MICHIGAN. THE REPORT CONCLUDES THAT RETROFITTING OF CERTAIN PUBLIC AND PRIVATELY OWNED FACILITIES IS COST EFFECTIVE AT THE PRESENT TIME; THAT THE NEW ENGLAND STATES SHOULD TAKE AN ACTIVE ROLE TO EXPOSE THE GENERAL PUBLIC TO SOLAR DEVICES AT PUBLIC FACILITIES, SO AS TO ACCELERATE MARKET ACCEPTANCE OF SOLAR WATER HEATING; THAT WIND GENERATORS ARE PRACTICAL AS SUPPLEMENTAL ELECTRIC-GENERATING SOURCES; THAT ENERGY STORAGE FROM RENEWABLE RESOURCES IS VIABLE; AND THAT TASK-ORIENTED LIGHTING CAN REDUCE ELECTRIC LIGHT USE BY AS MUCH AS 50 PERCENT OF PRESENT CONSUMPTION. THE REPORT SUGGESTS THAT NEW EMPLOYMENT CAN BE CREATED FOR UNSKILLED WORKERS IN THE RELAMPING OF STATE-OWNED PROPERTIES, AND THAT EMPLOYMENT CAN BE EXPANDED FOR ROOFERS, CARPENTERS, PLUMBERS, AND GENERAL CONTRACTORS IN THE RETROFIT AREAS DEMONSTRATED, AND FOR METAL WORKERS, PLASTICS FABRICATORS, ELECTRICAL WORKERS, AND INSTALLERS IN THE WIND-CONVERSION INDUSTRIES. THE STATEMENTS, FINDINGS, AND RECOMMENDATIONS CONTAINED IN THE REPORT ARE SOLELY THOSE OF THE RESEARCH AND DESIGN INSTITUTE, AND DO NOT NECESSARILY

REFLECT THE VIEWS OF THE NEW ENGLAND REGIONAL COMMISSION.

76-0306 FINE K
RENEWABLE ENERGY HANDBOOK.
TORONTO, ENERGY PROBE, 1976. 61P.

THE POTENTIAL FOR RENEWABLE ENERGY USE IN CANADA IS EXAMINED. IT IS POINTED OUT THAT CANADA CAN CHOOSE TO BEGIN TO DIVERSIFY ITS ENERGY SUPPLY NOW, MOVING RAPIDLY AND SMOOTHLY TOWARDS AN EFFICIENT ENERGY SOCIETY BASED ON RENEWABLE ENERGY SOURCES; OR, IT CAN CONTINUE ON ITS PRESENT COURSE AND FACE THE POSSIBILITY OF BEING FORCED BY NECESSITY TO MAKE A LATER TRANSITION TO RENEWABLE SOURCES, PROBABLY WITH A GREAT DEAL OF ECONOMIC AND POLITICAL DISRUPTION. THE HANDBOOK BEGINS WITH A DISCUSSION ON MAJOR ISSUES AND OPTIONS AVAILABLE. THE SECOND SECTION DEALS WITH THE TECHNOLOGY, APPLICATIONS AND COSTS OF DIRECT SOLAR ENERGY UTILIZATION, SOLAR THERMAL ELECTRICITY GENERATION, PHOTOVOLTAIC CONVERSION, WIND ENERGY, BIOMASS ENERGY, HEAT PUMPS, AND ENERGY STORAGE. SECTION THREE DISCUSSES HOW RENEWABLE ENERGY MIGHT REALISTICALLY SUPPLY CANADA'S ENERGY REQUIREMENTS WITHIN A REASONABLE PERIOD OF TIME. SOME ISSUES ON HOW GOVERNMENT, INDUSTRY, AND THE INDIVIDUAL MAY BECOME INVOLVED TO MAKE THIS HAPPEN ARE SUGGESTED. A LIST OF RESOURCE PEOPLE AND RENEWABLE ENERGY BUSINESSES IS PROVIDED IN THE LAST SECTION. A RECOMMENDED READING LIST AND BIBLIOGRAPHY COMPLETE THE HANDBOOK.

76-0307 FISCHER A
WIND ENERGY GENERATION FOR ELECTRIC POWER PRODUCTION, PRELIMINARY STUDIES. PART 1.
NTIS, MARCH 1976. 18P. (IN SWEDISH)
STU-75-3260

STUDIES OF WIND POWER GENERATION DONE BY SAAB-SCANIA DURING 1975 ARE DESCRIBED. THE PROJECT DEALS WITH GENERATION OF ELECTRICITY FOR DELIVERY TO THE TRANSMISSION SYSTEM. BOTH PLANTS WITH HORIZONTAL AXIS AND PLANTS WITH VERTICAL AXIS HAVE BEEN STUDIED. A PROJECTED PILOT PLANT WITH A ROTOR OF 18 METERS AND AN EFFECT OF 50 KW AT 10 M/S WIND VELOCITY IS DESCRIBED. SUGGESTIONS ARE MADE FOR A CONTINUATION OF THE PROJECT.

76-0308 FLYING IN THE FACE OF THE WIND.
CONSULT. ENG. (LONDON) 40(11): 42-43, NOVEMBER 1976.

THE PRACTICAL APPROACH TO BUILDING A WINDMILL IN DENMARK IS DISCUSSED TOGETHER WITH A PROJECT TO BUILD A 54 M DIAM, 2 MW WINDMILL, WHICH WILL GENERATE ALL THE COMMUNITY'S ELECTRICITY AND HAVE SPARE CAPACITY TO FEED THE NATIONAL GRID.

76-0309 FOLEY G, NASSIM C, LEACH G
THE ENERGY QUESTION.
NEW YORK, PENGUIN BOOKS, 1976. 344P.

THIS SURVEY OF THE WORLD'S ENERGY RESOURCES AND THEIR POTENTIAL FOR DEVELOPMENT DEMONSTRATES THE INEXTRICABLE LINKAGE BETWEEN INDUSTRIAL CIVILIZATION AND ENERGY CONSUMPTION. APPROACHES TO ENERGY DEMAND AND CONSUMPTION FORECASTING, ENERGY CONVERSION PROCESSES, AND THE NEED TO CONSERVE ENERGY AND PLAN FOR SCARCITY ARE ALSO ADDRESSED.

76-0310 FORBES R B
GEOTHERMAL ENERGY AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA. ALASKAN GEOTHERMAL AND WIND POWER RESOURCES PLANNING CONFERENCE, ANCHORAGE, ALASKA, JULY 8-9, 1975. CONFERENCE PROCEEDINGS. NTIS, APRIL 1976. 256P.
PB-261521

THE ALASKAN ENERGY PROBLEMS THAT CAN BE ALLEVIATED THROUGH WIND AND GEOTHERMAL RESOURCES ARE DEFINED, AND RECOMMENDED PLANS FOR THE INITATION OF STATE AND FEDERAL PROGRAMS ARE PRESENTED. WORKING GROUPS WERE FORMED IN THE FOLLOWING AREAS: AGRICULTURE, ELECTRIC POWER, FISHERIES AND AGRICULTURE, GEOTHERMAL RESOURCE RESEARCH AND DEVELOPMENT, SPACE HEATING AND INDUSTRIAL APPLICATION, AND WIND POWER DEVELOPMENT AND APPLICATIONS.

76-0311 FOREMAN K M, GILBERT B, OMAN R A
DIFFUSER AUGMENTATION OF WIND TURBINES.
NTIS, 1976. 13P.
CONF-760842-6

WIND TUNNEL INVESTIGATION OF MODELS OF TWO DIFFUSER DESIGN CONCEPTS IS DIRECTED TOWARD UNCONVENTIONAL, VERY SHORT, COST-EFFECTIVE, CONFIGURATIONS. ONE APPROACH USES THE ENERGETIC EXTERNAL WIND TO PREVENT SEPARATION OF THE DIFFUSER'S INTERNAL BOUNDARY LAYER. ANOTHER METHOD USED HIGH LIFT AIRFOIL CONTOURS FOR THE DIFFUSER WALL SHAPE. DIFFUSER MODEL TESTS HAVE INDICATED ALMOST A DOUBLING OF WIND POWER EXTRACTION CAPABILITY FOR DAWTS COMPARED TO CONVENTIONAL TURBINES. ECONOMIC STUDIES OF DAWTS HAVE USED THESE TEST DATA AND RECENT (1975) COST PROJECTIONS OF WIND TURBINES WITH DIAMETER. THE SPECIFIC POWER COSTS ($/KW) FOR A REALISTIC DAWT CONFIGURATION ARE FOUND TO BE LOWER THAN CONVENTIONAL WIND TURBINES FOR VERY LARGE SIZE ROTORS, ABOVE 50 METERS DIAMETER, AND FOR ROTOR DIAMETERS LESS THAN ABOUT 20 METERS. THE COST-TO-BENEFIT ASSESSMENT FOR INTERMEDIATE SIZE ROTORS IS AFFECTED BY THE UNCERTAINTY BAND OF COST FOR THESE ROTOR SIZES.

76-0312 FOX W
THE MILL.
TORONTO, MCCLELLAND + STEWART, 1976. 224P.

76-0313 FRAENKEL P L
FOOD FROM WINDMILLS.
WIND POWER DIG. 1(7): 50-55, DECEMBER 1976.

THIS REPORT DESCRIBES WORK DONE TO IMPROVE AND EVALUATE A SERIES OF WINDMILLS DEVELOPED FOR IRRIGATING SMALL PLOTS OF LAND ON THE BANKS OF THE OMO RIVER, USING RIVER WATER.

76-0314 FRAENKEL P L
VERTICAL AXIS WIND-MACHINES.
APPROP. TECHNOL. 3(2): 17-19, 1976.

MENTIONED ARE THE SAVONIUS- AND DARRIEUS-ROTORS. THE DARRIEUS-ROTOR IS THE MOST PROMISING ONE THOUGH SOME CONSTRUCTIONAL PROBLEMS SHOULD BE SOLVED BEFORE IT CAN LEAVE THE WIND TUNNEL PHASE.

76-0315 FRANK W
AUSTRIAN ENERGY.
OESTERR. Z. ELEKTRIZITAETSWIRT. 29(5): 163-166, MAY 1976. (IN GERMAN)

THE AUTHOR STUDIES THE NON-RENEWABLE FOSSIL FUEL RESERVES (INCLUDING URANIUM) AS WELL AS THE HYDRO POWER RESOURCES, THE RESERVES OF BIOLOGICAL WASTE, GEOTHERMAL ENERGY AND SOLAR AND WIND ENERGY AS RENEWABLE FORMS OF ENERGY.

76-0316 FREE ENERGY--AT A COST: ELECTRICITY BY WIND ENERGY CONVERSION.
INT. CONSTR. 15(11): 40-41, 43, 45, 47-48, NOVEMBER 1976.

76-0317 FREEMAN B E
A NEW WIND ENERGY SITE SELECTION METHODOLOGY. FINAL REPORT. 17 MARCH 1975-16 APRIL 1976.
NTIS, MAY 1976. 236P.
PB-282834, NSF/RA-761229

THE OBJECTIVES OF THIS STUDY WERE TO DEVELOP SIMULATION METHODS TO MAKE THE SITING OF WIND ENERGY DEVICES MORE ACCURATE, TO IDENTIFY AND OBTAIN DATA ON METEOROLOGICAL FIELD EXPERIMENTS, AND TO BEGIN THE PROCESS OF EVALUATION OF COMPUTER CODES BY THE COMPARISON OF CALCULATIONS WITH FIELD DATA. ONE OF THE MAJOR TASKS ACCOMPLISHED WAS THE ADAPTATION, DEVELOPMENT, AND INITIAL TESTING OF METEOROLOGICAL SIMULATION MODELS. THE MESOSCALE COMPUTER CODES (SIGMET) WERE EXTENSIVELY MODIFIED TO BROADEN THE PHYSICAL EFFECTS TO BE TAKEN INTO ACCOUNT, AND A MICROSCALE COMPUTER CODE (MICMET) WAS SELECTED, MODIFIED, AND TESTED.

76-0318 FREEMAN B E
DISCUSSION OF THE ROLE OF METEOROLOGICAL MODELING IN SELECTING WIND ENERGY SITES.
NTIS, JUNE 176.
PB-282975, NSF/RA-761231

A DISCUSSION OF SEVERAL ASPECTS OF THE METEOROLOGY OF WIND ENERGY SITES AND OF THE MODELS WHICH CAN BE APPLIED TO LOCATING WINDY SITES IS PRESENTED. THE TOPICS CONSIDERED INCLUDE THE PHYSIC OF NEAR SURFACE

WINDS, CLASSES OF WIND MODELS, TESTS OF WIND SITE MODELS, METHODOLOGY OF WIND SITE SELECTION, AND COST-BENEFITS OF SITE SELECTION.

76-0319 FREEMAN B E, PATNAIK P C, PHILLIPS G T
DEVELOPMENT OF A WIND ENERGY SITE SELECTION METHODOLOGY. PROGRESS REPORT, MAY 3--DECEMBER 3, 1976.
NTIS, 1976. 152P.
RLO/2440-76/4

THE COMPONENTS OF THE SITE SELECTION METHODOLOGY, AND THE METHOD OF EMPIRICAL ORTHOGONAL EIGENFUNCTIONS FOR THE IDENTIFICATION OF RECURRENT METEOROLOGICAL PATTERNS IN THE CLIMATOLOGICAL DATA ARE DESCRIBED. SEVERAL FASTER METEOROLOGICAL COMPUTER CODES ARE COMPARED. THE FURTHER DEVELOPMENT AND TESTING OF THE PRIMITIVE EQUATION MODELS (THE SIGMET FAMILY OF CODES) ARE DESCRIBED. THIS CONSISTS OF DEVELOPMENTS WHICH WILL PERMIT CALCULATIONS TO BE PERFORMED MORE RAPIDLY (THROUGH PARTIAL IMPLICITIZATION) AND MORE ACCURATELY (THROUGH IMPROVED PHYSICAL MODELS).

76-0320 FREEMAN B E, TAFT J R
MATHEMATICAL MODELING OF TOPOGRAPHIC EFFECTS OF WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, U.K., DEPARTMENT 7, 1976. NTIS, APRIL 1976. 26P.
BNWL-SA-5935, CONF-760909-3

IN THE BASIC WIND CHARACTERISTICS ASSESSMENT PROCEDURE A NEW STEP IS INCORPORATED TO OVERCOME ITS MOST SERIOUS DEFICIENCIES. THIS STEP EMPLOYS MATHEMATICAL MODEL-BASED METEOROLOGICAL PREDICTION TOOLS. WITH THEM CLIMATOLOGICAL DATA FROM WEATHER STATIONS IN THE REGION ARE USED TO INFER CLIMATOLOGICAL DATA AT THE UNMEASURED LOCATIONS WITHIN THE REGION. METEOROLOGICAL PHENOMENA TAKING PLACE IN REGIONS COMPARABLE TO THE DISTANCE BETWEEN SYNOPTIC WEATHER STATIONS (APPROXIMATELY 200 KM) AND IN THE IMMEDIATE VICINITY OF THE WINDMILL SITE (APPROXIMATELY 1 KM) ARE CONSIDERED. COMPUTER CODES WERE DEVELOPED FOR EACH OF THESE REGIMES, AND CALCULATIONS OF WIND FLOW OVER COMPLEX TERRAIN HAVE BEEN PERFORMED. RESULTS OF SOME OF THESE WIND CALCULATIONS ARE PRESENTED, ILLUSTRATING THE EFFECTS OF TERRAIN ON WIND ENERGY POTENTIAL.

76-0321 GEOTHERMAL AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA.
PROCEEDINGS OF A CONFERENCE HELD IN ANCHORAGE, ALASKA, JULY 8-9, 1975.
ANCHORAGE, FORBES, R.B., ALASKA STATE ENERGY OFFICE, 1976. 249P.
GEOTHERMAL AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA.
ANCHORAGE, ALASKA, JULY 8-9, 1975.

THE REPORT ATTEMPTS TO DEFINE ALASKA ENERGY PROBLEMS THAT CAN BE ALLEVIATED THROUGH THE EFFICIENT USE OF WIND POWER AND GEOTHERMAL RESOURCES, AND TO PRESENT RECOMMENDED SHORT- AND LONG-RANGE PLANS FOR THE INITIATION OF STATE AND FEDERAL PROGRAMS IN THE MORE PROMISING AREAS. AFTER THE INITIAL CHAPTER, ALASKA AND THE ENERGY CRUNCH, THE CHAPTERS FOLLOWING ARE: ENERGY ECONOMICS; ALASKA'S GEOTHERMAL POTENTIAL; GEOTHERMAL RESOURCE APPLICATIONS; SPACE HEATING AND INDUSTRIAL APPLICATIONS; ENVIRONMENTAL HAZARDS AND PROTECTION; WIND POWER POTENTIAL OF ALASKA; POWER AND ENERGY PRODUCTIVITY OF SMALL WIND-MILLS IN ALASKA; WIND POWER APPLICATIONS; ALASKAN AGRICULTURE AND THE ENERGY PROBLEM; FISHERIES AND AQUACULTURE; AND CONCLUSIONS AND RECOMMENDATIONS. MUCH ADDITIONAL INFORMATION ON ESKIMO VILLAGES, GEOTHERMAL SPRINGS, AND DEMONSTRATION PROJECTS IS GIVEN IN SEVEN APPENDIXES.

76-0322 GILMORE E
WIND ENERGY: VALUE AND FUTURE IMPACT ON TEXAS.
PRESENTED AT TEXAS ENERGY FORECAST CONFERENCE, HOUSTON, MARCH 15-16, 1976. 7P.

THE WIND POWER POTENTIAL FOR TEXAS HAS BEEN ESTIMATED TO BE ABOUT 250,000 MW, OR ABOUT 10 TIMES THE AVERAGE OF ELECTRICITY GENERATED IN THE STATE. THE IMPACT OF WIND ENERGY DEPENDS ON THE PHILOSOPHY OF ALTERNATIVE ENERGY. IT IS NOT A QUESTION OF AVAILABLE WIND ENERGY OR NEED FOR A SCIENTIFIC OR TECHNOLOGICAL BREAKTHROUGH, BUT A QUESTION OF HOW MUCH EVERYONE IS WILLING TO PAY FOR ENERGY NOW AND IN THE FUTURE. THE PRICE INCLUDES THE EFFECT ON THE ENVIRONMENT.

76-0323 GLASGOW J C, LINSCOTT B S
EARLY OPERATION EXPERIENCE ON THE ERDA/NASA 100 KW WIND TURBINE.
NTIS, SEPTEMBER 1976. 28P.

N77-10640, NASA-TM-X-71601

AS PART OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) WIND-ENERGY PROGRAM, NASA LEWIS RESEARCH CENTER IS TESTING AN EXPERIMENTAL 100-KW WIND TURBINE AT SANDUSKY, OHIO. ROTOR-BLADE AND DRIVE-SHAFT LOADS AND TOWER DEFLECTION WERE MEASURED DURING OPERATION OF THE WIND TURBINE AT RATED RPM. THE BLADE LOADS MEASURED ARE HIGHER THAN ANTICIPATED. PRELIMINARY RESULTS INDICATE THAT AIR-FLOW BLOCKAGE BY THE TOWER STRUCTURE PROBABLY CAUSES THE HIGH ROTOR-BLADE-BENDING MOMENTS.

76-0324 GOLDSMITH M W
NEW ENERGY SOURCES: DREAMS AND PROMISES.
FRAMINGHAM, MASSACHUSETTS, ENERGY RESEARCH GROUP, MARCH 1, 1976. 35P.

A SHORT SECTION ON WIND POWER IS INCLUDED IN THIS PAMPHLET.

76-0325 GOVINDA RAJU S P, NARAHARI RAO K, NARASHIMA R
SOME WINDMILL ROTORS SUITABLE FOR USE IN A RURAL ENVIRONMENT.
BANGALORE, INDIA, INDIAN INSTITUTE OF SCIENCE, DEPARTMENT OF AERONAUTICAL ENGINEERING, REP. 76 FM 1, JANUARY 1976. 15P.

AS PART OF A PROJECT FOR ASTRA ON WINDMILLS SUITABLE FOR FABRICATION AND USE IN INDIAN RURAL AREAS, FOUR ROTORS WERE TESTED IN A SMALL WIND TUNNEL. BASED ON THE RESULTS OF THESE TESTS, A SMALL WINDMILL USING SAILS FOR THE ROTOR SURFACES WAS FABRICATED AND TESTED. THIS REPORT SUMMARISES THE RESULTS OBTAINED TO DATE AND DESCRIBES A DESIGN THAT APPEARS PROMISING IN THE LIGHT OF THE EXPERIMENTS.

76-0326 GRAVEL M
ENERGY: A RADICAL REDIRECTION.
J. ENERGY DEV. 1: 191-200, SPRING 1976.

SUITABLE APPROACHES FOR A NATIONAL ENERGY POLICY ARE DISCUSSED, TAKING INTO ACCOUNT THE GOAL OF ENERGY SELF-SUFFICIENCY FOR THE U.S. CURRENT COMMITMENTS IN REGARD TO ENERGY POLICY ARE CRITICALLY EXAMINED. IT IS CONCLUDED THAT THE PREFERENTIAL TREATMENT OF THE BREEDER REACTOR IN THE ALLOCATION OF FUNDS AT THE EXPENSE OF SOLAR ENERGY OPTIONS CANNOT BE JUSTIFIED. THE PROPOSAL IS MADE TO PLACE GREATER EMPHASIS ON THE DEVELOPMENT OF APPROACHES FOR THE UTILIZATION OF SOLAR ENERGY. ATTENTION IS GIVEN TO SOLAR HEATING AND COOLING OF BUILDINGS, WIND ENERGY, AND BIOCONVERSION TO FUELS. DIFFICULTIES CONCERNING A USE OF SOLAR CELLS ARE RELATED TO THEIR HIGH PRICE. IT IS RECOMMENDED TO PROVIDE GOVERNMENT SUPPORT IN ASSURING A MARKET WHICH WOULD MAKE A LOWERING OF THE PRODUCTION COSTS POSSIBLE.

76-0327 GRAYBILL C L
WIND ENERGY CONVERSION DEVICE.
U.S. PATENT NO. 3,995,170, NOVEMBER 30, 1976. 8P.

A WIND ENERGY CONVERSION DEVICE FOR CONVERTING DIRECTIONAL WIND FORCE TO TORQUE ALONG ON A VERTICAL ROTATIONAL AXIS IS DESCRIBED. THE DEVICE INCLUDES A PLURALITY OF FLEXIBLE VANES MOUNTED TO A FRAMEWORK FOR ROTATION THEREWITH ABOUT A VERTICAL AXIS. THE VANES ARE MOUNTED TO UPRIGHT POSTS ON THE FRAMEWORK. AXIAL VANE SIDE EDGES EXTEND TO OPPOSITE RADIAL SIDES OF THE POSTS AND ARE CONNECTED IN A SPECIFIC MANNER TO THE FRAME IN ORDER TO PRODUCE A POSITIVE EFFECT ON ROTATION OF THE DEVICE IN A PRESCRIBED DIRECTION, IN RESPONSE TO WIND CURRENTS.

76-0328 GRIMMER D
A LOW-COST METHOD OF CONSTRUCTING DARRIEUS BLADES.
WIND POWER DIG. 1(6): 31-34, SEPTEMBER 1976.

DESCRIBED ARE DARRIEUS ROTOR BLADES MADE OF A MILD STEEL STRIP BENT AS A TROPOSKIEN, ON WHICH IS GLUED EXPANDABLE HONEYCOMB PAPER CUT IN THE RIGHT CURVED AIRFOIL. THE PAPER HONEYCOMB IS WATER-PROOFED AND COVERED WITH A THIN OUTERSKIN (DACRON POLYESTER OR FIBERGLASS).

76-0329 GUIZZI G L
(POTENTIALITIES AND LIMITATIONS OF THE UTILIZATION OF WIND MACHINES).
CONFERENZA LAXIALE DI INGEGNERIA AMBIENTALE, 1ST, ROME, APRIL 2, 1976.
INGEGNERIA, P. 265-274, SEPTEMBER-OCTOBER, 1976. (IN ITALIAN)

THE ARTICLE REVIEWS ECONOMIC AND TECHNOLOGICAL EXPLOITATION OF WIND POWER

IN THE PAST AND THE SITUATION FAVORING IT, AND SURVEYS THE CURRENT OUTLOOK FOR WIDE-SCALE UTILIZATION OF WIND POWER, TAKING A DIM VIEW OF THE PROSPECTS EXCEPT FOR PUMPING OF WATER FROM DEEP WELLS WHERE IT IS COMPETITIVE WITH OTHER POWER SOURCES. THE HIGH COST AND SHORT LIFE OF THE BATTERIES NEEDED TO STORE ENERGY DERIVED FROM WIND AND RELEASE IT ON DEMAND IS SEEN AS THE MAJOR OBSTACLE, ALONG WITH THE LOW ENERGY CONCENTRATION AND IRREGULARITY IN MAGNITUDE, DIRECTION, AND VELOCITY. PUMPING WATER AS PART OF A TURBINE SYSTEM, AND USE AS AUXILIARY POWER SOURCE IN VEHICLES POWERED BY OTHER SOURCES, ARE MENTIONED. LARGE-SCALE WIND POWER FARMS ARE VIEWED AS NOT ONLY NONCOMPETITIVE, BUT POSSIBLY CONDUCIVE TO CLIMATIC "POLLUTION" BY SLOWING DOWN AND DISTRIBUTING WIND CURRENTS AND PATTERNS.

76-0330 HAM N D
AEROELASTIC ANALYSIS OF THE TROPOSKIEN-TYPE WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.185--II.204.
SAND-76-5586

AN AEROELASTIC ANALYSIS OF THE STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF TROPOSKIEN-TYPE BLADES IS PRESENTED WITH A VIEW TO DETERMINE THE CAUSE OF THESE VIBRATIONS AND A MEANS OF SUPPRESSING THEM.

76-0331 HARDY D M
WIND POWER STUDIES: FIELD MEASUREMENT PRIORITIES FOR NUMERICAL ANALYSIS OF WIND ENERGY. PROGRESS REPORT. APRIL-JUNE 1976.
NTIS, JUNE 15, 1976.
UCRL-50034-76-3

RESULTS OF INITIAL NUMERICAL STUDIES AND THEIR ROLE IN PLANNING THE JULY-AUGUST 1976 FIELD PROGRAM ARE PRESENTED. THE ACQUISITION, CALIBRATION, AND DEPLOYMENT OF METEOROLOGICAL INSTRUMENTS FOR THE FIELD PROGRAM ARE REVIEWED.

76-0332 HARDY D M
WIND POWER STUDIES: REGIONAL WIND ENERGY MEASUREMENTS. PROGRESS REPORT, JULY-SEPTEMBER 1976.
NTIS, NOVEMBER 1, 1976. 12P.
UCRL-50034-76-4

THIS REPORT DISCUSSES THE WIND POWER FIELD MEASUREMENT PROGRAM WHICH IS BEING CONDUCTED IN CONJUNCTION WITH NUMERICAL ANALYSES OF REGIONAL WIND ENERGY. EARLY EXAMPLES OF DATA COLLECTED IN THE PROGRAM ARE GIVEN, INCLUDING DATA CONFIRMING THE EXISTENCE OF A BROAD AREA OF HIGH WIND SPEEDS WHICH WERE PREDICTED IN PREVIOUS NUMERICAL ANALYSES. THE MEASUREMENT PROGRAM IS DESCRIBED, AND PLANS FOR FURTHER NUMERICAL ANALYSIS AND THE CONTINUATION OF THE MEASUREMENT PROGRAM ARE DISCUSSED.

76-0333 HARTEL R W
WIND-POWERED AERATION FOR REMOTE LOCATIONS. M.S. THESIS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, FALL 1976. 103P.

THE OBJECTIVES OF THIS RESEARCH WERE TO INVESTIGATE THE USE OF WIND-POWERED AERATORS (WPA'S) AND TO FURTHER DEVELOP THE DESIGN. THESE WPA'S WERE STUDIED FOR USE IN INCREASING OXYGEN LEVELS IN LAKES TO PREVENT WINTERKILL AND IN SEWAGE LAGOONS TO INCREASE LAGOON CAPACITY. THE WPA CONVERTS THE ENERGY IN THE WIND INTO COMPRESSED AIR WHICH IS FORCED TO EXIT AT THE BOTTOM OF THE LAKE. THESE AIR BUBBLES CAUSE CIRCULATION WHICH BRINGS THE WARMER WATER AT THE BOTTOM OF THE LAKE IN CONTACT WITH THE ICE. A HOLE IS MELTED IN THE ICE THROUGH WHICH OXYGEN FROM THE ATMOSPHERE IS TRANSFERRED. THREE DIFFERENT WPA'S WERE INSTALLED AT DIFFERENT SITES. THESE SYSTEMS WERE TESTED AND EVALUATED. THE RESULTS OF THIS WORK SHOW THAT THESE SYSTEMS WORKED SATISFACTORILY BUT THAT CERTAIN IMPROVEMENTS IN DESIGN MUST BE MADE TO INCREASE THE EFFICIENCY OF THE WPA. FROM THE EXPERIENCE GAINED IN STUDYING THESE SYSTEMS A NEW PROTOTYPE IS DESIGNED. IN ADDITION TO THE STUDY OF THE MECHANICS OF THE WPA, PRELIMINARY RESEARCH WAS PERFORMED CONCERNING TWO-PHASE AIR-BUBBLE FLOW. RESEARCH OF THIS NATURE IS NEEDED FOR INCREASING THE EFFICIENCY OF THE WPA BY DETERMINING THE OPTIMUM BUBBLE FLOW PARAMETERS. FROM THIS RESEARCH ON TWO-PHASE AIR-BUBBLE FLOW, ANOTHER EXPERIMENT IS RECOMMENDED WHICH DETERMINES THE HEAT TRANSFER CHARACTERISTICS OF THE AIR-BUBBLE FLOW AND INDUCED CIRCULATION.

76-0334 HAWRALEK J, RACHUK T, BARLISHEN J
WIND POWER IN ALBERTA.
ALBERTA RESEARCH COUNCIL INF. SER. NO. 70, SEPTEMBER 1976. 118P.

THIS MANUAL WAS PREPARED IN RESPONSE TO A GROWING INTEREST IN THE DOMESTIC USE OF WIND POWER AS AN ENVIRONMENTALLY ATTRACTIVE ENERGY SOURCE. IT PROVIDES FACTUAL INFORMATION ON EQUIPMENT, CONSTRUCTION, OPERATION AND COSTS. OTHER TOPICS COVERED INCLUDE A BRIEF HISTORY OF WIND MACHINES AND CURRENT RESEARCH BEING UNDERTAKEN IN CANADA; THE BASIC STRUCTURE AND OPERATION OF WIND MACHINES, INCLUDING WIND PUMPS AND AEROGENERATORS. A DETAILED "HOW TO" GUIDE EXPLAINS THE STEPS INVOLVED IN SITING AND SELECTING THE CORRECT WIND PLANT TO MEET ENERGY REQUIREMENTS. THE FINAL CHAPTERS OF THE MANUAL INCLUDE LISTS OF MANUFACTURERS AND DISTRIBUTORS, THOSE AGENCIES FROM WHICH CONSTRUCTION PLANS ARE AVAILABLE, AND ASSOCIATIONS PROMOTING WIND POWER UTILIZATION.

76-0335 HEATH S D
LOOK AT VOCATIONAL TRAINING FOR THE SOLAR ENERGY INDUSTRY.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 8. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 298-310.

THE PRIMARY THRUST OF THIS PAPER IS TO EXPLORE THE OPPORTUNITY FOR PRESENT AND PROSPECTIVE TRADESMEN TO BECOME COMPETENT IN SOLAR SYSTEM INSTALLATIONS AND MAINTENANCE. A TRAINING PROGRAM WHICH OFFERS A MAJOR CONTRIBUTION TO OVERCOMING BARRIERS TO INNOVATION THAT MIGHT EXIST IN THE CONSTRUCTION INDUSTRY IS DISCUSSED. THE PURPOSE AND OPERATION OF THE TRAINING MUST NECESSARILY TEACH NEW SKILLS AND UPGRADE PRESENT SKILLS IN RELATION TO ESTABLISHED CONSTRUCTION LABOR CLASSIFICATIONS. CERTAIN EMPHASIS MUST ALSO BE PLACED ON TEACHING OF THE BASIC THEORY AND TECHNICAL RUDIMENTS RELATED TO THE INSTALLATION OF SOLAR ENERGY SYSTEMS. A VIABLE TRAINING PROGRAM MUST PROCESS TRAINEES THROUGH STRUCTURED SOLAR SYSTEM INSTRUCTION AND AT THE SAME TIME CONTINUE TO EVALUATE THE TRAINEE'S RESPONSE TO SOLAR SYSTEM EXPOSURE. CURRENT EMPLOYMENT OPPORTUNITIES MUST ALSO BE UNDER CONTINUAL EVALUATION AND ANALYSIS. A COMPREHENSIVE LOOK AT ONE TRAINING PROGRAM NOW IN OPERATION IN THE SOUTHWEST UNITED STATES IS DISCUSSED. THE TRAINING FACILITY IS OPERATED BY THE SAN DIEGO COUNTY CONSTRUCTION LABORERS TRAINING AND RETRAINING TRUST (A NON-PROFIT TAFT-HARTLEY AUTHORIZED ORGANIZATION). THE PROGRAM PROVIDES BASIC TRAINING APPLICABLE TO THE THE BUILDING TRADES IN THE INSTALLATION AND MAINTENANCE OF A WIDE VARIETY OF SOLAR ENERGY SYSTEMS.

76-0336 HENGEVELD H J
EEN ELEKTRONISCHE GELIJKSPANNINGS-DRAAISPANNINGS OMZETTER T.B. V. HET TRANSPORT VAN ENERGIE VAN EEN WINDMOLENAS NAAR HET DRAAISTROUMNET. (AN ELECTRONIC DC TO AC CONVERTER TO BE USED FOR THE TRANSFER OF ENERGY FROM A WINDMILL SHAFT TO THE UTILITY NETWORK).
EINDHOVEN, THE NETHERLANDS, UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF ELECTRICAL ENGINEERING. REP. NO. EM 76-12, JUNE 1976.

DESCRIBED IS THE DESIGN AND CONSTRUCTION OF AN ELECTRONIC CONVERTER CONSISTING OF A LOW TO HIGH CHOPPER AND A THREE PHASE BRIDGE CONVERTER. THE CHOPPER CONTROL CHARACTERISTIC TO OBTAIN THE MAXIMUM EFFICIENCY IN THE SYSTEM WIND-TURBINE-GENERATOR-LOAD AT ALL WIND SPEEDS IS DERIVED. MEASUREMENTS OF A TEST CIRCUIT (BKW) ARE GIVEN.

76-0337 HERONEMUS W E
OCEANIC WINDPOWER.
ENERGY FROM THE OCEANS: FACT OR FANTASY. REPORT NO. 76-19. RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. P. 10-18.

THE OCEANIC WINDPOWER RESOURCE IS EXAMINED MACROSCOPICALLY. ONE REGION IN WHICH THAT RESOURCE IS KNOWN TO BE RICH IS THEN EXAMINED IN GREATER DETAIL. SIX DIFFERENT PRODUCTS ASSOCIATED WITH THE U.S. ENERGY INDUSTRY ARE THEN PROPOSED AS PRODUCTS THAT COULD BE PROVIDED FROM WINDPOWER SYSTEMS. A CLOSER LOOK AT THE POSSIBLE SIZE OF THAT ATLANTIC COAST RESOURCE IS TAKEN AND AN ESTIMATED TOTAL ANNUAL PRODUCTIVITY IS WEIGHED AGAINST THE LAST YEAR'S 73 QUAD U.S. ENERGY BUDGETS: A 12 PERCENT IMPACT FROM THIS ONE SOLAR REPLENISHED RESOURCE ALONE IS PREDICTED. STATEMENTS AS TO SYSTEM ENERGY BUDGET AND ENVIRONMENTAL IMPACT ARE MADE. CONCLUSIONS SUGGEST THAT WINDPOWER SYSTEMS, INCLUDING OCEANIC WINDPOWER SUBSYSTEMS, SHOULD BE ADVANCED RAPIDLY BY THE UNITED STATES.

76-0338 HERONEMUS W E
THE U. MASS. WIND FURNACE PROGRAM.
WIND POWER DIG. 1(7): 34-38, DECEMBER 1976.

76-0339 HERONEMUS W E
WIND POWER; A SIGNIFICANT SOLAR ENERGY SOURCE.
CHEM. TECH. 6: 498-503, AUGUST 1976.

76-0340 HERWIG L O
SUMMARY OF THE ROLE OF PLANNING AND ANALYSIS IN THE DEVELOPMENT OF THE FEDERAL SOLAR ENERGY PROGRAM.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 188-210.

THE PROJECTS THAT HAVE GUIDED THE GROWING FEDERAL EFFORTS TO DEVELOP SOLAR ENERGY TECHNOLOGIES ARE SUMMARIZED. PLANNING AND ANALYSIS INCLUDE STUDIES INVOLVING MISSION ANALYSIS, COMPARATIVE SYSTEM EVALUATION, APPLICATION SELECTION, PRELIMINARY SYSTEM DESIGN, AND ENGINEERING AND ECONOMIC EVALUATION. AS PLANNING METHODOLOGY HAS EVOLVED AND EXPANDED OVER THE PAST THREE TO FIVE YEARS, THE RESULTS OF THE PLANNING STUDIES HAVE INFLUENCED DIRECTION, CONTENT, SCHEDULE, AND GOALS OF THE FEDERAL SOLAR ENERGY PROGRAM. PLANNING PROJECTS ARE REVIEWED IN EACH OF A LARGE NUMBER OF IMPORTANT SUBPROGRAM AREAS OF SOLAR TECHNOLOGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION. REFERENCES TO THE RESULTS OF THESE PLANNING STUDIES ARE GIVEN AS THEY ARE NOW AVAILABLE.

76-0341 HEWSON E W, BAKER R W, BROWNLOW R
RESEARCH ON WIND POWER POTENTIAL IN SELECTED AREAS OF OREGON: FOURTH PROGRESS REPORT.
CORVALLIS, OREGON, OREGON STATE UNIVERSITY, JUNE 1976. 43P.

DURING THE FOURTH YEAR OF THE PROJECT, RESEARCH CENTERED ON WIND SITE PROSPECTING AND ANALYSIS OF POTENTIAL WIND POWER SITES, THE DEVLOPMENT OF A PROMISING NEW WIND ANALYSIS TECHNIQUE, AND CONTINUED RESEARCH ON WIND TUNNEL SIMULATIONS OF WIND FLOW OVER A MODEL OF A COASTAL HEADLAND. A DETAILED FIELD PROGRAM OF MONITORING THE WIND FLOW OVER YAQUINA HEAD USING A TEMPORARY, 27-M (90-FT) TOWER INSTRUMENTED AT FOUR LEVELS WAS ACCOMPLISHED. THE DATA FROM THIS PROJECT AGREED CLOSELY WITH THAT OBTAINED FROM THE WIND TUNNEL RESEARCH. A PERMANENT 30-M (100-FT) METEOROLOGICAL TOWER WAS ERECTED FARTHER EAST ON YAQUINA HEAD AND INSTRUMENTED AT TWO LEVELS. THIS IS THE PROPOSED SITE FOR THE EARLY ERECTION OF A LARGE AEROGENERATOR. FURTHER ANALYSIS OF DATA FROM THE OREGON COASTAL AREAS NEAR CAPE BLANCO AND TILLAMOOK INDICATES THAT THERE MAY BE SUFFICIENT WIND TO SUPPORT MEDIUM-SIZED WIND POWER FARMS IN THESE AREAS. THE COLUMBIA RIVER GORGE AREA FROM THE CENTRAL CASCADE RANGE TO ITS EASTERN EXTENSION INTO WASHINGTON AND OREGON IS A PROMISING AND ATTRACTIVE AREA FOR LARGE PERMANENT WIND POWER FARMS. THE TECHNIQUE FOR MEASURING THE WINDS IN THE LOWER BOUNDARY LAYER BY USING SINGLE ENGINE SMOKE ROCKETS SHOWS MUCH PROMISE; HOWEVER, FURTHER DEVELOPMENT IS NEEDED TO ENSURE STABLE FLIGHTS UNDER STRONG WIND FLOW.

76-0342 HIRST P
REGULATION, STORAGE AND CONVERSION OF WIND PRODUCED ELECTRICAL ENERGY AT THE LEVEL OF A FEW HUNDRED WATTS.
ENERGY DIG. 5(6): 7-9, DECEMBER 1976.

THIS ARTICLE IS AN EXCERPTED PAPER FROM AN INTERNATIONAL SYMPOSIUM: "WIND ENERGY SYSTEMS" HELD AT ST. JOHN'S COLLEGE, CAMBRIDGE, ENGLAND. THE WIND TURBINE ASSUMED IS ONE OF THE VERTICAL AXIS TYPE COUPLED THROUGH A GEARBOX TO A PERMANENT MAGNET ALTERNATOR. BY REDUCING MAGNETIC "COGGING" IN THE ALTERNATOR AND MECHANICAL FRICTION AS MUCH AS POSSIBLE, THE SYSTEM WILL ROTATE AT VERY LOW WIND SPEEDS WITH THE ALTERNATOR UNLOADED. THE BATTERY CHARGER WILL ACCEPT, OVER A 10:1 RANGE, WHATEVER VOLTAGE THE ALTERNATOR PRODUCES, AND WILL LOAD THE ALTERNATOR WITH A CURRENT DETERMINED TO BE A PRE-PROGRAMMED FUNCTION OF ALTERNATOR VOLTAGE. IN THIS WAY THE WIND TURBINE MAY BE OPERATED NEAR OPTIMUM EFFICIENCY OVER A CONSIDERABLE RANGE OF WIND SPEED. ON RISING WIND SPEED THE ALTERNATOR VOLTAGE RISES UNTIL A SELECTED LEVEL IS REACHED. A SIMPLE VOLTAGE SENSING ARRANGEMENT PROVIDES A SIGNAL AND POWER TO A LINEAR FORCE MOTOR TO RELEASE THE FRICTION BRAKE ON THE EPICYCLIC GEARBOX. THIS PERMITS THE ANNULUS TO ROTATE AND LIMITS THE SPEED AND TORQUE OF THE ALTERNATOR

ROTOR. FOR POWERING MANY COMMERCIAL PIECES OF EQUIPMENT AN AC SUPPLY IS REQUIRED. PRODUCING A TRUE SINE WAVE IS INEFFICIENT AND EXPENSIVE. A SIMPLE SQUARE-WAVE INVERTER MAY BE ADEQUATE.

76-0343 HODGES L, NEFF J
SOLAR ENERGY: 1976.
DES MOINES, IOWA, IOWA ENERGY POLICY COUNCIL, NP-21386, JUNE 1976. 70P.

IN THIS REPORT, THE IOWA ENERGY POLICY COUNCIL ATTEMPTS TO DESCRIBE SOME USES TO WHICH SOLAR ENERGY IS BEING PUT IN SPRING, 1976, AND TO ANTICIPATE SOME FURTHER FUTURE USES.

76-0344 HOLME O
A CONTRIBUTION TO THE AERODYNAMIC THEORY OF THE VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, ENGLAND, SEPTEMBER 1976. PROCEEDINGS.

76-0345 HOLTEN T VAN
RENDEMENT VAN WINDMOLEN DOOR NIEUW TYPE VLEUGEL VERGROTEN. (AUGMENTING THE EFFICIENCY OF WINDMILLS BY A NEW WING TYPE).
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, TECHNO MAGAZINE, JANUARY 1976. P. 10-11. (IN DUTCH)

76-0346 HVELPLUND F, LINDEROTH H
POWER STATION ECONOMY UNDER DANISH CONDITIONS. A REPORT ON THE ECONOMICS, EMPLOYMENT AND MONETARY ASPECTS OF ATOMIC POWER STATIONS, DECENTRALIZED STATIONS PRODUCING BOTH ELECTRICITY AND HEAT, AND WIND ENERGY SYSTEMS.
NTIS, 1976. 110P. (IN DANISH)

AN ANALYSIS IS PRESENTED BASED ON DANISH CONDITIONS OF ECONOMICS, EMPLOYMENT, AND MONETARY ASPECTS OF THE WIND ENERGY, OIL/COAL/GAS, AND ATOMIC POWER TECHNOLOGIES. IT IS CONCLUDED THAT ATOMIC POWER IS NOT ADVANTAGEOUS IN DENMARK.

76-0347 HOWE E D
WIND POWER.
SUNWORLD NO. 2: 6-9, NOVEMBER 1976.

COMPARISONS ARE MADE BETWEEN WIND-POWER AND WATER-POWER GENERATION IN A SUPERFICIAL REVIEW. DIFFERENT TYPES OF EACH ARE BRIEFLY DESCRIBED. IT IS CONCLUDED THAT WIND-POWER IS TRENDING TOWARD A MORE FAVORABLE SOURCE AROUND THE WORLD.

76-0348 HUL F A J R VAN T, VAN DE VEN N J
(FAST RUNNING WIND SCREWS).
THE NETHERLANDS, TWENTE UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF MECH., REF. NR. BMS-037, JUNE 1976. (IN DUTCH)

THIS IS A STUDY OF AN OPTIMAL CONSTRUCTION METHOD OF THE ONE-BLADE, SELF-ADJUSTING WINDMILL (SO-CALLED CYPRODYNE). PROPULSIVE SCREW THEORY IS FITTED FOR WIND SCREW THEORY. CONSIDERING BETZ'S MINIMUM VELOCITIES, DRAG AND BLADE NUMBER, A WIND SCREW CALCULATION METHOD IS GIVEN. TO OPTIMIZE FOR A GIVEN BLADE NUMBER AND TIP-SPEED RATIO, A NEW CONSTRUCTION METHOD IS GIVEN AND PERFORMED ARITHMETICALLY AS WELL AS GRAPHICALLY. DYNAMICAL FORCES AND TORQUES CAUSED BY BLADE-ADJUSTMENT, ARE QUANTICISED AND OPTIMISED. THE INFLUENCE OF BLADE-ADJUSTMENT ON THE WINDMILL CHARACTERISTICS IS MEASURED.

76-0349 IEEE POWER ENGINEERING SOCIETY SUMMER MEETING. TEXT OF "A" PAPERS.
NEW YORK, IEEE, 1976. 820P.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, 1976.

NINETY-EIGHT PAPERS WERE PRESENTED, INCLUDING SOME ON WIND ENERGY.

76-0350 HUXLEY B
A VERTICAL AXIS SAILWING ROTOR.
DUBLIN, IRELAND, LOW ENERGY SYSTEMS, 1976. 21P.

CONSTRUCTION OF A SIMPLE TO BUILD VERTICAL AXIS WIND TURBINE WITH 3 OR 4 SAILWINGS IS DESCRIBED. CONSTRUCTION PLANS OF THE COMPONENTS ARE GIVEN IN DETAIL.

76-0351 IGT ANNUAL REPORT 1976.
CHICAGO, ILLINOIS, INSTITUTE OF GAS TECHNOLOGY, 1976. 33P.

PROGRAMS OF THE INSTITUTE OF GAS TECHNOLOGY, AFFILIATED WITH THE ILLINOIS INSTITUTE OF TECHNOLOGY IN CHICAGO, FOR 1976 ARE REVIEWED. THE INSTITUTE'S R+D EFFORTS AND ACCOMPLISHMENTS CONCERNING FOSSIL AND NONFOSSIL FUEL RESOURCES, ENERGY SUPPLY, THE HYGAS PROCESS, THE STEAM-IRON PROCESS, ASH AGGLOMERATION, COAL GASIFICATION, OIL SHALE AND PEAT GASIFICATION, PLANNING AND POLICY, ENERGY CONSERVATION, AND PRESERVATION OF THE ENVIRONMENT ARE DISCUSSED. IGT EDUCATIONAL PROGRAMS, FINANCING, AND INFORMATION SERVICES ARE ALSO SUMMARIZED.

76-0352 IGT RESEARCH ON NONFOSSIL FUEL SOURCES.
GAS SCOPE 35(1): 1-8, SPRING 1976.

THE INSTITUTE OF GAS TECHNOLOGY'S RESEARCH INTO FUEL CELLS, HYDROGEN, OCEAN THERMAL ENERGY, AND WIND ENERGY IS REVIEWED. HYDROGEN PRODUCTION, TRANSMISSION, AND USE IN VEHICLES AND APPLIANCES IS DISCUSSED. THE INSTITUTE IS ANALYZING CHEMICAL-ENERGY CARRIERS, SPECIFICALLY GASEOUS AND LIQUID HYDROGEN, AMMONIA, METHANOL, AND SYNTHETIC GASOLINE, FOR OCEAN THERMAL FLOATING PLANTS. INVESTIGATIONS INDICATE THAT A WIND ENERGY SYSTEM USING AVAILABLE COMPONENTS WOULD BE TECHNICALLY FEASIBLE NOW FOR A DAIRY, POULTRY, OR SWINE FARM. BATTERY AND HOT WATER STORAGE WOULD PROVIDE FOR WIND VARIATIONS.

76-0353 IGRA O
SHROUDS FOR AEROGENERATORS.
AIAA J. 14(10): 1481-1483, OCTOBER 1976.

TO USE WIND POWER EFFICIENTLY, REDUCE THE SIZE OF ROTORS, AND TO INCREASE THE ROTATIONAL SPEEDS, VARIOUS COMBINATIONS OF TURBINES OPERATING INSIDE SPECIALLY DESIGNED SHROUDS COMPOSED OF A BELL-SHAPED INTAKE, A CYCLINDRICAL SECTION, AND A DIFFUSER HAVE BEEN RECENTLY INVESTIGATED. THIS ARTICLE PRESENTS A NEW APPROACH TO SHROUD DESIGN, SUCH THAT GOOD AERODYNAMIC PERFORMANCE IS RETAINED, WHILE THE SHROUD IS MADE MORE ATTRACTIVE ECONOMICALLY.

76-0354 HERMAN S W, CANNON J S
INEXHAUSTIBLE RESOURCES.
ENERGY FUTURES; INDUSTRY AND THE NEW TECHNOLOGIES, BY HERMAN S W AND CANNON J S. NEW YORK, INFORM INC., 1976. P. 17-257.

THIS SECTION, SECTION I, SUMMARIZES INFORMATION ON NONDEPLETABLE RESOURCES OF SOLAR HEATING AND COOLING, SOLAR CELLS, SOLAR THERMAL ELECTRIC CONVERSION, OCEAN THERMAL ELECTRIC CONVERSION, WIND GENERATORS, NUCLEAR FUSION, AND HYDROGEN PRODUCTION. EACH OF THE SEVEN CHAPTERS CONSISTS OF TWO-PARTS--AN OVERVIEW, OR GENERAL INTRODUCTION TO THE STATUS OF THE TECHNOLOGY, FOLLOWED BY FROM 3 TO 34 INDIVIDUAL PROFILES OF COMPANIES' PROJECTS IN THE TECHNOLOGY. THE OVERVIEW SUMMARIZES DATA ON THE TECHNOLOGY, THE ENVIROMENTAL IMPACT, THE HISTORY, OBSTACLES TO THE COMMERCIALIZATION, FEDERAL AND PRIVATE PROGRAMS, AND A BRIEF PROGNOSIS OF THE TECHNOLOGY'S FUTURE.

76-0355 INTERVIEW WITH HERMAN DREES, PRESIDENT, PINSON ENERGY CORP.
WIND POWER DIG. 1(7): 5-13, DECEMBER 1976.

76-0356 JANSEN W A M
HORIZONTAL AXIS FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WIND ENERGY IN DEVELOPING COUNTRIES, SWD, DHV, CONSULTING ENGINEERS, JUNE 1976. 91P.

THIS REPORT GIVES BRIEFLY THE THEORIES THAT FORM THE BASIS FOR CALCULATION OF THE DESIGN AND THE BEHAVIOUR OF A WINDMILL. A MODIFICATION OF THE PRANDTL MODEL OF TIP LOSSES IS DERIVED. THIS MODIFICATION TAKES THE RELATIVELY HEAVY LOADING OF THE WINDMILL ROTOR INTO ACCOUNT. IT IS ARGUED THAT, IN CONTRAST WITH PROPELLER DESIGN, A MAXIMUM ENERGY EXTRACTION IS REACHED BY ENLARGING THE CHORDS OF THE BLADES NEAR THE TIPS. SELECTION, DESIGN AND CONSTRUCTION OF SEVERAL ROTORS AND OF A TEST UNIT ARE DESCRIBED. TESTS OF STEEL PLATE ROTORS AND SO-CALLED SAIL TROUSER ROTORS ARE DESCRIBED WHILE TEST RESULTS ARE PRESENTED IN THE FORM OF CP-LAMBDA AND CQ-LAMBDA CHARACTERISTICS. FINAL CONCLUSION IS THAT WITH SIMPLE MATERIALS HIGH POWER COEFFICIENTS ARE POSSIBLE.

76-0357 JANSEN W A M
LITERATURE SURVEY, HORIZONTAL AXIS FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WIND ENERGY IN DEVELOPING COUNTRIES, SWD, DHV, CONSULTING ENGINEERS, MARCH 1976. 43P.

LITERATURE IS EXAMINED ON THE KEYWORDS: ROTOR, AERODYNAMIC PROFILES, TURBINE AERODYNAMICS, PERFORMANCE, DEVELOPING COUNTRIES, SMALL PLANTS. AS A RESULT, SOME STARTING POINTS ARE NOTED FOR RESEARCH ON BEHAVIOUR AND APTITUDE OF FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.

76-0358 JAYADEV T S
WINDMILLS STAGE A COMEBACK.
IEEE SPECTRUM 13(11): 44-49, NOVEMBER 1976.

THERE IS NEW INTEREST IN THE WIND BECAUSE WIND POWER PLANTS CAN BE CONNECTED DIRECTLY TO THE LOCAL POWER GRID, RESULTING IN AN IMMEDIATE SAVINGS IN FOSSIL FUEL. THERE IS NO NEED FOR A SEPARATE ENERGY-STORAGE FACILITY SO LONG AS THE CONTRIBUTION DERIVED FROM WIND POWER IS SMALL COMPARED WITH THE SYSTEM'S TOTAL CAPACITY. A WIND-ENERGY SYSTEM CONSISTS OF THREE SUBSYSTEMS--AERODYNAMIC, MECHANICAL, AND ELECTRICAL--THAT INTERACT AND INFLUENCE EACH OTHER'S PERFORMANCE. PRESENT-DAY U.S. TECHNOLOGY IS WELL DEVELOPED IN ALL THESE AREAS, BUT THERE REMAINS THE PROBLEM OF FAILURES IN WIND SYSTEMS AT THEIR AERODYNAMIC-STRUCTURAL INTERFACE. RESONANT FREQUENCIES ARE MORE TROUBLESOME IN VARIABLE-SPEED CONSTANT-FREQUENCY (VSCF) SYSTEMS THAN IN CONSTANT-SPEED CONSTANT-FREQUENCY (CSCF) SYSTEMS, BUT THE SPREAD IN VARIABLE SPEED NEED NOT SPAN THE RESONANT FREQUENCIES. FOR EXAMPLE, WITH A 20-30 PERCENT SPEED VARIATION, A DOUBLE-OUTPUT INDUCTION GENERATOR PROVIDES 90 PERCENT OF THE ENERGY THAT COULD BE COLLECTED FROM AN IDEAL VSCF SCHEME.

76-0359 JAYADEV T S, SMITH R T
WIND-POWERED ELECTRIC UTILITY PLANTS.
J. ENG. IND. 98: 293-296, FEBRUARY 1976.

THIS PAPER DESCRIBES THE GENERAL OPERATING MODES OF WIND-POWERED ELECTRIC UTILITY PLANTS UNDER CONSTANT-SPEED OR VARIABLE SPEED CLASSIFICATIONS. IT IS SHOWN THAT FOR A PARTICULAR SET OF WIND FREQUENCY-VELOCITY SPECTRA THERE ARE A NUMBER OF ATTRACTIVE SYSTEM CONFIGURATIONS, SO FAR AS TOTAL YEARLY ENERGY PRODUCTION IS CONCERNED. THUS, DETAILED COST EFFECTIVENESS STUDIES AND ADDITIONAL RESEARCH WILL BE REQUIRED TO DEVELOP WIND ELECTRIC CONVERSION SYSTEMS (WECS).

76-0360 JENSEN B H, CILETTI M D
WIND-SOLAR COUPLED DOMESTIC HEATING SYSTEM.
SOLAR COOLING AND HEATING: A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, 13 DECEMBER 1976. NTIS, 1976. P. 195-196.
CONF-761220

76-0361 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 20: 24-25, MARCH 1976; NO. 21: 34-35, JUNE 1976; NO. 22: 32-33, SEPTEMBER 1976; NO. 23: 34-35, DECEMBER 1976.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WIND GENERATORS.

76-0362 JORDAN P F, GOLDMAN R L
SEGMENTED AND SELF-ADJUSTING WIND TURBINE ROTORS. FINAL REPORT.
NTIS, APRIL 1976. 113P.
COO/2613-2

AN INVESTIGATION WAS CARRIED OUT TO EXAMINE THE USE OF BLADE AEROELASTIC PROPERTIES FOR PROVIDING ROTATIONAL SPEED CONTROL FOR A WIND TURBINE GENERATOR (WTG). THE STUDY WAS SPECIFICALLY DIRECTED AT OBTAINING A ROTOR CONFIGURATION THAT HAS THE CAPABILITY FOR MAINTAINING NEARLY CONSTANT TORQUE AT CONSTANT RPM IN THE PRESENCE OF VARYING WIND CONDITIONS AND IS AIMED AT ELIMINATING THE CURRENT REQUIREMENT FOR MECHANICAL PITCH CHANGE DEVICES. THE APPROACH CONSIDERED IS ONE IN WHICH ROTOR TWIST DUE TO AERODYNAMIC LOADING IS USED TO ADJUST THE BLADE'S PITCH AS THE WIND SPEED CHANGES. THE PRELIMINARY DESIGN CONCEPT THAT HAS EVOLVED IS A FLEXIBLE ROTOR BLADE FORMED FROM A SERIES OF INDIVIDUAL, LIGHT, RIGID SEGMENTS THAT ARE ARRANGED ALONG THE BLADE SPAR. EACH

SEGMENT CAN ROTATE AROUND THE SPAR BUT IS RESTRICTED IN PITCH BY A NONLINEAR MECHANICAL SPRING. THE RESULTS OF PERFORMANCE CALCULATIONS AS WELL AS VIBRATION AND FLUTTER ANALYSES ARE PRESENTED. BASED ON THESE RESULTS, THE CONCEPT APPEARS TO PROVIDE AN ATTRACTIVE SOLUTION TO THE PROBLEM OF WTG OPERATION IN A VARYING WIND FIELD.

76-0363 JOSEPHSON J
ENERGY: THE U.S. AT THE CROSSROADS.
ENV. SCI. TECHNOL. 10(9): 854-859, SEPTEMBER 1976.

A QUICK-FIX TO THE ENERGY PROBLEM IS POSSIBLE THROUGH CONSERVATION MEASURES NORMALLY ASSOCIATED WITH WARTIME AUSTERITY. EFFORTS SHOULD BE ACCELERATED TO BRING RENEWABLE ENERGY RESOURCES TO A STATE OF HIGH TECHNOLOGY. SOLAR ENERGY FOR HEAT AND HOT WATER, AND EVEN FOR COOLING, IS NOW AVAILABLE. SOME ELECTRIC UTILITIES ARE INTERESTED IN WIND ENERGY AND SEVERAL FIRMS CARRY EQUIPMENT FOR HOME, FARM, AND BUSINESS NEEDS. THE CALIFORNIA GEYSERS PROVIDE 502 MW FOR 5 PERCENT OF THE NEEDS OF THE PACIFIC GAS + ELECTRIC CO. HYDROGEN SYSTEMS WERE THE CENTRAL TOPIC OF THE FIRST WORLD HYDROGEN ENERGY CONFERENCE HELD IN MARCH 1976. ADVANCING RENEWABLE ENERGY RESOURCES TECHNOLOGY IS DISCUSSED. THE MAIN THRUST OF ENERGY DEVELOPMENT WILL REMAIN FOSSIL AND NUCLEAR.

76-0364 JUSTUS C G
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (NEW ENGLAND AND CENTRAL U.S. REGIONS). FINAL REPORT.
NTIS, AUGUST 1976. 129P.
PB-260679

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500 KW-1500 WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO THE UTILITY DISTRIBUTION GRID IN THE NEW ENGLAND-MIDDLE ATLANTIC AND THE CENTRAL U.S. REGIONS. DESPITE COMPARABLE WIND REGIMES IN COASTAL NEW ENGLAND AND IN THE CENTRAL U.S., WIND POWER IS POTENTIALLY CLOSER TO BEING COST-EFFECTIVE AS A FUEL SAVER IN NEW ENGLAND. THIS IS BECAUSE OF THE HEAVY RELIANCE ON EXPENSIVE FUELS IN NEW ENGLAND AS COMPARED WITH THE CENTRAL U.S. AREA. BY ARRAY POWER RETURN TIME ANALYSIS, IT IS ESTIMATED THAT 24 TO 48 HOURS OF STORAGE WOULD INCREASE THE POWER RELIABILITY OF 200 KW PER 1500 KW GENERATOR TO ABOUT 95 PERCENT IN NEW ENGLAND, AND TO BETTER THAN 95 PERCENT IN THE CENTRAL U.S. PRELIMINARY ANALYSIS OF DIURNAL CYCLES OF MONTHLY MEAN WINDS VERSUS TIME OF DAY SHOWS THAT IN BOTH NEW ENGLAND AND THE CENTRAL U.S., THERE IS A STRONG SUMMERTIME AFTERNOON PEAK IN AVAILABLE WIND, WHICH WOULD CORRESPOND TO THE SUMMERTIME PEAK AIR CONDITIONING LOAD. THE APPENDICES INCLUDED IN THIS REPORT ARE: (1) ANALYSIS METHODS; AND (2) SOME ASPECTS OF STATISTICS OF ARRAYS OF WIND TURBINES.

76-0365 KADLEC E G
SYSTEM DESIGN, 17-METER RESEARCH TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.1--II.9.
SAND-76-5586

BRIEFLY DESCRIBED IS THE 17-M RESEARCH TURBINE USED BY SANDIA LABORATORIES TO PROVIDE A TEST BED FOR SYSTEM PERFORMANCE AND RESPONSE AND FOR COMPONENT EVALUATION.

76-0366 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION (ABSTRACT).
COMBUSTION 48: 8, JULY 1976.

76-0367 KAPLAN G
PLANNING SOLAR'S FUTURE.
IEEE SPECTR. 13(6): 54-59, JUNE 1976.

EXAMINES THE BUDGETARY AND DEVELOPMENTAL TARGETS OF VARIOUS SOLAR-ELECTRIC TECHNOLOGIES--NAMELY, WIND, PHOTOVOLTAIC, SOLAR-THERMAL, OCEAN-THERMAL, AND SATELLITE POWER GENERATION--IN COMPARISON WITH OTHER TECHNOLOGIES THAT ARE EXPECTED TO CONTRIBUTE SIGNIFICANTLY, IN THE LONG TERM, TO THE GENERATION OF ELECTRIC POWER. THE PRESENT STATUS AND PROBLEMS OF SOME OF THE SOLAR-ELECTRIC TECHNOLOGIES ARE ALSO ADDRESSED.

76-0368 KIRSCHBAUM H S, SOMERS E V, SULZBERGER V T

EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
AM. POW. CONF. PROC. 38: 474-483, 1976.

AN EVALUATION OF AN OFFSHORE SITE OFF THE NEW JERSEY SHORE FOR WIND ENERGY GENERATION IS GIVEN. THE SITE POTENTIAL IS DISCUSSED AND A BRIEF ECONOMIC ANALYSIS IS MADE.

76-0369 KING J
A FORECAST FOR SAILING SHIPS.
FUTURES 8(6): 517-524, DECEMBER 1976.

THE INCREASE IN FUEL PRICES HAS SPURRED REEVALUATION OF THE ECONOMIC FEASIBILITY OF WIND-POWERED VESSELS. ADVANCEMENTS IN THE FIELDS OF AERODYNAMICS, NAVAL ARCHITECTURE, CLIMATOLOGY, AND NAUTICAL ENGINEERING HAVE BEEN GENERALLY IGNORED BY COMMERCIAL SHIPPERS AND SHIPBUILDERS BECAUSE OF THE AVAILABILITY OF INEXPENSIVE FUEL. THE DYNASCHIFF CAN COMPETE SATISFACTORILY IN WORLD SHIPPING MARKETS, IF GIVEN THE OPPORTUNITY. THE SHIP'S MASTS AND ASSOCIATED SAILS ARE DESIGNED AS A HIGH-ASPECT RATIO, VERTICAL WING THAT PROVIDES THE SHIP WITH MORE EFFICIENT SAILING QUALITIES TO THE WINDWARD. A "ROTOR-SHIP" HAS VERTICAL CYLINDERS MOUNTED ON ITS DECK THAT ARE ROTATED ABOUT THEIR MAJOR AXES BY SMALL MOTORS, AND THE AIRFLOW AROUND THE ROTATING CYLINDERS CREATES LIFT. STILL, THAT THE TECHNICAL PROBLEMS CAN BE OVERCOME IS SAYING ONE THING, BUT TO PROVIDE THE CONDITIONS THAT WOULD ENCOURAGE THE USE AND DEVELOPMENT OF VIABLE SAILING VESSELS IS ANOTHER OF A DIFFERENT CHARACTER.

76-0370 KIRK J A, STUDER P A, EVANS H E
MECHANICAL CAPACITOR.
NTIS, MARCH 1976. 61P.
N76-20634

A NEW ENERGY STORAGE SYSTEM (THE MECHANICAL CAPACITOR), USING A SPOKELESS MAGNETICALLY LEVITATED COMPOSITE RING ROTOR, IS DESCRIBED AND DESIGN FORMULAS FOR SIZING THE COMPONENTS ARE PRESENTED. THIS NEW SYSTEM IS CONFIGURED AROUND A PERMANENT MAGNET (FLUX BAISED) SUSPENSION WHICH HAS ACTIVE SERVO CONTROL IN THE RADIAL DIRECTION AND PASSIVE CONTROL IN THE AXIAL DIRECTION. THE STORAGE RING IS USED AS A MOVING ROTOR AND ELECTRONIC COMMUTATION OF THE STATIONARY ARMATURE COILS IS PROPOSED. THERE IS NO MECHANICAL CONTACT WITH THE ROTATING SPOKELESS RING; THEREFORE, LONG LIFE AND NEAR ZERO RUNDOWN LOSSES ARE PROJECTED. A 7-KW H SYSTEM IS SIZED TO DEMONSTRATE FEASIBILITY. A LITERATURE REVIEW OF FLYWHEEL ENERGY STORAGE SYSTEMS IS ALSO PRESENTED AND GENERAL FORMULAS ARE DEVELOPED FOR COMPARING ROTOR GEOMETRIES.

76-0371 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
IEEE POWER ENG. SOC., TEXT OF "A" PAPER FROM THE SUMMER MEETING, PORTLAND, OREGON, JULY 18-23, 1976. NEW YORK, IEEE, CAT. NO. 76CH1135-3-PWR, 1976. 7P.

AN ANALYSIS OF THE POTENTIAL FOR WIND GENERATION AT AN OFFSHORE SITE IDENTIFIED BY PSE+G OF NEWARK, N.J., INDICATES A POTENTIAL IN EXCESS OF 5700 KWH/KW FOR A 1MW WINDMILL RATED AT 20 MI/H AND HUB HEIGHT OF 235 FEET. THE PRELIMINARY ECONOMICS OF THE APPLICATION OF WIND POWER, AS A LIMITED SUPPLEMENT TO BASE LOADED NUCLEAR AND OTHER FORMS OF GENERATION, APPEARS TO OFFER ENOUGH PROMISE THAT A MORE SERIOUS STUDY IS WARRANTED TO DETERMINE THE OVERALL ECONOMIC, TECHNICAL, AND ENVIRONMENTAL FEASIBILITY OF SUCH AN APPLICATION. IN ADDITION SOME OF THE STATISTICAL PROPERTIES OF THE WIND AT THE OFFSHORE SITE MUST HAVE BEEN ANALYZED.

76-0372 KLING A
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,506,160/A/, AUGUST 26, 1976. 49P. (IN GERMAN)

THE INVENTION IS CONCERNED WITH A WIND-POWER PLANT WHOSE ROTOR AXIS IS PIVOTED IN THE SUPPORTING STRUCTURE AND SWINGABLE AROUND AN AXIS OF TILT, FORMING AN ANGLE WITH THE ROTOR AXIS AND THE VERTICAL AXIS, AND ALLOWING PRECESSION OF THE ROTOR. ON CHANGES OF WIND DIRECTION AN ELECTRIC POSITIONING DEVICE IS MOVING THE ROTOR AXIS INTO THE NEW DIRECTION IN SUCH A WAY THAT NO PRECESSION FORCES ARE EXERTED ON THE SUPPORTING STRUCTURE AND THIS ONE MAY VERY EASILY BE HELD. INSTEAD OF ONE ROTOR, ALSO A TYPE WITH TWO COAXIAL, CO-PLANAR COUNTERCURRENT ROTORS MAY BE

USED. EACH OF THE TWO COUNTERCURRENT ROTORS IS CARRYING A NUMBER OF MAGNETIC POLES, DISTRIBUTED ALL OVER THE CIRCUMFERENCE, ACTING TOGETHER WITH THE MAGNETIC POLES OF THE OTHER ROTOR. AT LEAST THE POLES OF ONE ROTOR HAVE ELECTRIC LINE WINDINGS BEING CONNECTED BY LEADS WITH A COLLECTOR SO THAT THE TWO ROTORS FORM THE TWO PARTS OF A POWER GENERATOR BEING EACH ROTATABLE WITH RESPECT TO THE OTHER('STATOR' AND 'ROTOR').

76-0373 KNOX J B, HARDY D M, SHERMAN C A, SULLIVAN T J
STATUS REPORT OF LAWRENCE LIVERMORE LABORATORY. WIND ENERGY STUDIES.
NTIS, JUNE 1976. 20P.
VCID-17157-1

NUMERICAL MODEL CALCULATIONS OF THREE-DIMENSIONAL REGIONAL WIND FIELDS ORIENTED TOWARD IDENTIFYING THE LOCATION, INTENSITY AND EXTENT OF WIND ENERGY-RICH AREAS ON OAHU ARE REPORTED. THE USE OF THESE CALCULATIONS IN PLANNING A FIELD DATA-COLLECTION PROGRAM TO STUDY AREAS OF EXPECTED HIGH WIND ENERGY IS DESCRIBED. CRITERIA FOR THE SELECTION OF WIND-ENERGY SUBREGIONS OF PRIMARY INTEREST ARE DISCUSSED.

76-0374 KOCIVAR B
WIND CAR -- LAND SAILOR FOR THE HIGHWAY.
POP. SCI. 209: 102-104, 162, NOVEMBER 1976.

DESCRIBED IS THE WINDMOBILE, A THREE-WHEELED EXPERIMENTAL CAR WHICH RUNS ON THE WIND WITH ELECTRIC MOTORS AS AUXILIARY POWER.

76-0375 KOHL J
ENERGY FROM THE OCEANS: FACT OR FANTASY. REPT. NO. 76-1.
RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. 115P.
CONFERENCE ON ENERGY FROM THE OCEANS: FACT OR FANTASY, RALEIGH, NORTH CAROLINA, JANUARY 27, 1976.

76-0376 KORSBECH U
ATOMIC POWER OR WINDMILLS.
INGENIOEREN 2(31): 3-4, 1976. (IN DANISH)

IT IS ARGUED THAT IF THE DANISH MINISTRY OF TRADE'S PLANS FOR NUCLEAR POWER IN THE NINETIES ARE CHANGED TO WINDPOWER THE PRICE WILL BE 5 TIMES AS HIGH. A THOROUGH ESTIMATION OF THE ECONOMY OF A BIG DANISH WINDPOWER PROGRAM IS GIVEN.

76-0377 LARGEST WINDMILL TO PRODUCE 1.5 MW.
MACH. DES. 48: 6, SEPTEMBER 9, 1976.

76-0378 LAWAND T A, ALWARD R, SAULNIER B, BUDGEN H P, BRUNET E
RURAL ENERGY CENTRE FOR AFRICA USING SOLAR, WIND, AND BIOGAS ENERGIES.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 282-309.

A RURAL ENERGY CENTRE UTILIZING SOLAR, WIND AND BIOGAS ENERGIES IN ORDER TO SATISFY THE BASIC ENERGY NEEDS, HAS BEEN DESIGNED FOR A TYPICAL VILLAGE IN SENEGAL. THE PARAMETERS OF SITE SELECTION, AND THE BALANCE BETWEEN THE SUPPLY AND DEMAND FOR ENERGIES ARE DISCUSSED. IN THE CENTRE, ENERGY WILL BE SUPPLIED FOR WATER PUMPING AND POTABILIZATION, COOKING AND SOME LIGHTING. THE ENERGY REQUIRED FOR ECONOMIC FACTORS HAVE BEEN CONSIDERED IN MAKING THE SELECTION OF EQUIPMENT NEEDED. THE CONCEPT OF AN APPROPRIATE TECHNOLOGY APPROACH HAS BEEN FOLLOWED IN UNDERTAKING THE STUDY.

76-0379 LEON H I, GORMAN R, SAWLEY R
SOLAR ENERGY OPTIONS FOR ELECTRIC UTILITIES.
ENGINEERING IN A CHANGING ECONOMY. PROCEEDINGS OF THE SOUTHEAST REGION 3 CONFERENCE, CLEMSON, SOUTH CAROLINA, APRIL 5-7, 1976. NEW YORK, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, 1976. P. 76-78.

FOUR SOLAR ELECTRIC TECHNOLOGIES FOR UTILITIES ARE EXAMINED: SOLAR THERMAL, SOLAR PHOTOVOLTAIC, OCEAN THERMAL, AND WIND CONVERSION. THE TECHNOLOGIES ARE ASSESSED AND COMPARED BY DEFINING A BASELINE OF CONVENTIONAL PLANTS, THE SOLAR ELECTRIC PLANT OBJECTIVES FOR PERFORMANCE, CAPITAL COST AND YEAR OF COMMERCIAL AVAILABILITY, AND A STANDARD SET OF ECONOMIC MEASURES TO CALCULATE BUS BAR COST.

76-0380 MARVIN H H
SOLAR ENERGY AND THE ERDA PLAN FOR RESEARCH, DEVELOPMENT, AND DEMONSTRATION.
ERDA/AGA/NCA/EPRI ENERGY TECHNOLOGY CONFERENCE, 3D, WASHINGTON, D.C., MARCH 29-31, 1976. P. 129-134.

ERDA'S PLANS TO PROMOTE SOLAR ENERGY ARE DISCUSSED. SOLAR HEATING AND COOLING, SOLAR PROCESS HEATING, WIND ENERGY, SOLAR THERMAL CONVERSION, PHOTOVOLTAICS, OCEAN THERMAL ENERGY, AND FUELS FROM BIOMASS ARE CONSIDERED BRIEFLY. NO TECHNOLOGICAL BREAKTHROUGH IS NEEDED TO CONVERT SOLAR ENERGY TO SEVERAL USEFUL FORMS. CAPITAL COSTS ARE NOW SEVERAL TIMES THE COST OF COMPETING ENERGY FORMS--THE MAJOR AIM IS TO LOWER THESE COSTS.

76-0381 LEVY R, MCGINNESS H
WIND POWER PREDICTION MODELS.
NTIS, NOVEMBER 15, 1976. 61P.
N77-12509, NASA-CR-149235

INVESTIGATIONS WERE PERFORMED TO PREDICT THE POWER AVAILABLE FROM THE WIND AT THE GOLDSTONE, CALIFORNIA, ANTENNA SITE COMPLEX. THE BACKGROUND FOR POWER PREDICTION WAS DERIVED FROM A STATISTICAL EVALUATION OF AVAILABLE WIND SPEED DATA RECORDS AT THIS LOCATION AND AT NEARBY LOCATIONS SIMILARILY SITUATED WITHIN THE MOJAVE DESERT. IN ADDITION TO A MODEL FOR POWER PREDICTION OVER RELATIVELY LONG PERIODS OF TIME, AN INTERIM SIMULATION MODEL THAT PRODUCES SAMPLE WIND SPEEDS IS DESCRIBED. THE INTERIM MODEL FURNISHES UNCORRELATED SAMPLE SPEEDS AT HOURLY INTERVALS THAT REPRODUCE THE STATISTICAL WIND DISTRIBUTION AT GOLDSTONE. A STOCHASTIC SIMULATION MODEL TO PROVIDE SPEED SAMPLES REPRESENTATIVE OF BOTH THE STATISTICAL SPEED DISTRIBUTIONS AND CORRELATIONS IS ALSO DISCUSSED.

76-0382 LIGON C, KIRBY G, JORDAN D, LAWRENCE J H, WIESNER W, KISOVEC A, SWANSON R K, SMITH R T, JOHNSON C C, HODSON H O
OPERATIONAL, COST, AND TECHNICAL STUDY OF LARGE WINDPOWER SYSTEMS INTEGRATED WITH AN EXISTING ELECTRIC UTILITY. FINAL REPORT.
NTIS, APRIL 1976. 392P.
COO/2621-2

DETAILED WIND ENERGY ASSESSMENT FROM THE AVAILABLE WIND RECORDS, AND EVALUATION OF THE APPLICATION OF WIND ENERGY SYSTEMS TO AN EXISTING ELECTRIC UTILITY WERE PERFORMED IN AN AREA KNOWN AS THE TEXAS PANHANDLE, ON THE GREAT PLAINS.

76-0383 LINDHAUT A H
NATIONAL PROGRAMME FOR ENERGY INVESTIGATION 1976.
ATOOMENERG. TOEPASS. 18(9): 232-238, SEPTEMBER 1976. (IN DUTCH)

GIVEN IS AN ESTIMATE OF (DUTCH) ENERGY REQUIREMENTS UP TO THE YEAR 2000, SHOWING AN OVERALL INCREASE OF ABOUT 40 PERCENT, REACHING A LEVELLING OFF. THE CONTRIBUTION FROM IMPORTED COAL WILL INCREASE, AND AFTER 1990 THERE WILL BE A SMALL AMOUNT FROM SOLAR AND WIND ENERGY. ATOMIC ENERGY WILL CONTINUE TO INCREASE, BUT WILL ACCOUNT FOR AT MOST 20 PERCENT OF THE TOTAL. NATURAL GAS AND OIL MUST BE IMPORTED. DEVELOPMENT IS CONTINUING ON FAST URANIUM-PLUTONIUM REACTORS, THERMAL URANIUM-THORIUM REACTORS, AND NUCLEAR FUSION. COAL AND NATURAL GAS ARE BEING PROCESSED BEFORE USE (E.G. TRANSFORMED INTO HYDROGEN AND METHANOL RESPECTIVELY).

76-0384 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT, EXECUTIVE SUMMARY, JULY 1975 - AUGUST 1976.
NTIS, 1976. 23P.
COO-2618-1(SUMM.)

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD (1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND (2) DEFINING THE TECHNICAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS

AS AN ENERGY ALTERNATE.

76-0385 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT, JULY 1975 - AUGUST 1976.
NTIS, 1976. 349P.
COO-2618-1

HONEYWELL, IN A JOINT EFFORT WITH MINNESOTA POWER AND LIGHT COMPANY, BOEING VERTOL COMPANY, AND DR. C.G.JUSTUS, GEORGIA INSTITUTE OF TECHNOLOGY, HAS CONDUCTED A REGIONAL APPLICATION STUDY OF WIND ENERGY SYSTEMS. PROOF OF ECONOMIC VIABILITY IS NEEDED TO JUSTIFY THE CAPITAL INVESTMENT TO BUILD A PRACTICAL WIND ENERGY CONVERSION SYSTEM (WECS). THE OBJECTIVES OF THIS STUDY HAVE BEEN TO ASSESS CURRENT WECS VIABILITY FOR A UTILITY APPLICATION AND TO DEFINE THE ATTRIBUTES AND PERFORMANCE REQUIREMENTS OF A SYSTEM CAPABLE OF YIELDING A SATISFACTORY RETURN ON INVESTMENT TO A UTILITY COMPANY. MINNESOTA POWER AND LIGHT COMPANY, AN INVESTOR-OWNED COMPANY WITH 853-MW OWNED CAPACITY, HAS SERVED AS THE CASE STUDY SUBJECT UTILITY. AN INITIAL SYSTEM DEFINITION WAS DEVELOPED BASED ON AVAILABLE WIND INFORMATION AND NEAR-TERM WIND TURBINE GENERATOR (WTG) TECHNOLOGY. THE SYSTEM WAS TAILORED TO FIT MP + L'S FORECASTED GENERATION NEEDS AND THE COMPANY'S EXISTING TRANSMISSION AND DISTRIBUTION SYSTEM. HONEYWELL DEVELOPED A WECS SIMULATION TO CONVERT WIND DATA TO WIND ENERGY AVAILABLE FOR INPUT TO THE UTILITY'S GRID. THE SIMULATION WAS USED TO EVALUATE THE PERFORMANCE OF PRELIMINARY DESIGN WIND TURBINE GENERATORS DEVELOPED FOR ERDA/NASA BY THE GENERAL ELECTRIC COMPANY AND KAMAN AEROSPACE CORPORATION, AND TO EVALUATE THE PERFORMANCE OF A WIND TURBINE OPTIMIZED FOR THE NORTHERN MINNESOTA WIND REGIME AND DEVELOPED BY THE BOEING VERTOL COMPANY UNDER SUBCONTRACT TO HONEYWELL. OVERALL EVALUATION OF WECS PERFORMANCE WAS CONDUCTED BY MP + L USING THE COMPANY'S PRODUCTION COSTING AND FINANCIAL PLANNING MODELS.

76-0386 LINDSEY F C
WIND DRIVEN MECHANICAL DRIVE.
U.S. PATENT NO. 3,964,426, JUNE 22, 1976. 4P.

A MECHANICAL DRIVE ACTUATED BY WIND HAS PROPELLERS ROTATABLY MOUNTED ON A VERTICAL STANDARD WHICH IS ROTATABLY FASTENED TO THE DECK OF A SHIP. THE ROTATIONAL FORCE OF THE PROPELLERS IS TRANSMITTED BY A SERIES OF SHAFTS TO DRIVE THE SHIP'S SCREW. THE VERTICAL STANDARD MAY BE ROTATED TO TAKE FULL ADVANTAGE OF THE PREVAILING WINDS.

76-0387 LINGELBACH D D
SIMULATION OF WIND TURBINE GENERATOR SYSTEM POWER FLOW DYNAMICS.
KANSAS STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, MIDWEST POWER SYMPOSIUM, MANHATTAN, KANSAS STATE UNIVERSITY, OCTOBER 6-8, 1976. PAPER. 31P.

THE DYNAMICS OF THE POWER FLOW IN A PARTICULAR WIND TURBINE DRIVING DIFFERENT TYPES OF GENERATORS IS ANALYZED. THE TYPES OF GENERATOR DISCUSSED INCLUDE THE CONVENTIONAL SYNCHRONOUS GENERATOR, THE INDUCTION GENERATOR, AND THE FIELD-MODULATED GENERATOR OPERATING INTO AN ELECTRICAL SYSTEM AND INTO AN ISOLATED PURE RESISTIVE LOAD. THE DISCUSSION IS LIMITED TO THE DYNAMICS OF REAL POWER (WATTS), DISREGARDING PROBLEMS OF REACTIVE POWER FLOW. TO OBTAIN THE DYNAMIC RESPONSE OF THE SYSTEM, APPROXIMATE INCREMENTAL CHANGES IN THE WIND VELOCITY WERE SIMULATED MANUALLY. IT IS SHOWN THAT THE FIELD-MODULATED GENERATOR WITHOUT FEEDBACK SUPPLYING A PURE RESISTIVE LOAD IS ABLE TO EXTRACT MORE ENERGY THAN THE OTHERS FOR VARIABLE WIND VELOCITIES. REGARDLESS OF THE TYPE OF ELECTRICAL GENERATOR USED, A SYSTEM WITH VELOCITY TYPE DAMPING LOSSES SHOULD OPERATE AT A TIP SPEED RATIO BELOW THAT YIELDING MAXIMUM POWER COEFFICIENT IN ORDER TO MAXIMIZE THE ELECTRICAL POWER DEVELOPED.

76-0388 LISSAMAN P B S
WIND ENERGY OVERVIEW.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH, STATELINE, NEVADA, SEPTEMBER 12-17, 1976. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, 1976.

WIND ENERGY IS COMPARED WITH AIR TRANSPORTATION, AND IT IS NOTED THAT, IN ITS EARLY DAYS, AIR TRANSPORTATION, ALTHOUGH TECHNICALLY FEASIBLE, APPEARED COMPLETELY NON-COMPETITIVE WITH LONG ESTABLISHED TRADITIONAL

TRANSPORTATION NETWORKS. THIS SITUATION HAS NOW REVERSED, BECAUSE OF THE IMPORTANCE OF THE NON-REPLENISHABLE RESOURCE OF TIME. IT IS SUGGESTED THAT ANOTHER NON-REPLENISHABLE, FOSSIL FUEL, MAY PROVIDE THE SAME DRIVING FORCE FOR COMMERCIALIZATION OF WIND ENERGY. BECAUSE OF THE CURRENT EXTENSIVE AND WIDE RANGING RESEARCH EFFORT IN WIND ENERGY, THESE PROCEEDINGS DO NOT COVER THE ENTIRE WIND PROGRAM. HOWEVER, THEY PROVIDE AN OVERVIEW OF SOME OF THE IMPORTANT TECHNICAL AND ECONOMIC WORK IN PROGRESS.

76-0389 LITTLER J G F
AUTONOMOUS HOUSE EXPERIMENT.
ASPECTS OF ENERGY CONVERSION, PROCEEDINGS OF A SUMMER SCHOOL, LINCOLN COLLEGE, OXFORD, ENGLAND, JULY 14-25, 1975. ELMSFORD, NEW YORK, PERGAMON PRESS, 1976. P. 609-620.

A PROJECT RELYING ON ON-SITE RESOURCES OF ENERGY SUPPLY AT AN ACCEPTABLE PRICE IS DESCRIBED. A PROTOTYPE HOUSE WITH ITS OWN WATER SUPPLY, WASTE DISPOSAL, WIND GENERATOR, AND SOLAR HEATING SYSTEM IS PROPOSED, AND CALCULATIONS ARE PRESENTED.

76-0390 LOAN GUARANTEES FOR SOLAR ENERGY DEMONSTRATIONS.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS, 94TH CONGRESS, 1ST SESSION, OCTOBER 7, 1975. WASHINGTON, D.C., GOVT. PRINT. OFFICE, 1976.

HEARINGS WERE HELD TO REVIEW FEDERAL LOAN GUARANTEES FOR SOLAR ENERGY DEMONSTRATIONS, PROPOSED IN SECTION 103 OF THE SENATE VERSION OF H.R.3474, THE ERDA AUTHORIZATION FOR FY 76 AND FOR THE TRANSITION PERIOD. WITNESSES INCLUDED: A SOLAR ENERGY INDUSTRIES ASSN. OFFICER, THE ARIZONA PUBLIC SERVICE CO. PRESIDENT, AND A NATIONAL RURAL ELECTRIC ASSOCIATON COUNSEL. SUMMARIES OF NSF FUNDED STUDIES OF INCENTIVES AND BARRIERS TO SOLAR ENERGY UTILIZATION, ABSTRACTS OF STATE LEGISLATIVE ENACTMENTS OF 1974-75 REGARDING SOLAR ENERGY, AND AN FEA PROJECT INDEPENDENCE REPORT "SOLAR ENERGY" ARE APPENDED.

76-0391 LOTKER M
DESIGN, ECONOMIC AND SYSTEM CONSIDERATIONS OF LARGE WIND-DRIVEN GENERATORS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 1976.

76-0392 LOWERY G W
NEW TECHNOLOGIES IN SOLAR ENERGY CONVERSION - AN OVERVIEW.
TECHNOLOGY FOR THE NEW HORIZON. SPACE CONGRESS, 13TH, COCOA BEACH, FLORIDA, APRIL 7-9, 1976. PROCEEDINGS. 6P.

76-0393 LUTTERVELD R VAN
TOEPASSINGSMOGELIJKHEDEN VOUR ZONNE - EN WINDENERGIE BIJ DE NEDERLANDSE PTT. (POSSSIBLE APPLICATION OF SOLAR AND WIND ENERGY BY THE DUTCH POSTAL AND TELEGRAPH AND TELEPHONE SERVICES).
DR. NEHERLABORATORIUM 1976. 74P.

IN THIS REPORT POSSIBILITIES ARE DISCUSSED TO DIMINISH THE ENERGY CONSUMPTION OF THE DUTCH P.T.T. WIND TURBINES ARE MENTIONED TOGETHER WITH SOLAR CELLS AS A POSSIBLE ENERGY SOURCE FOR TELECOMMUNICATION-EQUIPMENT IN ISOLATED PLACES. REVIEWED ARE DIFFERENT SMALL POWER (UP TO 1KW) WIND MACHINES AND ACTIVITIES IN THIS FIELD CARRIED OUT BY POST-TELEGRAPH SERVICES OF OTHER COUNTRIES (GERMANY, NORWAY, FRANCE, SWITZERLAND AND ITALY). IT IS CONCLUDED THAT WIND ENERGY IS TECHNICALLY AND ECONOMICALLY USABLE FOR PTT SERVICES IN THE NETHERLANDS.

76-0394 MCCALLUM B
CAN CANADA HARNESS THE WIND?
ENG. J. 59: 46-48, SEPTEMBER 1976.

CANADA'S OPTIONS FOR WIND POWER AND NEW DEVELOPMENTS IN WIND POWER GENERATOR (WPG) TECHNOLOGY ARE DISCUSSED. BATTERIES FOR POWER STORAGE ACCOUNT FOR ABOUT 50 PERCENT OF SYSTEMS COSTS, REQUIRE MAINTENANCE AND POSSIBLY BACKUP FROM A CONVENTIONAL GENERATOR IN SLACK-WIND PERIODS. A POWER CONVERSION UNIT DEVELOPED BY WINDWORKS MAKES IT POSSIBLE TO DO WITHOUT BATTERIES AND TO CONVERT VARIABLE CURRENT FROM A WPG TO 60-CYCLE AC SO THAT LOAD CAN BE SHARED WITH THE LOCAL POWER GRID AND EXCESS WIND-GENERATED POWER CAN BE FED INTO THE GRID. POSSIBILITIES OF ACCOMMODATING LARGER WPG INTO SUCH A SETUP ARE GOOD, AND THE OUTLOOK FOR

WPG ON THE ORDER OF 10 KW TO 100 KW IS EXAMINED, PARTICULARLY OFFSHORE WPG. BRIEF DATA ARE PROVIDED ON CANADA'S WINDIEST REGIONS BEST SUITED TO WPG USE. THE HERONEMUS PLAN FOR LARGE WPG ON THE GREAT LAKES AND WESTERN GREAT PLAINS, WITH ELECTROLYTICALLY RECOVERED HYDROGEN AS SECONDARY PRODUCT, IS MENTIONED.

76-0395 MCCORMACK M M
PROTECTING THE ENVIRONMENT.
ENCYCLOPEDIA OF ENERGY, D.N. LAPEDES, ED. NEW YORK, MCGRAW HILL BOOK CO., 1976. P. 49-55.

THE ENVIRONMENTAL IMPACTS OF PRODUCING AND UTILIZING FOSSIL AND NUCLEAR FUELS ARE INVESTIGATED. THE MEASURES APPLIED FOR KEEPING THESE IMPACTS WITHIN SOCIALLY ACCEPTABLE LIMITS AND MAJOR LEGISLATIVE APPROACHES TO THIS END ARE EXAMINED. THE EFFECTS OF PRODUCING COAL, OIL, NATURAL GAS, URANIUM, OIL SHALE, TAR SANDS, AND GEOTHERMAL ENERGY ARE SPECIFICALLY INVESTIGATED. HEAT ENERGY FROM THESE SOURCES CAN BE USED DIRECTLY AS PROCESS HEAT BY INDUSTRY TO HEAT AND COOL BUILDINGS OR FOR CONVERSION INTO ELECTRICAL AND MECHANICAL ENERGY. COMMON TO ALL OF THESE USES ARE THE ENVIRONMENTAL EFFECTS FROM BURNING OF FOSSIL FUELS OR THE FISSIONING OF URANIUM. THE ENVIRONMENTAL ASPECTS OF THE CONVERSION OF HEAT INTO MECHANICAL ENERGY AND ELECTRICITY ARE PEVIEWED. THE ENVIRONMENTAL IMPACTS OF HYDRO POWER, TIDAL POWER, SOLAR POWER, AND WIND POWER ARE DISCUSSED BRIEFLY. MEASURES TO CONTROL AIR QUALITY, WATER QUALITY, LAND POLLUTION, STRIP MINING, AND NUCLEAR POWER ARE NOT WITHOUT IMPACTS OF THEIR OWN IN TERMS OF COST, JOBS, OR RESOURCES. THE AUTHOR CONCLUDES THAT THE PROBLEM IS TO BALANCE SOCIETY'S NEED FOR ENERGY AGAINST THE NEED FOR A LIVABLE ENVIRONMENT, AT THE SAME TIME GIVING APPROPRIATE ATTENTION TO IMPORTANT ECONOMIC, TECHNICAL, AND SOCIAL FACTORS.

76-0396 MCCORMICK M E
OVERVIEW OF THE OCEANS AS ENERGY SOURCES.
ENERGY FROM THE OCEANS: FACT OR FANTASY. REP. NO 76-1. RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. P. 1-4.

AN OVERVIEW OF RENEWABLE OCEAN ENERGY RESOURCES IS PRESENTED, INCLUDING WAVES, TIDES, CURRENTS, SALINITY GRADIENTS AND THERMAL GRADIENTS, ALONG WITH THE UTILIZATION OF OCEAN COOLNESS AND THE USE OF THE OCEAN AS "REAL ESTATE" FOR THE CONVERSION OF SOLAR RADIATION AND WIND ENERGY.

76-0397 MAGNUS FORCE HARNESSED.
WIND POWER DIG. 1(6): 23, SEPTEMBER 1976.

DESCRIBED IS A PROTOTYPE MAGNUS FORCE WINDROTOR DEVELOPED AT THE UNIVERSITY OF MISSOURI.

76-0398 MAILE L H J
COMMERCIAL VERTICAL AXIS WIND TURBINES.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.28--III.38.
SAND-76-5586

RESEARCH AND DEVELOPMENT ACTIVITIES WITH VERTICAL AXIS WIND TURBINES (VAWT) OVER THE PAST TWO AND A HALF YEARS ARE REVIEWED. COMMERCIALLY AVAILABLE, "OFF THE SHELF", WIND TURBINES ARE DESCRIBED. SOME PRODUCTION AND DESIGN CONSIDERATIONS ARE PRESENTED.

76-0399 MALZAHN E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,410,802/A/, SEPTEMBER 18, 1975. 7P. (IN GERMAN)

A WIND TURBINE IS DISCLOSED WHICH CONSISTS OF A ROTATING DRUM CARRIED IN BALL BEARINGS AND ADJUSTABLE TO THE WIND DIRECTION BY MEANS OF A VERTICAL CONTROL SURFACE ATTACHED TO CONNECTING RODS LEADING TO THE DRUM. THE DRUM HAS AN AXIAL WIND INLET OPENING. TWO AXIAL GUIDE PLATES ARE CONNECTED TO THE BASE PLATE AND THE DRUM ON BOTH SIDES OF THIS OPENING; THEY SERVE AS CONTROL DEVICES FOR THE WIND ENTERING THE DRUM. OPPOSITE TO THE WIND INLET OPENING IN THE DRUM, THERE IS ANOTHER OPENING FOR REMOVING THE WIND TO THE BACK. THE DRUM AND THE TWO SHEET STEEL WALLS ON ITS SIDES ARE COVERED BY A PLATE IN ORDER TO FULLY UTILIZE THE WIND ENTERING THE DRUM.

76-0400 MARCUS S
HERE COMES THE WIND.
ENV. ACTION 8(3): 3-7, JUNE 5, 1976.

BOSTON WIND, FOUNDED IN JULY 1975 AS THE ONLY ALTERNATIVE ENERGY CENTER IN BOSTON, BELIEVES THAT INDIVIDUAL SELF-SUFFICIENCY IS THE MOST SENSIBLE GOAL FOR ENERGY PRODUCTION. DESPITE THE PAST PROVED PERFORMANCE OF WIND MILLS, WIND ENERGY BECAME OBSOLETE DURING THE 1930'S-40'S BECAUSE OF THE EASY ACCESSIBILITY OF FOSSIL FUELED ELECTRIC POWER. BUT AS THE SUPPLY OF FOSSIL FUELS DWINDLE AND THEIR PRICES INCREASE, A RETURN TO WIND POWER GENERATION BECOMES MORE ATTRACTIVE TO INDIVIDUAL CONSUMERS. WIND ENERGY IS ACTUALLY SOLAR ENERGY IN KINETIC FORM, AND A MILL TO GATHER THIS ENERGY IS SIMPLE TO BUILD, ACCORDING TO BOSTON WIND. WHILE WIND POWER BY ITSELF IS NOT A PANACEA, IF INTEGRATED WITH OTHER ENLIGHTENED TECHNOLOGIES, WIND MILLS COULD HELP PROVIDE A HIGH QUALITY, LONG LASTING ANSWER TO MANY ENERGY NEEDS TO THE NORTHEAST.

76-0401 MAUGHMER M D
OPTIMIZATION AND CHARACTERISTICS OF A SAILWING WINDMILL ROTOR. FINAL REPORT. FEBRUARY 1, 1975 -- JANUARY 31, 1976.
NTIS, MARCH 1976. 90P.
PB-259898

WITHIN THIS FOURTH AND FINAL QUARTER PROGRESS REPORT ARE COMPREHENSIVELY DISCUSSED ALL OF THE RESEARCH EFFORTS UNDERTAKEN BY THE PRINCETON WINDMILL GROUP OVER THE PAST YEAR. THIS INCLUDES A DETAILED ACCOUNTING OF THE DEVELOPMENT AND OPERATIONAL TECHNIQUES OF THE PRINCETON MOVING-VEHICLE WINDMILL TESTING FACILITY. ALSO PRESENTED IS A COMPLETE DOCUMENTATION OF THE PERFORMANCE BUILD-UP (DP(MAX) = .06 TO CP(MAX) = .40) OF A 12 FT. DIAMETER, TWO-BLADED SAILWING ROTOR. THIS REPORT FURTHER INCLUDES AN EXAMINATION OF AN EXPLORATORY RESEARCH EFFORT DIRECTED TOWARD USING A SMALL, FIRST-STAGE, COAXIAL ROTOR TO AUGMENT WINDMILL PERFORMANCE. FINALLY CONSIDERED ARE THE RESULTS AND CONCLUSIONS OF AN EXTENSIVE WIND-TUNNEL TEST PROGRAM AIMED AT A QUANTITATIVE DETERMINATION OF THE AERODYNAMIC PENALTIES ASSOCIATED WITH NUMEROUS SIMPLIFICATIONS OF THE BASIC DOUBLE-MEMBRANED SAILWING CROSS-SECTION.

76-0402 MELISS M
ENERGIEQUELLEN FUER MORGEN.; NICHTNUKLEARENICHTOSSILE PRIMAERENERGIEQUELLEN. T. 1. ZUKUENFTIGE ENERGIEBEDARFSDECKUNG UND DIE BEGEUTUNG DER NICHTFOSSILEN UND NICHTNUKLEAREN PRIMAERENERGIEQUELLEN. (ENERGY SOURCES FOR TOMORROW. NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY CARRIERS. PT. 1. MEETING THE ENERGY DEMAND IN THE FUTURE AND THE IMPORTANCE OF NON-FOSSIL AND NON-NUCLEAR PRIMARY ENERGY CARRIERS).
FRANKFURT AM MAIN, GERMANY F.R., UMSCHAU VERLAG, 1976. 85P. (IN GERMAN)

IN THE STUDY IN QUESTION, THE REGENERATIVE PRIMARY ENERGY SOURCES, SOLAR ENERGY, WIND, TIDAL POWER, GEOTHERMAL POWER AND HYDRO-ELECTRIC POWER ARE EXAMINED. THE THEORETICAL, TECHNICAL AND ECONOMICAL POTENTIALS OF THESE PRIMARY ENERGY SOURCES FOR A FUTURE ENERGY SUPPLY NOT ONLY IN THE WORLD BUT ALSO IN THE FEDERAL REPUBLIC OF GERMANY, ARE ANALYZED IN PARTICULAR. IN THIS CONTEXT, THE STATE OF TECHNOLOGY AND THE FUTURE DEVELOPMENT POSSIBILITIES OF THE UTILISATION TECHNOLOGIES OF THESE PRIMARY ENERGY SOURCES ARE DESCRIBED, AND SUGGESTIONS ARE MADE FOR A PROGRAMME PROMOTING FURTHER DEVELOPMENT AND INTRODUCTION INTO THE MARKET.

76-0403 MELISS M
ENERGIEQUELLEN FUER MORGEN. NICHTNUKLEARENICHTFOSSILE PRIMAERENERGIEQUELLEN. T. 3. NUTZUNG DER WINDENERGIE. (ENERGY SOURCES FOR TOMORROW. NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY CARRIERS. PT. 3. UTILIZATION OF WIND ENERGY).
FRANKFURT AM MAIN, GERMANY F.R., UMSCHAU VERLAG, 1976. 201P. (IN GERMAN)

THE 3RD PART OF THE PROGRAMME STUDY "NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY SOURCES" SUPPORTED BY BMFT EVALUATES THE POSSIBLE WINNING OF ENERGY FROM THE WIND AND THEN DEALS WITH THE WAYS TO OBTAIN MEASURING DATA OF THE WIND. THE STUDY IS GLOBAL, RELATED TO EUROPE AND ESPECIALLY TO THE FRG. IN THE FOLLOWING CHAPTERS 1) THE HISTORICAL DEVELOPMENT OF THE WIND ENERGY CONVERTERS IS EXPLAINED; 2) FREE-DRIVING AND WIND TURBINES WITH A SHELL AND THEIR POWER VALUES ARE DISCUSSED; 3) THE ADVANTAGES AND DISADVANTAGES OF SEVERAL WIND TURBINES AND ROTORS ARE COMPARED; 4) THE PRESENT LEVEL OF TECHNOLOGY IS EXPLAINED AND THE FUTURE

POSSIBLE DEVELOPMENT OF THE WIND CONVERTERS IS ESTIMATED. THE CALCULATION OF THE CONVERSION EFFICIENCY, THE AVAILABILITY OF SECONDARY ENERGY AND THE TECHNICALLY UTILIZED WIND ENERGY POTENTIAL IS BASED ON THE TWO-WING WIND CONVERTER WITH HORIZONTAL AXIS. FUNDAMENTALS ARE WIND ENERGY UTILIZATION SYSTEMS OF 3 MW AND 1 MW AND SMALL SYSTEMS. RELATIVELY BRIEFLY EXPLAINED ARE WAYS TO STORE THE SECONDARY ENERGY PRODUCED. ELECTRO-CHEMICAL, HEAT- AND PUMP STORAGES AND PRESSURE-AIR-STORAGE GAS TURBINES ARE DISCUSSED. THE CHAPTER "ASPECTS OF UTILIZATION" SHOWS BRIEFLY ENVIRONMENTAL EFFECTS AND ASPECTS OF SECURITY AND THEN DEALS WITH COST DETERMINATION FOR SYSTEMS OF DIFFERENT POWER AND WITH THE COSTS NECESSARY FOR RESEARCH AND DEVELOPMENT. THE REPORT ENDS WITH RECOMMENDATIONS AND PROPOSALS FOR RESEARCH AND DEVELOPMENT.

76-0404 MELISS M
ENERGY SOURCES FOR TOMORROW. TRANSLATED FROM A GERMAN PAPER.
NTIS, 1976. 17P.
ERDA-TR-226

THE REGENERATIVE SOURCES OF SOLAR ENERGY, WIND ENERGY FROM THE SEAS, EARTH HEAT, AND RUNNING WATER WERE INVESTIGATED BY A CONSORTIUM OF MAJOR RESEARCH INSTALLATIONS. THE SOURCES WERE ASSESSED FIRST ON A GLOBAL BASIS, THEN MORE SPECIFICALLY FOR THE GERMAN FEDERAL REPUBLIC. THIS PAPER SUMMARIZES RESULTS FROM THE COMPLETE STUDY, BUT IS DEVOTED MOSTLY TO AN ANALYSIS OF UTILIZATION OF WIND ENERGY, USING THE FOLLOWING TOPICS: PHYSICAL BASES AND THEORETICAL POTENTIAL, WIND ENERGY INSTALLATIONS AND TECHNICALLY USEFUL POTENTIAL, UTILITY ASPECTS, AND RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT WORK.

76-0405 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, RIDER M A
SITES FOR WIND POWER INSTALLATIONS: WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO-DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE--TABULATED EXPERIMENTAL DATA. PROGRESS REPORT FOR THE PERIOD JUNE--NOVEMBER 1976.
COLORADO STATE UNIVERSITY, CIVIL ENGINEERING DEPARTMENT,
CER76-77RNM-VAS-RB-MAR29, DECEMBER 1976. 69P. ALSO NTIS, DECEMBER 1976. 70P.
RLO/2438-76/1

IN THE SECOND PART OF THE REPORT ON THE WIND FIELD DEVELOPED OVER TWO DIMENSIONAL MODEL HILLS EXPERIMENTAL DATA ARE PRESENTED IN TABULAR FORM. FOR THE INITIAL INTERPRETATION OF THE LARGE QUANTITY OF DATA THE FIRST ANNUAL REPORT SHOULD BE CONSULTED (ERDA/NSF-00702/75/T1). THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF WIND TUNNEL MODELING. MEASUREMENTS REPORTED HEREIN HAVE BEEN COMPLETED OVER TRIANGULAR AND SINUSOIDAL SHAPE HILLS OF WIND SPEED, STATIC PRESSURE VARIATION, AND TURBULENCE INTENSITY. HILL ASPECT RATIOS STUDIED RANGE FROM 1/2 TO 1/6 WITH SOME DATA AVAILABLE AT 1/20.

76-0406 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, RIDER M A
SITES FOR WIND POWER INSTALLATIONS: WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO-DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE. ANNUAL REPORT: FIRST YEAR.
COLORADO STATE UNIVERSITY, CIVIL ENGINEERING DEPARTMENT,
CER76-77-RNM-VAS-RB-MAR5, JULY 1976. ALSO NTIS, JULY 1976. 88P.
ERDA/NSF/00702-75/1

THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF WIND TUNNEL MODELING.

76-0407 MIDDLETON P, ARGUE R, ARGUE R, BURRELL T, HATHAWAY G
CANADA'S RENEWABLE ENERGY RESOURCES: AN ASSESSMENT OF POTENTIAL.
NTIS, APRIL 1976. 528P.
N78-13588

RISING COSTS OF CONVENTIONAL, FRONTIER, AND NUCLEAR ENERGY PRODUCTION AND

THE PROSPECT OF FUTURE SHORTAGES HAVE PROMPTED A RESURGENCE OF INTEREST IN ALTERNATIVE, RENEWABLE ENERGY TECHNOLOGIES. PRINCIPAL SOURCES OF RENEWABLE ENERGY (SOLAR RADIATION, WIND, AND BIOMASS), AS WELL AS WAVES, THERMAL GRADIENTS, AND SENSIBLE HEAT SOURCES ARE REVIEWED TO ESTABLISH, IN GENERAL TERMS, THEIR SIGNIFICANCE IN THE CANADIAN CONTEXT. NEXT, THE TECHNICAL CHARACTERISTICS, EFFICIENCY, COSTS, IMPACTS, AND STATE OF THE ART OF SIXTEEN HARNESSING OR CONVERSION TECHNOLOGIES ARE PRESENTED AS AN INFORMATION BASE UPON WHICH TO BUILD AN ASSESSMENT OF POTENTIAL. A METHOD OF COMPARING THE LIFE COST OF A RENEWABLE ENERGY SYSTEM TO THAT OF THE LIKELY CONVENTIONAL ALTERNATIVE IS PROPOSED AND APPLIED IN CASES WHERE ADEQUATE TECHNICAL AND ECONOMIC DATA ARE AVAILABLE.

76-0408 MIERNIK M
IMPACTS OF ALTERNATIVE ENERGY SYSTEMS: A CRITICAL LOOK.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY. CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1ST, AMHERST, MASSACHUSETTS, JUNE 24, 1976. SHAW, E., ED. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 73-79.

THIS PAPER POINTS OUT SOME HAZARDS OF ALTERNATIVE ENERGY SYSTEMS. THE PROBLEMS ENCOUNTERED IN UTILIZING SOLAR ENERGY CONVERSION SYSTEMS ARE VARIED-INCLUDING SUCH AREAS AS BUILDING CONSTRUCTION, ACCESS TO SUNLIGHT, ZONING, AND TRANSFERABLE DEVELOPMENT RIGHTS. SOLAR HEATING AND COOLING AND DIRECT CONVERSION TO POWER BY THERMAL AND PHOTOVOLTAIC MEANS ARE SPECIFICALLY DISCUSSED. ENVIRONMENTAL PROBLEMS ENCOUNTERED WHEN UTILIZING WIND POWER AND OCEAN THERMAL GRADIENTS TO GENERATE POWER ARE SUMMARIZED. OWNERSHIP OF THESE RESOURCES IS EXAMINED.

76-0409 MILLER R H, MARTINEZ-SANCHEZ M, DUGUNDJI J, LARRABEE E E, CHOPRA I
WIND ENERGY CONVERSION.
NTIS, OCTOBER 1976. 431P.
PB-268718

AN INVESTIGATION IS MADE OF VARIOUS PROBLEMS ASSOCIATED WITH THE DESIGN OF HORIZONTAL AXIS, LOW SOLIDITY, HIGH PERFORMANCE WIND TURBINES. THE REPORT DEALS WITH THE FOLLOWING TOPICS: (A) WIND TURBINE PERFORMANCE AS DETERMINED FROM VARIOUS ELEMENTARY AND MORE REFINED MOMENTUM THEORIES; (B) PERFORMANCE TRADE-OFFS BETWEEN CONSTANT RPM AND CONSTANT VELOCITY RATIO OPERATION; (C) AERODYNAMIC VORTEX THEORIES FOR BLADE LOADINGS INCLUDING UNSTEADY EFFECTS AND WIND SHEAR VELOCITY GRADIENTS; (D)CONTROL DYNAMICS OF A SYNCHRONOUS ALTERNATOR-WIND TURBINE SYSTEM; (E) LINEAR AEROELASTIC STABILITY STUDIES OF ROTOR BLADES IN THE PRESENCE OF MODERATE INITIAL CONING ANGLES; (F) NONLINEAR DYNAMIC RESPONSE OF ROTOR BLADES INCLUDING GRAVITY AND WIND SHEAR EXCITATION; (G) AN EXPERIMENTAL INVESTIGATION OF A .914 M (3 FT) DIAMETER, 2 BLADED WIND TURBINE PLACED IN A WIND TUNNEL.

76-0410 MINARDI J E, LAWSON M O, WILLIAMS G
ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR. FINAL REPORT.
NTIS, OCTOBER 1976. 84P.
COO/4130--77/1

THE EFD WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT, POSSIBLY, FOR DIRECTING IT INTO THE WIND. ADVANTAGES OF THE EFD WIND DRIVEN GENERATOR ARE: THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE, AND THUS ECONOMICS OF SCALE CAN BE REALIZED; ALL PROBLEMS OF PITCH CONTROL, BEARINGS, TRANSMISSIONS, GENERATOR DESIGN, AND MATCHING OF GENERATOR CHARACTERISTICS TO WIND ROTOR CHARACTERISTICS ARE AVOIDED IN THE EFD SINCE IT IS A DIRECT ENERGY CONVERSION DEVICE. THE TECHNICAL AND ECONOMIC IMPACT OF THE EFD WIND DRIVEN GENERATOR ON WIND ENERGY SYSTEMS IS POTENTIALLY VERY FAVORABLE. THEORETICAL ANALYSIS PREDICTS FAVORABLE PERFORMANCE CHARACTERISTICS FOR THE EFD WIND GENERATOR; HOWEVER, DETAILED EXPERIMENTAL DATA HAVE BEEN LACKING ON THE ACTUAL PERFORMANCE OF SUCH GENERATORS. THEREFORE, THE FIRST YEAR OF RESEARCH ON EFD WIND DRIVEN GENERATORS WAS DESIGNED TO INCLUDE EXPERIMENTS ON AN EFD WIND DRIVEN GENERATOR TEST RIG, AS WELL AS THEORETICAL STUDIES OF SUITABLE GENERATOR CONFIGURATIONS. PRESENTED IS A THEORETICAL ANALYSIS OF THE EFD WIND DRIVEN GENERATOR, INCLUDING A COMPUTER STUDY OF ELECTRIC FIELD GEOMETRY AND AN ANALYSIS OF CHARGED COLLOID PRODUCTION REQUIREMENTS. ALSO DESCRIBED IS EXPERIMENTAL DATA OBTAINED WITH THE EFD TEST RIG AND A SMALL WIND TUNNEL DESIGNED AND BUILT FOR THIS PROGRAM. FUTURE PLANS ARE ALSO DETAILED.

76-0411 MOMENT R L
SYSTEMS DEVELOPMENT AND TEST CENTER ACTIVITIES IN THE WIND SYSTEMS PROGRAM AT ROCKY FLATS.
NTIS, 1976. 5P.
RFP-2698

A TEST CENTER HAS BEEN ESTABLISHED WITH 12 MACHINE TOWERS OF VARYING DESCRIPTIONS AND EIGHT WTGS ERECTED TO DATE. ADDITIONALLY, TWO LARGE AND THREE SMALL METEOROLOGICAL TOWERS HAVE BEEN INSTALLED AS WELL AS A SMALL IRRIGATION SYSTEM, TYPICAL OF THE TYPE COMMONLY USED THROUGHOUT THE COUNTRY. EXPERIENCE WITH THESE MACHINES HAS REVEALED A NUMBER OF OPERATIONAL PROBLEMS, BUT HAS RESULTED IN HARDWARE MODIFICATIONS BY MANUFACTURERS. THE OTHER MAIN AREA OF EFFORT HAS BEEN TO SOLICIT AND EVALUATE PROPOSALS FOR DEVELOPMENT OF 8 KW, 40 KW, AND HIGH RELIABILITY SWECS.

76-0412 MOSEY D
POWER FROM HYPERION'S GRANDCHILDREN.
SCI. DIMENSION 8(5): 14-20, 1976.

THE PRACTICABILITY OF EXPLOITING WIND ENERGY TO AUGMENT CANADA'S ENERGY SUPPLIES IN SELECTED AREAS IS EXAMINED WITH REFERENCE TO WINDMILL DESIGN, AVAILABLE WIND POWER, PRODUCTIVITY, COSTS, AND OTHER RELEVANT PARAMETERS. CURRENT RESEARCH UNDER THE NATIONAL RESEARCH COUNCIL INCLUDES A BROAD RANGE OF ECONOMIC AND ENGINEERING ASPECTS OF HIGH-GRADE WIND ENERGY. ADVANTAGES OF THE VERTICAL AXIS TURBINE WIND GENERATOR ARE OUTLINED, NOTING THAT POWER PRODUCTION OF THE TURBINE INSTALLATION AT THE MAGDALEN ISLANDS SITE (AVERAGE WIND SPEED 32 KM/HR) CAN BE ESTIMATED AT ABOUT 70 KW YEAR-ROUND WITH A CAPITAL COST PER KILOWATT OF APPROXIMATELY $1400, A RELATIVELY HIGH FIGURE, BUT SUITABLE FOR THE SITE, WHERE FUEL COSTS ARE VERY LARGE. ADVANTAGES AND DISADVANTAGES OF THE SEVERAL TYPES OF WINDMILLS-CONVENTIONAL, CONSTANT SPEED VERTICAL AXIS, HORIZONTAL AXIS, ETC.-ARE DISCUSSED AND ILLUSTRATED. MIXING POWER FROM WIND GENERATORS WITH THAT FROM CONVENTIONAL DIESEL UNITS OFFERS PROMISING POSSIBILITIES FOR THE SOLUTION OF BASE AND PEAK LOAD DEMANDS. DETAILED INFORMATION ON WIND CONDITIONS AND SPEED PROBABILITY DISTRIBUTIONS OVER LARGE AREAS FOR EACH MONTH OF A 3-YR PERIOD ARE REQUIRED BEFORE REASONABLY ACCURATE ESTIMATES OF WIND ENERGY AVAILABILITY CAN BE ATTEMPTED. ENVIRONMENTAL ASPECTS - OBTRUSIVENESS OF THE STRUCTURES ON A LANDSCAPE - MUST NOT BE DISREGARDED. PHOTOGRAPHS, CHARTS, AND TABLES AUGMENT THE TEXT.

76-0413 MUSGROVE P J
VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
ENERGY DIG. 5(6): 10-11, DECEMBER 1976.

THE VGVAW OPERATES AERODYNAMICALLY IN EXACTLY THE SAME WAY AS THE DARRIEUS WINDMILL, BUT HAS STRAIGHT BLADES ATTACHED TO A HORIZONTAL CROSS-ARM. IF THE BLADES ARE RIGIDLY ATTACHED TO THE CROSS-ARM, BENDING STRESSES IN HIGH WIND SPEEDS BECOME EXCESSIVE, AND CROSS-BRACING BETWEEN THE BLADES, THOUGH POSSIBLE, IS IMPRACTICAL. IN THE VGVAW EXCESSIVE BLADE STRESSES ARE AVOIDED BY ATTACHING THE BLADES TO THE CROSS-ARM VIA A HINGE. AT LOW ROTATIONAL SPEEDS, CORRESPONDING TO LOW WIND SPEEDS, THE BLADES ARE KEPT IN THE UPRIGHT POSITION, AGAINST HINGE STOPS, BY TENSION IN THE TIE-WIRES. THESE TIE-WIRES, ATTACHED TO THE UPPER PART OF EACH BLADE, ARE CONNECTED TO A SINGLE VERTICAL EXTENSION SPRING HOUSED WITHIN THE INNER, TUBULAR, WINDMILL DRIVE SHAFT. TYPICALLY THE SPRING RATE AND PRE-TENSION ARE ADJUSTED SO THAT WHEN THE WIND SPEED IS LESS THAN ABOUT 5 M/S THE MOMENT ABOUT THE HINGE DUE TO THE TIE-WIRE TENSION EXCEEDS THE MOMENT ABOUT THE HINGE DUE TO BLADE CENTRIFUGAL FORCES. UP TO THIS SPEED, WHICH IS APPROXIMATELY THE ANNUAL AVERAGE WIND SPEED OVER THE U.K., THE BLADES THEREFORE REMAIN UPRIGHT AND GIVE MAXIMUM AERODYNAMIC EFFICIENCY. WHEN THE WIND SPEED INCREASES, THE ROTATIONAL SPEED OF THE WINDMILL ALSO INCREASES, AND THE RESULTING INCREASED CENTRIFUGAL FORCES MAKE THE BLADES INCLINE OUTWARDS. THE PROTOTYPE VGVAW HAS A DIAMETER OF 3M AND 2 BLADES EACH 2M LONG AND IS SUPPORTED ON A 5M HIGH, 10CM DIAMETER GUYED STEEL TOWER.

76-0414 NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY.
TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. 577P.
NEW ENGLAND SOLAR ENERGY ASSOCIATION, CONFERENCE AND EXHIBITION, 1ST, AMHERST, MASSACHUSETTS, JUNE 24, 1976.
CONF-760657

THIS CONFERENCE CONSISTED OF 81 PAPERS ON VARIOUS ASPECTS OF SOLAR TECHNOLOGY.

76-0415 NAERGER M
BORTOP WIND TURBINE.
WIND POWER DIG. 1(6): 21, SEPTEMBER 1976.

THE AUTHOR DESCRIBES A VERTICAL AXIS WIND TURBINE HE DEVELOPED FOR WATER-LIFTING APPLICATIONS.

76-0416 NASSAR F M
ANALYSIS OF THE WIND-DRIVEN RECIPROCATOR.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 209-216.

THE CONCEPT OF THE RECIPROCATING CASCADE IS PROPOSED AS A MEANS FOR WIND ENERGY CONVERSION. PRELIMINARY AERODYNAMIC AND PERFORMANCE ANALYSES ARE CONDUCTED. A TYPICAL FULL-SCALE CONFIGURATION IS SELECTED AND ESTIMATES OF WEIGHT AND COST ARE MADE. A COST COMPARISON BETWEEN THE RECIPROCATOR AND THE CONVENTIONAL ROTARY PROPELLER UNDER THE SAME CONDITIONS INDICATES POTENTIAL REDUCTION IN THE COST PER OUTPUT FIGURE.

76-0417 NATIONAL PLAN FOR ENERGY RESEARCH, DEVELOPMENT + DEMONSTRATION: CREATING ENERGY CHOICES FOR THE FUTURE. VOL. 2. PROGRAM IMPLEMENTATION. SOLAR ENERGY TECHNOLOGY.
NTIS, JUNE 30, 1976. P. 75-116.
ERDA-76-1 (VOL. 2)

THE NATIONALLY-BASED SOLAR ENERGY PROGRAM IS ORGANIZED INTO FOUR MAJOR AREAS: THERMAL APPLICATIONS; TECHNOLOGY SUPPORT AND UTILIZATION; SOLAR ELECTRIC APPLICATIONS; AND FUELS FROM BIOMASS. THE STRATEGY IN SOLAR ENERGY R+D IS TO LOWER COST AND IMPROVE EFFICIENCY AND RELIABILITY TO DEVELOP AN ECONOMICALLY COMPETITIVE SOLAR ENERGY SYSTEM. THE ROLE OF INDUSTRY IS EMPHASIZED TO ENSURE THAT RESULTS CONFORM TO MARKET NEEDS AND CONSTRAINTS. THE BASIC PRINCIPLES OF SEVERAL SOLAR HEATING AND COOLING SYSTEMS ALREADY IN OPERATION ARE DESCRIBED.

76-0418 NAZARE E
AEROTHERMIC POWER PLANT WITH ARTIFICIAL CYCLONE.
HELIOTECHNIQUE AND DEVELOPMENT. INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2, 1975. CAMBRIDGE, MASSACHUSETTS. DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. P. 773-776.

A TOWER OF THE VENTURI TYPE IS CONCEIVED SO THAT AIR CONVECTED BY SOLAR HEAT BE GUIDED INTO ACCELERATOR DUCTS. THE WHIRL HAVING BEEN THUS STARTED, THE CORIOLIS FORCES DUE TO THE ROTATION OF THE EARTH SUSTAIN THE CYCLONE ROTATION. WITH A DIFFERENCE OF TEMPERATURE OF 50 DEGREES C, A 300 M HIGH TOWER COULD PRODUCE 650 MW OF ELECTRICITY. FOR EQUAL POWER A TOWER WILL COST 4 TIMES LESS THAN A NUCLEAR POWER PLANT. IT CAN ALSO COMPLEMENT THE CONVENTIONAL PLANTS BY RECUPERATING PART OF THE 60 PERCENT THERMIC ENERGY LOST TO THE ATMOSPHERE. THE CYCLE BEING NATURAL, IT WILL NOT CREATE AN ECOLOGY DISORDER AND CAN IN CERTAIN CASES CONSTITUTE A CLIMATIC REGULATOR.

76-0419 NEW WIND LEGISLATION.
WIND POWER DIG. 1(7): 18, DECEMBER 1976.

76-0420 NUNN R H
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE UNIVERSITY, SEPTEMBER 7-9, 1976. CONFERENCE REPORT.
NTIS, DECEMBER 7, 1976. 28P.
AD-A034871

VERTICAL- AND HORIZONTAL-AXIS SYSTEMS WERE DISCUSSED BOTH IN THEORY AND IN PRACTICE. APPLICATIONS RANGED FROM WIND FARMS EACH WITH HUNDREDS OF MEGAWATT UNITS TO THE USE OF CRETAN WINDMILLS TO PROVIDE WATER FOR CATTLE. WIND ENERGY CONVERSION UNITS HAVE BEEN OPERATED IN SEVERAL CONFIGURATIONS AND THE THEORY OF THEIR PERFORMANCES IS SUFFICIENTLY ADVANCED TO ALLOW DESIGN FOR FABRICATION. THE TRENDS ARE TOWARDS LARGER UNITS FOR MUNICIPAL POWER SYSTEMS AND SMALLER UNITS FOR DOMESTIC USE. IN

THE FORMER CASE, THE BEHAVIOR OF LARGE WIND TURBINES OPERATING IN LARGE ARRAYS, AND THE OUTPUT (WITH AND WITHOUT STORAGE) OF SEVERAL SUCH ARRAYS WHEN GEOGRAPHICALLY DISPERSED, HAS YET TO BE WELL UNDERSTOOD. THE FIELD HAS REACHED A LEVEL OF MATURITY CHARACTERIZED BY SUCH FACTORS AS ECONOMICS, ENVIRONMENTAL IMPACT, AND PUBLIC ACCEPTANCE.

76-0421 OBERMEYER J L, TOWNES H W
ECONOMIC EVALUATION OF SMALL-SCALE WIND POWERED ELECTRIC GENERATION SYSTEMS.
ASME PAPER 76-WA/ENER-1, 1976. 4P.

PRESENTED IS AN ECONOMIC EVALUATION OF SEVERAL COMMERCIAL WIND POWERED ELECTRIC GENERATION SYSTEMS OF THE TYPE WHICH COULD BE USED BY AN INDIVIDUAL HOME OWNER. A SYSTEM INCLUDES A WIND PLANT, TOWER, STORAGE BATTERY AND D-C TO A-C INVERTER. THE ANALYSIS CONSIDERED A TOTAL OF 12 DIFFERENT SYSTEM CONFIGURATIONS. THE EVALUATION OF ENERGY OUTPUT WAS BASED ON WIND SPEED DATA FOR SEVERAL LOCATIONS IN THE STATE OF MONTANA. THE ANALYSIS CAN BE EXTENDED TO OTHER LOCATIONS ON THE BASIS OF MEAN ANNUAL WIND SPEED. THE RESULTS OF THE EVALUATION INDICATE THAT SOME OF THE "HOME BUILT" SYSTEMS ARE COMPETITIVE ECONOMICALLY AT THE PRESENT TIME IN SOME "WINDY" LOCATIONS. NONE OF THE SYSTEMS WHICH ARE ECONOMIC COULD INDIVIDUALLY SUPPLY THE ENTIRE POWER REQUIREMENT FOR A SINGLE FAMILY DWELLING.

76-0422 OWEN J A
ANALYSIS OF A SOLAR THERMAL WIND ASSISTED, TURBOELECTRIC COMMUNITY POWER SYSTEM WITH EXCESS HEAT RECOVERY ASPECTS.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY, 1ST CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 553.

76-0423 PANTALONE D K, POTTER A G
APPLICATION OF WIND POWER TO THE ELECTRIC POWER SYSTEM.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 6.1--6.22.

A WIND GENERATOR SYSTEM CONSISTS OF A WIND TURBINE, AN ELECTRIC GENERATOR, AND A LINK TO THE ELECTRIC POWER LINE. THE DYNAMICS OF A WGS ARE EXHIBITED BY BLOCK DIAGRAMS AND A FREQUENCY AND TIME RESPONSE, AND THE RESULTING EIGENVALUES OF THE SYSTEM FOR DIFFERENT CONDITIONS ARE CALCULATED. POSITIVE DAMPING CHARACTERISTICS ARE SHOWN THAT INDICATE STABILITY FOR SMALL DISTURBANCES.

76-0424 PARK J
BUILDING THE GREAT AEROMOOSE.
WIND POWER DIG. 1(6): 35-37, SEPTEMBER 1976.

AEROMOOSE IS A THREE-BLADE DARRIEUS WITH A SAVONIUS STARTER ROTOR, DESIGNED BY THE AUTHOR.

76-0425 PARVIN B
THE PIPERS OF RENAISSANCE.
NEW ZEALAND ENERGY J. 49(4): 59-61, APRIL 25, 1976.

ENERGY SOURCES TERMED RECOVERABLE MAY BE THOUGHT OF AS THE PIPERS OF THE ENERGY RENAISSANCE. THEIR TUNE IS INCISIVE, PERSISTENT, AND GATHERING A CROWD OF FOLLOWERS. PROSPECTS OF SOLAR AND WIND ENERGY SYSTEMS ARE DISCUSSED.

76-0426 RAMSDELL J V
WIND SHEAR DOWNWIND OF LARGE SURFACE ROUGHNESS ELEMENTS.
CONFERENCE ON AEROSPACE AND AERONAUTICAL METEOR[illegible]. 7TH, MELBOURNE, FLORIDA, NOVEMBER 16, 1976. NTIS, AUGUST 1976. [illegible] P.
BNWL-SA-5840

THE EXISTING INFORMATION ON MEAN WIND PROFILES AND THE CHARACTERISTICS OF TURBULENCE AT A POINT ARE ADEQUATE FOR MANY PURPOSES, BUT THEY ARE NOT SUFFICIENT FOR WECS DESIGN. THE PURPOSE OF THIS PAPER IS TO DESCRIBE SOME OF THE VARIABILITY OBSERVED IN A RECENT MEASUREMENT PROGRAM. IN PARTICULAR, THE VARIATIONS OF THE VERTICAL AND LATERAL SHEAR OF THE LONGITUDINAL COMPONENT OF THE WIND WILL BE DESCRIBED. DATA ON THE FLUCTUATIONS OF THE VERTICAL AND LATERAL SHEARS OF THE LONGITUDINAL WIND

COMPONENT NEAR THE SEATTLE, WASHINGTON, CENTRAL BUSINESS DISTRICT HAVE BEEN ANALYZED TO DETERMINE SHEAR CHARACTERISTICS DOWNWIND OF LARGE ROUGHNESS ELEMENTS. THE ANALYSIS HAS EXAMINED THE FREQUENCY DISTRIBUTIONS AND TIME SCALES OF THE SHEAR FLUCTUATIONS. WHEN POSSIBLE THE RESULTS HAVE BEEN COMPARED WITH RESULTS OF ANALYSIS OF DATA FROM CAPE KENNEDY, FLORIDA.

76-0427 PETERSON R, CROMACK D
CENTRALIZED SOLAR/WIND HOME HEATING.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 108-115.

IN THE IMMEDIACY OF NATIONAL GOALS FOR ENERGY INDEPENDENCE, THE NEED EMERGES TO USE DIALECTIC METHODS TO DIMINISH THE ENERGY-CONSUMPTIVE CHARACTERISTICS OF THE TYPICAL HOME. AT THE CUTTING EDGE OF RESOURCEFUL PROGRESS ARE THE RESIDENTIAL DEVELOPMENTS THAT EMBRACE ALTERNATIVE AND CONSERVATIVE ENERGY TECHNIQUES. IN CONJUNCTION WITH SUCH A PLANNED, LOW-IMPACT COMMUNITY, THIS PAPER PROPOSES A CLUSTER-CENTRALIZED SYSTEM THAT UTILIZES WIND ENERGY IN COMBINATION WITH SOLAR THERMAL ENERGY FOR SPACE AND DOMESTIC WATER HEATING. A DESCRIPTION OF THE RANDOM SOLAR-WIND RESOURCE EMBODIES A MATCHING PROBLEM THAT IN TURN REVEALS THE BENEFITS OF THE COMBINED MODE OF ENERGY COLLECTION. THOUGH SOLAR AND WIND ENERGY SYSTEMS HAVE BEEN COINCIDENTALLY ADVANCED, THEIR MUTUAL AND UNIFIED APPLICATION REMAINS NOVEL. THE COMBINED SYSTEM DEMONSTRATES AN APPEALING ABILITY TO FULFILL THE HEATING REQUIREMENTS.

76-0428 PICKEL H
WIND TURBINES WITH VERTICAL MAIN AXLES AND WITH VERTICALLY STANDING TURBINE BLADES ROTATING ROUND THEIR OWN VERTICAL AXLE AND WHICH ARE PLACED IN THE BEST POSITION FOR THE DIRECTION OF WIND OVER TOOTHED GEARS.
GERMAN (FRG) PATENT NO. 2,506,584/A/, SEPTEMBER 16, 1976. (IN GERMAN)

THE DISCOVERY CONCERNS A WIND TURBINE ROTATING ROUND A VERTICAL AXLE WITH VERTICALLY STANDING TURBINE BLADES ROTATING ROUND THEIR OWN VERTICAL AXLE. THE TURBINE ROTATES ROUND THE BEARING MAST AND SEVERAL SUCH TURBINES CAN BE ARRANGED SO AS TO SAVE SPACE. THE TURBINE BLADES ARE ADJUSTED OVER THE TOOTHING GEARS, WHICH ARE, E.G., POWERED BY AN ELECTRONIC CONTROL SYSTEM, TO SUIT THE WIND DIRECTION AT THE TIME.

76-0429 PIEPERS G G
WINDENERGIE IN NEDERLAND. (WIND ENERGY IN THE NETHERLANDS).
TNO PROJECT 76(2): 49-56, 1976. (IN DUTCH)

IF THE NORTHSEA COAST WERE HALF OCCUPIED BY WIND TURBINES, NEARLY 15 PERCENT OF THE ELECTRICITY PRODUCED IN 1974 WOULD BE AVAILABLE BY MEANS OF 5000 (DIAM.50M) WIND TURBINES. THE COSTS PER RMH AT DEN HELDER ARE ESTIMATED TO BE COMPARABLE WITH THOSE USING CONVENTIONAL FUEL. IN THE NATIONAL RESEARCH PROGRAM ON WIND ENERGY, FINANCED BY THE GOVERNMENT, A NUMBER OF DUTCH RESEARCH INSTITUTES AND INDUSTRIES WILL INVESTIGATE HORIZONTAL AXIS AND VERTICAL AXIS WIND TURBINES AND THEIR POSSIBLE CONTRIBUTION TO THE NATIONAL ENERGY PRODUCTION.

76-0430 PIPE TOWER DEVELOPED.
WIND POWER DIG. 1(7): 18, DECEMBER 1976.

A NOVEL TOWER SYSTEM DESIGNED TO SUPPORT A 2500 WATT, 32 VOLT JACOBS WIND GENERATOR IS DESCRIBED.

76-0431 POLLARD W G
THE LONG-RANGE PROSPECTS OF SOLAR ENERGY.
AM. SCI. 64(4): 424-429, JULY-AUGUST 1976.

THE LONG-RANGE POTENTIAL OF VARIOUS WAYS OF USING SOLAR ENERGY IS EVALUATED FROM AN ECONOMIC AND COMMERCIAL STANDPOINT. SOLAR RADIATION USED DIRECTLY AND INDIRECTLY IS ANALYZED. THE VARIOUS TECHNOLOGIES ARE ASSUMED TO BE ESTABLISHED AND THE RESULTING SYSTEMS ARE VISUALIZED IN OPERATION BY INDUSTRY IN THE NORMAL BUSINESS OF SELLING ELECTRICITY, FUEL, OR EQUIPMENT. MANY SOLAR SYSTEMS ARE CONFRONTED BY CONSTRAINTS AND SHOW VARYING DEGREES OF PROMISE. SMALL, SELF-CONTAINED TOTAL ENERGY SYSTEMS FOR RURAL AREAS SEEM DESTINED TO PLAY AN INCREASINGLY IMPORTANT ROLE IN THE TOTAL WORLD ENERGY SYSTEM. WIND POWER IS DISCUSSED AS AN INDIRECT FORM OF SOLAR ENERGY.

76-0432 PONTIN G W W
APPLICATIONS OF WIND POWER FOR FUEL SAVINGS IN AGRICULTURE.
SOLAR ENERGY IN AGRICULTURE. JOINT CONFERENCE BETWEEN UNIVERSITY OF READING AND UK SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, READING, UK, 13 SEPTEMBER 1976. NTIS, 1976. P. 59-60.
CONF-7609161

INFORMATION IS SUMMARIZED ON WIND TURBINE DESIGN, WIND TURBINE MATERIALS, POWER CONVERSION, AND APPLICATION FEASIBILITY.

76-0433 PONTIN G W W
ENERGY PRODUCING WINDMILLS.
EXEC. ENG. 56(5-6): 23-24, JUNE-JULY 1976.

IN THIS ARTICLE, THE AUTHOR COVERS THE THEORY OF WINDMILLS AND SIGNIFICANCE OF THE THEORETICAL FACTORS. THE ECONOMICS AFFECTING ENERGY CONVERSION ARE DISCUSSED. SOME FEATURES OF MODERN WIND UNITS, TOGETHER WITH A CLASSIFICATION SYSTEM AND POSSIBLE APPLICATIONS, ARE PROVIDED.

76-0434 POTTER A G
SOLAR-ASSISTED POWER SYSTEMS.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 47-56.

EXCEPT FOR HYDROELECTRIC POWER, SOLAR ELECTRIC GENERATION HAS NOT BEEN WIDELY USED IN THE PAST TO ASSIST POWER SYSTEM GENERATION BECAUSE OF ITS RELATIVELY HIGH COST. THIS SITUATION HAS NOW STARTED TO CHANGE WITH THE ADVENT OF THE ENERGY CRISIS AS EXEMPLIFIED BY DECREASING NATURAL GAS SUPPLIES AND INCREASING FOSSIL FUEL PRICES. ONE POSSIBLE RESPONSE TO THIS SITUATION WHICH APPEARS TO HAVE A RELATIVELY GOOD CHANCE FOR ECONOMIC SUCCESS IS THE UTILIZATION OF WIND AND SOLAR THERMAL ENERGY FOR SPACE AND WATER HEATING LOADS SERVED BY NATURAL GAS OR ELECTRIC POWER. UNFORTUNATELY, A LARGE PORTION OF THE ENERGY COLLECTED IN A TYPICAL SOLAR HEATING SYSTEM IS LOST BECAUSE THE RECEIVED SOLAR ENERGY IS VARIABLE AND, IN MOST CASES, IS NOT WELL CORRELATED WITH COLLECTION SITE LOADS. THIS PAPER EXAMINES THE FEASIBILITY OF USING THE EXCESS ENERGY AVAILABLE FROM SOLAR HEATING SYSTEMS FOR ELECTRIC POWER PRODUCTION SO THAT POWER SYSTEM PEAKING CAPACITY AND TOTAL FOSSIL FUEL CONSUMPTION CAN BE REDUCED. AS SOLAR ELECTRIC GENERATION BECOMES LARGER, ENERGY STORAGE SYSTEMS WILL BE NEEDED TO ASSURE POWER SYSTEM STABILITY AND RELIABILITY. AT THE SOLAR COLLECTION SITE, THERMAL ENERGY AND CHEMICAL STORAGE UNITS IN BATTERY FORM ARE PREFERRED. FOR LARGE CENTRAL ENERGY STORAGE FACILITIES, PUMPED HYDRO, COMPRESSED AIR, LIQUID AMMONIA, STORAGE BATTERIES, AND LIQUID HYDROGEN SYSTEMS ARE POSSIBLE CHOICES. THE LIQUID AMMONIA STORAGE SYSTEM IS CONSIDERED THE BEST OVERALL CHOICE WHEN PUMPED HYDRO OR COMPRESSED AIR ARE NOT FEASIBLE.

76-0435 PYTLINSKI J T
USE OF SOLAR AND WIND ENERGY AS ALTERNATIVE ENERGY SOURCES.
PERSPECTIVES IN ENERGY: 1976. SHULTIS, J.K., ED. KANSAS STATE UNIVERSITY. NTIS, AUGUST 2, 1976.
CES-17

THIS IS ONE OF 17 LECTURES IN THIS 429 PAGE VOLUME CONTAINING PRESENTATIONS FROM VARIOUS WORKSHOPS HELD AT KANSAS STATE UNIVERSITY ON ENERGY TOPICS.

76-0436 RAMAKUMAR R
OPERATIONAL AND CONTROL ASPECTS OF WIND ENERGY SYSTEMS UTILIZING FIELD MODULATED GENERATORS.
1976 CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, OKLAHOMA CITY, MARCH, 10-12, 1976. NEW YORK, IEEE, 1976. P. 111-114.

TWO CONTROL SYSTEMS ARE PRESENTED AND DISCUSSED FOR OPERATING WIND-DRIVEN VARIABLE-SPEED CONSTANT-FREQUENCY FIELD MODULATED GENERATOR SYSTEMS IN PARALLEL WITH UTILITY POWER LINES. ONE OF THEM USED WIND SPEED AND AEROTURBINE SHAFT SPEED AS CONTROL INPUTS AND THE OTHER USES AEROTURBINE SHAFT TORQUE AND SPEED AS CONTROL INPUTS. THE OBJECTIVE IS TO MAINTAIN A CONSTANT AND OPTIMUM TIP SPEED RATIO WITH VARYING WIND SPEEDS TO DELIVER MAXIMUM POSSIBLE ELECTRICAL POWER TO THE POWER GRID.

76-0437 RAMAKUMAR R

UTILIZATION OF SOLAR AND WIND ENERGY TO IMPROVE THE LIVING ENVIRONMENT IN LESS DEVELOPED COUNTRIES.
INST. ENVIRON. SCI. PROC. 22: 314-318, 1976.

INTRODUCTION OF DECENTRALIZED SMALL-SCALE SYSTEMS CAN "ENERGIZE" THE RURAL ECONOMIES OF LESS DEVELOPED COUNTRIES AND IMPROVE THE LIVING ENVIRONMENT FOR MILLIONS OF PEOPLE. NEARLY 66 PERCENT OF THE WORLD'S POPULATION INHABIT LESS DEVELOPED COUNTRIES, ONE HALF OF WHOM LIVE IN SCATTERED RURAL AREAS OR BIG CITY SLUMS UNDER THE MOST DEHUMANIZING CONDITIONS. A THREE-PHASE, STEP BY STEP APPROACH FOR ADOPTING TECHNOLOGIES DESIGNED TO EXPLOIT RENEWABLE ENERGY SOURCES AT THE RURAL LEVEL IS DESCRIBED. THE FIRST STEP IS THE ESTABLISHMENT OF AN ENERGY CENTER IN EACH VILLAGE OR CLUSTER OF VILLAGES TO PROVIDE THE BASIC HUMAN NEEDS OF EXISTENCE. THE CENTER WOULD THEN EXPAND TO PROVIDE ENERGY FOR IMPROVING AGRICULTURAL PRODUCTIVITY AND SMALL-SCALE INDUSTRIAL DEVELOPMENT.

76-0438 RAMAKUMAR R, HUGHES W L
WIND ENERGY UTILIZATION--AN OVERVIEW.
ANNUAL ASME SYMPOSIUM ON ENERGY ALTERNATIVES, 16TH, ALBUQUERQUE, N.M., FEBRUARY 1976. PROCEEDINGS. P. 143-149.

A BRIEF OVERVIEW OF THE POTENTIAL OF WIND AS A NATURAL, CLEAN AND REPLENISHABLE SOURCE IS PRESENTED.

76-0439 RAMAKUMAR R, HUGHES W L, ALLISON H J, YARLAGADDA R K, SMITH G G, TSUNG C C, ASHBAUGH C D, HOY L D, RAHMAN A U, ALI M H, DESHMUKH R R
DEVELOPMENT AND ADAPTATION OF FIELD MODULATED GENERATOR SYSTEMS FOR WIND ENERGY APPLICATION. FINAL REPORT.
NTIS, AUGUST 1976. 420 P.
PB-272495, ERDA/NSF/AER/00647-76/2

THE OBJECTIVES OF THIS PROJECT ARE: (1) TO DEVELOP A MATHEMATICAL MODEL AND UNDERSTANDING OF THE FIELD MODULATED GENERATOR SYSTEM CULMINATING IN USABLE DESIGN CURVES FOR OPTIMUM PERFORMANCE OVER THE SELECTED OPERATING SPEED RANGE; AND (2) TO STUDY THE PROBLEMS AND ARRIVE AT CONTROL PHILOSOPHIES AND PERIPHERAL EQUIPMENT NEEDED TO OPERATE A WIND-DRIVEN FIELD MODULATED GENERATOR SYSTEM IN PARALLEL WITH A CONVENTIONAL POWER SYSTEM.

76-0440 REVIE R W, BOCKRIS J O'M
SOLAR ENERGY FOR A FUTURE SOCIETY.
APEA J 16(PT.2): 39-43, 1976.

THE SUN IS AN INEXHAUSTIBLE ENERGY SOURCE CAPABLE OF ELEVATING THE ENTIRE WORLD POPULATION TO THE STANDARD OF LIVING ENJOYED IN THE U.S. METHODS OF CONVERTING SOLAR ENERGY FALL INTO SIX CATEGORIES: SOLAR HEATING AND COOLING OF BUILDINGS, INCLUDING AGRICULTURAL AND INDUSTRIAL PROCESSES; PHOTOVOLTAICS; OCEAN THERMAL ENERGY; BIOCONVERSION; WIND ENERGY; AND SOLAR THERMAL ELECTRIC POWER. THE PRINCIPLES, PRESENT STATUS, AND FUTURE OF THESE METHODS ARE EXAMINED.

76-0441 RANGI R S
RECENT CANADIAN ACTIVITIES IN WIND POWER.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 110-118.

THE MAJOR PART OF THE WIND POWER ACTIVITY IN CANADA IS CENTERED AROUND VERTICAL-AXIS WIND TURBINES (VAWT). THE NATIONAL RESEARCH COUNCIL, HAVING DEVELOPED THE VAWT, IS CONCENTRATING ON THIS CONCEPT. THREE CANADIAN COMPANIES, DOMINION ALUMINUM FABRICATING, LIMITED, BRISTOL AEROSPACE LIMITED, AND BARBER HYDRAULIC TURBINE LTD., HAVE STARTED TO MARKET THE VAWT. THE NATIONAL RESEARCH COUNCIL, IN CO-OPERATION WITH QUEBEC HYDRO, IS INSTALLING A 200 KW VAWT AT A SITE ON THE MAGDALEN ISLANDS. THIS UNIT IS EXPECTED TO BE IN OPERATION IN OCTOBER 1976. BRACE RESEARCH INSTITUTE AND THE UNIVERSITY OF SHERBROOKE ARE CONTINUING WITH RESEARCH AND DEVELOPMENT OF THE HORIZONTAL WIND MACHINE. BRISTOL AEROSPACE AND THE UNIVERSITY OF MANITOBA, WITH NATIONAL RESEARCH COUNCIL FINANCIAL SUPPORT, HAVE STARTED WORK TO DEVELOP A LOW SPEED GENERATOR SUITABLE FOR WIND POWER APPLICATION.

76-0442 REED J W
PREDICTING WIND POWER AT TURBINE LEVEL FROM AN ANEMOMETER RECORD AT ARBITRARY HEIGHT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, U.K., SEPTEMBER 7, 1976. NTIS, 1976. 10 P.
SAND-76-5397, CONF-760909-1

WIND SPEED VARIATION WITH HEIGHT IN THE FRICTIONAL BOUNDARY LAYER DEPENDS ON WIND SPEED, SURFACE ROUGHNESS AND THERMODYNAMIC STABILITY. OVER RELATIVELY FLAT TERRAIN, SUITABLE FOR EXTENSIVE FIELDS OF WIND ENERGY EXTRACTORS, USEFUL WIND INCREASES IN PROPORTION TO THE ONE-SEVENTH POWER OF HEIGHT ABOVE GROUND. THIS CLOSELY APPROXIMATES THE MORE GENERAL AND THEORETICALLY BASED LOGARITHMIC MODEL ABOVE STANDARD 10 METER ANEMOMETER HEIGHT AND WITH THE 0.03M ROUGHNESS LENGTH OFTEN FOUND BY OBSERVATION. SEVERAL DATA COLLECTIONS HAVE BEEN ASSEMBLED TO VERIFY THE UTILITY OF THIS ONE-SEVENTH POWER LAW, FROM SPECIAL METEOROLOGICAL RESEARCH TOWERS AS WELL AS LONG-TERM RECORDS FROM REGULAR WEATHER STATIONS WHERE THE ANEMOMETER HAPPENED TO BE MOVED ON OCCASION. A MINOR CORRECTION FOR LOWER SPEEDS OF 2-8M/S IMPROVES PREDICTIONS BUT IS NOT ESSENTIAL TO GROSS POWER AVAILABILITY CALCULATIONS FOR LARGE TURBINE BLADES.

76-0443 REICHEL R
HARNESSING WIND POWER IN TANZANIA.
EAST AFRICAN ACADEMY OF SCIENCES ON NEW SOURCES OF ENERGY IN EAST AFRICA, 12TH, ARUSHA, TANZANIA, AUGUST 31, 1976. 18 P.

76-0444 REICHEL R
WIND POWER AND RURAL ELECTRIFICATION. A RESEARCH PROGRAMME AT THE FACULTY OF ENGINEERING.
TANZANIA, UNIVERSITY OF DAR ES SALAAM, FACULTY OF ENGINEERING, JULY 1976. 4 P.

76-0445 RENEWABLE ENERGIES, STATE FUNDED PROGRAMS.
WIND POWER DIG. 1(7): 32-33, DECEMBER 1976.

PROGRAMS IN MONTANA, IOWA, AND MINNESOTA ARE DESCRIBED.

76-0446 REPORT OF THE MIT SOLAR ENERGY WORKING GROUP.
CAMBRIDGE, MASSACHUSETTS, MIT ENERGY LABORATORY, 1976. 86 P.

76-0447 RESEARCH ON NONFOSSIL FUEL SOURCES.
GAS WORLD 181(4694): 526-527, 529-531, SEPTEMBER 1976.

PROBABLY NOT AS WELL KNOWN AS THE PIONEERING WORK OF THE CHICAGO ISTITUTE OF GAS TECHNOLOGY IN COAL GASIFICATION IS THE ASSOCIATION'S INCREASING INVOLVEMENT IN THE DEVELOPMENT OF NONFOSSIL ENERGY SOURCES. WORK IS SUMMARIZED IN THE FIELDS OF OCEAN THERMAL ENERGY CONVERSION, FUEL CELL POWER PLANTS, HYDROGEN, LOW COST ELECTROLYZERS, THERMOCHEMISTRY, PIPELINE TRANSMISSION, SOLAR ENERGY, LARGE STORAGE CAPACITY, AND WIND ENERGY SYSTEMS.

76-0448 REUTER R C
STRUCTURAL OVERVIEW.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.126--II.129.
SAND-76-5586

WHENEVER ADVANCED HARDWARE INVOLVES LARGE, PERIODIC LOADS, LOW NATURAL FREQUENCIES AND MANY INTERACTING COMPONENTS, THE PROBABILITY OF ENCOUNTERING STRUCTURAL PROBLEMS IS HIGH. THE DARRIEUS VERTICAL AXIS WIND TURBINE IS TYPIFIED BY THESE FEATURES. THE VAWT STRUCTURAL PROGRAM AT SANDIA HAS THREE NATURAL OBJECTIVES: (1) TO UNDERSTAND THE PROBLEMS AND THEIR SOLUTIONS, (2) TO AID AND SUPPORT DESIGN, AND (3) TO ASSIST IN SYSTEM COST EVALUATION. PRESENTLY BEING EMPHASIZED ARE STRENGTH REQUIREMENTS NECESSARY TO MEET PERFORMANCE CONDITIONS, STIFFNESS REQUIREMENTS FOR CONTROL OF NATURAL FREQUENCY LOCATIONS, FATIGUE REQUIREMENTS FOR SAFETY AND LOW LIFE CYCLE COSTS, AND ALSO AEROELASTICITY EFFECTS WHICH COUPLE STRUCTURAL BEHAVIOR WITH AERODYNAMICS.

76-0449 REUTER R C
TOWER ANALYSIS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY

17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.151--II.167.
SAND-76-5586

DURING THE COURSE OF SANDIA LABORATORIES' WIND ENERGY PROGRAM, TWO WIND TURBINES HAVE BEEN BUILT AND OPERATED WITH NO APPARENT PROBLEMS RESULTING FROM BLADE SUPPORT TOWER DESIGN. THE SMALLER TURBINE, A TWO METER MODEL, HAS A PRISMATIC, TRIANGULAR CROSS SECTION TRUSS TOWER, AND THE LARGER ONE, A 5 METER TURBINE, HAS A TUBULAR TOWER. SINCE NO SUSTAINING PROBLEMS HAVE ARISEN FROM EITHER TOWER DESIGN, THE RATIONALE FOR SELECTION OF A TRUSS TOWER OR TUBULAR TOWER IS STILL UNCERTAIN. THE PURPOSE OF THIS REPORT IS TO ENHANCE TOWER SELECTION RATIONALE BY ESTABLISHING SOME DESIGN GUIDELINES FOR VAWT BLADE SUPPORT TOWERS, AND TO REVIEW THE SPECIFIC DESIGN FOR THE TOWER OF THE FORTHCOMING 17 METER TURBINE.

76-0450 REUTER R C, SHELDAHL R E
SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROGRAM. QUARTERLY REPORT APRIL - JUNE 1976.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, NOVEMBER 1976.
SAND-76-0581

76-0451 REVIEW OF HARDWARE.
WIND POWER DIG. 1(6): 44-46, SEPTEMBER 1976.

76-0452 RI Z
WIND POWERED VEHICLE ELECTRICITY GENERATOR (HAS SPOON SHAPED HINGED PADDLES ON ROTOR ARM ENDS DRIVEN BY AIRFLOW).
GERMAN PATENT APPLICATION 2,424,578, JANUARY 20, 1976.

76-0453 RICHARDS A F
EXTRACTING ENERGY FROM THE OCEANS: A REVIEW .
MAR. TECHNOL. SOC. J. 10(2): 5-24, MARCH 1976.

METHODS AND VARIANTS OF OBTAINING ENERGY FROM THE OCEANS ARE DESCRIBED. OCEAN THERMAL, KELP BIOCONVERSION, OCEAN WAVES, TIDES AND TIDAL CURRENTS, OCEAN WINDS, OCEAN CURRENTS, SALINITY GRADIENTS, AND OCEAN GEOTHERMAL ENERGY ARE DISCUSSED IN TERMS OF CONCEPT, GEOGRAPHIC AREAS APPLICABLE, AND DEVELOPMENT COSTS AND SCHEDULE AS FAR AS INFORMATION IS AVAILABLE. NONE OF THE METHODS PRODUCES EXCESS HEAT INTO THE ENVIRONMENT, AND MOST REPRESENT RELATIVELY NEW TECHNOLOGIES.

76-0454 ROCKY FLATS: TESTING SMALL-SCALE WIND SYSTEMS.
WIND POWER DIG. 1(7): 39-41, DECEMBER 1976.

76-0455 RODEMAN R
EFFECTS OF SYSTEM IMBALANCE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.180--II.184.
SAND-76-5586

THE VAWT IS A COMPLEX STRUCTURE WITH MANY SIGNIFICANT NORMAL MODES. TO DETERMINE IF THE EFFECTS OF IMBALANCE WERE CRITICAL FOR THE 17M TURBINE A SIMPLIFIED MODEL WAS CONSTRUCTED. THIS MODEL IS KNOWN AS THE JEFFCOTT MODEL.

76-0456 ROHRBACH C
EXPERIMENTAL AND ANALYTICAL RESEARCH ON THE AERODYNAMICS OF WIND TURBINES. MID-TERM TECHNICAL REPORT, JUNE 1 -- DECEMBER 31, 1975.
NTIS, FEBRUARY 1976. 111 P.
COO-2615-76-T-1

THE SUCCESSFUL DEVELOPMENT OF RELIABLE, COST COMPETITIVE HORIZONTAL AXIS, PROPELLER-TYPE WIND ENERGY CONVERSION SYSTEMS (WECS) IS STRONGLY DEPENDENT ON THE AVAILABILITY OF ADVANCED TECHNOLOGY FOR EACH OF THE SYSTEM COMPONENTS. PAST EXPERIENCE AND CURRENT STUDIES OF THIS TYPE OF WIND ENERGY CONVERSION SYSTEMS HAVE SHOWN THAT THE WIND TURBINE SUBSYSTEM MOST SIGNIFICANTLY EFFECTS THE SYSTEM'S COST EFFECTIVENESS AND PERFORMANCE CAPABILITY. THUS ADEQUATE TECHNOLOGY BASES ARE ESSENTIAL FOR ALL ELEMENTS OF THE WIND TURBINE DESIGN. INFORMATION IS PRESENTED CONCERNING AERODYNAMICS DESIGN AND PERFORMANCE TECHNOLOGY, WIND TURBINE PARAMETRIC PERFORMANCE STUDY, SELECTION OF MODEL WIND TURBINE

CONFIGURATIONS AND STRUCTURAL DESIGN OF WIND TURBINE MODELS.

76-0457 SUMNER J
WIND POWER RESEARCH TURNS TO HARDWARE ON SITES ROUND THE WORLD.
ENGINEER 243: 32-33+, SEPTEMBER 16, 1976.

RESEARCH OF FOUR NATIONS (CANADA, U.S., DENMARK, GREAT BRITAIN) ON WIND POWER IS DESCRIBED.

76-0458 RYLE M L
ALTERNATE ENERGY SOURCES.
ILLINOIS ENERGY ANNUAL CONFERENCE, 4TH., SEPTEMBER 16-17, 1976. P. 216-228.

POTENTIAL BENEFITS OF NUCLEAR ENERGY, SOLAR ENERGY, GEOTHERMAL ENERGY, WIND ENERGY, AND CONSERVATION ARE DISCUSSED. SEVERAL ACTIONS TAKEN TOGETHER WILL DELAY EXPANSION OF THE NUCLEAR ENERGY INDUSTRY. SOLAR ENERGY CAN CONTRIBUTE TO HOME HEATING IN THE NEXT 10 YEARS. THE FUTURE OF SOLAR ENERGY DEPENDS ON DEVELOPMENT OF IMPROVED STORAGE DEVICES. GEOTHERMAL ENERGY WILL LIKELY PROVIDE AROUND 1 PERCENT OF U.S. ELECTRICITY NEEDS AFTER 1985. CONSERVATION IS A NECESSITY, BUT IT WILL BE HARD TO INITIATE.

76-0459 SALIEVA R B
COMPOSITE METHOD OF PLOTTING PRODUCTIVITY PROVISION CURVES OF JOINTLY UTILIZED SOLAR AND WIND ENERGY PLANTS.
GELIOTEKHNIKA 4: 52-56, 1976. TRANSL.: APPL. SOLAR ENERGY 12(4): 39-42, 1976.

A METHOD OF COMPOSITE PLOTTING OF A RESULTANT SUMMARY CURVE OF PROVISION OF PRODUCTIVITY OF A SOLAR AND A WIND ENERGY PLANT JOINTLY USED FOR ENERGY AND WATER MANAGEMENT PURPOSES IS CONSIDERED.

76-0460 SALIEVA R B
DESIGN PRINCIPLES FOR SOLAR AND WIND POWER INSTALLATIONS.
GELIOTEKHNIKA 12(1): 51-57, 1976. TRANSL.: APPL. SOLAR ENERGY 12(1): 41-45, 1976.

THE SYSTEMS APPROACH FOR PLANNING AND DESIGN OF SOLAR AND WIND POWER INSTALLATIONS INVOLVING NATURAL, TECHNOLOGICAL AND HUMAN FACTORS IS DISCUSSED. FIVE BASIC FEATURES ARE CONSIDERED; OPERATIONAL TARGETS, THE PRESENCE OF CONTROL, HIERARCHIC STRUCTURE, CONTINUOUS VARIATION OF THE STATE OF SUBSISTENCE AND ELEMENTS, AND THE NECESSITY OF USING COMPUTERS FOR THE SOLUTION OF ALL OPTIMISATION PROBLEMS.

76-0461 SALIEVA R B
EXPERIENCE OF EVALUATION OF THE RELIABILITY OF SYSTEMS OF POWER SUPPLY FROM RENEWABLE ENERGY SOURCES BY TWO-MODEL DISTRIBUTION CURVES.
GELIOTEKHNIKA 4: 57-62, 1976. TRANSL.: APPL. SOL. ENERGY 12(4): 43-47, 1976.

THE POWER SUPPLY CONSIDERED AS AN EXAMPLE RELATES TO A RADIO RELAY COMMUNICATION SYSTEM WHICH IS TO BE EQUIPPED WITH WIND AND SOLAR POWER PLANTS SUPPLEMENTED OCCASIONALLY BY A DIESEL POWER PLANT. MATHEMATICAL DESCRIPTION OF THE FUNCTION OF DISTRIBUTION OF THE LENGTH OF THE PERIOD OF OPERATION OF AN ELECTRIC STORAGE BATTERY W$SUB $PHI$$ BY MEANS OF A TWO-MODAL CURVE IS CONSIDERED. THE PARAMETER W$SUB $PHI$$ CHARACTERIZES THE DISTRIBUTION OF THE LENGTH OF CONTINUOUS FUNCTIONING OF THE APPARATUS CONTROLLING THE WORK OF THE ELECTRIC STORAGE BATTERY. THIS IS IMPORTANT IF ONE IS TO TAKE INTO ACCOUNT THAT 90-95 PERCENT OF THE ENERGY CONSUMED IS TO BE PRODUCED BY WIND ENERGY OR SOLAR ENERGY PLANTS WORKING JOINTLY WITH AN ELECTRIC STORAGE BATTERY.

76-0462 SALIEVA R B
OPTIMISATION CRITERIA FOR SOLAR AND WIND POWER SYSTEMS.
GELIOTEKHNIKA 12(1): 58-63, 1976. TRANSL.: APPL. SOL. ENERGY 12(1): 46-49, 1976.

IT IS SHOWN THAT THE DESIGN OF SOLAR AND WIND POWER SYSTEMS REQUIRES BOTH THE SPECIFICATION OF THE TARGET FUNCTION AND THE OPTIMISATION OF THE SYSTEM WITH RESPECT TO TWO CRITERIA, NAMELY, THE SYSTEM MUST BE ECONOMICAL AND IT MUST BE RELIABLE.

76-0463 SAVINO J M, WAGNER L H
WIND TUNNEL MEASUREMENTS OF THE TOWER SHADOW ON MODELS OF THE ERDA/NASA 100KW WIND TURBINE TOWER.
NTIS, NOVEMBER 1976. 37 P.
NASA-TM-X-73548, N77-13534, DOE/NASA/1004-77/1

DETAILED WIND SPEED PROFILE MEASUREMENTS WERE MADE IN THE WAKE OF 1/25 SCALE AND 1/48 SCALE TOWER MODELS TO DETERMINE THE MAGNITUDE OF THE SPEED REDUCTION (THE TOWER SHADOW). THE 1/25 SCALE TOWER MODELED CLOSELY THE ACTUAL WIND TURBINE INCLUDING THE SERVICE STAIRWAY AND THE EQUIPMENT ELEVATOR RAILS ON ONE FACE. THE 1/48 SCALE MODEL WAS MADE OF ALL TUBULAR MEMBERS. MEASUREMENTS WERE MADE ON THE 1/25 SCALE MODEL WITH AND WITHOUT THE STAIRWAY AND ELEVATOR RAILS, AND ON THE 1/48 ALL TUBE MODEL WITHOUT STAIRS AND RAILS. THE TEST RESULTS SHOW THAT THE STAIRS AND RAILS WERE A MAJOR SOURCE OF WIND FLOW BLOCKAGE. THE ALL TUBULAR 1/48 SCALE TOWER WAS FOUND TO OFFER LESS RESISTANCE TO THE WIND THAN THE 1/25 SCALE MODEL THAT CONTAINED A LARGE NUMBER OF SQUARE SECTIONS. SHADOW PHOTOS ARE INCLUDED TO SHOW THE EXTENT OF THE BLOCKAGE OFFERED TO THE WIND FROM VARIOUS DIRECTIONS.

76-0464 SCHIERHOLZ P M, SOMERVELL W L, BABCOCK W, HARTEL R, WATSON K
WIND-POWERED AERATION FOR REMOTE LOCATIONS. FINAL REPORT, MARCH 15, 1975 - AUGUST 31, 1976.
NTIS, OCTOBER 1976. 152 P.
ERDA/NSF/00833-75/1

WIND-POWERED AERATORS WERE INSTALLED AND OPERATED AT THREE FISH WINTERKILL LAKES AND AT A SEWAGE LAGOON. A WIND-POWERED AERATOR IS A SYSTEM THAT CONVERTS THE ENERGY IN THE WIND DIRECTLY INTO COMPRESSED AIR WHICH CAN BE USED IN AN AERATION PROCESS. NO AUXILIARY ENERGY STORAGE IS REQUIRED IN THAT THE LAKE ACTS AS A STORAGE DEVICE FOR THE OXYGEN. NONE OF THE LAKES WHERE WIND-POWERED AERATORS WERE INSTALLED EXPERIENCED FISH WINTERKILL DURING THE 1975-1976 WINTER. WIND-POWERED AERATION SHOWS PROMISE FOR INCREASING SEWAGE LAGOON CAPACITY ONLY UNDER SEVERE WEATHER CONDITIONS. THE MOST DESIRABLE WIND-POWERED AERATOR WOULD BE AN AMERICAN WIND TURBINE DRIVING A ROTARY BLOWER MOUNTED ON A SINGLE POLE TOWER. THE WINDS ARE OF SUFFICIENT STRENGTH AND FREQUENCY FOR WIND-POWERED AERATION IN NORTHEASTERN COLORADO AND SOUTHEASTERN WYOMING, BETWEEN THE FRONT RANGE AND THE CONTINENTAL DIVIDE.

76-0465 SCHIERHOLZ P M, SOMERVELL W L, BABCOCK W, HARTEL R, TIMBRE K
WIND POWERED AERATION FOR REMOTE LOCATIONS. PROGRESS REPORT. MARCH 15, 1975-MARCH 15, 1976.
NTIS, APRIL 1976. 74 P.
PB-259304, ERDA/NSF/00833-75/1

THIS REPORT CONCERNS THE USE OF WIND POWER DIRECTLY TO COMPRESS AIR TO INCREASE OXYGEN LEVELS IN POLLUTED RIVERS AND LAKES SUBJECT TO WINTERKILL. A PRIME ADVANTAGE MAY BE USING THE WATER FOR STORAGE OF OXYGEN ELIMINATING REQUIREMENTS FOR ENERGY STORAGE SUCH AS BATTERIES. THREE SITES ARE PROPOSED FOR THE INSTALLATION OF WIND POWERED SYSTEMS. ONE IS A LAKE CHOSEN ON THE HIGH PLAINS FOR EASE OF ACCESS, ANOTHER IS A HIGH MOUNTAIN LAKE SUBJECT TO WINTERKILL AND THE THIRD IS A HIGH PLAINS RIVER WITH POLLUTION PROBLEMS.

76-0466 SCHOENBALL W
MECHANICAL OVERLOAD PROTECTION FOR WIND IMPELLERS.
GERMAN (FRG) PATENT NO. 2,558,848/A/, SEPTEMBER 16, 1976. 5 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND IMPELLER WITH A HORIZONTAL AXIS OF ROTATION, WHICH IS AT RIGHT ANGLES TO THE WIND AT NORMAL WINDSPEEDS, BUT AT HIGH WIND PRESSURES IS PRESSED UPWARDS THROUGH A RIGHT ANGLE, OUT OF THE WIND DIRECTION, BY A SWIVELLING AXLE. ACCORDING TO THE INVENTION THE IMPELLER IS HELD IN POSITION AGAINST THE WIND BY A COUNTER WEIGHT HUNG ON ROPES. WHEN THE IMPELLER IS PRESSED UPWARDS, THE COUNTER WEIGHT IS PULLED UP BY THE ARRANGEMENT OF ROPES. WHEN THE WIND PRESSURE DROPS THE IMPELLER IS PULLED BACK INTO POSITION AGAINST THE WIND BY THE LOAD OF THE COUNTER WEIGHT.

76-0467 SCHROEDER K
WIND-POWERED ENGINE, PARTICULARLY FOR PRODUCING ELECTRICAL ENERGY.
GERMAN (FRG) PATENT NO, 2,502,783/A/, JULY 29, 1976. 7 P. (IN GERMAN)

THE WIND-POWERED ENGINE HAS 2 WIND-OPERATED PROPELLERS WHICH ARE SITUATED ONE BEHIND THE OTHER, BEARING-MOUNTED, INDEPENDENT OF ONE ANOTHER AND ROTATING IN OPPOSITE DIRECTIONS, WHICH CONVERT THEIR ENERGY OF ROTATION IN AN ELECTRIC GENERATOR. THE ROTOR AND STATOR OF THE GENERATOR ARE EACH CONNECTED TO ONE PROPELLER, SO THAT THEY ROTATE IN OPPOSITE DIRECTIONS. SPEED REGULATION TAKES PLACE DUE TO STRESSES IN THE PROPELLERS. THE PITCH OF THE BLADE ENDS CHANGES AT HIGH WIND SPEEDS. BRAKING SURFACES ARE CREATED THERE WHICH STOP THE MACHINE.

76-0468 SEGINER A
FLAP-AUGMENTED SHROUDS FOR AEROGENERATORS.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 188-196.

AXISYMMETRICAL SHROUDS FOR WINDMILLS ARE AUGMENTED BY RING-SHAPED "FLAPS" AND THEIR PERFORMANCE IS STUDIED EXPERIMENTALLY. THE CONCEPT OF THE SHROUD AS AN ANNULAR "WING" IS JUSTIFIED, LEADING TO THE CONCLUSION THAT HIGH-LIFT TECHNIQUES SHOULD BE USED IN SHROUD DESIGN, AND THAT HIGH-LIFT DEVICES, SUCH AS FLAPS, WOULD INCREASE THE POWER OUTPUT OF THE WINDMILL. IT IS SHOWN EXPERIMENTALLY THAT THE IDEAL POWER OUTPUT OF A FLAP-AUGMENTED SHROUDED TURBINE CAN BE MORE THAN 4 TIMES THE POWER OF UNSHROUDED TURBINES OF THE SAME DIAMETER.

76-0469 SELLMAN D L
WIND MOTORS.
U.S. PATENT NO. 3,988,072, OCTOBER 26, 1976. 4 P.

WIND MOTORS ARE DESCRIBED WHICH ARE PROPELLED BY IMPACT OF THE WIND AGAINST THE VANES OF AN IMPELLER WHEEL THAT HAVE WIND CHANNELING DEVICES THAT GATHER THE WIND FROM A LARGE AREA AND FUNNEL IT AT INCREASED DENSITY AND PRESSURE TO APPLY MULTIPLIED IMPACT AGAINST THE IMPELLER VANES.

76-0470 SFORZA P M
VORTEX AUGMENTOR CONCEPTS FOR WIND ENERGY CONVERSION. PROGRESS REPORT MAY-NOVEMBER 1975.
NTIS, JANUARY 1976. 65 P.
PB-263749

A PROGRESS REPORT ON RESEARCH, DESIGN, AND DEVELOPMENT OF AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT HERE IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH KINETIC ENERGY DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF LOW KINETIC ENERGY DENSITY. PROPERLY DESIGNED TURBINES WOULD BE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). TWO MAJOR GOALS ARE DESCRIBED: (1) EVALUATION AND ASSESSMENT OF THE VAC FOR WIND ENERGY CONVERSION APPLICATIONS; AND (2) CONSTRUCTION AND OPERATION OF A SMALL-SCALE OUTDOOR TEST MODEL. EACH TASK OBJECTIVE IS REVIEWED SO THAT A DESCRIPTION OF PROGRESS TO DATE AS WELL AS ANTICIPATED ACTIVITIES FOR THE REMAINDER OF THE PROGRAM IS PRESENTED.

76-0471 SFORZA P M
VORTEX AUGMENTORS FOR WIND ENERGY CONVERSION. PROGRESS REPORT MAY-NOVEMBER 1976.
NTIS, DECEMBER 1976. 114 P.
TID-27885

A PROGRESS REPORT ON ADVANCED RESEARCH, DESIGN, AND DEVELOPMENT ON AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT HERE IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH KINETIC ENERGY DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF LOW KINETIC ENERGY DENSITY. PROPERLY DESIGNED TURBINES WOULD BE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). PERFORMANCE, DESIGN, SYSTEMS, ECONOMICS, AND FIELD TESTING ARE DISCUSSED.

76-0472 SHEAHAN R T
FUELING THE FUTURE; AN ENVIRONMENTAL AND ENERGY PRIMER.

NEW YORK, ST. MARTIN'S PRESS, 1976.

WIND POWER IS BRIEFLY DISCUSSED AS AN ALTERNATIVE ENERGY SOURCE.

76-0473 SHELDAHL R E, BLACKWELL B F
AERODYNAMIC CHARACTERISTICS OF FOUR SYMMETRICAL AIRFOIL SECTIONS THROUGH 180 DEGREES ANGLE OF ATTACK AT LOW REYNOLDS NUMBERS (PRELIMINARY DATA REPORT).
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.73--II.106.
SAND-76-5586

SANDIA LABORATORIES CONTRACTED WITH WICHITA STATE UNIVERSITY TO CONSTRUCT FOUR DIFFERENT SYMMETRICAL AIRFOIL SECTIONS AND TO TEST THE MODELS AT ANGLES OF ATTACK 180 DEGREES FOR THREE DIFFERENT REYNOLDS NUMBERS. ONE OF THE REYNOLDS NUMBERS WAS TO BE AS LOW AS COULD BE OBTAINABLE AND STILL BE WITHIN THE OPERATIONAL RANGE OF THE FACILITY AND BALANCE SYSTEM. THE PURPOSE OF THESE TESTS WAS TO OBTAIN NEEDED SECTION DATA FOR THE NACA-0012 AIRFOIL OVER THE ANGLE OF ATTACK RANGE OF INTEREST AT AS LOW A REYNOLDS NUMBER AS POSSIBLE. IN ADDITION TO HELP ANSWER THE QUESTION OF THE OPTIMUM AIRFOIL FOR THE TURBINE, SIMILAR SECTION DATA FOR A THINNER (NACA-0009) AND THICKER (NACA-0015) AIRFOIL WAS DEEMED NECESSARY. ALSO, A NON-STANDARD AIRFOIL, A MODIFIED-0012 DESIGNATED NACA/0012H, WAS TESTED.

76-0474 SHULTIS J K
PERSPECTIVES IN ENERGY: 1976.
NTIS, AUGUST 1976. 429 P.
CES-17

VARIOUS ASPECTS OF ENERGY PRODUCTION AND CONSUMPTION ARE EXAMINED. TOPICS INCLUDE ENERGY AND CIVILIZATION, ENERGY RESOURCES, CURRENT U.S. PROBLEMS, ENERGY CONSERVATION, CONVENTIONAL ELECTRIC ENERGY PRODUCTION, NUCLEAR POWER REACTORS, ELECTRICAL GENERATION AND DISTRIBUTION AND DIRECT USE OF FOSSIL FUELS, SOLAR AND WIND ENERGY, FUTURE ENERGY ALTERNATIVES, FINANCIAL CONSIDERATIONS, RADIOACTIVITY AND BIOLOGICAL EFFECTS OF RADIATION, POLLUTION FROM ENERGY PRODUCTION, ENVIRONMENTAL EFFECTS OF ENERGY CONSUMPTION, RISK/BENEFIT CONSIDERATIONS, NATIONAL ENERGY POLICY, AND PLANNING AND LICENSING OF ELECTRIC POWER PLANTS.

76-0475 SIMON D I M
(THERMAL ATMOSPHERIC POWER SYSTEM CONCEPTS).
INTERNATIONAL SCIENTIFIC TECHNOLOGICAL CONFERENCE ON SPACE, 16TH, ROME, MARCH 18-20, 1976. PROCEEDINGS. ROME, RASSEGNA, INTERNAZIONALE ELETTRONICAL NUCLEARE ED AEROSPAZIALE, 1976. P. 525-536. (IN GERMAN)

THERMAL ATMOSPHERIC AREA POWER SYSTEMS EXPLOITING INSOLATION OF A ROOFED-OVER AREA, WITH THE GROUND ACTING AS A NATURAL COLLECTOR OF SUNSHINE ENERGY, AND A CENTRAL CHIMNEY PROVIDING A CONVECTION CHANNEL FOR EXTRACTING ENERGY FROM AIR CURRENTS GENERATED, ARE DESCRIBED. TRANSFORMATION OF THE KINETIC ENERGY OF THE RISING AIR CURRENTS TRAVERSING THE VERTICAL CHIMNEY INTO ELECTRICAL POWER OR MECHANICAL SHAFT OUTPUT BY MEANS OF WIND TURBINES, AND UTILIZATION OF RANDOM HORIZONTAL WIND IN ADDITION BY MEANS OF AN AUXILIARY SLEWABLE WIND TURBINE STAGE ATOP THE VERTICAL CHIMNEY, ARE ALSO DESCRIBED. THE CONCEPTS ARE RECOMMENDED PRIMARILY FOR ENERGY-POOR SEMI-ARID REGIONS WITH ABUNDANT INSOLATION. APPLICATIONS IN MORE TEMPERATE ENVIRONMENTS ARE ALSO CONSIDERED.

76-0476 SINGER R, ROBERTS T C
LAND USE REQUIREMENTS FOR FIVE ENERGY ALTERNATIVES.
AMERICAN NUCLEAR SOCIETY PUBLIC INFORMATION COMMITTEE REPORT, BLACK + VEATCH CONSULTING ENGINEERS, 1976. 12 P.

THE AMOUNT OF LAND NEEDED FOR VARIOUS ALTERNATIVE SOURCES OF ELECTRIC POWER GENERATION IS USUALLY IGNORED, EVEN THOUGH THE SURFACE OF THE EARTH IS A FINITE RESOURCE. STILL, ESSENTIAL SITING CHARACTERISTICS LIKE WATER SUPPLY, TRANSPORTATION, AFFECTED POPULATIONS, GEOGRAPHICAL FEATURES, AND ELECTRICAL TRANSMISSION FACILITIES MUST BE CONSIDERED IF ANY DISCUSSION IS TO PROCEED. ANALYSES OF A NUMBER OF FACILITIES FOR FIVE TYPES OF GENERATION STATIONS--HYDROELECTRIC, FOSSIL, NUCLEAR, SOLAR, AND WIND--INDICATE THAT NUCLEAR POWER REQUIRES THE LEAST AMOUNT OF LAND

AND WIND POWER THE MOST. BECAUSE OF THEIR EFFICIENT USE OF LAND, NUCLEAR AND FOSSIL-FUELED FACILITIES WILL BE EASIEST TO LOCATE NEAR ESSENTIAL SITING REQUIREMENTS.

76-0477 SINGH T, SONI J S
REVIEW AND ANALYSIS OF NATIONAL ENERGY RESEARCH AND DEVELOPMENT PROGRAMS AND PROPOSALS.
NTIS, JANUARY 1976. 433 P.
AD-A020794

TABULATED AND ANALYZED IN THIS REPORT ARE RECENTLY COMPLETED AND ON-GOING ENERGY R AND D PROGRAMS BY PERTINENT GOVERNMENTAL AND INDUSTRIAL ORGANIZATIONS. THE FIVE MAJOR AREAS OF DISCUSSION IN THIS STUDY INCLUDE: NUCLEAR FISSION; RENEWABLE ENERGY RESOURCES; CONVERSION SYSTEMS; ENERGY CONSERVATION; AND MULTI-DIRECTIONAL ENERGY R AND D STUDIES. OUTLINED ARE THE STATE-OF-THE-ART; ESTABLISHED NATIONAL GOALS AND OBJECTIVES; NATURE OF R AND D STUDIES CURRENTLY UNDERWAY; AND RECOMMENDATIONS FOR FUTURE R AND D WORK BY THE U.S. ARMY.

76-0478 SKURKA N, NAAR J
DESIGN FOR A LIMITED PLANET; LIVING WITH NATURAL ENERGY.
NEW YORK, BALLENTINE BOOKS, 1976. 215 P.

76-0479 SMITH R T
ANALYSIS OF POLYPHASE COMMUTATOR GENERATORS FOR WIND POWER APPLICATIONS.
IEEE TRANS. AEROSP. ELECTRON. SYST. AES-12 (1): 39-41, JANUARY 1976.

THIS PAPER DESCRIBES THE MATHEMATICAL MODELING OF THE AC POLYPHASE COMMUTATOR GENERATOR BY MEANS OF PARK'S EQUATIONS. FOR CLARITY, A TWO-PHASE, BALANCED-OPERATION MACHINE IS ANALYZED. EQUATIONS OF PERFORMANCE ARE DEVELOPED IN TERMS OF FAMILIAR PARAMETERS. THE MACHINE IS SHOWN TO HAVE ATTRACTIVE CHARACTERISTICS FOR VARIABLE-SPEED CONSTANT-FREQUENCY POWER GENERATION, WITH POSSIBLE APPLICATION TO WIND-POWER SYSTEMS.

76-0480 SMULDERS P T
PHYSICAL ASPECTS OF WINDMILL DESIGN.
PHYS. TECHNOL. 7(5): 208-214, SEPTEMBER 1976.

THE REVIVAL OF INTEREST IN RENEWABLE ENERGY SOURCES HAS LED TO SOME AMBITIOUS PROJECTS FOR HARNESSING WIND ENERGY - IN PARTICULAR THE NASA-ERDA PLAN TO BUILD A 1.5 MW WINDMILL IN 1978. THE UNDERLYING PHYSICS DETERMINING WINDMILL DESIGN FOR EFFICIENT ENERGY EXTRACTIONS IS DESCRIBED.

76-0481 SOLAR ENERGY, DFVLR ACTIVITIES.
BRAUNSCHWEIG, GERMANY F.R., DEUTSCHE FORSCHNUNGS- UND VERSUCHANSTALT FUER LUFT- UND RAUMFAHRT E.V. TRANSL.: NTIS, FEBRUARY 11, 1976. 8P.
ERDA-TR-143

THE RESEARCH PROGRAMS OF THE DFVLR IN THE AREA OF UTILIZATION OF SOLAR ENERGY ARE BRIEFLY SUMMARIZED IN TERMS OF SYSTEMS WITH FOCUSING COLLECTORS, SYSTEMS WITH FLAT COLLECTORS, AND WIND TURBINES.

76-0482 SUN + WIND IN MAINE.
WIND POWER DIG. 1(7): 20, DECEMBER 1976.

THE MAINE AUDUBON SOCIETY'S NEW HEADQUARTERS IS AN INTEGRATION OF ENERGY-EFFICIENT DESIGN, SOLAR AND WOOD SPACE-HEATING, AND WIND-POWERED WATER DELIVERY.

76-0483 SUMNER J
WINDMILL AIR STORAGE BOOSTS ENERGY HOPES.
ENGINEER 243: 13, DECEMBER 16-23, 1976.

A LECTURE BY P. MUSGROVE IS DISCUSSED. HE RECOMMENDS AN OFFSHORE WINDMILL SITE IN THE SOUTHERN NORTH SEA, WHICH HAS A POTENTIAL FOR STORING COMPRESSED AIR IN EXHAUSTED OIL AND GAS WELLS.

76-0484 SORENSEN B
DEPENDABILITY OF WIND ENERGY GENERATORS WITH SHORT-TERM ENERGY STORAGE.
SCIENCE 194(4268): 935-937, NOVEMBER 26, 1976.

POWER FLUCTUATIONS AND POWER DURATION CURVES FOR WIND ENERGY GENERATORS, INCLUDING ENERGY STORAGE FACILITIES OF A CERTAIN CAPACITY, ARE COMPARED TO THOSE OF TYPICAL NUCLEAR REACTORS. A STORAGE SYSTEM CAPABLE OF DELIVERING THE YEARLY AVERAGE POWER OUTPUT FOR ABOUT 10 HR ALREADY MAKES THE DEPENDABILITY OF THE WIND ENERGY SYSTEM COMPARABLE TO THAT OF A TYPICAL NUCLEAR PLANT.

76-0485 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL.
ENERGY DIG. 5(6): 4-5, DECEMBER 1976.

76-0486 SOUTH P
A HIGH-SPEED VERTICAL-AXIS WIND MACHINE.
ADVANCED WIND ENERGY SYSTEMS. WORKSHOP PROCEEDINGS. STOCKHOLM, STU/VATTENFALL, 1976. P. 3-5 TO 3-18.

76-0487 STANSELL J
(IS WINDPOWER READY TO TAKE OFF)?
ARCH. ENERGIEWIRTSCH. 30(8): 681-685, AUGUST 1976. (IN GERMAN) ALSO ELECTR. REV. 197(15): 456-457, OCTOBER 1975.

THIS ARTICLE GIVES A BRIEF SURVEY ABOUT THE POSITION OF WIND ENERGY DEVELOPMENTS IN THE USA, IN DENMARK, AND IN GREAT BRITAIN. THE PROTOTYPE OF A WIND ENGINE WHICH WAS BUILT BY WESCO (WIND ENERGY SUPPLY COMPANY) TO PRODUCE 140 KW IS DEALT WITH MORE INTENSIVELY. SOME DATA ABOUT THE PROFITABILITY OF WIND-ENERGY PLANTS ARE GIVEN.

76-0488 STARR C
ROLE OF ADVANCED ENERGY SYSTEMS.
TECHNOLOGY OF CONTROLLED NUCLEAR FUSION, 2D TOPICAL MEETING, RICHLAND, WASHINGTON, SEPTEMBER 21, 1976. PROCEEDINGS. VOL. 1. CONF-760935. P. 7-19.

WIND POWER IS MENTIONED BRIEFLY AS A TECHNOLOGY THAT COULD PROVIDE PART OF OUR ELECTRICITY NEEDS BETWEEN NOW AND THE FIRST PART OF THE 21ST CENTURY.

76-0489 STEWART H J
DUAL OPTIMUM AERODYNAMICS DESIGN FOR A CONVENTIONAL WINDMILL.
AIAA J. 14(11): 1524-1527, NOVEMBER 1976.

THE THEORETICAL POSSIBILITY OF DESIGNING THE BLADING OF A CONVENTIONAL WINDMILL SO AS TO MATCH THE OPTIMUM LOADING FOR MAXIMUM OUTPUT AT TWO DIFFERENT OPERATING CONDITIONS (I.E., AT TWO DIFFERENT VALUES OF THE RATIO OF TIP SPEED TO WIND SPEED) IS INVESTIGATED USING THE VORTEX BLADE ELEMENT THEORY. THE THEORY OF OPTIMUM LOADING IS DEVELOPED, INCLUDING THE EFFECT OF PROFILE DRAG. FOR THE RANGE OF PARAMETERS CONSIDERED, IT IS SHOWN THAT THE EFFECT OF PROFILE DRAG ON BLADE LOADING IS QUITE SMALL, ALTHOUGH THE EFFECT ON EFFICIENCY IS SIGNIFICANT. THE SIMPLER THEORY, NEGLECTING PROFILE DRAG, AND FIRST PRESENTED BY GLAUERT, THEN IS USED TO DESIGN THREE SETS OF BLADING WHICH MATCH THE GLAUERT LOADING CONDITIONS AT TWO CONDITIONS, TIP SPEED RATIOS OF 4 AND 5.

76-0490 STICKNEY G H
WINDMILL OPTIMIZATION.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 197-202.

THIS PAPER TREATS THE DEVELOPMENT AND STATEMENT OF THE WINDMILL LAW. IT ALSO SHOWS THE DERIVATION OF THE EQUATION FOR THE POWER SURFACE RELATING THE WIND VELOCITY, POWER AND ANGULAR VELOCITY OF THE ROTOR. IT IS AN APPLICATION OF BASIC FUNDAMENTALS AND YIELDS SEVERAL INSIGHTS REGARDING THE PHENOMENA ENCOUNTERED IN WIND POWER APPLICATIONS. IT HAS BEEN DEMONSTRATED THAT HIGH SPEED MILLS CAN EXTRACT MORE POWER FROM THE WIND THAN SLOW ONES. THE EQUATION OF THE POWER SURFACE HAS BEEN DERIVED. ITS GRAPH COMPARES FAVORABLY WITH PERFORMANCE CHARACTERISTICS OF MODEL WINDMILLS. IT SHOWS THAT INCREASING THE NUMBER OF BLADES GREATLY ENHANCES THE POWER OUTPUT OF A LOW SPEED MILL BUT HAS LITTLE EFFECT ON A HIGH SPEED MILL. IT SHOWS, HOWEVER, THAT STARTING TORQUE IS GREATLY ENHANCED FOR ALL MILLS BY INCREASING THE NUMBER OF BLADES.

76-0491 STOY B
NON-NUCLEAR, NON-FOSSIL SOURCES OF ENERGY.
ATOMWIRTSCH. - ATOMTECH. 21(11): 527-534, NOVEMBER 1976.

THE POTENTIAL OF ENERGY FROM THE EARTH'S CORE, EARTH'S CRUST, RIVERS, GROUNDWATER, GLACIAL ICE, SEA WATER, WAVES, TIDES, WIND, AMBIENT AIR, AND SOLAR RADIATION IS EVALUATED BY COMPARING EACH POTENTIAL ENERGY RESOURCE FOR TECHNICAL VIABILITY, ECONOMICS, AVAILABILITY, ECOLOGICAL IMPACT, AND POSSIBLE CONTRIBUTIONS TO FUTURE ENERGY REQUIREMENTS. AMBIENT AIR, A SOURCE OF ENERGY OVERLOOKED IN SYSTEMS STUDIES SO FAR, SEEMS TO HAVE THE GREATEST POTENTIAL. SINCE THE DIRECT OR INDIRECT USE OF SOLAR ENERGY IS NOT FEASIBLE WITHOUT THE APPLICATION OF ELECTRICITY, PARTICULAR IMPORTANCE IS ATTACHED TO THE FURTHER EXPANSION OF NUCLEAR POWER CAPABILITIES.

76-0492 STRICKLAND J H
AERODYNAMICS OF THE DARRIEUS TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.29--II.58.
SAND-76-5586

AN ANALYTICAL PERFORMANCE PREDICTION MODEL FOR THE DARRIEUS TURBINE IS PRESENTED. THIS MODEL IS SHOWN TO PREDICT THE PERFORMANCE OF SMALL SCALE ROTORS, FOR WHICH TEST DATA IS AVAILABLE, WITH REASONABLE ACCURACY. IT DISPLAYS A MARKED IMPROVEMENT OVER OLDER METHODS IN WHICH THE "INDUCED VELOCITY" THROUGH THE ROTOR IS CONSIDERED TO BE CONSTANT. THE MODEL IS CAPABLE OF PREDICTING THE OVERALL ROTOR POWER OUTPUT AND THE DISTRIBUTION OF AERODYNAMIC FORCES ALONG THE ROTOR BLADES. THE MODEL CAN BE USED TO STUDY THE EFFECTS OF ROTOR GEOMETRY VARIATIONS SUCH AS BLADE SOLIDITY, BLADE TAPER, AND VARIATIONS IN ROTOR HEIGHT TO DIAMETER RATIOS. IN ADDITION, SPACIAL VARIATIONS IN FREESTREAM VELOCITY SUCH AS THAT PRODUCED BY ATMOSPHERIC WIND SHEAR CAN BE HANDLED BY THE MODEL.

76-0493 SULLIVAN W N
5-M TURBINE FIELD TESTING.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.107--II.117.
SAND-76-5586

THE 5-M TURBINE (ACTUALLY DESIGNED AS, AND PREVIOUSLY DESIGNATED AS A 15-FOOT-DIAMETER UNIT) HAS RECENTLY UNDERGONE A SERIES OF OPERATIONAL FIELD TESTS. THIS TEST SERIES WAS INITIATED TO SEE IF FIELD DATA COULD POSSIBLY BE USED TO MEASURE THE PERFORMANCE OF THE 5-M TURBINE AND TO DEVELOP STANDARDIZED TECHNIQUES APPLICABLE FOR THE 17-M TEST PROGRAM.

76-0494 SULLIVAN W N
STRUCTURAL LOADS FOR THE 17M DARRIEUS TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.130--II.136.
SAND-76-5586

THE MAIN PURPOSE OF THE STRUCTURAL LOAD EFFORT AT SANDIA IS TO PROVIDE A REALISTIC LOAD INPUT TO THE STRUCTURAL ANALYSIS PROGRAMS WHICH HAVE BEEN DEVELOPED TO EXAMINE THE 17M TURBINE. THERE ARE THREE MAJOR LOAD SYSTEMS WHICH ACT ON THIS TURBINE: GRAVITATIONAL, CENTRIFUGAL, AND AERODYNAMIC. ONLY THE AERODYNAMIC LOADS ARE DISCUSSED SINCE THE GRAVITATIONAL AND CENTRIFUGAL LOADS ARE WELL UNDERSTOOD AND CAN BE ROUTINELY INPUT TO AN ANALYSIS.

76-0495 SULLIVAN W N
SYSTEM ENGINEERING: PERFORMANCE CONSIDERATIONS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.10--II.18.
SAND-76-5586

THE KNOWN PERFORMANCE CHARACTERISTICS OF THE DARRIEUS TURBINE ARE REVIEWED WITH EMPHASIS ON COMPARING THE PERFORMANCE OF THIS TURBINE WITH STATE-OF-THE-ART HORIZONTAL AXIS MACHINES. ALSO, THE POTENTIAL ADVANTAGES GAINED BY USING THE DARRIEUS TURBINE IN AN ASYNCHRONOUS

(VARIABLE RPM) MODE ARE DISCUSSED.

76-0496 SUMNER J
BIG US WIND POWER SCHEME GETS GO-AHEAD.
ENGINEER 243: 13, AUGUST 19, 1976.

76-0497 THE SUNWIND WIND CAR.
WIND POWER DIG. NO. 1(6): 38-40, SEPTEMBER 1976.

THIS WINDMOBILE IS A PROTOTYPE HIGHWAY VEHICLE POWERED BY WIND AND BATTERIES. ITS AERODYNAMICALLY EFFICIENT SHAPE ENABLES IT TO CRUISE AT 43 MPH OR FASTER ON WIND POWER ALONE.

76-0498 A SURVEY OF THE WINDS ON THE ISLAND OF MAUI FOR POTENTIAL WIND POWER GENERATION.
HONOLULU, UNIV. OF HAWAII, DEPT. OF METEOROLOGY, 1976. 2 VOLS:
UHMET76-06 AND 76-07.

76-0499 SWAMY N V C, FRITZSCHE A A
AERODYNAMIC STUDIES ON VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, ENGLAND, SEPTEMBER 1976.

76-0500 SWANSON R K, SMITH R T, JOHNSON C C
OPERATIONAL, COST, AND TECHNICAL STUDY OF LARGE WINDPOWER SYSTEMS INTEGRATED WITH AN EXISTING ELECTRIC UTILITY. FINAL REPORT.
NTIS, APRIL 1976. 19P.
COO/2621-2(EXEC. SUMM.)

THE OBJECTIVE OF THIS PROGRAM WAS TO EXPLORE THE FEASIBILITY OF THE USE OF WINDPOWER GENERATING SYSTEMS AS SUPPLEMENTAL ENERGY SOURCES ON EXISTING ELECTRIC UTILITIES IN THE TIME FRAME OF THE NEXT TWO DECADES. SPECIFICALLY THE STUDY WAS CENTERED UPON THE GEOGRAPHICAL REGION SERVED BY SOUTHWESTERN PUBLIC SERVICE COMPANY, AN INVESTOR-OWNED FACILITY WITH HEADQUARTERS IN AMARILLO, TEXAS.

76-0501 THRESHER R W, MEYER E E
DARRIEUS STRUCTURAL STUDIES AT OREGON STATE UNIVERSITY.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.10-III.37.
SAND-76-5586

THE OBJECT OF THE CURRENT RESEARCH EFFORT IS TO INVESTIGATE THE STATIC AND DYNAMIC RESPONSE OF THE DARRIEUS ROTOR USING A MORE REALISTIC MODEL BASED ON A RIGOROUS ANALYTICAL FORMULATION. SIMPLIFYING ASSUMPTIONS ARE STILL NECESSARY TO ACHIEVE A PRACTICAL SOLUTION; HOWEVER, THEY WILL BE APPLIED IN A MORE SYSTEMATIC FASHION THAN WAS POSSIBLE DURING THE PREVIOUS STUDY. THE FOLLOWING TASKS ARE BEING ACCOMPLISHED: FORMULATION OF BLADE KINEMATICS; FORMULATION OF BLADE STRAIN ENERGY; FORMULATION OF BLADE POTENTIAL AND KINETIC ENERGY; DEVELOPMENT OF AN AERODYNAMIC FORCE MODEL; DEVELOPMENT OF THE BLADE GOVERNING EQUATIONS; AND SOLUTION OF VARIOUS PROBLEMS OF PRACTICAL IMPORTANCE SUCH AS: BLADE DEFORMATION UNDER STATIC AND QUASI-STATIC LOADING, ROTOR BLADE STEADY STATE RESPONSE AND BLADE STABILITY BOUNDARIES.

76-0502 TAKLE E S, BROWN J M
WIND + WIND ENERGY IN IOWA. FINAL REPORT TO THE IOWA ENERGY POLICY COUNCIL.
AMES, IOWA, IOWA STATE UNIVERSITY. IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION, OCTOBER 1, 1976. 139P.

THE PURPOSE OF THIS STUDY WAS TO DOCUMENT THE CHARACTERISTICS OF WIND AND WIND ENERGY IN IOWA IN THE LOWEST 200 FEET OF THE ATMOSPHERE. WIND ENERGY WAS ALSO EXPLORED IN A GENERAL WAY BY STUDYING THE CHARACTERISTICS OF "METEOROLOGICAL ENERGY" AND N A SPECIFIC WAY BY MODELING THE ENERGY PRODUCTION OF WIND-DRIVEN GENERATORS USING IOWA WIND STATISTICS AS INPUT.

76-0503 A TALK WITH JIM SENCENBAUGH
WIND POWER DIG. NO. 1(6): 4-9, SEPTEMBER 1976.

76-0504 TAUBENFELD R F, TAUBENFELD H J
BARRIERS TO THE USE OF WIND ENERGY MACHINES: THE PRESENT LEGAL/REGULATORY

REGIME AND A PRELIMINARY ASSESSMENT OF SOME LEGAL/POLITICAL/SOCIETAL PROBLEMS.
NTIS, JULY 1976. 159P.
PB-253576

THIS REPORT ANALYZES AND ASSESSES THE PRESENT STATE OF LAW AND REGULATION OF ALL LEVELS OF GOVERNMENT THAT MAY AFFECT WIND ENERGY MACHINES. ALSO ANALYZED AND ASSESSED IS THE STATE OF ANALOGOUS AND RELATED LAW AND REGULATION, REQUIREMENTS AT VARIOUS LEVELS OF GOVERNMENT, AND INTERNATIONAL RULES, AS WIND MACHINES GROW LARGER AND/OR ARE USED IN ARRAYS. IT SUGGESTS SOME POTENTIAL IMPACTS OF THE DEVELOPMENT OF WIND-BASED POWER TECHNOLOGY ON SELECTED ASPECTS OF THE AMERICAN ECONOMY, PARTICULARLY ON THE ENERGY DELIVERING UTILITIES.

76-0505 ROSE M
WTG SYSTEMS.
WIND POWER DIG. 1(7): 42-45, DECEMBER 1976.

76-0506 TEMPLIN R J, SOUTH P
CANADIAN WIND ENERGY PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. I.57-I.88.
SAND-76-5586

THE VERTICAL-AXIS WIND TURBINE RESEARCH AND DEVELOPMENT WORK CARRIED OUT BY THE NATIONAL RESEARCH COUNCIL OF CANADA IN SUPPORT OF THE MAGDALEN ISLANDS TURBINE IS REVIEWED.

76-0507 TEWARI S K
RURAL ELECTRIFICATION AND WIND POWER.
INDIAN EAST. ENG. 118(10): 455, 457-459, OCTOBER 1976.

THE ECONOMIC ASPECTS OF USING WIND GENERATED ELECTRICITY IN RURAL VILLAGES OF INDIA ARE STUDIED.

76-0508 TEXAS ENERGY: FUTURE SOURCES.
AUSTIN, TEXAS, GOVERNOR'S ENERGY ADVISORY COUNCIL, OCTOBER 1976. 16P.

THIS PAMPHLET BRIEFLY DESCRIBES THE DEVELOPMENT OF FUTURE ENERGY SOURCES FOR TEXAS INCLUDING COAL, SOLID WASTE, NUCLEAR AND WIND POWER, AND SOLAR AND GEOTHERMAL ENERGY.

76-0509 THOMAS R I
HARNESSING THE WIND'S ENERGY.
SPEC. ENG. 36(1): 57-62, JULY 1976.

THE STATUS OF THE NASA-LEWIS WIND SYSTEM IN SANDUSKY, OHIO, IS REVIEWED. THE 125 FT DIAMETER, 100 KW ROTOR TURBINE ACHIEVED ITS RATED POWER AT 18 MPH AND 40 REVOLUTIONS/MIN IN DECEMBER 1975. PERFORMANCE IS AS EXPECTED, EXCEPT FOR BLADE BENDING PROBLEMS. WIND TURBINES OF SIMILAR DESIGN ARE DESCRIBED. ERDA'S PRESENT FEDERAL WIND ENERGY PROGRAM CALLS FOR OPERATION OF THE FIRST LARGE, 1000-2000 KW WIND TURBINES NEAR THE END OF 1979.

76-0510 THOMAS R L
LARGE EXPERIMENTAL WIND TURBINES: WHERE WE ARE NOW.
ENERGY TECHNOLOGY III: COMMERCIALIZATION. BETHESDA, MARYLAND, GOVERNMENT INSTITUTES, INC., 1976. P. 135-157. ALSO NTIS, 1976. 31P.
NASA-TM-X-71890

SEVERAL LARGE WIND TURBINE PROJECTS HAVE BEEN INITIATED BY NASA-LEWIS AS PART OF THE ERDA WIND ENERGY PROGRAM. THE PROJECTS CONSIST OF PROGRESSIVELY LARGE WIND TURBINES RANGING FROM 100 KW WITH A ROTOR DIAMETER OF 125 FEET TO 1500 KW WITH ROTOR DIAMETERS OF 200 TO 300 FEET. ALSO INCLUDED IS SUPPORTING RESEARCH AND TECHNOLOGY FOR LARGE WIND TURBINES AND FOR LOWERING THE COSTS AND INCREASING THE RELIABILITY OF THE MAJOR WIND TURBINE COMPONENTS. THE RESULTS AND STATUS OF THE ABOVE PROJECTS ARE BRIEFLY DISCUSSED. IN ADDITION, A BRIEF SUMMARY AND STATUS OF THE PLANS FOR SELECTING THE UTILITY SITES FOR THE EXPERIMENTAL WIND TURBINES IS ALSO DISCUSSED.

76-0511 TISON R R

WIND-POWERED HYDROGEN ELECTRIC SYSTEMS FOR FARM AND RURAL USE. FINAL REPORT MAY - DECEMBER 1975.
NTIS, APRIL 1976. 171P.
PB-259318

PRELIMINARY DESIGN FOR WIND-ENERGY CONVERSION SYSTEMS SUPPLYING THE TOTAL ENERGY NEEDS OF SELECTED FARMS AND A RURAL HOME ARE SYNTHESIZED. THE CONCEPT IS A FULLY DEDICATED SYSTEM WHOSE COMPONENTS AND SUBSYSTEMS ARE OFF-THE-SHELF TECHNOLOGY. THE PRINCIPAL SUBSYSTEMS AND COMPONENTS ARE: (1) INPUT (WIND TURBINE, ELECTROLYZER, AND RECTIFIERS); (2) STORAGE (BATTERIES, AND STORAGE TANKS OF HYDROGEN AND HOT WATER);AND (3) OUTPUT (INVERTER, MOTOR GENERATOR, ENGINE GENERATOR, AND FUEL CELL). TWO METHODS OF ENERGY STORAGE ARE EVALUATED FOR USE AND SUBSEQUENTLY FORM THE BASES UPON WHICH EACH DESIGN IS OPTIMIZED. IT IS SHOWN THAT WIND-ENERGY SYSTEMS BASED ON BATTERY-STORAGE SYSTEMS ARE: (1) SIMPLER TO CONSTRUCT AND MAINTAIN; (2) MORE EFFICIENT; AND (3) LESS EXPENSIVE THAN THOSE BASED ON HYDROGEN-STORAGE SYSTEMS. FURTHER, THE RELATIVE ECONOMICS OF EACH WIND-ENERGY SYSTEM ARE HEAVILY DEPENDENT ON WIND AVAILABILITY, NUMBER OF DAYS OF ENERGY STORAGE REQUIRED, AND THE MATCH BETWEEN THE WIND ENERGY AVAILABLE AND THE ENERGY REQUIREMENTS OF THE LOAD. OF ALL THE ENERGY REQUIREMENTS CHARACTERIZED, THE CASH GRAIN OPERATION IS SHOWN TO BE THE LEAST ADAPTABLE TO WIND-ENERGY SYSTEMS.

76-0512 TODD J
THE NEW ALCHEMISTS.
CO EVOLUTION Q. NO. 9: 54-65, SPRING 1976.

THE NEW ALCHEMY INSTITUTE'S EXPERIENCES WITH WINDPOWER ARE DESCRIBED ALONG WITH OTHER PROJECTS OF THIS GROUP. THEY HAVE COMBINED WINDPOWER WITH SOLAR IN SEVERAL BIO-SHELTER APPLICATIONS.

76-0513 TORREY V
WIND-CATCHERS; AMERICAN WINDMILLS OF YESTERDAY AND TOMORROW.
BRATTLEBORO, VT., STEPHEN GREENE PRESS, 1976. 226P.

"WIND-CATCHERS" PROVIDES THE ESSENTIAL BACKGROUND OF WINDMILL DEVELOPMENT ABROAD, BUT THE MEAT OF THE BOOK IS THE STORY OF WINDMILL PROGRESS IN AMERICA AND ITS PROJECTION INTO THE FUTURE OF WINDMILLS AS AN ENERGY SOURCE. IT DESCRIBES DOZENS OF AMERICAN WINDMILLS FROM ALL OVER THE COUNTRY, GIVING AN ACCOUNT OF THEIR DESIGNS, SPECIFICATIONS, AND CAPABILITIES--FROM THE HOME-BUILT INSTALLATION THAT GENERATES ELECTRICITY FOR AN ENTIRE MECHANIZED FARM IN IOWA TO THE NASA, ERDA AND OTHER PROJECTS THAT FORESHADOW A WINDCATCHING TOMORROW. IT INCLUDES PICTURES.

76-0514 TOWER OF POWER.
WIND POWER DIG. 1(6): 46, SEPTEMBER 1976.

A LIGHTWEIGHT TOWER IS DESCRIBED.

76-0515 TURNQUIST R O, APPL F C
DESIGN AND TESTING OF A PROTOTYPE SAVONIUS WIND MACHINE.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 15.1-15.3.

THE VARIOUS TYPES OF MECHANICAL DEVICES THAT HAVE BEEN TRIED OR PROPOSED TO RECOVER WIND ENERGY CAN BE SEPARATED INTO TWO CATEGORIES: VERTICAL AXIS AND HORIZONTAL AXIS MACHINES. ONE OF THE SIMPLEST VERTICAL AXIS WIND MACHINES IS THE SAVONIUS TYPE. DURING 1974, IT WAS THEREFORE DECIDED TO STUDY THE SAVONIUS TYPE WIND MACHINE AT KANSAS STATE UNIVERSITY BECAUSE OF ITS SIMPLICITY AND POTENTIAL FOR A REASONABLY HIGH EFFICIENCY. SINCE THEN, THIS DECISION HAS BEEN FURTHER JUSTIFIED BY RESULTS OF RECENT WIND TUNNEL TESTS OF SAVONIUS ROTORS. DESIGN DETAILS ARE SUMMARIZED. RESULTS INDICATE THAT EFFICIENCIES OF 30 PERCENT WERE REACHED, BUT WITH OPTIMIZATION, EFFICIENCIES OF 37 PERCENT COULD BE ATTAINED.

76-0516 UPMALIS A
MIT WINDKRAFT ENERGIELUECKEN SCHLIESSEN. (WIND POWER PLANTS FOR PEAK DEMANDS).
ENERGIE 28(9): 262-265, SEPTEMBER 1976. (IN GERMAN)

A SURVEY OF THE CURRENT DEVELOPMENT OF WIND TURBINES AND CONTROL SYSTEMS FOR STORAGE AND PEAKING REQUIREMENTS IS GIVEN. THE PROSPECTS OF USING WIND POWER PLANTS MOUNTED ON ROOFS OF HIGH BUILDINGS ARE EVALUATED.

76-0517 UTILIZATION OF WIND ENERGY.
NTIS, OCTOBER 1976. 10P. (IN IRANIAN)
CRAR--76-7

THIS REPORT IS BY THE ATOMIC ENERGY ORGANIZATION OF IRAN, TEHERAN, CENTRE FOR RESEARCH AND FOR APPLICATION OF RADIOISOTOPES. THE STATISTICS OF THE WIND ENERGY IN THE THREE AEROLOGY STATIONS IN THE SHAHBANU FARAH DAM REGION--OVER A PERIOD OF EIGHT YEARS--WERE EVALUATED AND ANALYZED. THE AVERAGE OF MAXIMAL VELOCITY CALCULATIONS INDICATES A SPEED OF 15 M/S. THE YEARLY PHYSICAL CONVERSION VALUE OF THIS ENERGY, IS 150,000 KW/H WHICH IS QUITE SUFFICIENT FOR A FAMILY OF FIVE PERSONS. ON A LARGER SCALE, THIS POWER CAN BE USED TO SUPPLY THE ENERGY REQUIRED FOR THE SEDIMENT DREDGING ACTIVITIES OF THE SHAHBANU FARAH DAM.

76-0518 WINDMILLS IN TVIND.
INGENIOEREN NO. 25-26, JUNE 1976. TRANSL.: NTIS, 1976. 13P.
ERDA-TR-230

DESIGN CHARACTERISTICS AND OPERATING PARAMETERS OF WIND TURBINES BUILT BY THE TVIND, DENMARK SCHOOLS ARE PRESENTED.

76-0519 VAN LIER J J C
HEAT AND ELECTRICITY PRODUCTION FOR THE NETHERLANDS ENERGY SURVEY.
POLYTECH. TIJDSCHR. PROCESTECH. 31(1): 2-17, JANUARY 1976.

76-0520 VENERUSO A F
AUTOMATIC CONTROL AND DATA ACQUISITION.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.263-II.269.
SAND-76-5586

THE PRIMARY GOAL OF AUTOMATIC CONTROL AND DATA ACQUISITION FOR THE WIND TURBINE PROGRAM IS TO MINIMIZE THE MANPOWER COSTS OF OPERATION BY HAVING COST EFFECTIVE AUTOMATION CAPABLE OF OPERATING AND MONITORING THE COMPLETE WIND TURBINE SYSTEM INDEPENDENTLY OF ON-SITE PERSONNEL. TO ACHIEVE THIS GOAL SANDIA LABORATORIES' WIND TURBINE TEST FACILITY IS EQUIPPED WITH A MICROPROCESSOR SYSTEM AND A NUMBER OF PERIPHERAL ELECTRONIC DEVICES WHICH INTERFACE THE PROCESSOR WITH THE TURBINE'S POWER SYSTEMS, OPERATING SENSORS, ANEMOMETERS AND OUTPUT RECORDING DEVICES.

76-0521 VENERUSO A F
ELECTRICAL POWER SYSTEM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.241-II.262.
SAND-76-5586

THE BASIC APPROACH TO THE ELECTRICAL POWER SYSTEM FOR THE VERTICAL AXIS WIND TURBINE (VAWT) HAS BEEN TO USE STANDARD INDUCTOR MACHINES WITH ALL THE VAWT'S BUILT AND TESTED. OTHER MACHINES HAVE ALSO BEEN OF INTEREST IN THIS ENDEAVOR. FOR EXAMPLE, AUTOMOTIVE TYPE ALTERNATIVES HAVE BEEN USED IN SMALL SCALE SYSTEMS TESTS WITH THE 5 METER VAWT AND A 60 KW SYNCHRONOUS GENERATOR BEING DESIGNED AND BUILT ALONG WITH AN INDUCTION MACHINE FOR THE 17 METER VAWT TO BE USED AS A GENERAL PURPOSE COST EFFECTIVE ELECTRICAL POWER TESTBED FOR OPERATION OF THE VAWT IN CONJUNCTION WITH THE UTILITY SYSTEMS.

76-0522 VON KOENING F M
WINDENERGIE IN PRAKTISCHER NUTZUNG. RAEDER, ROTOREN, MUCHLEN, WINDKRAFTWERKE. (WIND ENERGY IN PRACTICAL USE. WHEELS, ROTORS, WINDMILLS, WIND POWER PLANTS).
GERMANY, F.R., PFRIEMER, 1976. 182P. (IN GERMAN)

FOLLOWING A BRIEF INTRODUCTION TO ENERGY CONVERSION THE FUNDAMENTALS OF ENERGY PRODUCTION FROM WIND POWER ARE PRESENTED, E.G. WIND SYSTEMS ON THE EARTH, ANNUAL COURSE OF THE WIND VELOCITY CURVES, DEPENDENCE OF THE WIND VELOCITY ON HEIGHT, ENERGY CONTENT OF AN AIR STREAM. THE MAIN PART OF THE BOOK CONTAINS A SURVEY OF THE USE OF WIND ENERGY FROM ANTIQUITY TO THE PRESENT. THE VARIOUS TYPES OF TECHNICAL SYSTEMS ARE DESCRIBED. FINALLY, A SURVEY IS GIVEN OF TODAY'S STATE OF WIND ENERGY UTILIZATION REPORTING ON LARGE WIND POWER PROJECTS AS WELL AS ON ECONOMIC QUESTIONS.

76-0523 VORTEX TURBINE TESTED.
WIND POWER DIG. 1(6): 22, SEPTEMBER 1976.

WIND TUNNEL TESTS OF A VORTEX TURBINE ARE SUMMARIZED.

76-0524 WADE G, HARTMANN M, HARTMANN S
HOMEGROWN ENERGY; POWER FOR THE HOME AND HOMESTEAD. REV. ED.
N.Y., CHARLES SCRIBNER'S SONS, 1976. 150P.

THIS BOOK IS A LIST OF COMPANIES PRODUCING PRODUCTS OR PUBLICATIONS IN ALTERNATIVE ENERGY, WITH A MASTER INDEX BY PRODUCT.

76-0525 WALTER STRESE'S WIND MUSEUM.
WIND POWER DIG. 1(7): 22, DECEMBER 1976.

76-0526 WALTERS R E
INNOVATIVE WIND MACHINES. EXECUTIVE SUMMARY AND FINAL REPORT.
NTIS, JUNE 1976. 218P.
ERDA/NSF/00367-76/2

INFORMATION IS PRESENTED CONCERNING WING TRAILING VORTICES, VORTEX TYPE CONCENTRATORS, VERTICAL AXIS WIND MACHINE ANALYSIS USING STRIP THEORY, NUMERICAL SOLUTION FOR THE UNSTEADY LIFTING CHARACTERISTICS OF VARIABLE PITCH CROSS-FLOW WIND TURBINES, AND OUTDOOR VAT TEST MODEL.

76-0527 WEINGARTEN L I, LOBITZ D W
BLADE STRUCTURAL ANALYSIS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.137-II.150.
SAND-76-5586

THE ANALYSIS PRESENTED ADDRESSES THE BLADE WHICH IS BEING DESIGNED AND BUILT BY KAMAN FOR SANDIA'S 17-METER WIND TURBINE. THE BLADE CONSISTS OF TWO STRAIGHT SECTIONS AND A CENTER CIRCULAR SECTION. STRUTS ARE INCLUDED BETWEEN THE BLADE AND THE SHAFT TO PROVIDE ADDITIONAL SUPPORT. THE GEOMETRIC PROPERTIES USED IN THE ANALYSIS ARE ALSO GIVEN. THE STRUTS HAVE THE SAME CROSS SECTION AS THE BLADE. THE LOAD-CARRYING PORTION OF THE BLADE IS A 6061-T6 ALUMINUM LEADING-EDGE D-SECTION AND TRAILING-EDGE SPLINE. STRUCTURAL ANALYSIS RESULTS ARE PRESENTED.

76-0528 WEINGARTEN L I, BLACKWELL B F
SANDIA VERTICAL-AXIS WIND TURBINE PROGRAM. TECHNICAL QUARTERLY REPORT. JANUARY - MARCH 1976.
NTIS, AUGUST 1976. 55P.
SAND-76-0338

THIS QUARTERLY REPORT DESCRIBES THE ACTIVITIES WITHIN THE SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROGRAM DURING THE THIRD QUARTER OF THE FISCAL YEAR 1976. INCLUDED ARE THE HIGHLIGHTS OF THE QUARTER; A REVIEW OF THE STATUS OF GENERAL DESIGN EFFORTS IN THE AREAS OF AERODYNAMICS, STRUCTURES, SYSTEMS ANALYSIS, AND TESTING; A SUMMARY OF PRELIMINARY DESIGN DETAILS OF THE PROPOSED 17-M TURBINE/60-KW GENERATOR SYSTEM FOR POWER GRID APPLICATION; AND STRUCTURAL ANALYSIS AND OPERATIONAL TEST RESULTS FOR THE EXISTING 5-M TURBINE.

76-0529 WEISS G
AUTOMATICALLY ADJUSTABLE WIND POWER UNIT (HAS CARRIER POLE FOR WHEEL TILTABLY MOUNTED, AND WIND SCREEN).
GERMAN PATENT APPL. 2,423,612, JANUARY 6, 1976.

76-0530 WELLS W D, MCGOWAN J G
DESIGN AND INSTALLATION OF HEATING SYSTEM FOR UMASS SOLAR HABITAT I.
NTIS, DECEMBER 1976. 102P.
UM-WF-TR-76-10

DETAILS ARE PRESENTED OF DESIGN PRINCIPLES AND INSTALLATION OF THE SOLAR AND WINDPOWERED HEATING SYSTEMS INSTALLED IN UMASS SOLAR HABITAT I. INCLUDED ARE A COMPLETE SPECIFICATION OF MATERIALS AND OPERATING INSTRUCTIONS. A SUMMARY OF POTENTIAL MODIFICATIONS AND IMPROVEMENTS TO THE SYSTEM IS ALSO INCLUDED.

76-0531 WENTINK T

STUDY OF ALASKAN WIND POWER AND ITS POSSIBLE APPLICATIONS. QUARTERLY PROGRESS REPORT 1 OCTOBER-31 DECEMBER 1975.
GEOPHYSICAL INSTITUTE, UNIVERSITY OF ALASKA, FAIRBANKS, ALASKA. NTIS, JANUARY 20, 1976. 14P.
PB-263695

EXTENSIVE ANALYTICAL STUDIES ON WIND SPECTRA WERE EXTENDED TO THE PREDICTION OF THE MONTHLY AND AVERAGE POWER OUTPUT FROM SPECIFIED WINDMILLS, BASED ON ONLY KNOWLEDGE OF THE MEASURED MEAN WINDSPEED. FOR THE ELEKTRO WINDMILL AND 44 SETS OF LONG TERM ALASKAN WIND FREQUENCY DATA, THE AUTHOR CALCULATED THE EXPECTED MEAN POWERS. THEN, FROM ANALYTICAL CONSIDERATIONS HE PREDICTED THE EXPECTED MEAN POWER, WITH RESULTING ERRORS OF 0 TO 7 PERCENT.

76-0532 WENTINK T
WIND POWER POTENTIAL OF ALASKA. PART 11. WIND DURATION CURVE FITS AND OUTPUT POWER ESTIMATES FOR TYPICAL WINDMILLS.
NTIS, AUGUST 1976. 92P.
RLO/2229/T12--76/1

AN EMPIRICAL ANALYTICAL FUNCTION (F1) AND THE WEIBULL FUNCTION (F3) WERE COMPARED FOR USE IN CASTING MEASURED LONG-TERM WIND SPEED FREQUENCY DATA IN THE FORM OF THE WIND SPEED DURATION CURVES. DATA FROM 18 ALASKAN LOCATIONS WERE USED IN THE 248 CASES TREATED. THE FITTED DURATION CURVES WERE COUPLED WITH THE INSTANTANEOUS POWER VS. WIND SPEED CHARACTERISTICS FOR THREE WIND ENERGY CONVERSION SYSTEMS (WECS) TO PREDICT THE PROBABLE MONTHLY AND ANNUAL MEAN ENERGY PRODUCTIVITY AND POWER LEVELS OF THE WECS. THE LATTER, AS USED HERE, WERE RATED AT 6 KW (ELEKTRO), 15 KW (GRUMMAN), AND 100 KW (NASA-MOD-0). IN THE ABSENCE OF THE RELIABLE TEST DATA FOR AVERAGE ENERGY OR AVERAGE POWER (ANTI P) AT KNOWN AVERAGE WIND SPEEDS NO CHOICE BETWEEN F1 AND F3 IS OBVIOUS, BUT STATISTICAL TESTS FAVOR F1. BOTH SEEM EQUALLY USEFUL FOR WIND POWER ESTIMATION. THE VALIDITY OF USE OF THE LONG-TERM AVERAGE WIND SPEED AS A KEY PARAMETER IN WIND WORK IS DEMONSTRATED.

76-0533 WHISPERING WIND.
CONSULT. ENG. (LONDON) 40(11): 44-45, NOVEMBER 1976.

THIS IS A REVIEW OF THE INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS HELD AT CAMBRIDGE, ENGLAND, IN SEPTEMBER 1976.

76-0534 WHITEHURST C A, SARCO B, BLANCHARD W A
WIND ENERGY POTENTIAL IN THE COASTAL AREAS OF LOUISIANA.
LA. ENG. P. 6-9, DECEMBER 1976.

WIND POWER DATA FOR VARIOUS SITES ALONG THE LOUISIANA GULF COAST ARE PRESENTED. THE FEASIBILITY OF USING CURRENT DESIGN WIND TURBINES FOR ELECTRIC POWER GENERATION AT THESE SITES IS DISCUSSED.

76-0535 WIDGER W K
ESTIMATING WIND POWER FEASIBILITY.
POWER ENG. 80: 58-61, AUGUST 1976.

A DESCRIPTION IS GIVEN OF A METHOD WHICH MAKES IT POSSIBLE TO OBTAIN WIND POWER FEASIBILITY FOR AN AREA ON THE BASIS OF AVERAGE WIND SPEED DATA. THE METHOD APPEARS PARTICULARLY USEFUL, WHEN APPLIED TO CLIMATOLOGICAL AVERAGE WIND SPEED DATA, AND FOR INITIAL FEASIBILITY ASSESSMENTS. ATTENTION IS GIVEN TO DATA NEEDS AND SOURCES, RELATIONSHIPS BETWEEN WIND SPEEDS, THE NOMINAL AVERAGE WIND POWER, AND A TECHNICAL EVALUATION.

76-0536 WIDGER W K, DERRICKSON R A
NEW ENGLAND WIND POWER -- COASTAL OR MOUNTAIN.
POWER ENG. 80(12): 43-47, DECEMBER 1976.

A COMPARATIVE STUDY IS MADE OF THE WIND POWER AVAILABLE IN THE COASTAL AND IMMEDIATE OFFSHORE AREA OF THE GULF OF MAINE AND ON THE EXPOSED RIDGES AND SUMMITS IN OR PERIPHERAL TO THE WHITE MOUNTAINS AND OTHER NEW ENGLAND RANGES. IT IS CONCLUDED THAT THE WIND POWER AVAILABLE AT ELEVATIONS OF ABOUT 3000 FT MSL OR ABOVE EQUALS OR EXCEEDS THAT AVAILABLE 50 OR MORE MILES OFFSHORE IN THE GULF OF MAINE. THERE IS NO WAY TO AVOID DAY-TO-DAY VARIABILITY DUE TO CHANGING SYNOPTIC WEATHER SITUATIONS, BUT THE HIGHER ELEVATIONS INLAND DO APPEAR TO PERMIT RELATIVELY STEADY SEASONAL AVERAGE POWER GENERATION, IF THE OPERATING RANGE IS

APPROPRIATELY TRUNCATED.

76-0537 WIEDUWILT G
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,505,954/A/, AUGUST 26, 1976. 17P. (IN GERMAN)

THE WIND POWER PLANT DESCRIBED IN THIS INVENTION CONSISTS OF A VERTICAL ROTOR WITH A HORIZONTAL AND TRAVERSE TO WIND DIRECTION RUNNING SHAFT, WITH CIRCULAR IMPELLER SHOVELS. EXTRA GUIDE SHOVELS PROVIDE THAT WIND CANNOT HAVE A HINDERING AFFECT ON THE IMPELLER SHOVELS AT ANY POSITION. IN ADDITION A WIND DETOUR CANAL IS PROVIDED. THIS HAS THE TASK OF CAPTURING A GREATER AMOUNT OF WIND AND THAT OF DISTRIBUTING THE WIND TO THE WHEELS SO THAT THE BACK SIDE OF THE WHEELS ARE ACTIVATED ALSO. THROUGH CHANNELED WIND GUTTERS THE WIND IS EVENTUALLY LEAD TO THE CENTER OF THE WIND POWER PLANT. ADDITIONALLY THE COMPLETE INSTALLATION HAS A VERTICAL AXIS TURBINE. IT IS SIMILARLY CONSTRUCTED AS THE ABOVE DESCRIBED HORIZONTAL AXIS TURBINE, BUT DISPLAYS A SUBSTANTIALLY SMALLER MOMENT OF INERTIA, SO THAT IT IS ALSO CAPABLE OF RESPONDING TO SMALL WIND VELOCITIES.

76-0538 WIENECKE R
POSSIBLE SUBSTITUTES FOR THE PRESENT PRIMARY ENERGY SOURCES.
SYMPOSIUM ON ENVIRONMENTAL PROTECTION CONDITIONS AND LIMITS OF ECONOMIC GROWTH, AUGSBURG, GERMANY FR, JUNE 27, 1976. NTIS, 1976. 24P.
AED-CONF-76-323-001

THE PARAMETERS OF THE DEVELOPMENT OF ENERGY SUPPLY ARE EXAMINED FOR THE NEXT THOUSAND YEARS, IN ORDER TO GET A VIEW OF THE PARTS PLAYED BY THE DIFFERENT ENERGY CARRIERS. PROCEEDING FROM A RISING WORLD ENERGY DEMAND IN THE FUTURE, IT IS ESTABLISHED THAT GEOGRAPHICAL DISTRIBUTION AND THE QUANTITY OF RESERVES OF FOSSIL-ENERGY CARRIERS COMPEL THE INDUSTRIAL NATIONS, BEFORE ANYTHING ELSE, TO DEVELOP ALTERNATIVE ENERGY SOURCES. FOLLOWING THE PRESENT SITUATION, NUCLEAR ENERGY WILL THEREFORE DOMINATE. FROM THE DEVELOPMENT OF NON-NUCLEAR, NON-FOSSIL ENERGY CARRIERS (SUN, WIND ETC.) A CERTAIN EASING OF THE SITUATION ON THE ENERGY SECTOR HAS LONG BEEN AWAITED. UNTIL THE YEAR 2000, THESE ENERGY CARRIERS WILL, OF COURSE, BE ABLE TO CONTRIBUTE ONLY ABOUT 3 PERCENT TOWARDS INCREASING GUARANTEES OF SUPPLY.

76-0539 WILKE O, NEWTON O
AN ASSESSMENT OF WIND POWER AND ITS AGRICULTURAL USES ON THE HIGH PLAINS OF TEXAS.
TEXAS AGRIC. EXP. STA. MISC. PUBL. 1251, FEBRUARY 1976. 2P.

76-0540 WILKERSON A W
CIRCUIT FOR USING GEOPHYSICAL SOURCES OF ENERGY.
GERMAN (FRG) PATENT 2,608,627/A/, SEPTEMBER 16, 1976. 43P. (IN GERMAN)

THE PATENT SPECIFICATION CONCERNS ELECTRICAL RECTIFIER CIRCUITS IN TWO WAY AND IN FULL WAVE RECTIFIER CIRCUITS FOR SINGLE PHASE AND MULTI PHASE AC SUPPLY NETWORKS, WHICH WORK WITH ELECTRONICALLY CONTROLLED THYRISTORS. IT IS PROPOSED TO CONNECT A DC GENERATOR DRIVEN BY A WIND ROTOR ON THE DC SIDE OF THE RECTIFIER CIRCUIT, IN ORDER TO SUPPLY THE AC CONSUMER CONNECTED IN PARALLEL TO THE AC SIDE OF THE DC CIRCUIT TO THE SUPPLY NETWORK WITH ELECTRICAL ENERGY, AND THUS TO REDUCE THE AC CONSUMPTION FROM THE PUBLIC SUPPLY, OR EVEN TO SUPPLY POWER INTO THE SUPPLY NETWORK AT HIGH WIND SPEEDS.

76-0541 WILLIAM H
DELP II.
MOTHER EARTH NEWS NO. 40: 6-17, JULY 1976.

THIS IS AN INTERVIEW WITH BILL DELP, A DESIGNER, MANUFACTURER, AND INSTALLER OF WATER, WIND, SOLAR ETC., ENERGY SYSTEMS.

76-0542 WILSON R E, WALKER S N, LISSAMAN P B S
AERODYNAMICS OF THE DARRIEUS ROTOR.
J. AIRCRAFT 13: 1023-1024, DECEMBER 1976.

TO ANALYZE A DARRIEUS TYPE CROSSWIND-AXIS WIND TURBINE, THE FORCES ON THE SYSTEM ARE EXPRESSED BY A MOMENTUM ANALYSIS OF THE WAKE AND BY AN AIRFOIL THEORY AT THE LIFTING SURFACE. EQUATING WAKE AND WING FORCES YIELDS EQUATIONS FOR DETERMINING INDUCED FLOWS. SOME AVAILABLE EXPERIMENTAL

DATA ON ROTOR POWER AND THRUST COEFFICIENTS ARE COMPARED WITH THEORETICAL RESULTS OF WILSON AND LISSAMAN (1974).

76-0543 WILSON R E
AERODYNAMICS OF THE DARRIEUS ROTOR.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.1 - III.9.
SAND-76-5586

PERFORMANCE MODELS OF THE DARRIEUS ROTOR HAVE BEEN FORMULATED BY WILSON AND LISSAMAN, TEMPLIN, JAMES, MURACA, SHANKAR AND STRICKLAND. THE CURRENT ANALYSIS IS IN ESSENCE A STRIP THEORY IN WHICH THE TIME-AVERAGED FORCE ON A BLADE ELEMENT IS EQUATED TO THE MEAN MOMENTUM FLUX THROUGH A STREAMTUBE OF FIXED LOCATION AND DIMENSIONS. THE ANALYSIS USES QUASI-STEADY AERODYNAMICS NEGLECTING THE EFFECTS OF MUTUAL INTERFERENCE AND OF MORE SIGNIFICANCE, NEGLECTS THE EFFECTS OF THE REAR BLADES IN CROSSING THE VORTEX SHEETS OF THE FORWARD BLADES (FRONT AND REAR BLADE LOADS ARE THE SAME).

76-0544 WILSON R E, LISSAMAN P B S, WALKER S N
AERODYNAMIC PERFORMANCE OF WIND TURBINES.
NTIS, JUNE 1976. 170P.
PB-259089

THIS REPORT SUMMARIZES THE STATE-OF-THE-ART OF PERFORMANCE PREDICTION METHODS FOR BOTH HORIZONTAL AND VERTICAL AXIS WIND TURBINES. STRIP THEORY METHODS FOR HORIZONTAL AXIS WIND TURBINES ARE EVALUATED FOR VARIOUS TIP LOSS MODELS AND OCCURRENCE OF MULTIPLE SOLUTIONS IN STRIP THEORY ANALYSIS IS DISCUSSED AND ILLUSTRATED. THE PERFORMANCE OF HIGH-SOLIDITY TURBINES SUCH AS THE CHALK DESIGN ALSO ARE DISCUSSED. THE CONFIGURATION AND PERFORMANCE OF OPTIMUM HORIZONTAL AXIS WIND TURBINES ARE ADDRESSED. OPTIMIZATION SCHEMES ARE DEVELOPED AND DISCUSSED AND COMPARISONS WITH THE MOD-0 ROTOR ARE MADE. PERFORMANCE AT OFF-DESIGN CONDITIONS IS ALSO EXAMINED. PERFORMANCE PREDICTION METHODS FOR VERTICAL AXIS WIND TURBINES ARE COVERED. CHAPTER 4 DEVELOPS THE PERFORMANCE MODEL FOR THE DARRIEUS ROTOR. MULTIPLE SOLUTIONS ARE FOUND TO OCCUR FOR DARRIEUS ROTORS IN THE SAME MANNER AS OCCURS FOR HORIZONTAL AXIS ROTORS. THIS FLOW MODEL IS COMPARED TO EXISTING EXPERIMENTAL DATA AND SHOWN TO YIELD EXCELLENT AGREEMENT. CHAPTER 5 CONTAINS AN ANALYTICAL MODEL OF THE FLOW IN A SAVONIUS ROTOR. THE FLOW MODEL IS SHOWN TO PREDICT THE ESSENTIAL FEATURES OF FLOW IN SAVONIUS ROTORS WITH CONSIDERATION OF VISCOUS EFFECTS.

76-0545 WIND AND WAVE.
AMERICAN NUCLEAR SOCIETY. CONFERENCE ON ENVIRONMENTAL ASPECTS OF NONCONVENTIONAL ENERGY SOURCES, DENVER, FEBRUARY 29-MARCH 3, 1976. P. 18-19.

76-0546 WIND ENERGY DEVELOPMENT POTENTIAL FOR THE NIAGARA FRONTIER TRANSPORTATION AUTHORITY: PRE-PROPOSAL.
ENERGY RESEARCH GROUP OF WESTERN NEW YORK, 1976. 67P.

INFORMATION ON THE FEASIBILITY OF USING WIND POWER FOR ELECTRIC POWER PRODUCTION IN WESTERN NEW YORK IS PRESENTED. AREAS OF INVESTIGATION FOR THE NIAGARA FRONTIER TRANSPORTATION AUTHORITY INCLUDE AN ENERGY DEMAND ANALYSIS; ALTERNATIVE ENERGY OPTIONS; WIND SURVEY OF THE NFTA WATERFRONT SITE; ECONOMIC ANALYSIS; PERFORMANCE SPECIFICATIONS OF ALTERNATIVE ENERGY HARDWARE; AND ALTERNATIVE ENERGY HARDWARE ANALYSIS.

76-0547 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: BASIC CONSIDERATION.
ASME PAPER 76-WA/ENER-2, 1976. 11P.

SINCE WIND ENERGY DENSITY IS LOW, A LARGE ROTOR BECOMES A NECESSITY FOR COLLECTING A SIGNIFICANT AMOUNT OF WIND ENERGY. IT IS GENERALLY RECOGNIZED THAT AROUND 200 FT IN DIAMETER IS ROUGHLY THE PRACTICAL LIMITING SIZE FOR SUCH ROTORS, USING MODERN MATERIALS AND MANUFACTURING PROCESSES. YET, SUCH A ROTOR SIZE WILL GENERATE ONLY AROUND 1-MW WITH A STRONG 30-MPH WIND. TO BREAK THROUGH THE "1-MW LIMIT", A NEW CONCEPT IS PROPOSED CALLED THE TORNADO-TYPE WIND ENERGY SYSTEM, ONE VERSION OF WHICH IS ILLUSTRATED AND A PATENT HAS BEEN APPLIED FOR THIS CONCEPT. A GENERAL DESCRIPTION OF THE CONCEPT, SCALING LAWS, AND WIND TUNNEL TEST DATA HAVE

BEEN COVERED IN A PREVIOUS PAPER. A BASIC THERMODYNAMIC CONSIDERATION WILL BE PRESENTED IN THIS PAPER TO GAIN A PROPER PERSPECTIVE OF THE OVERALL PERFORMANCE OF THE NEW DESIGN. SOME DETAILS OF WIND TUNNEL DATA, DERIVATION OF THE SCALING LAWS, AND SOME RECENT RESULTS IN FLOW VISUALIZATION ARE ALSO PRESENTED.

76-0548 WIND LAWS ENACTED.
WIND POWER DIG. 1(6): 20, SEPTEMBER 1976.

76-0549 WIND POWER--THE MODERN VERSION.
PETROL. ECON. 43(6): 221-223, JUNE 1976.

THE NETHERLANDS HAS ACCEPTED AN INVITATION FROM THE INTERNATIONAL ENERGY AGENCY TO ACT AS HEAD COUNTRY FOR THE NEW LINE OF R+D INTO WIND POWER. THE U.K. IS TO ACT AS HEAD COUNTRY IN THE RELATED FIELD OF WAVE POWER. THE MOST OBVIOUS DRAWBACK TO THE CONCEPT OF WIND ENERGY IS VARIABILITY OF THE INCIDENCE OF WINDS. THIS DRAWBACK MAY EVENTUALLY BE OVERCOME BY THE DEVELOPMENT OF SUITABLE TECHNIQUES FOR ENERGY STORAGE. WIND AND WAVE POWER SYSTEMS ARE DISCUSSED.

76-0550 BUICK T R, MCMULLAN J T, MORGAN R, MURRAY R B
ON MONITORING WIND POWER.
WEATHER 31(12): 412-416, DECEMBER 1976.

THREE MAIN CONSIDERATIONS IN ANY PROPOSED WIND-POWER SCHEME ARE 1) AMOUNT OF POWER THAT IS THEORETICALLY AVAILABLE AT THE PROPOSED SITE; 2) TOTAL AMOUNT OF ENERGY (POWER X TIME) THAT CAN BE OBTAINED FROM A PROPOSED PLANT; AND 3) THE STRUCTURAL STRENGTH REQUIRED TO WITHSTAND THE FORCE THAT THE WIND IMPOSES ON THE POWER PLANT. WIND-FORCE MEASUREMENT PRESENTS SOME PROBLEMS. THIS PAPER DESCRIBES A DEVICE THAT WILL GIVE INFORMATION ON WIND SPEED, FORCE, POWER, AND ENERGY.

76-0551 WIND POWER PLANT WITH AIRFOIL BALLOONS (TO WHICH ATTACHED CABLES ARE CONNECTED TO IMPELLERS DRIVING GENERATORS).
GERMAN PATENT APPLICATION 2,437,003, FEBRUARY 12, 1976.

76-0552 DONALD COOKSEY, SITE PROJECT ENGINEER. THE NASA WIND TURBINE GENERATOR PROJECT.
MOTHER EARTH NEWS NO. 39: 6-11, MAY 1976.

76-0553 A WIND-POWERED "HYBRID HOUSE".
WIND POWER DIG. 1(7): 23, DECEMBER 1976.

DEL SCHLUMPBERGER'S "HYBRID HOUSE," WHICH INCLUDES TWO JACOBS WINDMILLS, IS DESCRIBED.

76-0554 MANALIS M S
AIRBORNE WINDMILLS AND COMMUNICATION AEROSTATS.
J. AIRCRAFT 13: 543-544, JULY 1976.

76-0555 MARIER D
NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 20: 27-29, MARCH 1976; NO. 22: 34, SEPTEMBER 1976.

THE AUTHOR DESCRIBES HIS EXPERIENCES IN REWINDING A JACOBS WIND GENERATOR TO CHANGE IT FROM 32 VOLTS TO 110 VOLTS.

76-0556 SOLAR ENERGY RESEARCH INSTITUTE, OVERSIGHT HEARINGS.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS. 94TH CONGRESS, 1ST SESSION, OCTOBER 22, 1975. HEARINGS TRANSCRIPT. WASHINGTON, D.C., GOV'T. PRINT. OFF., 1976. 409P.

HEARINGS WERE HELD TO REVIEW ERDA PLANS FOR THE SOLAR ENERGY RESEARCH INST. PROVIDED FOR BY THE SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974, PUBLIC LAW 93-473. SOLAR PROGRAMS ESTABLISHED BY THE ACT ARE NOW CONSOLIDATED IN THE NATIONAL SOLAR ENERGY R+D PROGRAMS WITHIN ERDA, WITH ERDA RESPONSIBLE FOR IMPLEMENTING THE SERI CONCEPT. WITNESSES INCLUDED: ERDA OFFICIALS, SOLAR ENERGY RESEARCH INST. OFFICIALS, AND INDUSTRY REPRESENTATIVES.

76-0557 SWIFT-HOOK D T
ATMOSPHERE AND THE OCEANS AS ENERGY SOURCES.

ASPECTS OF ENERGY CONVERSION, PROCEEDINGS OF A SUMMER S[illegible]., LINCOLN COLLEGE, OXFORD, ENGLAND, JULY 14-25, 1975. ELMSFORD, NEW YORK PERGAMON PRESS, 1976. P. 405-430.

WIND POWER, WAVE POWER, TIDAL POWER AND POWER FROM OCEAN THERMAL GRADIENTS ARE CONSIDERED, AND TECHNOLOGICAL SOLUTIONS FOR WINDMILL DESIGN, TIDAL BARRAGES, THERMAL SEA POWER UTILIZATION, AND WAVE POWER CONVERSION DEVICES, ARE EVALUATED.

76-0558 WIND POWER.
MECH. ENG. 98: 62, SEPTEMBER 1976.

76-0559 KALLIO-MANNILA R
TUULESTA ENERGIAA. (WIND ENERGY).
TEHO 5(5): 26-27, 29-31, 49, 1976. (IN FINNISH)

76-0560 KARLSTROM C, KRIEG R, KVICK T, OLSSON L E, LJUNGSTROM O
PRELIMINARY SURVEY OF THE AERIAL WIND ENERGY RESOURCES IN SWEDEN.
NTIS, JANUARY 1976. 135P. (IN SWEDISH)
VES-1975-28

WIND VELOCITY DATA FOR DIFFERENT HEIGHTS ARE REVIEWED FOR SEVERAL METEOROLOGICAL STATIONS IN SWEDEN. WIND ENERGY RESOURCES ARE ESTIMATED FOR THE DIFFERENT COUNTIES. IT IS SHOWN THAT IT IS POSSIBLE TO PRODUCE WIND ENERGY IN SWEDEN. UP TO 30 TWH/YEAR COULD BE PRODUCED. IT IS DESIRABLE TO PRODUCE THIS ENERGY IN BIG PLANTS OTHERWISE IT WILL NOT BE AN ECONOMIC WAY OF PRODUCING ENERGY.

76-0561 BATTY J C, RILEY J P, GRENNEY W J, BELL D A
AN ENERGY ACCOUNTING EVALUATION OF SEVERAL ALTERNATIVES FOR HYDROPOWER AND GEOTHERMAL DEVELOPMENT.
NTIS, JUNE 1976. 40P.
PB-269188, PRJER-031-1, W77-09057

ALTERNATIVE MANAGEMENT STRATEGIES FOR HYDROPOWER AND GEOTHERMAL DEVELOPMENT ARE MYRIAD. THE APPROACH TAKEN IN THIS STUDY IS BASED ON THE NOTION OF OPTIMUM DEPLOYMENT OF FINITE RESOURCES. A LEGITIMATE QUESTION WHICH THIS STUDY HAS ATTEMPTED TO ADDRESS IS: DOES THE CONSTRUCTION OF LARGE WATER MANAGEMENT FACILITIES, SUCH AS HYDROPOWER DAMS, WHICH INVOLVE HUGE AMOUNTS OF ENERGY, CONCRETE, AND STEEL, CONSTITUTE AN EFFICIENT USE OF BASIC RESOURCES. AN ENERGY ACCOUNTING ANALYSIS TECHNIQUE IS PROPOSED; AND, USING THIS PROCEDURE, ENERGY RESOURCE INPUTS ARE EXAMINED AND COMPARED FOR SPECIFIC HYDROPOWER DAMS AND GEOTHERMAL POWER PLANTS.

75-0420 ACKER F
THE WINDS OF CHANGE?
CHARTERED MECH. ENG. 22(3): 93-95, 1975.

THE RECENT SURGE OF INTEREST IN WINDPOWER HAS BEEN CONFINED TO POWER GENERATION FROM LAND-BASED SITES. THE ADDITIONAL NOTION THAT A SAILING SHIP CAN NOW RIVAL A MOTOR SHIP IN COST TERMS IS THE SURPRISING RESULT OF A RESEARCH STUDY CARRIED OUT AT HAMBURG UNIVERSITY. THE NATURE OF THIS NEW DYNA SHIP IS DESCRIBED HERE.

75-0421 ALTERNATE ENERGY SOURCES FOR HAWAII.
NTIS, FEBRUARY 1975. 276P.
PB-230470

THIS IS A REPORT OF THE COMMITTEE ON ALTERNATE ENERGY SOURCES FOR HAWAII, WHICH WAS ESTABLISHED BY THE GOVERNOR'S STATE ADVISORY TASK FORCE ON ENERGY POLICY TO HELP RESPOND TO PROBLEMS CREATED BY THE ARAB OIL EMBARGO. FOURTEEN STUDIES WERE UNDERTAKEN -- TEN ON ALTERNATE ENERGY SOURCES, AND FOUR MORE GENERAL STUDIES. INCLUDED AS APPENDICES TO THE REPORT ARE ALL THE STUDIES ON THE POTENTIAL OF DIFFERENT ENERGY SOURCES TO MINIMIZE THE STATE'S NEAR-TOTAL DEPENDENCE ON SEABORNE PETROLEUM. THESE ALTERNATE SOURCES OF ENERGY ARE: SOLID WASTE; BIOCONVERSION; HYDROELECTRIC; WIND; GEOTHERMAL; SOLAR COLLECTORS; OCEAN THERMAL ENERGY CONVERSION; WAVES; TIDES; CURRENTS; OSMOSIS; COAL; NUCLEAR.

75-0422 AN ANALYSIS IDENTIFYING ISSUES IN THE FISCAL YEAR 1976 ERDA BUDGET.
NTIS, MARCH 1975. 101P.
PB-244863

THE REPORT, PREPARED WITH THE ASSISTANCE OF AN AD HOC O.T.A. ENERGY PANEL, APPRAISES THE RELATIVE LEVELS OF FUNDING OF VARIOUS PROGRAMS EMBODIED IN THE FISCAL YEAR 1976 BUDGET OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA), AND IDENTIFIES MAJOR ISSUES INVOLVING FUTURE ENERGY PROBLEMS. AREAS EXAMINED INCLUDE FOSSIL FUEL RESEARCH; NUCLEAR ENERGY RESEARCH; SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS; CONSERVATION AND ENERGY PRODUCTIVITY AND ENVIRONMENTAL IMPACTS.

75-0423 ANDERSON W D
100 KW METAL WIND TURBINE BLADE DYNAMICS ANALYSIS, WEIGHT/BALANCE, AND STRUCTURAL TEST RES[illegible].
NTIS, JUNE 1975. [illegible]P.
NASA-CR-134957, N7[illegible]468

THIS REPORT PRESENTS THE RESULTS OF DYNAMIC ANALYSES, WEIGHT AND BALANCE TESTS, STATIC STIFFNESS TESTS, AND STRUCTURAL VIBRATION TESTS ON THE 60-FOOT LONG METAL BLADES FOR THE ERDA-NASA 100-KW WIND TURBINE. THE ANALYTICAL RESULTS SHOW THE METAL BLADES TO BE FREE FROM STRUCTURAL OR DYNAMIC RESONANCE AT THE WIND TURBINE DESIGN SPEED AND SHOW THAT AEROELASTIC INSTABILITIES ARE UNLIKELY TO OCCUR WITHIN THE NORMAL OPERATING RANGE OF THE WIND TURBINE.

75-0424 BADE P
FLAPPING-VANE WIND MACHINE AND ROD-PISTON PUMP, AN INTEGRATED DELIVERY SYSTEM FOR LARGE WELL DEPTHS AND SMALL FLOW RATES.
INTERNATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGIES FOR SEMI-ARID AREAS; WIND AND SOLAR ENERGY FOR WATER SUPPLY, SEPTEMBER 15-20, BERLIN, 1975. PROCEEDINGS. P. 71-82.

THIS IS A SHORT DESCRIPTION OF PERFORMANCE AND CONSTRUCTION OF A NON-CONVENTIONAL WINDDRIVEN PUMP, CONSISTING OF AN AERODYNAMICALLY SHAPED VANE, MOVING IN A NODDER PUMP-LIKE CONSTRUCTION, THUS CONVERTING WIND ENERGY DIRECTLY IN AN UP AND DOWN GOING MOVEMENT, CONVENIENTLY USABLE FOR A RECIPROCATING PUMP. THREE EXAMPLES OF DESIGN ARE GIVEN.

75-0425 BADE P
FLAPPING-VANE WIND MACHINE.
INTERNATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGIES FOR SEMI-ARID AREAS; WIND AND SOLAR ENERGY FOR WATER SUPPLY, SEPTEMBER 15-20, BERLIN, 1975. PROCEEDINGS. P. 83-88.

INCLUDED ARE THE PATENT SPECIFICATION AND PATENT CLAIMS OF A NON-CONVENTIONAL WINDDRIVEN RECIPROCATING PUMP.

75-0426 BAINBRIDGE G R
ALTERNATIVE SOURCES OF ELECTRICAL ENERGY. II.
TECH. RUNDSCH. 67(37): 1-2, SEPTEMBER 2, 1975. (IN GERMAN)

75-0427 BANKWITZ H, FRITZSCHE A, SCHMELZLE J, WELTE D, SWAMY C N N
DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (PHASE I). NON-NUCLEAR ENERGY TECHNOLOGY.
NTIS, OCTOBER 1975. 123P. (IN GERMAN)
BMFT-FB-T-76-55, N77-17112

STARTING FROM THE WORLDWIDE STATE OF THE ART THE PAPER DEALS WITH THE AERODYNAMIC, MECHANICAL, OPERATIONAL AND MANUFACTURING ASPECTS OF A VERTICAL-AXIS WIND ENERGY CONVERTER (DARRIEUS ROTOR). DESIGN TECHNIQUES AND DESIGN STUDIES ARE DESCRIBED.

75-0428 BESSELINK J, MASSELINK H
HET OPWEKKEN VAN ELECTRISCHE ENERGIE M.B.V. WINDMOLENS, HET KADER VAN DE SOCIAAL AANGEPASTE TECHNOLOGIE. (GENERATING ELECTRIC ENERGY BY MEANS OF WINDMILLS, WITH REGARD TO SOCIALLY APPROPRIATE TECHNOLOGY).
REP., HTS ENSCHEDE, THE NETHERLANDS, MAY 1975. (IN DUTCH)

75-0429 BLANC M
L'UTILISATION DE L'ENERGIE EOLIENNE POUR LE POMPAGE DE L'EAU. (THE UTILIZATION OF WIND ENERGY FOR WATER PUMPING).
PARIS, BUREAU CENTRAL D'ETUDES POUR LES EQUIPEMENTS D'OUTRE-MER. 11P.
(IN FRENCH)

WIND-DRIVEN WATERPUMPS ARE VERY OFTEN INTENDED FOR SEMI-ARID AND REMOTE AREAS. REQUIREMENTS FOR WINDMILLS IN THOSE AREAS ARE GIVEN. A COMPARISON IS MADE BETWEEN MULTI-BLADE WATER PUMPING WIND TURBINES AND WIND ELECTRIC TURBINES.

75-0430 BLOW S J
ENERGY: AN ANNOTATED BIBLIOGRAPHY.
NTIS, FEBRUARY 1975. 550P.
N75-27558

THIS ENERGY BIBLIOGRAPHY CONTAINS APPROXIMATELY 3,300 REFERENCES ON ENERGY AND POWER, ENERGY AND POWER SOURCES, AND ENERGY AND POWER STORAGE AND TRANSMISSION WITH THE SOURCES DATED FROM AUGUST 1974 - DECEMBER 1974.

75-0431 BONGAR Y
LE MARCHE DES AEROGENERATEURS. (THE MARKET FOR WIND GENERATORS).
REP. CNEXO, MAY 1975. (IN FRENCH)

75-0432 BOYLE G
LIVING ON THE SUN: HARNESSING RENEWABLE ENERGY FOR AN EQUITABLE SOCIETY.
LONDON, MARION BOYARS PUBLISHERS LTD., 1975. 127P.

THE FOLLOWING CHAPTERS ARE INCLUDED: ENERGY AND EXPLOITATION, DOMESTIC ENERGY CONSUMPTION, POWER FROM BIOMASS, DIRECT SOLAR POWER, WIND POWER, WATER POWER, INTEGRATION OF THE VARIOUS ENERGY SOURCES, AND RENEWABLE ENERGY IN A DECENTRALIZED SOCIETY.

75-0433 BRAND R VAN DE
IN NEDERLAND EN BELGIE VERKRIOGBARE WINDMOLENS. (WINDMILLS, OBTAINABLE IN THE NETHERLANDS AND BELGIUM).
DE KLEINE AARDE NO. 12: 13-16, MARCH-APRIL 1975. (IN DUTCH)

COMPARED ARE SEVEN WINDGENERATORS IN THE RANGE 100 TO 200 WATT (AEROWATT, BOSMAN, LUBING AND WINCHARGER). THE ANNUAL OUTPUT AND INSTALLATION COSTS PER KWH ARE CALCULATED FROM THE MANUFACTURERS SPECIFICATIONS.

75-0434 BRANGWYN F, PRESTON H
WINDMILLS.
DETROIT, GALE RESEARCH COMPANY, 1975. 126P. (REPRINT OF 1923: 1)

75-0435 BROWN C K
ANALYSIS OF THE POTENTIAL FOR WIND ENERGY PRODUCTION IN NORTHWESTERN ONTARIO.
NTIS, NOVEMBER 1975. 177P.
NP-22490

A STUDY OF THE FEASIBILITY OF GENERATING ELECTRIC POWER FROM WIND GENERATORS AT REMOTE SITES IN NORTHWESTERN ONTARIO HAS BEEN CARRIED OUT ON BEHALF OF THE ONTARIO MINISTRY OF ENERGY, WITH PROJECT MANAGEMENT FROM ONTARIO HYDRO. THE WORK INCLUDED (1) A SURVEY OF COMMERCIALLY AVAILABLE WIND DRIVEN ELECTRIC PLANTS, BOTH CURRENTLY AVAILABLE AND PLANNED FOR PRODUCTION, (2) AN ANALYSIS OF EXISTING WIND DATA AND PREPARATION OF AN ISOVENT MAP FOR ONTARIO SHOWING ANNUAL MEAN WIND SPEEDS, (3) THE SELECTION OF SUITABLE SITES FOR A DEMONSTRATION UNIT AND A PROTOTYPE SYSTEM, (4) THE MATCHING OF AVAILABLE PLANT TO THE WIND REGIMES TO PREDICT ANNUAL ENERGY PRODUCTION, AND (5) A SYSTEMS ANALYSIS OF PURE DIESEL, HYBRID WIND/DIESEL AND PURE WIND ELECTRIC PLANTS TO DETERMINE THE COST OF POWER FROM THE VARIOUS ALTERNATIVES.

75-0436 LIMAYE D R
COMPREHENSIVE EVALUATION OF ENERGY CONSERVATION MEASURES.
NTIS, MARCH 1975. 449P.
PB-250824

AN ANALYSIS OF THE RELATIVE SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS AND ENERGY SAVINGS ASSOCIATED WITH THIRTY PROPOSED ENERGY CONSERVATION MEASURES IS PRESENTED. THE STUDY COVERS RESIDENTIAL, COMMERCIAL, INDUSTRIAL, POWER GENERATION AND TRANSPORTATION ENERGY CONSUMPTION. PROJECTIONS ARE NATIONAL FOR THE YEARS 1977, 1980, 1985, AND 1990. A RANKING OF MEASURES COMPARES THE RELATIVE COSTS AND EFFECTIVENESS OF MEASURES. THE METHODOLOGY CAN BE ADAPTED TO A VARIETY OF SITUATIONS.

75-0437 CALVERT N G
THE MONO-KAIROS WINDMILLS OF LASITHI.
BRITISH SCHOOL OF ARCHAEOLOGY AT ATHENS, ANNUAL, 70: 51-57, 1975.

DESCRIBED ARE OLD CORN GRINDING WINDMILLS ON CRETE. AT MIRABELLO AND LASITHI THERE ARE ABOUT ONE HUNDRED MILLS IN VARIOUS STATES OF RUIN, THE CHARACTERISTIC FEATURE OF WHICH IS THE FIXED DIRECTION, FACING THE PREVAILING WINDS. CONSTRUCTIONAL DETAILS ARE GIVEN.

75-0438 CANEGHEM A E VON
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,402,647/A/, JULY 24, 1975. 17P. (IN GERMAN)

THE INVENTION APPLIES TO A WIND POWER PLANT IN WHICH THE WIND IS USED TO DRIVE WINDMILLS. THE PLANT CONSISTS BASICALLY OF A VERTICAL TUBE WITH A LATERAL WIND ENTRANCE OPENING WITH WINDMILL ON ITS LOWER END. ON ITS UPPER END, THE TUBE CARRIES A NOZZLE-LIKE TOP WHICH INCREASES THE WIND ENTERING THE TUBE BY PRESSURE DECREASE. THE WIND IS THUS MADE SUITABLE FOR HIGHER OUTPUTS. THE INVENTION IS ILLUSTRATED BY CONSTRUCTIONAL EXAMPLES.

75-0439 CHAJES A, COSTA A, KAMINSKY F C, KIRCHOFF R H, CROMACK C E
INVESTIGATION OF THE FEASIBILITY OF USING WINDPOWER FOR SPACE HEATING IN COLDER CLIMATES. QUARTERLY PROGRESS REPORT NO. 1. MARCH-JUNE 1975.
NTIS, JUNE 1975. 57P.
NSF-RANN/AER-75-00603/PR-75/1, NSF/RA/N-75-420

THIS REPORT REVIEWS THE WORK PLAN AND PROJECT DESCRIPTION. TOPICS COVERED INCLUDE: SUPPORT STRUCTURE, MOMENTUM EXCHANGER, ELECTRICAL SYSTEMS, THERMAL AND SOLAR COMPONENTS, AND MANUFACTURING.

75-0440 CHERNE J M
SOLAR ENERGY -- AN OVERVIEW.
J. VOC. SCI. TECHNOL. 12: 975-983, SEPTEMBER-OCTOBER 1975.

75-0441 CHERRITT A W, GAIDELIS J A
A 100-KW METAL WIND TURBINE BLADE BASIC DATA, LOADS AND STRESS ANALYSIS. FINAL REPORT.
NTIS, JUNE 1975. 241P.
N77-21467, NASA-CR-134956

A ROTOR LOADS COMPUTER PROGRAM WAS USED TO DEFINE THE STEADY STATE AND CYCLIC LOADS ACTING ON 60 FT LONG METAL BLADES DESIGNED FOR THE ERDA/NASA 100 KW WIND TURBINE. BLADE LOAD AND STRESS ANALYSIS USED TO SUPPORT THE STRUCTURAL DESIGN ARE PRESENTED. FOR THE LOADING CONDITIONS EXAMINED, THE METAL BLADES ARE STRUCTURALLY ADEQUATE FOR USE, WITHIN THE NORMAL OPERATING RANGE, AS PART OF THE WIND TURBINE SYSTEM.

75-0442 CHILCOTT R E
WIND ENERGY UTILISATION PROSPECT FOR NEW ZEALAND.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2ND, MAY 22-24, 1975.
CONF. PAPER NO. 4, P. 72-75.

75-0443 COLLI J-C
THE PLACE OF NEW ENERGY SOURCES IN FUTURE GROWTH.
REV. FRANC. ELECTR. 48(4TH QUARTER): 6-11, 1975.

75-0444 COPPS S L
ENERGY SURVEY: WHAT CAN R AND D DO BY 1985... FOSSIL FUEL UTILIZATION.
TECHNOLOGY TODAY AND TOMORROW. SPACE CONGRESS, 12TH., COCOA BEACH, FLA.,
APRIL 9-11, 1975. PROCEEDINGS. P. 5-19 TO 5-27.

75-0445 COSTER H
WINDMOLENS DEBREIGD DUOR HET GYROSKOPISCH EFFEKT. (WINDMILLS THREATENED
BY THE GYROSCOPIC EFFECT).
DE KLEINE AARDE 4(3): 27-30, SEPTEMBER 1975. (IN DUTCH)

THIS BRIEFLY DESCRIBES THE INFLUENCE OF GYROSCOPIC FORCES IN VARIOUS CONSTRUCTIONS, ESPECIALLY IN WINDMILLS. SOME SUGGESTIONS TO AVOID OR TO USE THESE FORCES ARE GIVEN.

75-0446 COTY U A, COURT A, REED J W
UNITED STATES WIND SPEED AND WIND POWER DURATION TABLES, BY MONTHS
(CUMULATIVE DISTRIBUTION).
NTIS, OCTOBER 1975. 532P.
SAN/1075-2

CUMULATIVE DISTRIBUTIONS OF WIND SPEED (METERS PER SECOND), ADJUSTED TO A STANDARD HEIGHT OF 10 METERS (33 FEET) ABOVE GROUND AT 478 PLACES IN THE UNITED STATES, FOR EACH MONTH AND SEASON, AND FOR THE YEAR AS A WHOLE, ARE PRESENTED. IN ADDITION, CUMULATIVE DISTRIBUTIONS OF WIND POWER (WATTS PER SQUARE METER), BY SEASONS AND FOR THE YEAR, AT HEIGHTS OF 10, 50, AND 100 METERS ABOVE GROUND ARE GIVEN.

75-0447 COURT A
WIND SHEAR EXTREMES.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C.,
JULY 29, 1974. NTIS, MAY 1975. P. 72-79.
PB-244132

EXTREMES OF WIND SPEEDS, AND OF THEIR DIFFERENCES IN SPACE (SHEARS) AND TIME (GUSTS) ARE STUDIED ACCORDING TO EXTREME VALUE THEORY. A CENTRAL CONCEPT IN THIS THEORY IS THAT OF THE "CHARACTERISTIC EXTREME" OR "EXPECTED EXTREME". EQUATIONS THAT EXPRESS INDEPENDENT BIVARIATE NORMAL AND RELATED X2 WIND DISTRIBUTION ARE PRESENTED.

75-0448 CRAFOORD C
AN ESTIMATE OF THE INTERACTION OF A LIMITED ARRAY OF WINDMILLS.
NTIS, NOVEMBER 1975. 43P.
N77-13539, MISU/IMI-DM-16

USING LOGARITHMIC WIND PROFILES, THE INCREMENT OF ROUGHNESS PARAMETER, AS AN INFINITE ARRAY OF WINDMILLS IS ADDED TO AN ALREADY ROUGH SURFACE, IS CALCULATED BY A METHOD OF SUPERPOSITION OF SURFACE STRESS AND WINDMILL DRAG. THE OBTAINED LOGARITHMIC PROFILES ARE USED TO CALCULATE THE RELATIVE POWER OF A SINGLE WINDMILL IN AN UNLIMITED ARRAY. THESE VALUES ARE THEN USED AS LIMITING VALUES FOR THE RELATIVE POWER OF A WINDMILL UNIT IN A LIMITED ARRAY, USING A SIMPLE CONTINUITY MODEL OF ENERGY FLOW. VARIOUS EXAMPLES ARE GIVEN TO ILLUSTRATE THE EFFICIENCY OF DIFFERENT WINDMILL UNITS AND ARRAY SIZES. EXAMPLES ARE ALSO GIVEN FOR A TENTATIVE 100 MW GROUP STATION, USING DIFFERENT RATED POWER UNITS. THE RESULTS ARE TO BE SEEN AS MAINLY QUALITATIVE DUE TO THE CRUDENESS OF THE ASSUMPTIONS INVOLVED. FAIRLY INDEPENDENT OF CHOSEN RATED POWER OF THE INDIVIDUAL UNITS, GROUP STATIONS WITH SMALL ARRAYS (5 TO 10 ROWS) SEEM TO BE MAINLY FED BY HORIZONTAL FLOW, BUT FOR LARGER ARRAY SIZES EXCEEDING 50 X 50 UNITS, THE VERTICAL FLUX FROM ABOVE BECOMES MORE IMPORTANT.

75-0449 COURTINE J J
ETUDE TECHNICO-ECONOMIQUE, APPLICATION DES AEROGENERATEURS AUX BESOIN
ELECTROMENAGERS. (TECHNICAL AND ECONOMICAL STUDY ON THE APPLICATION OF
WIND GENERATORS FOR THE ELECTRICITY SUPPLY).

REP. BERTIN, APCEI, MARCH 1975. (IN FRENCH)

75-0450 DAWBER K R, EDWARDS P J
OTAGO WIND ENERGY PROGRAMME -- ASPECTS OF WIND VARIABILITY.
AUSTRALIAN CONFERENCE ON CLIMATE AND CLIMATIC CHANGE, 1ST., MONASH UNIV., DECEMBER 1975.

75-0451 MALZAHN E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,405,767/A/, AUGUST 21, 1975. 5P. (IN GERMAN)

MECHANICAL ENERGY IS TO BE GENERATED BY MEANS OF THE DEVICE PROPOSED AND WIND PRESSURE. FOR THIS PURPOSE, A SHAFT WITH A SERIES OF BLADES IS ARRANGED WITHIN A DROP-SHAPED CYLINDER. THE CYLINDER IS MOUNTED ON A ROTATABLE PLATE. THE DIRECTION IS ADJUSTED BY THE WIND VIA A CONTROL UNIT. FURTHER CLAIMS CONCERN THE DESIGN OF THE BLADES, OF THE BEARING, OF POWER TRANSMISSION, AND THE ADDITIONAL USE OF AXIAL GUIDE BLADES.

75-0452 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
ENERGY INFORMATION WORKSHOP + FORUM FOR SCIENCE + ENGINEERING EDUCATORS, BOSTON, NOVEMBER 29, 1975. P. 105-110.

75-0453 ERDA AND NASA TO DEDICATE 100 KW WIND TURBINE AT SANDUSKY, OHIO.
INF. ERDA, WEEKLY ANNOUNCE. 1(30): 2, 75-206, 1975.

75-0454 EATON W W
TECHNOLOGICAL IMPACT OF IMPROVED STORAGE BATTERIES.
1975 IEEE SOUTHEASTERN REGION 3 CONFERENCE ON ELECTRICITY AND EXPANDING TECHNOLOGY, PROCEEDINGS. CHARLOTTE, N.C., APRIL 6-9, 1975. N.Y., IEEE, 1975. PART 1, P. 3D-3/1-9.

THE ARTICLE DISCUSSES THE USE OF STORAGE BATTERIES IN ELECTRIC VEHICLES, ENHANCED UTILIZATION OF SOLAR AND WIND ENERGY, AND ELECTRIC UTILITY LOAD-LEVELING.

75-0455 EGGERS A J
SOLAR ENERGY: STATUS AND PROSPECTS AS A NATIONAL RESOURCE.
ASHRAE J. 17: 41-43, NOVEMBER 1975.

CURRENT STATE OF SOLAR ENERGY R+D, INCLUDING OBJECTIVES OF THE SIX SOLAR PROGRAM AREAS, ARE EXAMINED. AREAS ARE: BIOCONVERSION, OCEAN THERMAL CONVERSION, WIND ENERGY, PHOTOVOLTAICS, SOLAR THERMAL CONVERSION, AND SOLAR HEATING AND COOLING OF BUILDINGS (INCLUDING AGRICULTURAL APPLICATIONS). PROVED, ECONOMICALLY VIABLE POWER SYSTEMS FOR HEATING AND COOLING BUILDINGS, BIOCONVERSION TO FUELS, AND WIND ENERGY SHOULD BE COMMERCIALLY AVAILABLE IN THE LATE 1970'S. POWER SYSTEMS BASED ON SOLAR THERMAL, PHOTOVOLTAIC, AND OCEAN THERMAL TECHNOLOGY ARE EXPECTED TO BE AVAILABLE IN THE MID-1980'S.

75-0456 EGGERS A J
STATUS AND PROSPECTS FOR WIDESPREAD UTILIZATION OF SOLAR ENERGY AS A NATIONAL ENERGY RESOURCE.
SOLAR ENERGY STORAGE SUBSYSTEMS FOR THE HEATING AND COOLING OF BUILDINGS. WORKSHOP ON SOLAR ENERGY STORAGE SUBSYSTEMS FOR THE HEATING AND COOLING OF BUILDINGS, CHARLOTTESVILLE, VA., APRIL 16, 1975. PROCEEDINGS. NEW YORK, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS, 1975. P. 1-4.

SOLAR ENERGY RESEARCH AND DEVELOPMENT HAS BEEN ORGANIZED PROGRAMMATICALLY UNDER SIX AREAS AS FOLLOWS: BIOCONVERSION TO FUELS, OCEAN THERMAL CONVERSION, WIND ENERGY CONVERSION, PHOTOVOLTAIC CONVERSION, SOLAR THERMAL CONVERSION, AND SOLAR HEATING AND COOLING OF BUILDINGS (INCLUDING AGRICULTURAL APPLICATIONS). THE OBJECTIVES, AND ACHIEVEMENTS IN EACH AREA ARE DISCUSSED.

75-0457 EISSA E T I, AHMED H M
POWER GENERATION FROM THE WIND.
KHARTOUM, SUDAN, UNIVERSITY OF KHARTOUM, DEPARTMENT OF MECHNICAL ENGINEERING, 1975. 476P.

75-0458 ELDRIDGE F R
WIND POWER.

ASTRONAUT. AERONAUT. 13(11): 53, 1975.

75-0459 ENERGY ALTERNATIVES: A COMPARATIVE ANALYSIS.
NTIS, MAY 1975. 706P.
PB-246365

THIS REPORT DEVELOPS A METHODOLOGY FOR SYSTEMATICALLY IDENTIFYING, ASSESSING, AND COMPARING ENERGY ALTERNATIVES IN ENVIRONMENTAL IMPACT STATEMENTS (EIS). THE REPORT PROVIDES DESCRIPTIONS AND DATA ON THE MAJOR ENERGY RESOURCE SYSTEMS IN THE UNITED STATES AND SUGGESTS PROCEDURES FOR USING THESE DESCRIPTIONS AND DATA. THE STUDY CONSISTS OF TWO MAJOR PARTS. PART 1 CONTAINS DESCRIPTIONS OF THE COAL, OIL SHALE, CRUDE OIL, NATURAL GAS, TAR SANDS, NUCLEAR FISSION, NUCLEAR FUSION, GEOTHERMAL ENERGY, HYDROELECTRIC POWER, ORGANIC WASTES, AND SOLAR ENERGY RESOURCE SYSTEMS PLUS DESCRIPTIONS OF ELECTRIC POWER GENERATION AND ENERGY CONSUMPTION. EACH RESOURCE SYSTEM DESCRIPTION CONTAINS DATA AND INFORMATION ON ENERGY EFFICIENCIES, ENVIRONMENTAL RESIDUALS AND ECONOMIC COSTS. PART II DESCRIBES PROCEDURES FOR USING THE DESCRIPTIONS AND DATA CONTAINED IN PART I IN SYSTEMATICALLY EVALUATING AND COMPARING THE RESIDUALS, EFFICIENCIES, AND ECONOMIC COSTS OF A PROPOSED ENERGY ACTION AND ITS ALTERNATIVES, AND SUGGESTS PROCEDURES FOR IMPACT ANALYSIS.

75-0460 CRAWLEY G M
ENERGY FROM THE WIND.
ENERGY. N.Y., MACMILLAN PUBL. CO. INC., 1975. P. 183-186.

75-0461 EVANS S C
ENERGY OPTIONS IN THE UNITED KINGDOM.
LONDON, LATIMER, 1975. 128P.

AN EXAMINATION OF ENERGY SOURCES AS ALTERNATIVES TO FOSSIL AND NUCLEAR FUELS IS PRESENTED, INCLUDING GEOTHERMAL, SOLAR, WIND, AND HYDROELECTRIC ENERGY. HIGH AND LOW GROWTH SCENARIOS FOR THE UNITED KINGDOM ARE DISCUSSED.

75-0462 FAUEL P L
VERGELIJKEND WINDTUNNELONDERZOEK VAN PROFIELEN VAN FOKWIEKEN VOOR WINDMOLENS. (COMPARATIVE WIND TUNNEL INVESTIGATION OF SAIL PROFILES FOR WINDMILLS).
NTIS, FEBRUARY 1975. 20P. (IN DUTCH)
N77-13012

LOW SPEED WIND TUNNEL TESTS WERE CARRIED OUT TO DETERMINE SAIL PROFILES FOR IMPROVING THE PERFORMANCE OF CLASSICAL DUTCH WINDMILLS. RESULTS ARE PRESENTED IN GRAPHS, IN WHICH THE COEFFICIENT OF FORCE-IN-PLANE RELATED TO THE WIND VELOCITY IS DEPICTED AS FUNCTION OF THE RATIO BETWEEN CIRCUMFERENTIAL SPEED AND EFFECTIVE WIND VELOCITY. IT APPEARS THAT IMPROVEMENTS IN PERFORMANCE MAY BE OBTAINED BY CHANGING THE SHAPE OF THE SAILS.

75-0463 FAUEL P L
VERGELIJKEND WINDTUNNELONDERZOEK VAN PROFIELEN VAN FOKWIEKEN VOOR WINDMOLENS. (COMPARATIVE WINDTUNNEL RESEARCH ON AIRFOILS OF FORE WINGS USED FOR WINDMILLS).
THE NETHERLANDS, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, REP. VTH-191, 1975. 7P. (IN DUTCH)

TO IMPROVE THE WORKING OF THE OLD DUTCH WINDMILL USE IS OFTEN MADE OF SO CALLED "FORE WINGS" WITHOUT SPOILING THE FINE SHAPE OF THE MILLS. AS LEADING EDGE AN AUXILIARY "FORE-SAIL" INSTEAD OF THE CLASSICAL CURVED BOARD IS USED. HOWEVER, QUANTITATIVE VALUES ARE NOT AVAILABLE ON WHICH AN OPTIMAL CHOICE OF THE FORM OF THOSE FORE-WINGS CAN BE BASED. IN THIS REPORT MEASUREMENTS ARE DESCRIBED PERFORMED IN A NUMBER OF FORE-WING CONFIGURATIONS IN A LOW SPEED WIND TUNNEL. THE RESULTS, GIVEN IN GRAPHS IN WHICH IS PLOTTED THE COEFFICIENT OF THE FORCE IN THE PLANE OF MILLING RELATED TO THE EFFECTIVE WINDSPEED AS A FUNCTION OF THE RATIO OF TIP SPEED AND EFFECTIVE WINDSPEED, SHOW THAT, AS WAS EXPECTED, FORE-WINGS LEAD TO BETTER PERFORMANCE.

75-0464 FEMENIA J
ALTERNATE ENERGY SOURCES FOR MARINE POWER PLANTS.
NTIS, SEPTEMBER 1975. 22P.
COM-75-11474

THIS REPORT DISCUSSES THE SIZE OF SHIP POWER PLANTS AND OTHER FACTORS GOVERNING THE SUITABILITY OF DIFFERENT TYPES OF FUEL FOR MARINE USE. IT THEN CONSIDERS VARIOUS ALTERNATIVES TO TRADITIONAL FUELS DERIVED FROM CRUDE PETROLEUM. TYPES OF FUEL CONSIDERED ARE OTHER LIQUID HYDROCARBON FUELS, BOTH NATURAL AND SYNTHETIC, HYDROCARBON FUELS IN SOLID, LIQUID/SOLID, AND GASEOUS FORMS, NON-HYDROCARBON FUELS AND SOLAR AND WIND ENERGY.

75-0465 FILKE R B
WIND POWER PROJECT DEVELOPMENT BY ELECTRICITE DE FRANCE.
LA HOUILLE BLANCHE 30(1): 45-66, 1975. (IN FRENCH)

THE RESULTS OF EDF'S WIND POWER DEVELOPMENT PROGRAMME FROM 1947 TO 1966 ARE REVIEWED. THE ENGINEERING DEVELOPMENT OF THE LARGER FRENCH WIND POWER GENERATORS IS DESCRIBED IN DETAIL: THESE ARE THE 800 KW NOGENT-LE-ROI, THE 132 KW AND 1,000 KW MACHINES AT SAINT-REMY-DES-LANDES. BRIEF DETAILS ARE ALSO GIVEN OF BRITISH, DANISH AND GERMAN GENERATORS. A TABLE LISTS MAIN PARAMETERS OF 15 LARGE WIND GENERATORS DEVELOPED BY EIGHT DIFFERENT COUNTRIES.

75-0466 FRAENKEL P
FOOD FROM WINDMILLS.
LONDON, INTERMEDIATE TECHNOLOGY PUBLICATIONS LTD., 1975. 75P.

THIS BOOK DESCRIBES HOW A PROGRAM OF SIMPLE SAILWING WINDMILL WATERPUMPS HAS CONSIDERABLY RAISED THE FOOD PRODUCTION OF ETHIOPIA.

75-0467 FREEMAN B E
A NEW WIND ENERGY SITE SELECTION METHODOLOGY, QUARTERLY REPORT NO. 2, 17 JUNE -- 16 SEPTEMBER 1975.
NTIS, OCTOBER 1975. 17P.
PB-282833, NSF/RA/N-75-418

MAJOR EMPHASIS WAS ON THE CODING AND TESTING OF A 3-D VERSION OF THE MESOSCALE COMPUTER PROGRAM SIGMET AND ON THE ACQUISITION OF MESOSCALE FIELD DATA FOR VALIDATION COMPARISONS.

75-0468 FROST W
WIND FIELDS OVER TERRAIN IRREGULARITIES.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C., JULY 29, 1974. NTIS, MAY 1975. P. 80-106.
PB-244132

CHANGES IN TERRAIN SUCH AS HILLS, VALLEYS OR DISCONTINUITIES IN SURFACE TEXTURE CAN DISTURB THE GROUND WINDS AS CAN ALSO OBSTRUCTION TO THE WIND SUCH AS BUILDINGS, CITIES, AND OTHER STRUCTURES CREATED BY MEN. IN THE REGION OF DISTURBANCE, THERE ARE ZONES OF HIGH WIND SPEEDS AND OF LOW WIND SPEEDS. KNOWLEDGE OF THESE WIND FIELDS IS USEFUL IN SELECTING WINDMILL SITES WITH A VIEW TOWARD UTILIZING THE REGIONS OF HIGH WIND AND TO AVOID THE REGIONS OF LOW WINDS. THE ATMOSPHERIC BOUNDARY LAYER EXISTS TO A HEIGHTH OF APPROXIMATELY ONE KILOMETER. THE INTERACTION OF SYNOPTIC PRESSURE PATTERNS, CORIOLIS FORCES AND FRICTIONAL FORCES CAUSE THE DIRECTION OF THE WIND TO TURN FROM FLOWING PERPENDICULAR TO ISOBARS NEAR THE EARTHS SURFACE. THIS TURNING EFFECT IS GENERALLY NEGLIGIBLE BELOW A HEIGHT OF 50 TO 100 METERS (164 TO 328 FT). THE EFFECTS OF TURNING ARE IGNORED IN THE FOLLOWING DISCUSSIONS; HOWEVER, THE DESIGN OF WINDMILLS EXCEEDING 164 FEET IN HEIGHT SHOULD CONSIDER THIS EFFECT.

75-0469 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, OCTOBER 1975. 74P.
NTIS-PS-75/743/5SL

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, AND ENERGY TRANSFER DEVICES (E.G. WINDMILLS) ARE REVIEWED. (CONTAINS 69 ABSTRACTS)

75-0470 HEAT THROUGH WIND.
GESUND. - ING. 96(11): 314, 1975. (IN GERMAN)

A BRIEF SURVEY IS PRESENTED OF THE PROJECTS ON THE UTILIZATION OF WIND

POWER CURRENTLY IN PROGRESS IN THE FRG AND USA.

75-0471 HELION MODEL 12/16 WINDMILL PLANS.
SYLMAR, CALIFORNIA, HELION, 1975. 39P.

75-0472 HERNDON C L
RESIDENCE HEATED BY NON-FOSSIL-FUEL ENERGY.
INTER-AMERICAN CONFERENCE ON MATERIALS TECHNOLOGY, 4TH, PROCEEDINGS. SAN ANTONIO, TEXAS, RESEARCH INSTITUTE, 1977. P. 590-597.
CONF-750677-P1

A HOUSE IN BUTTE, MONTANA WAS RETROFITTED TO USE SOLAR AND WIND ENERGY. SIX INCHES OF INSULATION WERE ADDED TO THE CEILING OF THE HOUSE; THE ROOF WAS MODIFIED TO INCORPORATE THE SKYLIGHT AND COLLECTORS; TWO 4 X 6 FT DOUBLE-GLAZED PICTURE WINDOWS WERE ADDED IN THE SOUTH WALL; A DOUBLE-GLAZED SKYLIGHT (APPROXIMATELY 66 SQ FT), 240 SQ FT OF FLAT-PLATE SOLAR COLLECTORS, AND A 3-KW WIND GENERATOR WERE INSTALLED; AND A WARM AIR HEATING SYSTEM CONSISTING OF AIR-HANDLING UNIT AND AIR-DISTRIBUTION SYSTEM WERE ADDED. THE WIND GENERATOR IS USED TO HEAT EITHER THE DOMESTIC WATER HEATER OR A HEATING ELEMENT IN THE THERMAL STORAGE TANK. SCHEMATICS ARE INCLUDED OF THE FLOOR PLAN, SKYLIGHT SECTION, PIPING, AIR HANDLING UNIT SECTION, SOLAR COLLECTOR SECTION, TEMPERATURE AND FLOW RATE MEASUREMENT POINTS, AND THE CONTROL SYSTEM.

75-0473 HERWIG L O
ERDA'S SOLAR ENERGY PROGRAM.
ASTM STAND. NEWS 3(8): 29, AUGUST 1975.

GENERAL OBJECTIVES IN EACH SUBPROGRAM FOR THE NEXT FIVE YEARS ARE SUMMARIZED. SOLAR THERMAL OBJECTIVES ARE TO DESIGN, CONSTRUCT, OPERATE, AND EVALUATE A 10 MW ELECTRIC, CENTRAL RECEIVER PILOT POWER PLANT; A TOTAL ENERGY PILOT POWER PLANT OF 200 KW ELECTRIC AND 200 KW THERMAL SIZE; AND A DISTRIBUTED COLLECTOR PILOT PLANT. PHOTOVOLTAIC OBJECTIVES ARE TO REDUCE SOLAR ARRAY PRICES TO ABOUT $5 PER PEAK WATT BY 1978 THROUGH LOWER-COST FABRICATION TECHNIQUES AND ECONOMICS OF INCREASING PRODUCTION. WIND OBJECTIVES ARE TO DEVELOP AND DEMONSTRATE LARGE-SCALE (100 KW TO MULTIMEGAWATT ELECTRIC) SINGLE-UNIT WIND ENERGY SYSTEMS FOR SELECTED APPLICATIONS. BIOCONVERSION OBJECTIVES ARE TO DESIGN, CONSTRUCT, OPERATE AND EVALUATE PILOT PLANTS FOR CONVERSION OF URBAN ORGANIC WASTE AND AGRICULTURAL WASTE MATERIALS TO METHANE GAS. OCEAN THERMAL OBJECTIVES ARE TO DESIGN AND CONSTRUCT FACILITIES FOR TEST AND EVALUATION OF COMPONENTS AND SUBSYSTEMS FOR OCEAN THERMAL POWER PLANTS.

75-0474 HILTON D J
POSSIBILITIES FOR EMPLOYING LOW-COST WINDMILLS IN RURAL KENYA.
NAIROBI, UNIVERSITY OF NAIROBI, DEPARTMENT OF MECHANICAL ENGINEERING, WORKING PAPER W1, MAY 1975.

75-0475 HITCHCOCK H C
ENERGY STORAGE AND RENEWABLE ENERGY SOURCES.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2ND, MAY 22-24, 1975. CONF. PAPER NO. 4, P. 80-85.

75-0476 MANNING R S
THE WINDMILL IN CALIFORNIA.
J. WEST 14(3): 33-39, JULY 1975.

75-0477 MARTIN M, PRUNIERAS J
RESULTATS SUMMAIRES DE L'EXPERIENCE DES AEROGENERATEURS DANS LE SERVICE FRANCAIS DES PHARES AT BALISES. (CONCISE RESULTS OF THE EXPERIENCES WITH WIND GENERATORS OF THE FRENCH SERVICE FOR LIGHTHOUSES AND BUOYS).
CONFERENCE INTERNATIONALE DES SERVICES DE SIGNALISATION MARITIME, 9TH, OTTAWA, CANADA, 1975. PROCEEDINGS. (IN FRENCH)

75-0478 HOOFT J T
UIT HET WINDMOLENDAGHOEK VAN HET KRINGLOUPHUIS. (FROM THE WINDMILL DIARY OF THE DUMEHOUSE).
DE KLEINE AARDE 4(4): 25-28, DECEMBER 1975. (IN DUTCH)

DESCRIBED ARE EXPERIENCES DURING ONE YEAR WITH A SMALL POLDER-WINDMILL, SUPPLYING ELECTRICITY TO A ONE-MAN HOUSEHOLD. THE OUTPUT WAS SOMEWHAT DISAPPOINTING DUE MAINLY TO THE BAD SITE (TALL TREES).

75-0479 HUTTER U
VUM WERT DER WINDENERGIE. (ON THE VALUE OF WIND ENERGY).
STUTTGART, GERMANY, TECHNISCHE HOSHSCHULE STUTTGART, FORSCHUNGSINSTITUT WINDENERGIETECHNIK, APRIL 1975. 8P. (IN GERMAN)

ANSWERING FIVE QUESTIONS A PLAN IS MADE FOR THE USE OF WIND ENERGY IN GERMANY. THOSE QUESTIONS ARE: (1) HOW MUCH ENERGY CAN BE OBTAINED FROM THE WIND ECONOMICALLY? (2) WHAT IS THE INFLUENCE OF FLUCTUATIONS IN WIND SUPPLY? (3) WHAT ARE THE POSSIBILITIES IN ECONOMICALLY DEVELOPING A LARGE WIND ENERGY CONVERTER? (4) HOW LARGE IS THE ENVIRONMENTAL IMPACT OF THE USE OF WIND ENERGY? AND (5) WHAT ARE THE POSSIBILITIES TO USE WIND ENERGY IN DEVELOPING COUNTRIES?

75-0480 HUTTER U, MOLLY J P, DUERNER H
WINDENERGIE--VORTEILE UND GRENZEN. (WIND ENERGY--ADVANTAGES AND LIMITS).
SPARSAME UND RATIONELLE ENERGIENUTZUNG--STRATEGIEN ZUR ENERGIEINSPARUNG.
BUNDESVERBAND BURGERINITIATIVEN UMWELTSCHUTZ E. V., 19-20 DECEMBER 1975, BAD ANTOGAST, SCHWARZWALD. (IN GERMAN)

75-0481 JAYADEV T S, SMITH R T
ELECTRICAL ENERGY OUTPUT OF WIND POWER PLANTS.
IAS (IEEE IND. APPL. SOC.) ANNUAL MEETING, 10TH, CONFERENCE RECORD, ATLANTA, GA., SEPTEMBER 28 - OCTOBER 2, 1975. NEW YORK, IEEE, CAT. NO. 75CH0999-31A, 1975. P. 506-511.

THIS PAPER PRESENTS A GENERAL ANALYSIS OF ELECTRICAL ENERGY OUTPUT OF CONSTANT-SPEED, CONSTANT-FREQUENCY (CSCF) AND VARIABLE-SPEED, CONSTANT-FREQUENCY (VSCF) SYSTEMS BASED ON POWER-DURATION CURVES. IT IS SHOWN, FROM A SAMPLE CALCULATION, THAT VSCF SYSTEMS HAVE A SLIGHT EDGE OVER CSCF SYSTEMS FROM THE POINT OF VIEW OF ENERGY OUTPUT, BUT THEY CALL FOR LARGE CAPITAL OUTLAY IN GENERATING SYSTEMS WHEREAS CSCF SYSTEMS CALL FOR ELABORATE PITCH CONTROLS. IT IS SHOWN THAT GENERATOR EFFICIENCY HAS A DOMINANT INFLUENCE ON ENERGY OUTPUT IN BOTH THE SYSTEMS.

75-0482 JUSTUS C G
WIND DATA COLLECTION AND ASSESSMENT.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C., JULY 29, 1974. NTIS, MAY 1975. P. 107-121.

THE WIND DATA COLLECTION AND ASSESSMENT PORTIONS HAS AS ITS OBJECTIVE TO DETERMINE FROM THE SURFACE WIND POWER THE STATISTICS NECESSARY FOR SYSTEM EVALUATION STUDIES, AND ALSO TO DETERMINE THE HEIGHT VARIATION OF THESE STATISTICS SINCE THE TYPICAL WIND GENERATOR SYSTEM WILL NOT BE LOCATED AT THE LEVEL OF SURFACE ANEMOMETERS. THE NECESSARY WIND DATA STATISTICS CAN BE CHARACTERIZED IN TERMS OF A TWO PARAMETER DISTRIBUTION FUNCTION. TWO CHOICES THAT SEEMED TO BE DOING A GOOD JOB ARE THE LOG-NORMAL DISTRIBUTION AND THE WEIBULL DISTRIBUTION. ANOTHER ASSUMPTION IS THAT THESE STATISTICS ARE SUFFICIENTLY CONTINUOUS SO THAT A NATIONAL MAP CAN BE DRAWN OF THESE WIND POWER STATISTICS. THE GOAL OF THIS PROJECT IS TO COME OUT WITH A MAP OF THE NECESSARY TWO PARAMETERS THAT DESCRIBE THE DISTRIBUTION FUNCTIONS.

75-0483 KOFOED S S
UDNYTTELSE AF VINDKRAFTENERGI TEL OPVARMNING. (UTILIZING WIND VELOCITY AS ENERGY FOR HEATING).
DET. NYE DAN. LANDBRUG 6(7): 10-13, JULY 1975.

75-0484 KYOCHUKOVA M, IVANOV P
(WIND IN BULGARIA AND THE POSSIBILITIES FOR ITS USE AS AN ENERGY SOURCE).
KHIDROLOGIYA I METEOROLOGIYA 24(6): 22-27, 1975. (IN BULGARIAN)

THE REGIME OF THE SURFACE WIND IN BULGARIA AND THE POSSIBILITIES FOR ITS USE AS AN ENERGY SOURCE ARE EXAMINED. THE WIND REGIME IN BULGARIA DOES NOT FAVOR THE USE OF WIND ENERGY ON A VAST SCALE. OVER THE LARGEST PART OF THE TERRITORY, THERE ARE WINDS WITH MEAN ANNUAL VELOCITY UNDER 3 M/SEC (THE LOWEST LIMIT OF THE WORKING VELOCITY OF THE WIND GAGE). ALONG WITH THIS, THE DURATION IN HOURS FOR A YEAR WITH WINDLESS WEATHER AND WIND VELOCITY UNDER 3 M/SEC IS ABOVE 70 PERCENT, BUT IN SOME REGIONS, IT REACHES 90 PERCENT. THE FOLLOWING PLACES ARE THE MOST FAVORABLE: OPEN MOUNTAIN PEAKS AND RIDGES, LOCATIONS ALONG THE BLACK SEA SIDE, AND DIFFERENT PLACES WITH RAISED TERRAIN IN THE NORTHEAST PART OF DOBROUDJA.

75-0485 KAUER E

TECHNICAL POSSIBILITIES OF SOLAR ENERGY UTILISATION.
ELECTROMEIST. ELEKTROHAND. 50(17): 1039-1042, SEPTEMBER 1975.

75-0486 KENWARD M
ENERGY FILE, WIND POWER.
NEW SCI. 67(959): 218, JULY 24, 1975.

A VERTICAL AXIS WINDMILL PROJECT AT READING UNIVERSITY (UK) IS DESCRIBED.

75-0487 LEE H C
WIND-DRIVEN POWER SUPPLY FOR ADVANCED BEEHIVE FUZE.
NTIS, NOVEMBER 1975. 18P.
AD-A019241

A WIND-DRIVEN FLUIDIC GENERATOR OF THE REED TYPE HAS BEEN DEVELOPED AT THE HARRY DIAMOND LABORATORIES (HDL) AS A POWER SOURCE FOR THE ADVANCED BEEHIVE FUZE. RESULTS OF LABORATORY STUDIES AND FIELD TESTS CONDUCTED IN 75-MM HOWITZERS INDICATE THAT THE FLUIDIC GENERATOR IS CAPABLE OF MEETING THE MUZZLE ACTION REQUIREMENTS OF THE BEEHIVE FUZE. AIRGUN TEST RESULTS INDICATE THAT THE DEVICE IS MECHANICALLY RUGGED TO WITHSTAND THE HIGH SETBACK FORCE ENVIRONMENT (25 K G) ENCOUNTERED BY THE BEEHIVE ROUNDS.

75-0488 LEEGWATER H. WELL A VAN
EEN MEER KAMAALS SIMULTAAN EN DIGITAAL MEET EN VERWERKINGS SYSTE TEN BEHOEVE VAN EEN WINDMOLEN PROJECT. (A MULTI CHANNEL SIMULTANEOUS AND DIGITAL MEASURING AND ANALYZING SYSTEM FOR A WINDMILL PROJECT).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, REP. NO. R-234-5, OCTOBER 1975.
(IN DUTCH)

A SYSTEM IS DESIGNED TO PROCESS SEVEN DIFFERENT SIGNALS FROM WIND DATA COLLECTED SIMULTANEOUSLY, THE SIGNALS ARE SAMPLED WITH A SAMPLE TIME BETWEEN 10-3 AND 100 SECONDS AND ARE TRANSFERRED TO A PUNCH TAPE FOR PROCESSING BY A DIGITAL COMPUTER. IN THIS WAY MEAN VALUE, VARIANCE, AUTO CORRELATION FUNCTION, SPECTRAL DENSITY, PROBABILITY DENSITY AND CUMULATIVE PROBABILITY DISTRIBUTION CAN BE CALCULATED. CALIBRATION PROCEDURES AND SOME EXAMPLES ARE GIVEN.

75-0489 MUSGROVE P J
THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL, THE BASIC CONCEPT.
READING, ENGLAND, UNIVERSITY OF READING, DEPARTMENT OF ENGINEERING AND CYBERNETICS, NOVEMBER 1975. 8P.

A WINDMILL DESIGN, DERIVED FROM THE DARRIEUS WINDMILL, IS DESCRIBED. IT HAS A SIMPLER AND CHEAPER BLADE FABRICATION AND POWER LIMITED BEHAVIOUR FOR HIGH WIND SPEEDS. USE IS MADE OF STRAIGHT HINGED BLADES INSTEAD OF TROPOSKIEN BLADES IN THE DARRIEUS ROTOR. A PROTOTYPE OF THIS MILL IS BEING CONSTRUCTED; THE PREDICTED PERFORMANCE IS SHOWN IN A GRAPH.

75-0490 NENIN J
L'ELECTRICITE A BON COMPTE AVEC LES EOLIENNES. (ELECTRICITY WITH A GOOD ACCOUNT WITH WINDMILLS).
FERMES MOD. 28: 27-30, FEBRUARY 1975. (IN FRENCH)

75-0491 NEWTON A B
MEETING U.S. ENERGY REQUIREMENTS: SOLAR ENERGY'S POTENTIAL SHARE.
ASHRAE J. 17: 36-40, NOVEMBER 1975.

SOLAR HEATING AND COOLING OF COMMERCIAL BUILDINGS IS TECHNICALLY FEASIBLE. IF FUEL COSTS INCREASE ONLY SLIGHTLY, COMBINED HEATING AND COOLING WILL ALSO BECOME ECONOMICALLY JUSTIFIABLE. JUSTIFICATION FOR HEATING SYSTEMS ONLY IS LESS DEMONSTRABLE, BUT IT WILL EXIST IN SEVERAL CASES. GREATER USE OF SOLAR ENERGIZED HEATING AND COOLING WILL BE POSSIBLE OVER THE NEXT FIVE YEARS AS COLLECTORS, STORAGE SYSTEMS, AND CONTROLS ARE PRODUCED IN MORE ECONOMICAL QUANTITIES. RESIDENTIAL SOLAR HEATING IS TECHNICALLY AND ECONOMICALLY FEASIBLE IN A SURPRISING NUMBER OF CASES. RESIDENTIAL COOLING, ALREADY DONE ON A SMALL SCALE, REQUIRES INCREASED DEVELOPMENT OF AIR-COOLED EQUIPMENT.

75-0492 WIND POWER.
LYNGBY, DENMARK, AKADEMIET FOR THE TEKNISKE VIDENSKABER, 1975. 20P.

THE PRESENT REPORT CONTAINS THE FINDINGS OF A COMMITTEE SET UP TO STUDY

THE CONDITIONS FOR WIND ENERGY UTILIZATION IN DENMARK, MAINLY ON THE BASIS OF WIND CLIMATE RECORDINGS AT 31 DOMESTIC METEOROLOGICAL SURVEY STATIONS. THE MAJOR CONCLUSIONS ARE THAT ECONOMICALLY EFFICIENT WIND POWER PLANTS CAN BE BUILT AT SPOTS CHARACTERIZED BY HIGH AVERAGE WIND SPEEDS, SUCH AS THE FAROE ISLANDS. THIS, HOWEVER, MUST BE PRECEDED BY EXTENSIVE RESEARCH AND DEVELOPMENT WORK WITH RESPECT TO WIND-POWER PLANT EQUIPMENT AND DESIGN.

75-0493 PUTHOFF R L, SIROCKY P
STATUS REPORT OF 100 KW EXPERIMENTAL WIND TURBINE GENERATOR PROJECT.
NTIS, JUNE 1975. 21P.
NASA-TM-X-71758, N75-29546

THE STATUS OF AN EXPERIMENTAL WIND TURBINE GENERATOR PROJECT IS DESCRIBED. THE MACHINE WILL BE READY FOR OPERATION IN AUGUST 1975. DESIGN CONSISTS OF A 125 FT. ROTOR TURBINE, TRANSMISSION, SHAFT, ALTERNATOR, AND TOWER. THE ROTOR CAN GENERATE 100 KW OF ELECTRICAL POWER AT WIND VELOCITY OF 18 MPH BY OPERATING TWO VARIABLE-PITCH BLADES AT 40 RPM.

75-0494 RAMAEV M
TIEN PROCENT VAN NEDERLANDS ENERGIEVERBRUIK KAN DOOR WINDTURBINECENTRALES GEDEKT WORDEN. (TEN PERCENT OF DUTCH ENERGY CONSUMPTION CAN BE COVERED BY WIND POWER PLANTS).
ELEKTRA 57(13): 16-19, 1975. (IN DUTCH)

75-0495 RAMAKUMAR R, HUGHES W L, ALLISON H J, YARLAGADDA R K, SMITH G G
DEVELOPMENT AND ADAPTATION OF FIELD MODULATED GENERATOR SYSTEMS FOR WIND ENERGY APPLICATIONS. PROGRESS REPORT.
NTIS, OCTOBER 17, 1975. 135P.
PB-263604

TWO WARD-LEONARD VARIABLE-SPEED DRIVE SYSTEMS WERE SET UP FOR USE AS MOTORING DYNAMOMETERS FOR TESTING FIELD MODULATED GENERATORS. ALL THE PARTS REQUIRED FOR THE DYNAMOMETER CRADLE ARRANGEMENT WERE DESIGNED AND FABRICATED. A SPECIALLY DESIGNED TEST MACHINE HAS BEEN FABRICATED FOR THE EXPERIMENTAL INVESTIGATION. THE STATOR AND ROTOR ARE BEING WOUND. THE SOLID STATE INVERTER REQUIRED FOR THIS SYSTEM IS BEING ASSEMBLED IN A CONVENIENTLY TRANSPORTABLE RACK FOR TESTING. PARALLEL-BRIDGE RECTIFIER SYSTEM STUDIES WERE EXTENDED TO INCLUDE BRIDGE-INPUT CAPACITORS FOR THE CASE OF RESISTIVE LOADS. FOURIER ANALYSIS OF SOURCE CURRENT AND LOAD CURRENT WAVEFORMS HAS BEEN COMPLETED, AND THE RESULTS ARE PRESENTED IN GRAPHICAL FORM FOR DIFFERENT VALUES OF (X SUB L/R SUB 1) AND (X SUB L/X SUB C) RATIOS. PRELIMINARY LITERATURE SURVEYS HAVE BEEN COMPLETED IN THE STUDY OF: (1) THE VARIABLE LOAD BAND PASS FILTER REQUIRED AT THE OUTPUT OF THE FIELD MODULATED GENERATOR SYSTEM; AND (2) THE SNUBBER AND VOLTAGE TRANSIENT DIVIDED CIRCUITRY ASSOCIATED WITH THE ELECTRONICS SUBSYSTEM. THE RESULTS ARE SUMMARIZED IN THIS REPORT.

75-0496 REISZ A
USE OF SOLAR ENERGY IN A SOYBEAN PROCESSING OPERATION.
APPLICATION OF SOLAR ENERGY. SOUTHEASTERN CONFERENCE, 1ST., HUNTSVILLE, ALA., MARCH 24-26, 1975. PROCEEDINGS. P. 539-549.

75-0497 REPORTS ON WIND POWER BY ERA, 1949-1968. VOL. 1: WIND MEASUREMENTS AND CHARACTERISTICS.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-34, SEPTEMBER 1975.

75-0498 REPORTS ON WIND POWER PUBLISHED BY ERA, 1949-1968. VOL. 2: WIND DRIVEN PLANT AND ITS APPLICATION.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-35, SEPTEMBER 1975.

75-0499 REPORTS ON WIND POWER PUBLISHED BY ERA, 1949-1968, VOL. 3: DESIGN AND TESTING OF WIND-DRIVEN PLANT.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-36, SEPTEMBER 1975.

75-0500 RICATEAU P, ZETTWOOG P
LA METEOROLOGIE ET L'ENERGIE EOLIENNE: CONVERSION EOLIENNE ELECTROSTATIQUE. (METEOROLOGY AND WINDPOWER: ELECTROSTATIC WIND CONVERSION).

LA METEOROLOGIE SER. 6(2): 123-130, SEPTEMBER 1975.

THE APPLICATION OF ELECTROFLUID DYNAMICS IN EXPLOITATION OF A PRINCIPLE OF DIRECT CONVERSION BY TRANSPORT OF ELECTRICAL CHARGES UNDER THE INFLUENCE OF GAS FLOW IS EXAMINED WITH PARTICULAR REFERENCE TO THE CONVERSION OF WIND ELECTROSTATICS. A DEVICE PERMITTING DEPOSITION OF UNIPOLAR CHARGES UPON PARTICLES ENTRAINED BY A FLUID IS PLACED UPSTREAM. IN CASE OF WIND FLOW, THESE PARTICLES WOULD BE THE ATMOSPHERIC AEROSOL PROPER OR, ULTIMATELY, THE AEROSOLS PRODUCED BY AN ADEQUATE GENERATOR. THE LARGER UNIPOLAR IONS THUS PRODUCED, BEING OF LOW MOBILITY, ARE ENTRAINED BY THE FLOW AND RECEIVED DOWNSTREAM ON A GRID, WHICH IS CHARGED AT A POTENTIAL OF THE SAME SIGN AS THE IONS. THE WORK ACCOMPLISHED BY THE WIND, WHICH FORCES THE LARGE IONS TO ASCEND THE ELECTRICAL FIELD CREATED BY THE SPACE CHARGE AND DIRECTED IN THE OPPOSITE SENSE OF THE WIND SPEED, IS RECEIVED IN AN ELECTRICAL FORM IN THE EXTERNAL CIRCUIT THAT CONNECTS THE INPUT GRID TO THE OUTPUT GRID. THE COMPUTATIONS OF FLOW IN THE CASE OF A UNIDIMENSIONAL HYPOTHESIS ARE SET FORTH. THE EQUATIONS FOR THE POWER EXTRACTED PER SQUARE METER AS A FUNCTION OF EXTERNAL RESISTANCE MULTIPLIED BY CURRENT DENSITY AND GENERATOR SEGMENT ARE DERIVED. IN CONNECTION WITH THE COMPUTATION PROCEDURE, THERE ARE DISCUSSED A MODULE OF AN OPEN CIRCUIT, CONSTRAINTS UPON THE DEVELOPMENT OF AN ELECTRICAL FIELD IN THE MODULE, THE MODULE OF MAXIMUM POWER, A SHORT CIRCUITING OF THE GENERATOR, LIMITATION BY GAS FLOW DISRUPTION, AND THE GENERAL CASE. IN CONNECTION WITH THE PERFORMANCE OF A MODULE, THE ORDER OF MAGNITUDE OF THE DISRUPTION FIELD MODULES OF CONSTANT OUTPUT AND THE INTERACTION OF MECHANICAL AND ELECTRICAL EQUATIONS ARE EXAMINED. THE CASES OF CORONA DISCHARGE AND OF IONIZATION BY A RADIOACTIVE SOURCE ARE DISCUSSED.

75-0501 RITTENHOUSE I D
WIND POWER NOW.
BULL. ATOM. SCI. 31(8): 20-26, 1975.

75-0502 ROLISON J P
THE NORTHEASTERN STATES CONFRONT THE ENERGY CRISIS: PAPERS OF THE REGIONAL RESPONSE TO THE ENERGY CRISIS. A CONFERENCE OF STATE LEGISLATIVE LEADERS FROM THE NORTHEASTERN STATES.
NTIS, NOVEMBER 1975. 316P.
PB-248997

A PARTIAL LISTING OF TOPICS INCLUDES: THE REGIONAL ECONOMIC AND ENVIRONMENTAL IMPACT OF ENERGY; NUCLEAR ENERGY, THE INTERMEDIATE SOLUTION; COAL-ENERGY OF THE PAST OR FUTURE; ALTERNATE SOURCES OF ENERGY - THEIR POTENTIAL AND FEASIBILITY; THE POTENTIAL OF REGIONAL ENERGY MODELING; EFFECTS OF ENERGY SHORTAGES ON THE WAY WE LIVE; AN EVALUATION OF MECHANISMS BY WHICH STATE LEGISLATORS CAN OBTAIN IMPROVED ACCESS TO INFORMATION ON ENERGY ISSUES; ENERGY REGULATION: A SUMMARY VIEW OF FEDERAL LIMITATIONS ON STATE AND LOCAL GOVERNMENTS; ON TAXES ANS SUBSIDIES TO AFFECT ENERGY CONSUMPTION; EFFICIENCY AND EQUITY CONSIDERATIONS.

75-0503 RUDMAN P S
EVALUATION OF WIND ENERGY CONVERSION SYSTEMS FOR ISRAEL.
ASSOC. ENG. ARCHIT. J. 34(4-5): 78-66, APRIL-MAY 1975.

75-0504 RUDMAN P S
AN EVALUATION OF WIND ENERGY CONVERSION SYSTEMS FOR ISRAEL.
MECH. ENG. CONGRESS, ISRAEL, JULY 1975. 40P.

75-0505 RUITER J P
ALTERNATIVE ENERGY SOURCES.
ELECKTROTECHNIEK 53(4): 183-195, MARCH 1975. (IN DUTCH)

THE POSSIBILITIES OF SOME NONCONVENTIONAL ENERGY SOURCES SUCH AS SOLAR RADIATION, TIDAL ENERGY AND GEOTHERMAL ENERGY ARE DESCRIBED. ALSO THE SOURCES DERIVED FROM THE SOLAR RADIATION SUCH AS WIND, TEMPERATURE DIFFERENCES IN THE OCEANS, AND ORGANIC WASTES ARE INCLUDED IN THIS SURVEY.

75-0506 RUITER J P, SCHURINK F
POTENTIELE ENERGIEBRONNEN. (POTENTIAL ENERGY SOURCES).
KEMA, AMHEM, THE NETHERLANDS, DIVISION OF RESEARCH AND DEVELOPMENT, SEPTEMBER 1975. 153P. (IN DUTCH)

REVIEWED ARE ENERGY SOURCES OTHER THAN FOSSIL AND NUCLEAR AND THEIR POSSIBLE CONTRIBUTION TO THE PRODUCTION OF ELECTRICITY IN THE NETHERLANDS. INCLUDED ARE: SUN, WIND, GEOTHERMAL, ORGANIC WASTE, OCEANS, STORAGE METHODS, HEAT PUMP.

75-0507 RYCKE F DE
STUDIE VAN EEN WIND-GENERATOR. (STUDY OF A WIND GENERATOR).
MECHELEN, BELGIUM, HOGER INSTITUT DE NAYER, DEPARTMENT OF ELECTROMECHANICS, 1975. (IN DUTCH)

75-0508 RYZHOV S V
WINDMILLS FOR SHEEP FARMS.
OVTSEVODSTVO 2: 33-35, FEBRUARY 1975. (IN RUSSIAN)

75-0509 SCHATTA M
WEATHER-POWER STATION.
GERMAN (FRG) PATENT NO. 2,412,908/A/, OCTOBER 2, 1975. 17P. (IN GERMAN)

A COMBINED POWER STATION IS DESCRIBED, WHICH ENABLES ONE TO CONVERT SOLAR ENERGY AND WIND ENERGY INTO OTHER FORMS OF ENERGY. THE PLANT CONSISTS OF A WATER-FILLED BOILER, IN WHICH SOLAR ENERGY HEATS THE WATER BY CONCENTRATION; SOLAR CELLS; AND FINALLY WIND ROTORS, WHICH TRANSFORM WIND ENERGY INTO ELECTRICAL ENERGY. THE TRANSFORMED ENERGY IS PARTLY AVAILABLE AS STEAM HEAT, PARTLY AS MECHANICAL OR ELECTRICAL ENERGY. THE PLANT CAN BE USED FOR SUPPLYING HEATING SYSTEMS OR ELECTROLYSIS EQUIPMENT. FINALLY, BY INCORPORATING SUITABLE MOTORS, A MOBILE VERSION OF THE SYSTEM CAN BE PRODUCED.

75-0510 SITING ENERGY FACILITIES AT CAMP GRUBER, OKLAHOMA.
NTIS, JUNE 1975. VOL.2. 71P.
PB-247127

COMPARING THE CHARACTERISTICS OF CAMP GRUBER WITH THE GENERAL SITING REQUIREMENTS FOR AN ENERGY CENTER REVEALS THAT THE CAMP IS SATISFACTORY. THE ENERGY FACILITIES FOR WHICH CAMP GRUBER DOES NOT APPEAR TO BE AN ATTRACTIVE SITE ARE THE MINE-MOUTH PLANTS. EXTRA COSTS MAY BE NECESSARY FOR PURCHASE OF WATER RIGHTS OR CONSTRUCTION OF STORAGE FACILITIES, CONVEYANCES, OR PURIFICATION PLANTS. CAMP GRUBER SATISFIES THE FOLLOWING REQUIREMENTS: AMPLE LOW COST LAND AREA; AMPLE WATER SUPPLY; FAVORABLE METEOROLOGICAL CHARACTERISTICS; MINIMUM ENVIRONMENTAL IMPACTS; LARGE MARKETS FOR ENERGY PRODUCTS; LOW CONSTRUCTION AND OPERATING COSTS; GOOD TRANSPORTATION FACILITIES; AND MINIMUM SOCIAL IMPACT.

75-0511 SIVASEGARAM S
AN EXPERIMENTAL INVESTIGATION OF A CLASS OF DIRECTION-INDEPENDENT WINDMILLS.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, MAY 15, 1975. 12P.

THE PAPER PRESENTS THE FINDINGS OF AN EXPERIMENTAL INVESTIGATION OF A CLASS OF DIRECTION-INDEPENDENT WINDMILLS WHICH ARE EASY TO FABRICATE AND HAVE SIMPLE BLADE PROFILES. THE PAPER DEMONSTRATES THE EXISTENCE OF CERTAIN OPTIMUM DESIGN PARAMETERS AND DISCUSSES THE SUITABILITY OF THE CLASS OF WINDMILLS FOR LOCAL APPLICATION.

75-0512 SIVASEGARAM S
ON IMPROVING THE PERFORMANCE OF THE SAVONIUS ROTOR.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, SEPTEMBER 1975. 8P.

DESCRIBED ARE WIND TUNNEL MEASUREMENTS ON TWO AND THREE BLADE PARAMETERS (ANGLE, SIZE, SETTING AND SPEED). SUGGESTED IMPROVEMENTS ARE MENTIONED.

75-0513 SIVASEGARAM S
AN INVESTIGATION OF DIRECTION INDEPENDENT WINDMILL DESIGN SUITABLE FOR FABRICATION OUT OF TIMBER.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, SEPTEMBER 1975. 9P.

WIND TUNNEL MEASUREMENTS ON MODELS OF VERTICAL AXIS ROTORS WITH ANGLED BLADES, RESEMBLING A CUP-ANEMOMETER, ARE DESCRIBED. IT IS CONCLUDED FROM THE RESULTS THAT ANGLE BLADE-ROTORS, SUITABLE FOR CONSTRUCTION OUT OF

TIMBER, POSSESS EFFICIENCIES COMPARABLE WITH CURVED BLADE DESIGNS. THE DESIGNS CAN BE CONSTRUCTED AT THE VILLAGE LEVEL.

75-0514 SMIT J
WIND POWER GENERATORS--DREAM OR PRACTICEABILITY?
POLYTECH. TIJDSCHR. ELEKTROTECH. ELEKTRON. 30(3): 76-83, FEBRUARY 5, 1975. (IN DUTCH)

75-0515 SOLAR AND PHYSICAL RESEARCH: HEARINGS BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, FEBRUARY 21, 1975.
WASHINGTON, D.C., GOV'T. PRINT. OFF., 1975. 700P.

DR. J.M. TEEM OF ERDA PRESENTS A PAPER ON THE SOLAR ENERGY DEVELOPMENT PROGRAM. MAJOR AREAS DISCUSSED IN RELATION TO BUDGET REQUESTS IN SOLAR ENERGY ARE: SOLAR HEATING AND COOLING, SOLAR THERMAL CONVERSION, WIND ENERGY, BIOCONVERSION TO FUELS, OCEAN THERMAL CONVERSION, AND PHOTOVOLTAIC CONVERSION. AREAS IN PHYSICAL RESEARCH INCLUDE: HIGH ENERGY PHYSICS AND NUCLEAR, MATERIALS, AND MOLECULAR SCIENCES. APPENDIX CONTAINS: THE NATIONAL SOLAR ENERGY PROGRAM, CURRENT ARTICLES AND BIBLIOGRAPHIES OF SOLAR ENERGY AND WIND POWER, AND PROGRAMS FOR PHYSICAL RESEARCH.

75-0516 SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974: NATIONAL SOLAR ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM, DEFINITION REPORT.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS. 94TH CONGRESS, 1ST SESSION, JULY 16, 1965. HEARING TRANSCRIPT. WASHINGTON, D.C., GOV'T. PRINT. OFF., 1975. 514P.

OVERSIGHT HEARINGS WERE HELD TO REVIEW THE NATIONAL SOLAR ENERGY PROGRAM DEFINITION THAT WAS TO BE SUBMITTED TO CONGRESS BY JUNE 30, 1975, PURSUANT TO PUBLIC LAW 93-473, THE SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974. AN ADMINISTRATOR FOR THE SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS DIV. OF ERDA TESTIFIED ON ERDA-49, A REPORT PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 15, PUBLIC LAW 93-473. TOPICS DISCUSSED INCLUDED: TECHNICAL PROBLEMS TO BE OVERCOME, SOLAR PHOTOVOLTAIC CONVERSION; LOW COST AND DEPENDABLE SOLAR COLLECTORS; ERDA REPORTS 48, 49, AND 23A; IMPLEMENTATION OF THE SOLAR ENERGY PROGRAM; AND UNCERTAINTIES PERTAINING TO FUTURE BUDGET LEVELS AND APPROPRIATIONS. ERDA-49, A SUMMARY OF THE FEDERAL WIND ENERGY PROGRAM, AND "SOLAR ENERGY FOR EARTH," AN AIAA REPORT, ARE APPENDED.

75-0517 WIND POWER.
ALTERN. SOURCES ENERGY NO. 15: 21-23, OCTOBER 1975.

75-0518 THE SOLAR RESOURCE SYSTEM.
UNIVERSITY OF OKLAHOMA. SCIENCE + PUBLIC POLICY PROGRAM. REPORT. MAY 1975. P. 11-21.

THE SOLAR ENERGY RESOURCE SYSTEM AND ITS RESOURCE BASE ARE DISCUSSED. FOUR POTENTIAL SOURCES OF SOLAR ENERGY ARE CONSIDERED: DIRECT RADIATION, WIND, ORGANIC FUELS, AND OCEAN THERMAL GRADIENTS. ENERGY EFFICIENCIES, ENVIRONMENTAL CONSIDERATIONS, TECHNOLOGIES FOR CONVERTING THE ENERGY, AND ECONOMICS OF EACH ALTERNATIVE SOURCE ARE DESCRIBED. ALL SOLAR SOURCES ARE CHARACTERIZED BY LOW PORE DENSITIES AND CONVERSION EFFICIENCIES, THUS RESULTING IN HIGH LAND AREA REQUIREMENTS FOR A GIVEN OUTPUT. OFFSETTING THE INITIAL LARGE INVESTMENT COSTS OF SOLAR POWER SYSTEMS ARE THE ULTIMATE ECONOMIC BENEFITS OF FREE ENERGY AND LOWER OPERATING COSTS.

75-0519 SOUTH P, RANGI R S
AN EXPERIMENTAL INVESTIGATION OF A 12-FT. DIAMETER HIGH SPEED VERTICAL-AXIS WINDMILL.
NATIONAL RESEARCH COUNCIL OF CANADA, LABORATORY TECHNICAL REPORT LTR-LA-166, APRIL 1975.

75-0520 SPRENGEL N
DFVLR ACTIVITIES IN THE AREA OF ENERGY RESEARCH.
DFVLR-NACHRICHTEN, JUNE 1975. P. 640-643. (IN GERMAN)

75-0521 STODHART A H
SELECTION OF TOWER HEIGHT FOR A WIND DRIVEN PLANT.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C.,

JULY 29, 1974. NTIS, MAY 1975. P. 122-125.
PB-244132

MANY STATEMENTS HAVE BEEN MADE FROM TIME TO TIME CONCERNING THE VALUE OF INCREASING TOWER HEIGHT ABOVE THAT REQUIRED TO GIVE ADEQUATE GROUND CLEARANCE TO THE ROTOR OF AN AEROGENERATOR. THIS MINIMUM GROUND CLEARANCE IS USUALLY RECKONED TO BE AROUND 10 METERS, BECAUSE OF THE INCREASED RELATIVE EFFECT OF GROUND INDUCED TURBULENCE BELOW THIS LEVEL; THE UNDOUBTED REDUCTION IN MEAN WIND SPEED, EVEN ON THE MOST FAVORABLE SITES, NEAR TO GROUND LEVEL, AND, IN THE EXTREME CASE, THE SAFETY ELEMENT. IT IS NOT MERELY A QUESTION OF IMPROVEMENT IN WIND REGIMES THAT IS TO BE SOUGHT BUT ALSO AN IMPROVEMENT IN THE OPERATING CONDITIONS FOR THE WIND ROTOR ITSELF. THE PROBLEM OF OPTIMUM TOWER HEIGHT IS DISCUSSED.

75-0522 STROM AUS WIND, AUCH FUER SIE VERFUEGBAR. 5,8-KW-ANLAGEN FUER 50,000 KWH/JAHR. (ELECTRICITY FROM THE WIND, ALSO FOR YOU AVAILABLE. 5,8 KW PLANTS FOR 50,000 KWH/YEAR).
GRAEFELING, GERMANY, NOAH-ENERGY-SYSTEMS- GENF., TECHNISCHER VERLAG RESCH KG, 1975. (IN GERMAN)

75-0523 STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, TECH. INF. CIRC. NO. 147, MAY 1975.

75-0524 STUBBE E J
DE NIET KONVENTIONELE ENERGIEBRONNEN. (THE NON-CONVENTIONAL ENERGY SOURCES).
INGENIEURSBLAD 44(17/18): 372-384, 1975.

75-0525 WOOD J R
WIND ENERGY UTILISATION IN NEW ZEALAND. INTERIM REPORT.
UNIVERSITY OF AUCKLAND, DEPARTMENT OF MECHANICAL ENGINEERING, AUGUST 1975.

75-0526 WORLD ENERGY RESOURCES: AN ANNOTATED BIBLIOGRAPHY OF SELECTED MATERIAL ON THE AVAILABILITY AND DEVELOPMENT OF WORLD ENERGY RESOURCES.
NTIS, 1975. 21P.
ERDA-53

THE BIBLIOGRAPHY PROVIDES REFERENCES TO 173 RECENT ENGLISH LANGUAGE PUBLICATIONS COVERING THE AVAILABILITY AND DEVELOPMENT OF WORLD ENERGY RESOURCES. CITATIONS DEALING EXCLUSIVELY WITH ENERGY RESOURCES OF THE UNITED STATES HAVE BEEN OMITTED.

75-0527 SWEENEY T E, NIXON W B, MAUGHMER M D, BLAHA R
SAILWING WINDMILL CHARACTERISTICS AND RELATED TOPICS.
NTIS, MARCH 1975. 70P.
PB-265828

THE METHOD OF EXPERIMENTALLY DETERMINING THE PERFORMANCE OF LARGE SCALE WINDMILL MODELS MOUNTED ON A MOVING VEHICLE IS DISCUSSED. AS A RESULT OF THE WIND TUNNEL EXPERIMENTS, ANALYSIS, AND THE LARGE SCALE VEHICLE WORK, AN OPTIMIZATION OF A PARTICULAR ROTOR IS DESCRIBED, AS ARE THE RESULTS OF BLADE TWIST EXPERIMENTS AS A METHOD OF RPM CONTROL. BECAUSE THE WIND TUNNEL MODELS WERE NECESSARILY SMALL SCALE, RIGID ROTOR BLADES WERE USED; HOWEVER, THE LARGE SCALE ROTORS TESTED AND REPORTED UPON WERE OF THE PRINCETON SAILWING TYPE. BY MEANS OF DIMENSIONAL ANALYSIS AND BY EXPERIMENTS, THE SIGNIFICANT TENSION COEFFICIENT FOR THE TRAILING EDGE CABLE OF THE SAILWING ROTOR WAS DETERMINED AND EVALUATED. THIS TENSION COEFFICIENT ENABLES THE DESIGN OF SUCH A ROTOR TO BE SUCH THAT THE LUFFING THRESHOLD CAN BE AVOIDED FOR ANY GIVEN SET OF CONDITIONS.

75-0528 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY).
MUHLE MISCHFUTTERTECH 112(30): 395-399, JULY 31, 1975. (IN GERMAN)

75-0529 TABOR H
RENEWABLE ENERGY-SOURCES AND THE NEW ZEALAND SCENE.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2D, MAY 22-24, 1975. CONF. PAPER NO. 4, P. 64-69.

75-0530 TEWARI S K
HOW FEASIBLE IS THE SUBSTANTIAL UTILIZATION OF WIND POWER IN INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, JUNE 1975. 37P.

REVIEWED ARE SOME TECHNICALLY SUCCESSFUL WIND MACHINES FROM THE PAST, THE FIELDS IN WHICH ENERGY IS A USEFUL AND RELIABLE SOURCE (ESPECIALLY FOR WATER PUMPING AND SUPPLYING ELECTRICITY TO THE GRID), AND THE ECONOMICS OF WIND POWER IN THE INDIAN ENERGY SCENE.

75-0531 TEWARI S K, SRINATH L S
A SYSTEMS APPROACH TOWARD UTILIZATION OF WIND ENERGY. A PRELIMINARY STUDY.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, MARCH 3, 1975. 72P.

THIS IS A SHORT REVIEW OF THE ASPECTS OF SYSTEM ANALYSIS NEEDED FOR RESEARCH AND DEVELOPMENT ON WIND POWER UTILIZATION WITH SPECIAL REFERENCE TO INDIA.

75-0532 THALHAMMER T
FUTURE ENERGY DEMAND AND THE ROLE OF SOLAR ENERGY.
ACTA ELECTR. 18(4): 267-273, OCTOBER 1975.

SOME ENERGY SUPPLY AND DEMAND SCENARIOS ARE FORECASTED. SOLAR ENERGY'S CONTRIBUTION WILL BE MINOR UNTIL THE YEAR 2000, BUT ITS DEVELOPMENT SHOULD BE CONTINUED. DIFFERENT METHODS OF CONVERTING SOLAR ENERGY INTO SUITABLE FORMS FOR HUMAN NEEDS ARE PRESENTED: PHOTOTHERMAL, PHOTOVOLTAIC, BIOLOGICAL, THERMAL SEA, WIND, AND OCEAN CURRENT ENERGY. SINCE THE SUCCESS OF ANY METHOD WILL DEPEND ON ITS ECONOMIC COMPETITIVENESS, COST CONSIDERATIONS ARE PRESENTED. OTHER FACTORS AFFECTING THE INTRODUCTION OF SOLAR ENERGY ARE APPRAISED.

75-0533 THRESHER R W, WILSON R E
CHARACTERISTICS OF THE VERTICAL AXIS WIND MACHINE.
BURBANK, CAL., LOCKHEED-CALIFORNIA CO., SEPTEMBER 1975.

IT IS THE PRIMARY OBJECTIVE OF THIS STUDY TO DETERMINE THE PERFORMANCE, OPERATING AND COST CHARACTERISTICS OF VERTICAL AXIS WIND MACHINES. MAJOR EMPHASIS IS PLACED ON THE DARRIEUS, BUT THE SAVONIUS ROTOR IS ALSO CONSIDERED. THE STUDY CENTERS ON THE FOLLOWING AREAS OF INTEREST: AERODYNAMIC PERFORMANCE; STRUCTURAL REQUIREMENTS; OPERATIONAL STRATEGY; AND ECONOMIC POTENTIAL VERSUS MACHINE SIZE. THE MACHINE CONFIGURATION FOR THIS STUDY IS A THREE-BLADED, TROPOSKIEN SHAPED DARRIEUS ROTOR, WHICH AT THIS TIME IS THE MOST PROMISING MACHINE CONFIGURATION. USING THIS MACHINE CONFIGURATION, ANALYTICAL MODELS ARE DEVELOPED FOR THE AERODYNAMICS AND STRUCTURES. WHILE THESE MODELS MAY NOT CONTAIN THE EFFECTS OF ALL OF THE PHYSICAL PARAMETERS, THE KEY PARAMETERS ARE INCLUDED. IN SOME CASES, SELECTING THESE KEY PARAMETERS IS A MATTER OF JUDGEMENT. WITH THESE MODELS, THE RELATIONSHIPS GOVERNING MACHINE PERFORMANCE; STRUCTURAL NEEDS AND POTENTIAL OPERATION ARE DEDUCED.

75-0534 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY). 3.
MUHLE MISCHFUTTERTECH, 112(32): 422-426, AUGUST 14, 1975. (IN GERMAN)

75-0535 DELISLE J F, TOMLINSON A I
STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND METEOROLOGICAL SERVICE TECH. INF. CIRC. NO. 147, MAY 1975.
REVISED EDITION OCTOBER 1975.

75-0536 TRANSLATIONS PUBLISHED BY ERA OF WIND POWER ARTICLES, 1930 TO 1949.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA TRANS-3012, OCTOBER 1975.

75-0537 TRANSLATIONS OF WIND POWER ARTICLES 1950 TO 1962.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA TRANS-3013, OCTOBER 1975.

75-0538 TROMP C
ONDERZOEK AAN EEN GENERATORSYSTEEM VOOR HET OPWEKKEN VAN-DIREKT AAN HET OPENBARE NET TE LEVEREN-ELECTRISCHE ENERGIE MET BEHULP VAN EEN WINDMOLEN.
(INVESTIGATION ON A GENERATOR SYSTEM, DELIVERING ELECTRICITY DIRECTLY TO

THE UTILITY NETWORK, BY MEANS OF A WINDMILL).
DELFT, THE NETHERLANDS, DELFT UNIVERSITY OF TECHNOLOGY, REP. NO. VE75A37, MAY 1975. 128P. (IN DUTCH)

IN THIS REPORT A DESCRIPTION IS GIVEN OF A SYSTEM FOR THE GENERATION OF ELECTRICITY FOR THE PUBLIC 3-PHASE GRID, BY WINDPOWER. BESIDES THE TRANSFORMATION OF MECHANICAL ENERGY INTO ELECTRICAL ENERGY WITH THE VOLTAGE AND FREQUENCY OF THE GRID, THE GENERATION-SYSTEM IS GIVEN THE TASK TO ADJUST THE ROTATIONAL SPEED OF THE WINDMILL-SHAFT, IN ORDER TO GET THE MAXIMUM POWER THAT CAN BE EXTRACTED FROM THE WIND AT A GIVEN WIND SPEED. ALTHOUGH THIS RESULTS IN A ROTATIONAL SPEED OF THE GENERATION-SHAFT THAT IS PROPORTIONAL TO THE WIND SPEED, THE GENERATOR CAN BE CONNECTED DIRECTLY TO THE GRID, BECAUSE CONSTANT OUTPUT VOLTAGE AND FREQUENCY ARE REALISED BY A CONVERTER FEEDING THE ROTOR CIRCUIT IN A SPECIAL WAY. IMPORTANT CHARACTERISTICS OF THE SYSTEM ARE THE BEHAVIOUR OF THE GENERATOR, BEING THAT OF A NORMAL SYNCHRONOUS GENERATOR AND THE NECESSARY CONVERTER CAPACITY, BEING ONLY APPROXIMATELY 15 PERCENT OF THE RATED CAPACITY OF THE GENERATOR.

75-0539 UTILIZATION OF WIND ENERGY ON MOUNT WASHINGTON.
MOUNT WASHINGTON OBSERVATORY NEWS BULL. 16(2): 41-47, JUNE 1975.

THE UTILIZATION OF WIND AS A SOURCE OF ELECTRICAL POWER IS NOT SO SIMPLE OR SO CHEAP AS MIGHT APPEAR AND SINCE WIND VELOCITY IS NOT CONSTANT, UTILIZATION OF WIND POWER FOR THE HOME IS VIEWED, AT THE MOMENT, AS A SUPPLEMENTARY RATHER THAN AS A PRIMARY SOURCE OF POWER. MOREOVER, ELECTRICAL ENERGY GENERATED BY THE WIND WOULD BE OF THE DC RATHER THAN THE AC TYPE THAT OPERATES MOST AMERICAN MOTOR APPLIANCES. THEREFORE, WHEN CONSIDERING THE COST OF THE EQUIPMENT NEEDED TO EXTRACT, STORE, AND CONVERT WIND POWER, IT MAY NOT BE AT ALL ADVANTAGEOUS. ON MT. WASHINGTON (N.H.), THERE IS AN ABUNDANCE OF WIND, THE AREA IS NOT SERVED BY POWER COMPANIES, AND THE OUTPUT OF A WIND-POWERED GENERATOR IS PROPORTIONAL TO THE CUBE OF THE WIND SPEED (A GENERATING UNIT CAPABLE OF PRODUCING 5 KW IN A 10-M.P.H. WIND COULD PRODUCE 40 KW IN A 20-M.P.H. WIND). HOWEVER, THE HARNESSING OF STRONG MOUNTAIN WINDS PRESENTS SOME PROBLEMS SUCH AS THE PERFORMANCE OF WIND-POWERED GENERATORS IN FREQUENT WINDS OF HURRICANE VELOCITY AND STRONG TURBULENCE. SEVERE WIND CONDITIONS MAY NECESSITATE DEACTIVATING OR DEMOUNTING THE EQUIPMENT, AND ICING COULD DAMAGE OR EVEN DESTROY IT. PLANS ARE UNDER WAY TO CONSTRUCT AND TEST A PROTOTYPE MACHINE SO THAT DATA CAN BE GATHERED ON THE PRACTICABILITY OF EXTRACTING POWER FROM THE WIND ON MT. WASHINGTON.

75-0540 UZZELL R S
WIND POWERED MACHINE.
GERMAN (FRG) PATENT, JULY 31, 1975. 11P. (IN GERMAN)

THE PATENT SPECIFICATION CONCERNS A WIND-POWERED MACHINE, WHERE THE WIND ROTOR IS MOUNTED TO ROTATE IN BEARINGS ON A FRAMEWORK, AND IS CONNECTED WITH A WEATHER VANE. THE WIND ROTOR DRIVES AN ELECTRIC GENERATOR. ACCORDING TO THE INVENTION THE WIND ROTOR IS ARRANGED AT THE NARROWEST CROSSECTION (THROAT) OF A CHAMBER IN THE FORM OF A VENTURI NOZZLE. SEVERAL GUIDE VANES ARE DISTRIBUTED EVENLY OVER THE CIRCUMFERENCE OF THE INLET OPENING ON THE INNER WALL OF THE VENTURI TUBE NEAR THE INLET OPENING.

75-0541 VOEGELI H E, TARRANT J J
SURVIVAL 2001: SCENARIO FROM THE FUTURE.
N.Y., VAN NOSTRAND REINHOLD, 1975. 115P.

CONCEPTS OF ALTERNATIVE ENERGY SOURCES, INCLUDING WIND, SOLAR, TIDAL, AND WAVE POWER, AND ALTERNATIVE HOUSING DESIGN ARE EXAMINED WITH ENERGY CONSERVATION AS THE GOAL. BRIEFLY DISCUSSED ARE PROBLEMS ASSOCIATED WITH TRANSPORTATION.

75-0542 VOORSTEL NATIONAAL ONDERZOEKPROGRAMMA WINDENERGIE. (PROPOSAL FOR A NATIONAL RESEARCH PROGRAM ON WIND ENERGY).
THE NETHERLANDS, LANDELIJKE STUURGROEP VOUR ENERGIE ONDERZOEK, JUNE 2, 1975. 57P.

THIS PROPOSAL FOR RESEARCH AND DEVELOPMENT OF LARGE SCALE WIND ENERGY SYSTEMS COVERS: (1) TECHNICAL AND COSTS OF THE USE OF WIND POWER; (2) THE USE OF ENERGY FROM AN INTERMITTENT SOURCE; (3) THE SOCIAL IMPLICATIONS OF WIND ENERGY, AND (4) DOCUMENTATION.

75-0543 WALENBERG F
MODELIJKHEDEN VOOR OPTIMALISERING VAN DE ENERGIE AFGIFTE DOOR EEN WINDKRACHTCENTRALE. (POSSIBILITIES FOR OPTIMALIZATION OF THE POWER PRODUCTION OF A WIND POWER ELECTRIC PLANT).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF ELECTRIC ENGINEERING, REP. NO. EM 75-2, APRIL 1975. 73P.
(IN DUTCH)

APPLICATIONS OF WINDMILL POWER OR WIND ENERGY IN GENERAL ARE MULTIPLE; ONE SPECIAL APPLICATION IS GENERATING ELECTRICAL ENERGY. ONE OF THE PROBLEMS OF A WINDMILL-DRIVEN ELECTRICAL PLANT IS THAT ONLY AT ONE WIND VELOCITY THE EFFICIENCY OF ENERGY PRODUCTION IS MAXIMAL. THE TRANSMISSION-ALTERNATOR COMBINATION IS ADAPTED TO THE WINDMILL FOR THIS SPECIAL WIND VELOCITY ONLY. TRYING TO ADAPT THE POWER SYSTEM FOR ALL OCCURRING WIND VELOCITIES IS A PROBLEM OF CONTROL-ENGINEERING. THIS REPORT HAS THE INTENTION TO CONTRIBUTE TO THE SOLUTION OF THIS PROBLEM. FROM A SIMPLE WINDMILL-THEORY CONDITIONS OF OPTIMAL POWER-EFFICIENCY ARE DERIVED. CONTROL SYSTEMS THAT MEET THESE CONDITIONS ARE TREATED MORE OR LESS SYSTEMATICALLY. FINALLY, A SPECIAL KIND OF CONTROL SYSTEM, A SO CALLED OPTIMUM CONTROLLER, IS INTRODUCED IN THE LAST CHAPTER.

75-0544 WALKER J
ENERGY AND THE ENVIRONMENT.
BIRMINGHAM, ENGLAND, UNIVERSITY OF BIRMINGHAM, 1975. 387P.

REPORTS FROM THE 1975 INTERNATIONAL SYMPOSIUM ON MAN AND HIS ENVIRONMENT IN ENGLAND ARE PRESENTED. EXAMINED ARE SOURCES OF ENERGY INCLUDING COAL, GAS, OIL, NUCLEAR, WIND, AND SOLAR, AND THE ENVIRONMENTAL EFFECTS OF EACH. DISCUSSED ARE USERS OF ENERGY INCLUDING GENERAL INDUSTRIAL CONSUMERS, ELECTRICITY SUPPLIERS, TRANSPORTATION, AND AGRICULTURE.

75-0545 WATT S B
THE CRETAN SAIL WINDWHEEL AS A POWER SOURCE.
APPROP. TECHNOL. 2(3): 4-5, 1975.

THIS SHORT DESCRIPTION OF THE CRETAN SAIL WINDWHEEL MENTIONS ITS ADVANTAGES. COMPARED WITH THE MULTIBLADE WINDWHEEL IT IS VERY SIMPLE TO BUILD BUT NEEDS CONSTANT ATTENTION TO TRIM AND REEF THE SAILS. SOME DETAILS ON CONSTRUCTION AND PERFORMANCE ARE GIVEN.

75-0546 WEBER W
THE OPTIMUM CONFIGURATION OF ROTOR BLADES FOR HORIZONTAL WIND ENERGY CONVERTERS.
Z. FLUGWISS 23(12): 443-447, 1975. TRANSL.: NTIS, FEBRUARY 1977. 17P.
NASA-TT-F-17379

CONSIDERATIONS, PROCEDURES AND SOME RESULTS RELATING TO THE PROBLEM OF THE AERODYNAMIC CONFIGURATION OF ROTOR BLADES FOR WIND ENERGY CONVERTERS ARE PRESENTED.

75-0547 WEEKS S A, PRICE D R
EVALUATION OF WIND ENERGY SYSTEMS.
N.Y. FARM ELECTR. COUNC. ANN. PROG. REP. 32D: 48-50, 1975.

75-0548 WEINGARTEN L I
MATERIAL AND MANUFACTURING CONSIDERATIONS FOR VERTICAL-AXIS WIND TURBINES.
NTIS, 1975. 14P.
SAND-75-5512

75-0549 WEISS G
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,423,612/A/, NOVEMBER 20, 1975. 9P. (IN GERMAN)

A WIND POWER PLANT IS PROPOSED SUITABLE FOR ELECTRICITY GENERATION OR WATER PUMPING. THIS PLANT IS TO BE SELF-ADJUSTING TO VARIOUS WIND VELOCITIES AND TO BE KEPT IN OPERATION EVEN DURING VIOLENT STORMS. FOR THIS PURPOSE THE MAST, CARRYING THE WIND ROTOR AND PIVOTABLE AROUND A HORIZONTAL AXIS, IS TILTABLE AND EQUIPPED WITH A WIND BLIND. FURTHER CLAIMS CONTAIN VARIOUS CONFIGURATIONS OF THE TILTING BASE IN RESPECT TO THE CUT IN OF AN ELASTIC LINK, THE ATTACHMENT AND DESIGN OF THE WIND BLIND AS WELL AS THE CONSTRUCTIVE ARRANGEMENT OF ONE OR MORE DYNAMOS.

75-0550 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY). 2.
MUHLE MISCHFUTTERTECH. 112(31): 409-412, AUGUST 7, 1975. (IN GERMAN)

75-0551 DELTA AIRFOIL GRASPS POWER FROM THE WIND. WIND GENERATOR PROMISES GREATER EFFICIENCY.
PROD ENG. 46(9): 15-16, SEPTEMBER 1975.

A WINDMILL THAT ONE DAY MAY GENERATE EIGHT TIMES THE POWER OF CONVENTIONAL ROTOR-TYPE WIND-ENERGY CONVERTERS FOR THE SAME SIZE ROTOR HAS BEEN INVENTED BY P. M. SFORZA, FROM POLYTECHNIC INSTITUTE OF NEW YORK. ONE OF THE MANY POSSIBLE SHAPES FOR SUCH A DEVICE IS THE DELTA WING OF SUPERSONIC TRANSPORTS WITH SHARP LEADING EDGES.

75-0552 SYVERSON C D
WIND POWER.
DESIGN NEWS 31(6): 155-158, 1975.

THIS IS A REVIEW ARTICLE COVERING THE CURRENT STATUS OF WIND POWER RESEARCH, INCLUDING GENERATORS, DESIGN, TOWER HEIGHT, AND SITE SELECTION.

74-0230 ABELSON P H
ENERGY: USE, CONSERVATION AND SUPPLY.
WASHINGTON, D.C., AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1974. 154P.

A CHAPTER ON WINDMILLS BY NICHOLAS WADE IS INCLUDED. WIND POWER IS ALSO MENTIONED IN OTHER CHAPTERS THROUGHOUT THE BOOK.

74-0231 ALTMAN A
DESIGNING WINDMILL BLADES, A GRAPHICAL METHOD.
ALTERN. SOURCES ENERGY NO. 14: 10-13, MAY 1974.

74-0232 ALTMAN A
02 POWERED DELIGHT PLANS.
ALTERN. SOURCES ENERGY NO. 14: 5, MAY 1974.

THE PLANS WERE DEVELOPED BY J. SENCENBAUGH.

74-0233 ALTMAN A
THE "12 FOOTER" PLANS.
ALTERN. SOURCES ENERGY NO. 14: 6, MAY 1974.

THE "12 FOOTER" IS A WINDMILL DESIGNED BY WINDWORKS.

74-0234 ALTMAN A
WINDMILL LIMITER.
ALTERN. SOURCES ENERGY NO. 14: 38, MAY 1974.

A DESIGN TO PROTECT A WINDMILL FROM OVERSPEED IS DESCRIBED.

74-0235 ALWARD R
REVIEW OF THE WINDPOWER ACTIVITIES AT THE BRACE RESEARCH INSTITUTE.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.
UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 94-109.

REVIEWED ARE ACTIVITIES OF THE PAST TWELVE YEARS INCLUDING DESCRIPTIONS OF PUBLICATIONS ON WINDPOWER.

74-0236 ARCHIBALD F
ENERGY: A WATER PUMPING WINDMILL THAT WORKS.
J. NEW ALCHEM. NO. 2: 19-22, 1974.

THIS IS A DETAILED REPORT ON M. M. SHERMAN'S DESIGN OF A WATER PUMPING WINDMILL.

74-0237 BAETEN A
L'ENERGIE EOLIENNE. THESE. VOL. 1: HISTORIE-THEORIE; VOL. 2: TECHNOL. - ECON. - RECHERCHE - DEVELOPM.
VILLE DE BRUXELLES, INST. D'ENSEIGNEMENT SUP. LUCIEN COOREMANS/INST. SUP. DE COMMERCE, 1974-1975. VOL. 1: 156P.; VOL. 2: 361P.

74-0238 BAIRAMOV R
WIND-SOLAR POWER INSTALLATIONS FOR WATER RAISING AND DISTILLATION.
PROB. OSVOENIIA PUSTYN' 4: 71-76, 1974.

74-0239 BASE T E
THE EFFECT OF ATMOSPHERIC TURBULENCE ON WINDMILL PERFORMANCE.
LONDON, ONTARIO, FACULTY OF ENGINEERING SCIENCE, UNIVERSITY OF WESTERN ONTARIO, APRIL 1974. 15P.

THEORETICAL AND EXPERIMENTAL STUDIES HAVE BEEN MADE TO DETERMINE THE EFFECTS OF FREE STREAM TURBULENCE STRUCTURE ON THE PERFORMANCE OF A SIMPLE AIRSCREW WINDMILL. A MODIFIED BLADE ELEMENT METHOD WAS DEVELOPED TO PREDICT THE FLUCTUATING LIFT FORCES ON THE ROTOR BLADES AND COMPUTED VORTEX MODELS OF TURBULENCE WERE USED TO REPRESENT THE FLUCTUATING VELOCITY FIELD. EVENTUALLY THE COMPUTER PROGRAM WILL ENABLE LARGE ROTOR DIAMETER WINDMILL PERFORMANCE STUDIES TO BE CONDUCTED AND ALSO COMPARISONS TO BE MADE WITH SMALL TEST ROTORS.

74-0240 BASE T E
THE PERFORMANCE OF AN AIRSCREW WINDMILL IN A TURBULENT AIRSTREAM.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.

UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 157-167.

THIS IS A SHORT DESCRIPTION OF RESEARCH ON THE INFLUENCE OF TURBULENT ATMOSPHERIC BOUNDARY LAYER ON WINDSCREWS. EXPERIMENTAL (WIND TUNNEL) AND THEORETICAL (ANALYTICAL MODELS) METHODS ARE DISCUSSED.

74-0241 BEALL S E, SPIEWAK I, ARNOLD H G, MCLAIN H W, BETTIS E S
AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF ALTERNATIVE ENERGY SOURCES.
NTIS, SEPTEMBER 1974. 134P.
ORNL-5024

ALTERNATIVE ENERGY SOURCES SUCH AS GEOTHERMAL, SOLAR, WIND AND FUSION ARE EVALUATED AS TO AVAILABILITY, FEASIBILITY, COST, AND ENVIRONMENTAL IMPACT. METHODS ARE SUGGESTED FOR COMPARING OPTIONS.

74-0242 BESSELAAR H
MOLENS VAN NEDERLAND.
AMSTERDAM, B.V. UITGENERSMAATSCHAPPJ KOSMOS, 1974. 145P. (IN DUTCH)

THIS IS A WELL ILLUSTRATED SURVEY OF OLD DUTCH WINDMILLS. AN EXTENSIVE LIST OF STILL EXISTING WINDMILLS IN THE NETHERLANDS IS ADDED.

74-0243 BEURSKENS J
WINDENERGIE VOUR ONTWIKKELINGSLANDEN. (WIND ENERGY FOR DEVELOPING COUNTRIES).
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPT. OF PHYSICS, REPT. R-215-D, NOVEMBER 1974. 5P. (IN DUTCH)

THIS REPORT IS INTENDED AS PART OF PRELIMINARY SURVEY OF THE PRACTICABILITY OF WIND ENERGY IN DEVELOPING COUNTRIES. ASSESSMENT OF THE WATER DEMAND IN INDIA IS MADE AND A WIND TURBINE-PUMP SYSTEM IS DESCRIBED AND THE OUTPUT CALCULATED. A SURVEY IS GIVEN OF VARIOUS CONSTRUCTIONS, SAFEGUARD AND CONTROL MECHANISMS AND TRANSMISSIONS. A LIST OF COMMERCIALLY AVAILABLE MACHINES IS GIVEN.

74-0244 BEURSKENS J M
WIND ENERGY.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, APRIL 1974. DICTAAT NO. 3323. 161P. (IN DUTCH)

INCLUDED IN THIS REPORT ARE: 1. INTRODUCTION: THE ENERGY PROBLEM; USE OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE. 2. HISTORY OF THE USE OF WIND ENERGY; CLASSIFICATION OF WINDMILL TYPES. 3. SHORT SURVEY OF MOMENTUM THEORIES, DESCRIBING OVERALL WINDMILL PERFORMANCE IN STEADY WINDS. 4. ANALYSIS OF METEOROLOGICAL DATA; WIND PROFILES OVER DIFFERENT SURFACES (LAND, SEA, ETC.) AS A FUNCTION OF HEIGHT; STABILITY OF ATMOSPHERE; ENERGY CONTAINED IN ATMOSPHERIC TURBULENCE; ESTIMATION OF USEFUL ENERGY DEPENDENT ON HEIGHT OF WIND-ROTOR. 5. DESCRIPTION OF THE WINDMILL SYSTEM: WIND-ROTOR, TRANSMISSION AND LOAD UNDER STEADY AND NON-STEADY WIND CONDITIONS. THIS MATHEMATICAL DESCRIPTION OPENS POSSIBILITIES OF OPTIMIZING A WINDMILL SYSTEM DEPENDENT ON REQUIREMENTS.

74-0245 BLACKWELL B F, FELTZ L V, RANDALL O M
WIND TURBINE.
WASHINGTON, D.C., ATOMIC ENERGY COMMISSION, PATENT APPLICATION, SEPTEMBER 20, 1974. 18P.
PAT-APPL-508016/WE

THE PATENT APPLICATION RELATES TO A WIND TURBINE ROTATABLE ABOUT A SHAFT WHICH MAY INCLUDE A DRIVE ROTOR WITH ONE OR MORE ELONGATED BLADES EACH HAVING A CENTRAL OUTWARDLY CURVED PORTION OF AIRFOIL SHAPE WHICH PRODUCES ROTARY MOTION WHEN THE BLADE ROTATES IN WIND AT A BLADE TIP VELOCITY TO WIND VELOCITY RATIO GREATER THAN ABOUT THREE OR FOUR. ADDITIONAL WIND ROTOR MEANS ARE DISPOSED AT BOTH ENDS OF THE CURVED PORTIONS OF THE ELONGATED BLADE FOR ROTATABLY ACCELERATING THE DRIVE ROTOR TO THE DESIRED VELOCITY RATIO, AND MEANS COUPLED TO SAID ROTORS FOR USING THE ROTATION THEREOF.

74-0246 BLACKWELL B F, FELTZ L V, RIGHTLEY E C
ADDENDUM TO A PROPOSAL TO NSF TO SPONSOR A VERTICAL-AXIS WIND TURBINE RESEARCH PROGRAM.
NTIS, NOVEMBER 1974. 34P.

SAND-74-0386

INFORMATION IS PRESENTED CONCERNING THE PERFORMANCE EVALUATION OF A 15 FOOT-DIAMETER TEST BED DARRIEUS ROTOR, DARRIEUS ROTOR WIND TUNNEL TESTS, SAVONIUS ROTOR WIND TUNNEL TESTS, BLADE MANUFACTURING TECHNIQUES FOR 15 FOOT-DIAMETER AND 35 FOOT-DIAMETER WIND TURBINES, STATIC AND DYNAMIC STRUCTURAL ANALYSIS, PRODUCTION PROTOTYPE DESIGN OF A 15 FOOT-DIAMETER TURBINE, PRODUCTION PROTOTYPE DESIGN OF A 35 FOOT-DIAMETER TURBINE, AND AERODYNAMIC PERFORMANCE STUDIES.

74-0247 BLOW S J
ENERGY: AN ANNOTATED BIBLIOGRAPHY.
NTIS, AUGUST 1974. 749P.

THIS BIBLIOGRAPHY ON ENERGY AND ENERGY RELATED TOPICS CONTAINS APPROXIMATELY 4,300 REFERENCES WHICH ARE DATED BETWEEN JAN., 1972 AND JULY, 1974. THE SUBJECT CATEGORIES COVERED INCLUDE ENERGY AND POWER, ENERGY AND POWER SOURCES, AND ENERGY AND POWER STORAGE AND TRANSMISSION.

74-0248 BOOTH D
THE WINDS OF CHANGE MIGHT BLOW THROUGH SAILS AGAIN.
ENGINEER 237: 44-46, APRIL 18, 1974.

THIS ARTICLE DESCRIBES THE PRESENT STATE OF WIND POWER UTILIZATION AND SOME FUTURE PROJECTS IN THE U.S.A. ARE MENTIONED. BRITAIN MUST MAKE USE OF ITS KNOWLEDGE AND FOLLOW OTHER COUNTRIES IN PLANNING FOR THE ENERGY CRISIS BY RETHINKING THE POTENTIAL SAVINGS OF WIND GENERATION.

74-0249 BUDGEN H P
MODIFIED DESIGN OF THE BRACE AIRSCREW 32 FOOT DIAMETER WIND TURBINE FOR WATER PUMPING AND ELECTRICAL GENERATION.
QUEBEC, BRACE RES. INST. PUBL. NO. T89, MAY 1974.

74-0250 BROWNE J
ALTERNATIVE LIFE SUPPORT SYSTEMS. A PRELIMINARY REPORT ON AN ELEKTRO WIND POWER INSTALLATION.
ALTERN. SOURCES ENERGY NO. 14: 14, MAY 1974.

EXPERIENCES WITH A SWISS MADE ELEKTRO IN BOULDER, COLORADO, ARE DESCRIBED.

74-0251 CAMERERO R
ENERGIE EOLIENNE: REVUE DES TRAVAUX EN COURS A L'UNIVERSITE DE SHERBROOKE. (WIND ENERGY: REVIEW OF THE ACTIVITIES AT THE UNIVERSITY OF SHERBROOKE).
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 79-93. (IN FRENCH)

THIS IS A SHORT DESCRIPTION OF RESEARCH ON WINDSCREWS AND VENTURIS, AND THEIR POSSIBLE USE FOR SPACE HEATING.

74-0252 CARVER C E, MACPHERSON R B
EXPERIMENTAL INVESTIGATION OF THE USE OF A SAVONIUS ROTOR AS A POWER GENERATING DEVICE.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 137-156.

THIS PAPER PRESENTS THE RESULTS OF A SERIES OF TESTS ON A SAVONIUS WING ROTOR 3 FEET HIGH AND 1.5 FEET IN DIAMETER MOUNTED VERTICALLY IN A WIND TUNNEL. EFFICIENCY AND POWER OUTPUT CHARACTERISTICS AS A FUNCTION OF ROTOR SPEED FOR SEVERAL WIND SPEEDS ARE GIVEN AS WELL AS STATIC TORQUE CHARACTERISTICS. MAXIMUM EFFICIENCY FOR THE DEVICE WAS DETERMINED TO BE 33 PERCENT, OCCURRING AT A RATIO OF WIND SPEED TO ROTOR TIP SPEED, U/V, OF ABOUT 0.85 TO 0.90, FOR WHICH THE POWER COEFFICIENT WAS FOUND TO BE 0.33. WIND SPEEDS RANGED FROM 15.6 FEET PER SECOND TO 21 FEET PER SECOND. IT IS CONCLUDED THAT SUCH A DEVICE CAN WELL SERVE TO PROVIDE AUXILLIARY POWER ON A SCALE COMPARABLE TO A SINGLE DWELLING, BEING RELATIVELY INEXPENSIVE TO FABRICATE, AND POSSESSING EXCELLENT TORQUE CHARACTERISTICS PARTICULARLY DURING RAPID VARIATIONS IN WIND SPEED AND DIRECTION. CONTINUED IMPROVEMENT IN DESIGN MAY WELL YIELD EFFICIENCIES OVER 40 PERCENT AND THUS THE DEVICE CAN BECOME A SERIOUS CONTENDER TO THE

HIGH SPEED ROTOR. CONSTRUCTED ON A LARGE SCALE, THE WING ROTOR HAS A DISTINCT POTENTIAL FOR USE IN WATER AS A LOW HEAD POWER GENERATING DEVICE.

74-0253 CERMAK J E
APPLICATIONS OF FLUID MECHANICS TO WIND.
ASME WINTER ANNUAL MEETING, NEW YORK, NOVEMBER 17-21, 1974. 30P.

74-0254 CHILCOTT R E
DESIGN SPEEDS FOR WIND TURBINES.
AUSTRALIAN CONFERENCE ON HYDRAULICS AND FLUID MECHANICS, 5TH, CHRISTCHURCH, NEW ZEALAND, DECEMBER 9-13, 1974. PROCEEDINGS, UNIVERSITY OF CANTERBURY, NEW ZEALAND, 1974.

PREDICTIONS OF WIND TURBINE PERFORMANCE ARE REQUIRED IN ORDER TO DESIGN AND COST WIND ENERGY CONVERSION SYSTEMS. BY ASSUMING THAT THE HOURLY-MEAN WIND-SPEED FREQUENCY CAN BE CHARACTERIZED BY THE WEIBULL DISTRIBUTION, AN OPTIMUM RATED WIND SPEED IS DEFINED WHICH MAXIMIZES THE PRIMARY ENERGY CONVERSION OF AN IDEAL WIND TURBINE. AS THE OVERALL CONVERSION SYSTEM DESIGN MAY REQUIRE A PRIME OPERATING TIME GREATER THAN THAT AVAILABLE ABOVE THE OPTIMUM RATED WIND SPEED, PRIMARY ENERGY CONVERSION PERFORMANCE AND PRIME TIME ARE PRESENTED AS FUNCTIONS OF RATED WIND SPEED. SECONDARY ENERGY CONVERSION PERFORMANCE BELOW RATED WIND SPEED IS PRESENTED IN A SIMILAR MANNER. THE INFORMATION GIVEN IS INTENDED TO PROVIDE A GUIDE TO THE RATING AND PERFORMANCE OF WIND TURBINES IN GIVEN WIND REGIMES.

74-0255 CLEWS H M
ELECTRIC POWER FROM THE WIND; A PRACTICAL GUIDE TO WIND-GENERATED POWER SYSTEMS FOR INDIVIDUAL APPLICATIONS. REVISED, EXPANDED AND UPDATED.
EAST HOLDEN, MAINE, SOLAR WIND CO., 1974. 40P.

74-0256 COLLINS C
WIND GENERATOR THEORY.
UNDERCURRENTS NO.8: 33-34, OCTOBER/NOVEMBER 1974.

GIVEN ARE SOME GENERAL NOTES ON WIND TURBINE THEORY, IMPORTANT FOR DESIGNING A SMALL WIND ELECTRIC PLANT.

74-0257 DAMBOLENA I G
WIND POWER ECONOMICS.
ENERGY TODAY, MAY 17, 1974. P. 138.

74-0258 DOBSON L
HYPERBOLOID VENTURI.
ALTERN. SOURCES ENERGY NO. 13: 38-39, FEBRUARY 1974.

74-0259 ELDRIDGE F R
SOME WIND-ENERGY STORAGE OPTIONS (SUMMARY).
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 4P.

74-0260 ELDRIDGE F R
WIND-POWERED AQUEDUCT SYSTEMS (SUMMARY).
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 11P.

74-0261 EMDEN P VAN, GUSSEN G, LIESHOUT H VAN, MOLLEN F, NIJSEN A
WINDMOLENS EN OKTROOIEN. (WINDMILLS AND PATENTS).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, STUD. GEN., 1974. 65P. (IN DUTCH)

REVIEWED ARE DUTCH PATENTS FOR WINDMILLS IN THE 16TH AND 17TH CENTURY AND IN THE PERIOD FROM 1816 TO 1869.

74-0262 L'ENERGIE GRATUITE DU VENT PENELLE RENDRE DES SERVICES A L'AGRICULTURE? (CAN FREE WIND ENERGY GIVE SERVICES TO AGRICULTURE?)
AGRICOLE (MARCHES AGRIC.) 26: 8-12, SEPTEMBER 7, 1974.

74-0263 ENERGY CONVERSION. REPORT BIBLIOGRAPHY JANUARY 1954 TO AUGUST 1973.
NTIS, JANUARY 1974. 407P.
AD-771750

74-0264 EOLE 74, CONCOURS D'IDEES SOUS L'EGIDE DU MINISTERE DE L'INDUSTRIE. (EOLE 74, CONTEST OF IDEAS UNDER PATRONAGE OF THE MINISTER OF INDUSTRY). PARIS, BANQUE DES IDEES NOUVELLES ET INVENTIONS, 1974. 12P.

THIS IS A SHORT DESCRIPTION OF 10 UNCOMMON INVENTIONS SELECTED FROM 368 CONTRIBUTIONS TO A CONTEST ON WIND ENERGY CONVERSION SYSTEMS.

74-0265 FELIZARDO M I
A NEW TRI-ENERGY ELECTRIC POWER SYSTEM FOR SMALL PHILIPPINE COMMUNITIES. MECHANICAL AND ELECTRICAL ENGINEERING, PHILIPPINE ASSOCIATION, SECOND QUARTER, P. 6-10, 1974.

AN ELECTRICITY GENERATING PLANT TO SUPPLY ENERGY AUTONOMOUSLY FOR A SMALL COMMUNITY IS DESCRIBED. USE IS MADE OF WIND ENERGY, DRIVING A WATER SYSTEM THAT CONVERTS THE ENERGY INTO AC-ELECTRICITY. AN AUXILIARY GENERATOR IS DRIVEN BY STEAM PRODUCED BY A SOLAR ENERGY BOILER AND A GARBAGE BOILER. COST ESTIMATION IS GIVEN.

74-0266 FLYNN H
COORDINATION OF RESEARCH AND DEVELOPMENT ACTIVITIES. WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 244-259.

74-0267 FONSECA H D
BASES PARA UNA NOVA MOLINOLOGICA. (BASIS FOR A NEW TYPE OF WINDMILL). INVENTIVA 2(8): 8-20, 1974. (IN PORTUGUESE)

THE AUTHOR DESCRIBES A WIND POWER BARRAGE, A NUMBER OF STREAMLINED BODIES, ARRANGED IN A PLANE PERPENDICULAR TO THE WIND DIRECTION, HAVING WINDMILLS IN THE GAPS BETWEEN THEM. CALCULATIONS TO PREDICT THE PERFORMANCE ARE MADE. A NUMBER OF MODELS HAVE BEEN BUILT. THE APPLICATION IS DISCUSSED WITH REGARD TO THE CAPE VERDIAN ISLANDS AND SOUTH WEST ANGOLA.

74-0268 WOLF M
THE POTENTIAL IMPACTS OF SOLAR ENERGY. ENERGY CONVERS. 14(1): 9-20, AUGUST 1974.

74-0269 GOOL W VAN
SOME ASPECTS OF ENERGY PRODUCTION AND ENERGY STORAGE. ELEKTROTECHNIEK 52(13): 714-719, 1974.

THE LIMITS OF ENERGY PRODUCTION BY FOSSIL AND NUCLEAR FUELS ARE SHOWN. WHEN OTHER ENERGY SOURCES LIKE SOLAR AND WIND ENERGY ARE USED, NO LIMITS EXIST REGARDING AVAILABILITY AND AIR POLLUTION, BUT PROBLEMS WILL APPEAR WITH RESPECT TO REQUIRED LAND SURFACES AND STORAGE OF ENERGY. THE POSSIBILITIES OF THE USE OF SOLAR AND WIND ENERGY FOR THE PRODUCTION OF ELECTRICITY IN THE NETHERLANDS ARE DISCUSSED.

74-0270 GRACE D J, CHENG E D H, CHIU A N L
A STUDY OF WIND ENERGY CONVERSION FOR OAHU. HONOLULU, CENTER FOR ENGINEERING RESEARCH, UNIVERSITY OF HAWAII, OCTOBER 15, 1974.

74-0271 GREELEY R S
RECOMMENDATIONS TO RANN/NSF SOLAR ENERGY R AND T PROGRAM. NTIS, FEBRUARY 1974. 84P.
N74-31529

A SYSTEMS ANALYSIS OF SOLAR ENERGY PROGRAMS WAS CONDUCTED AND A SUMMARY OF THE RESULTS IS PROVIDED. VARIOUS SOLAR ENERGY APPLICATIONS AND TECHNIQUES ARE EXPECTED TO BECOME ECONOMICALLY COMPETITIVE WITH CONVENTIONALLY FUELED SYSTEMS BETWEEN 1985 AND 2000 AND, GIVEN STRONG FEDERAL SUPPORT, COULD PROVIDE SIGNIFICANT QUANTITIES OF ENERGY TO THE U.S. EARLY IN THE 21ST CENTURY. IN ORDER TO ACHIEVE THIS RESULT, A SET OF MULTI-DISCIPLINARY RESEARCH TASKS AND PROOF-OF-CONCEPT EXPERIMENTS ARE REQUIRED TO OVERCOME A VARIETY OF TECHNICAL, ECONOMIC, ENVIRONMENTAL, SOCIAL AND INSTITUTIONAL PROBLEMS WHICH CURRENTLY EXIST. THE PROBLEMS ASSOCIATED WITH EACH OF SEVEN SOLAR ENERGY APPLICATIONS AND TECHNIQUES ARE IDENTIFIED AND DETAILS OF PROOF-OF-CONCEPT EXPERIMENTS IN EACH AREA ARE OUTLINED. RECOMMENDED METHODS FOR THE DISSEMINATION AND UTILIZATION OF RESEARCH RESULTS ARE LISTED.

74-0272 GUTHRIE M P
ENERGY RESEARCH AND TECHNOLOGY. INTERIM BIBLIOGRAPHY OF REPORTS, WITH ABSTRACTS.
NTIS, JUNE 1974. 71P.
NSF-74-22

THE BIBLIOGRAPHY CONTAINS 218 LISTINGS OF DOCUMENTS ON SOLAR ENERGY HEATING AND COOLING OF BUILDINGS; SOLAR THERMAL CONVERSION; WIND ENERGY CONVERSION; SOLAR ENERGY BIOCONVERSION TO FUELS; OCEAN THERMAL ENERGY CONVERSION; PHOTOVOLTAIC ENERGY CONVERSION; GEOTHERMAL ENERGY; ENERGY CONVERSION AND STORAGE; ENERGY SYSTEMS; ENERGY RESOURCES; AND ENERGY AND FUEL TRANSPORTATION.

74-0273 HELMHOLZ G
HOMEMADE WINDGENERATOR.
ALTERN. SOURCES ENERGY NO. 13: 27, FEBRUARY 1974.

74-0274 HERONEMUS W E
A SURVEY OF THE POSSIBLE USES OF WINDPOWER IN THAILAND AND THE PHILIPPINES.
AMHERST, MASSACHUSETTS, UNIVERSITY OF MASSACHUSETTS, DEPARTMENT OF CIVIL ENGINEERING, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, 1974.

74-0275 HERONEMUS W E
WINDPOWER DEVELOPMENT; A PROGRAM APPROPRIATE FOR JOINT CANADIAN AND UNITED STATES EFFORTS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.
UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 37-54.

DISCUSSED ARE THE POSSIBILITIES OF LARGE SCALE WIND GENERATED ELECTRICITY, WITH EMPHASIS ON COOPERATIVE RESEARCH AND DEVELOPMENT PROGRAMS OF CANADA AND THE U.S.A. ALSO DESCRIBED ARE POSSIBLE SITES, APPLICATIONS, AND STORAGE METHODS.

74-0276 HEUSELER H
HOFFEN AUF WASSER, WIND AND WAERME. (HOPING FOR WATER, WIND, AND HEAT).
BILD DER WISSENSCHAFT NO. 4: 99-102, 1974.

74-0277 HEWSON E W
WIND-POWER POTENTIAL IN THE PACIFIC NORTHWEST.
CITIZENS' FORUM ON POTENTIAL FUTURE ENERGY SOURCES, PROCEEDINGS.
PORTLAND STATE UNIVERSITY, OREGON, JANUARY 17, 1974. P. 7-24.

74-0278 HITCHINGS B
WIND WORKSHOP.
ALTERN. SOURCES ENERGY NO. 14: 7-9, MAY 1974.

A TWO WEEK WORKSHOP AT TUNSTALL HILL, SUNDERLAND, ENGLAND IN SEPTEMBER 1973 IS DESCRIBED. PARTICIPANTS BUILT A HORIZONTAL AXIS CONVENTIONAL JIB SAIL TYPE WINDMILL.

74-0279 HOLTEN T VAN
SAMENVATTING VEN EEN VOORONDERZOEK AAN WINDMOLENS MET HULPVLEUGELS BEVESTIGD AAN DE BLADTIPPEN. (SUMMARY OF A PRELIMINARY INVESTIGATION ON WINDMILLS WITH TIPVANES).
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, 1974. (IN DUTCH)

74-0280 HOLTEN T VAN
PERFORMANCE ANALYSIS OF A WINDMILL WITH INCREASED POWER OUTPUT DUE TO TIPVANE INDUCED DIFFUSION OF THE AIRSTREAM.
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, MEMO 224, 1974. 52P.

BETZ'S FORMULA FOR THE MAXIMUM POWER OUTPUT OF WINDMILLS IS VALID ONLY FOR WINDMILL TYPES CAUSING A STEADY, AXIAL FORCE TO BE APPLIED TO THE AIR. TYPES NOT COVERED BY BETZ'S ANALYSIS, SUCH AS WINDMILLS APPLYING RADIAL AS WELL AS AXIAL FORCES TO THE AIR, MAY HAVE A MUCH LARGER POWER OUTPUT. THIS REPORT DEALS WITH A TYPE OF WINDMILL WHERE RELATIVELY SMALL VANES, ATTACHED TO THE TIPS OF THE MILLBLADES, DEFLECT THE AIR RADIALLY OUTWARDS. THE RESULTING INCREASED MASS FLOW OF AIR THROUGH THE DISC PLANE OF THE WINDMILL CAUSES A LARGER POWER OUTPUT PER UNIT AREA SWEPT BY

THE MILL BLADES. THE PHYSICAL PRINCIPLES OF THE SYSTEM ARE EXPLAINED, AND A THEORETICAL ASSESSMENT OF ITS POTENTIAL PERFORMANCE IS GIVEN. THE ANALYSIS IS BACKED UP BY EXPERIMENTS. ACCORDING TO THE QUANTITATIVE ANALYSIS THE POWER OF A WINDMILL MIGHT AT LEAST BE DOUBLED FOR A GIVEN FRONTAL AREA. AREAS WHERE FURTHER RESEARCH IS NEEDED ARE INDICATED.

74-0281 HUGHES E E
CONTROL OF ENVIRONMENTAL IMPACTS FROM ADVANCED ENERGY SOURCES.
NTIS, MARCH 1974. 339P.
PB-239450

THE TECHNOLOGY AND ENVIRONMENTAL EFFECTS ASSOCIATED WITH PRODUCTION OF ENERGY FROM NEW OR ADVANCED SOURCES ARE REVIEWED. THESE INCLUDE SOLAR, GEOTHERMAL, OIL SHALE, SOLID WASTES, UNDERGROUND COAL GASIFICATION, AND HYDROGEN ENERGY SOURCES. PROJECTIONS TO THE YEAR 2000 OF LEVELS OF ENERGY PRODUCTION FROM THE FIRST FOUR OF THESE SOURCES ARE PRESENTED. ENVIRONMENTAL IMPACTS ON AIR AND WATER QUALITY, AND LAND USE ARE DERIVED PER UNIT OF ENERGY. LEVELS OF POLLUTANT EMISSIONS AND OTHER ENVIRONMENTAL EFFECTS OF THE DEVELOPMENT OF THESE ADVANCED ENERGY SOURCES ARE PROJECTED. IMPACTS LIKELY TO REQUIRE CONTROL MEASURES ARE IDENTIFIED. SUBJECTS FOR RESEARCH AND DEVELOPMENT DIRECTED TOWARD CONTROL OF ENVIRONMENTAL IMPACTS ARE RECOMMENDED. THESE RECOMMENDATIONS ARE INCORPORATED INTO A RESEARCH AND DEVELOPMENT PLAN. APPROXIMATE PRIORITY ASSIGNMENTS DERIVED FROM CONSIDERATION OF THE TIMING OF DEVELOPMENT AND THE IMPORTANCE AND DEGREE OF DEFINITION OF THE IDENTIFIED ENVIRONMENTAL EFFECTS ARE GIVEN.

74-0282 HUGHES W L, PARKER J D, ALLISON H J, RAMAKUMAR R, LINGELBACH D D
BASIC INFORMATION ON THE ECONOMIC GENERATION OF ENERGY IN COMMERCIAL QUANTITIES FROM WIND.
WIND ENERGY. HEARING BEFORE SUBCOMMITTEE ON ENERGY OF COMMITTEE ON SCIENCE AND ASTRONAUTICS. 93D CONG., 2D SESS., NO. 49. WASHINGTON, D.C., GOV'T. PRINT. OFFICE 1974. P. 3.

74-0283 HUGHES W L, PARKER J D, ALLISON H J, RAMAKUMAR R G, LINGELBACH D D
SURVEY OF OKLAHOMA STATE UNIVERSITY WORK IN ENERGY STORAGE, VARIABLE SPEED-CONSTANT FREQUENCY GENERATORS, AND WIND GENERATION SYSTEMS.
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, REP. NO. ER75-EL2, AUGUST 15, 1974. 60P.

74-0284 IGRA O
DESIGN AND PERFORMANCE OF A FUTURE TURBINE SUITABLE FOR AN AEROGENERATOR.
BEERSHEVA, ISRAEL, UNIVERSITY OF NIGEV, DEPARTMENT OF MECHANICAL ENGINEERING, REP. NO. 1, 1974. 55P.

74-0285 JOHNSON L
A COST COMPARISON BETWEEN LARGE SCALE WIND-ELECTRIC SYSTEMS; GAS, OIL, COAL, AND NUCLEAR FISSION.
STATEMENT PREPARED FOR PUBLIC HEARING ON PROJECT INDEPENDENCE FOR THE FEDERAL ENERGY ADMINISTRATION, PORTLAND, OREGON, SEPTEMBER 1974.

74-0286 JOHNSON M
WINDMILL WONDERS FOR REMOTE AREAS.
CITIZEN P. 8-9, APRIL 13, 1974.

THE VERTICAL AXIS WIND TURBINE BUILT BY THE NATIONAL RESEARCH COUNCIL, OTTAWA, CANADA IS DESCRIBED.

74-0287 JURKSCH G
THE WIND REGIME IN THE FEDERAL REPUBLIC OF GERMANY.
SEMINAR WINDENERGIE, JULICH, GERMANY, 12 SEPTEMBER 1974. JULICH, GERMANY F. R., KERNFORSCHUNGSANLAGE, 1974. P. 7-26. (IN GERMAN)

74-0288 KENTFIELD J A C
A MODIFIED SAVONIUS WIND TURBINE WITH GOOD LOW VELOCITY-RATIO TORQUE CHARACTERISTICS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 168-187.

THE ADVANTAGES OF VERTICAL AXIS WIND TURBINES ARE DISCUSSED BRIEFLY AND ATTENTION IS DRAWN TO THE IMPORTANCE OF GOOD LOW SPEED TORQUE

CHARACTERISTICS FOR SOME APPLICATIONS. DETAILS ARE GIVEN OF THE DESIGNS OF TWO MODEL SAVONIUS ROTORS: ONE OF THE CONVENTIONAL TYPE; THE OTHER INCORPORATING, IN ADDITION, LEADING EDGE SLOTS, TRAILING EDGE FLAPS AND OTHER FLOW GUIDING SURFACES. THE RESULTS OF COMPARATIVE TESTS CARRIED OUT IN A LOW-SPEED WIND TUNNEL SHOWED THAT THE HIGHEST EFFICIENCY, 55 PERCENT, WAS ACHIEVED WITH THE CONVENTIONAL ROTOR; THIS OCCURRED AT A VELOCITY RATIO OF 0.85. THE MAXIMUM EFFICIENCY WITH THE MODIFIED ROTOR WAS 43 PERCENT AT A VELOCITY RATIO OF 0.5. HOWEVER, THE MODIFIED ROTOR EXHIBITED A MUCH SUPERIOR TORQUE CHARACTERISTIC COMPARED WITH THAT OF THE CONVENTIONAL DESIGN. PROBABLE REASONS ARE GIVEN FOR THE OBSERVED PERFORMANCE CHARACTERISTICS. AN EVALUATION OF THE ANNUAL OUTPUT PER UNIT PROJECTED AREA, FOR EACH TYPE OF MACHINE, UNDER LIKELY WORKING CONDITIONS SHOWED THAT, FOR CONSTANT TORQUE OPERATION, THE SUPERIOR TORQUE CHARACTERISTIC OF THE MODIFIED ROTOR VIRTUALLY CANCELLED THE INFLUENCE OF ITS LOWER PEAK EFFICIENCY.

74-0289 KINDEREN W J G J DER, MEEL J J E A VAN
WIND MEASUREMENT AND DATA ANALYSIS IN A WINDMILL PLANT.
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPT. OF PHYSICS, WIND ENERGY GROUP, REP. R-203-S, JULY 1, 1974. 5P.

AT THE EINDHOVEN UNIVERSITY OF TECHNOLOGY A FEW PERSONS IN THE SECTION OF FLUID DYNAMICS (PHYSICS DEPT.) ARE ENGAGED IN A WINDMILL PROJECT. THE OBJECT IS AN EXPERIMENTAL PLANT IN OPEN-AIR WITH THE PROPERTIES THAT ONE CAN: 1. MEASURE THE CHARACTERISTICS OF A MILL IN A SHORT TIME. 2. STUDY THE INFLUENCE OF FLUCTUATIONS IN THE WIND. 3. TRY OUT MATHEMATICAL MODELS. INVESTIGATIONS ON WIND MEASURING EQUIPMENT AND A DATA-ANALYZING SYSTEM ARE IN AN INITIAL STAGE. A FEW EXPERIMENTS HAVE BEEN CARRIED OUT ON THE ROOF OF THE BUILDING, THE PLACE WHICH IS CHOSEN FOR A WINDMILL PLANT - FOR THE TIME BEING. THE MOST PRACTICAL WINDMETER IN AN EXPERIMENTAL PLANT SEEMS TO BE A CUPANEMOMETER. FIRST, HOWEVER, ONE HAS TO DETERMINE ITS PROPERTIES ACCURATELY; FOR INSTANCE, WITH A HOT-WIRE-ANEMOMETER AS REFERENCE. THE RESULTS OF THE MEASUREMENTS ARE ANALYZED BY MEANS OF A DIGITAL COMPUTER. A SYSTEM HAS BEEN DEVELOPED WHICH TRANSFERS THE INFORMATION BY PUNCH-TAPE TO THE COMPUTER. SUGGESTIONS ARE GIVEN FOR A MORE RAPID REGISTRATION SYSTEM.

74-0290 LAPEYSEN E H
UNCONVENTIONAL ENERGY SOURCES. A SELECT BIBLIOGRAPHY.
NTIS, FEBRUARY 1974. 64P.
N78-14626

A TOTAL OF 680 REFERENCES TO ARTICLES COVERING ECONOMICS, STATISTICS, AND PROSPECTS; GEOTHERMAL ENERGY; PROSPECTS TOWARDS NEW POLICIES; SOLAR ENERGY; AND TIDAL ENERGY AND WIND POWER ARE LISTED. THERE ARE NO SUBJECT OR AUTHOR INDEXES.

74-0291 LAW A D
WALTHAMSTOW WINDMILL AND ESSEX WINDMILLS TODAY.
LONDON, WALTHAMSTOW ANTIQUARIAN SOCIETY VERTRY HOUSE MUSEUM, MONOGRAPH (NEW SERIES) NO. 10, REVISED EDITION, 1974. 17P.

THIS IS A BRIEF HISTORICAL DESCRIPTION OF POSTMILLS, TOWERMILLS AND SMOCKMILLS IN ESSEX. CONSTRUCTIONAL DETAILS WITH PICTURES ARE GIVEN.

74-0292 LAWAND T A
THE POTENTIAL OF WINDPOWER IN MEETING CANADIAN ENERGY NEEDS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.
UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 6-36.

74-0293 LEK A C
EXPERIMENTAL INVESTIGATION OF THE SAVONIUS ROTOR.
BRACE RES. INST. PUBL. EP7, APRIL 1974. 78P.

74-0294 MCCARTHY C D, ROSEN G
WIND ENERGY -- COST EFFECTIVENESS IS THE KEY.
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 9P.

74-0295 MCHUGH B
THE APPLICATIONS OF WIND POWER.
GOETEBORG, INST. FOER ENERGITEKNIK, CHALMERS TEKNISKA HOEGSKOTA. REPT.

NO. A74-53, 1974. 22P. (IN SWEDISH)

74-0296 MARIER D
SOME NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 13: 28, FEBRUARY 1974.

74-0297 MEEL J J E A VAN
WINDMETINGEN VOOR ONTWIKKELINGSLANDEN. (WIND MEASUREMENTS FOR DEVELOPING COUNTRIES).
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, REP. NO. R-221-D, NOVEMBER 1974. (IN DUTCH)

PRESENTED ARE METHODS TO EVALUATE WIND DATA FOR SELECTING FAVOURABLE SITES AND PREDICTING THE ENERGY PRODUCTION BY A WIND MACHINE. A NUMBER OF WIND MEASURING METHODS ARE DISCUSSED. INFORMATION ON COMMERCIALLY AVAILABLE EQUIPMENT IS INCLUDED.

74-0298 MERCADIER Y
UN PROTOTYPE DE CHAUFFAGE HYDRO-THERMIQUE A PARTIR DE L'ENERGIE EOLIENNE. (A PROTOTYPE OF HYDRO THERMAL HEATING, BASED ON WIND ENERGY).
CANADA, UNIVERSITY OF SHERBROOKE, DEP. GENIE MEC., RAPP. TECH. MEC/74/1, 1974. (IN FRENCH)

74-0299 MOORE J E C
THE POTENTIAL CONVERSION OF WIND POWER TO ELECTRICAL ENERGY.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 214-235.

DESCRIBED ARE AN EXPERIMENTAL 100 W DARRIEUS WINDMILL, STORAGE IN LEAD/ACID BATTERIES, AND PROBLEMS WITH STARTING AND ANCHORING. PICTURES OF THE INSTALLATION ARE INCLUDED.

74-0300 MORSE F H
THE NATIONAL SOLAR ENERGY PROGRAM.
NTIS, 1974.
N75-24102

THE MAJOR EFFORTS WITHIN THE NATIONAL SOLAR ENERGY PROGRAM ARE DESCRIBED. THE FOLLOWING AREAS ARE INCLUDED: HEATING AND COOLING OF BUILDINGS, SOLAR THERMAL ENERGY CONVERSION, PHOTOVOLTAICS, BIOCONVERSION, WIND ENERGY CONVERSION, AND OCEAN THERMAL ENERGY CONVERSION.

74-0301 NATIONAL POWER SURVEY: ENERGY CONVERSION RESEARCH.
THE REPORT AND RECOMMENDATIONS OF THE TASK FORCE ON ENERGY CONVERSION RESEARCH TO THE TECHNICAL ADVISING COMMITTEE ON RESEARCH AND DEVELOPMENT.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, JUNE 1974. 311P.

THIS REPORT CONTAINS THE 1974 DISCUSSIONS AND RECOMMENDATIONS OF THE FEDERAL POWER COMMISSION REGARDING ENERGY CONVERSION RESEARCH. AREAS OF CONSIDERATION INCLUDE FOSSIL FUEL TECHNOLOGY, NUCLEAR TECHNOLOGY, AND SOLAR, GEOTHERMAL, TIDAL, AND OCEAN THERMAL ENERGIES. ALSO INCLUDES ENERGY CONVERSION CYCLES AND EQUIPMENT (FUEL CELLS, MAGNETOHYDRODYNAMICS, ETC.), SUBSTITUTE FUELS, SITING AND ENVIRONMENTAL RESEARCH DEVELOPMENT, BY-PRODUCT APPLICATIONS, AND ENERGY STORAGE.

74-0302 NATIONAL POWER SURVEY: ENERGY SOURCES RESEARCH.
THE REPORT AND RECOMMENDATIONS OF THE TASK FORCE ON ENERGY SOURCES RESEARCH TO THE TECHNICAL ADVISORY COMMITTEE ON RESEARCH AND DEVELOPMENT.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, JULY 1974. 125P.

EVALUATIONS OF RESEARCH AND DEVELOPMENT PROSPECTS, GOALS, AND RECOMMENDED FUNDING LEVELS FOR THE NEXT FIVE YEARS ARE CONTAINED IN THE 1974 NATIONAL POWER SURVEY REPORT. CONSIDERS THE ENERGY SOURCES OF COAL, PETROLEUM AND NATURAL GAS, OIL SHALE AND TAR SANDS, SOLAR ENERGY, GEOTHERMAL ENERGY, NUCLEAR FUELS, AND CONVERSION OF ORGANIC WASTES. INCLUDES AN APPENDIX ON SOLAR ENERGY.

74-0303 NEWMAN B G
MEASUREMENTS ON A SAVONIUS ROTOR WITH VARIABLE GAP.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 115-136.

RESULTS OF WIND TUNNEL TESTS ON SIX MODELS OF SAVONIUS ROTORS (WITH VARIABLE GAPS) ARE GIVEN GRAPHICALLY. THEY ONLY GIVE AN INDICATION OF FULL SCALE PERFORMANCE BUT CAN BE USED TO COMPARE THE VARIOUS DESIGNS. THE S-ROTOR, IF SIMPLY CONSTRUCTED, IS USABLE IF POWER REQUIREMENTS ARE SMALL.

74-0304 AN OVERVIEW OF ALTERNATIVE ENERGY SOURCES FOR LDCS.
NTIS, AUGUST 7, 1974. 372P.
PB-239465

THE REPORT PRESENTS AN OVERVIEW OF ALTERNATIVE ENERGY SOURCES OF TYPES WHICH COULD BE OF SIGNIFICANT VALUE TO LESSER-DEVELOPED COUNTRIES IN ADJUSTING TO THE IMPACT OF SHARPLY HIGHER WORLD MARKET PRICES OF PETROLEUM. IT PRESENTS A HIGHLY CONDENSED REVIEW OF NON-CONVENTIONAL ENERGY TECHNOLOGIES, TOGETHER WITH SOME LIMITED COMMENTARY ON THE RELEVANCE OF THE MORE CONVENTIONAL TECHNOLOGIES IN NEW LESSER-DEVELOPED COUNTRY (LDC) ECONOMIC SETTINGS. IT ALSO PROVIDES A SUMMARY ON A COUNTRY-BY-COUNTRY BASIS OF THE CURRENT ECONOMIC POSTURE AND ENERGY RESOURCES ARRAY IN FIFTEEN LDC'S SELECTED AS BEING BROADLY REPRESENTATIVE--GEOGRAPHICALLY AND IN TERMS OF PETROLEUM-PRICE IMPACTS--OF THE QUITE WIDE RANGE OF SITUATIONS THAT NEED TO BE CONSIDERED.

74-0305 PARKES M E
THE USE OF WINDMILLS IN TANZANIA.
TANZANIA BUREAU OF RESEARCH ASSESSMENT AND LAND USE PLANNING, UNIVERSITY OF DAR ES SALAAM, RESEARCH PAPER NO. 33, SEPTEMBER 1974. 75P.

BOTH GENERAL USE AND PARTICULAR USE OF WINDMILLS IN TANZANIA ARE REVIEWED. CHARACTERISTICS OF WIND PHENOMENA ARE DESCRIBED WHERE RELEVANT TO THE UNDERSTANDING OF WINDMILL SITE SELECTION, VARIOUS TYPES OF WINDMILLS ARE MENTIONED AND THEIR EXPECTED PERFORMANCES ARE PRESENTED. FROM AN ANALYSIS OF RELEVANT WIND DATA, THE POTENTIAL FOR WINDMILL USE IS ASSESSED AND PREDICTIONS ARE GIVEN FOR EXPECTED PERFORMANCE IN TWO GENERAL LOCATIONS. RECOMMENDATIONS FOR WINDMILL USE IN RURAL WATER SUPPLY, CATTLE WATERING AND IRRIGATION ARE DERIVED FROM CONSIDERATION OF APPROPIATE DESIGN CRITERIA. ANNUAL COSTS FOR THE LARGEST SIZE WINDMILL AND FOR THE EQUIVALENT DIESEL POWERED UNIT ARE COMPARED FOR WIND DATA ASSOCIATED WITH THE COASTAL AREAS. DESIGNS FOR WINDMILLS WHICH COULD BE LOCALLY MADE ARE DISCUSSED, AS WELL AS THE POSSIBILITY OF LOCAL MANUFACTURE OF CONVENTIONAL WINDMILLS.

74-0306 PASYMOWSKI Z
WIATRAK JAKO ZABYTEK POLSKIEGO BUDOWNICTWA DRECONIANEGO. (WINDMILLS AS RELICS OF POLISH WOODEN ARCHITECTURE).
PRZEGI. ZBOZ. MLYN. 18(12): 31-32, DECEMBER 1974. (IN POLISH)

74-0307 PETERSON E W
WIND POWER.
SCIENCE 185(4150): 480, 1974.

THIS LETTER TO THE EDITOR DISCUSSES A METHOD OF ESTIMATING THE COST AND MAGNITUDE OF A WIND POWER PROJECT SUGGESTED BY M. WOLF IN SCIENCE, APRIL 19, 1974, P. 382. THE AUTHOR CONCLUDES THAT LARGE SCALE GENERATION OF POWER BY WIND IS NOT FEASIBLE ECONOMICALLY.

74-0308 RANGI R S, SOUTH P, TEMPLIN R J
WIND POWER AND THE VERTICAL-AXIS WIND TURBINE DEVELOPED AT THE NATIONAL RESEARCH COUNCIL, OTTAWA, CANADA.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL . SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 55-74.

A MAP WITH CONTOURS OF THE ESTIMATED WIND POWER AVAILABLE IN CANADA IS PREPARED. IT SHOWS LARGE AREAS WITH HIGH POWER POTENTIAL. A COMPARISON OF WIND ENERGY COST WITH ALTERNATE SOURCES SHOWS THAT THE CAPITAL COST OF CURRENT WIND MACHINES HAS TO BE REDUCED CONSIDERABLY IN ORDER TO MAKE WIND POWER COMPETITIVE WITH EXISTING SOURCES. THE DESIGN FEATURES, PERFORMANCE AND ECONOMICS OF A VERTICAL-AXIS WIND TURBINE, DEVELOPED AT THE NATIONAL RESEARCH COUNCIL, OTTAWA, ARE DESCRIBED. A CASE IS MADE THAT WITH THIS TURBINE DESIGN CONSIDERABLE CAPITAL COST SAVINGS ARE POSSIBLE.

74-0309 REY H A
A CHAT WITH A FIRETOWER.
ALTERN. SOURCES ENERGY NO. 14: 15-16, MAY 1974.

THE AUTHOR "CHATS" WITH AN OLD FIRETOWER WHO DAYDREAMS ABOUT BEING CONVERTED TO A WINDMILL TOWER.

74-0310 SHERMAN M M
A LOW COST--HIGH CAPACITY SAILWING WINDMILL.
J. NEW ALCHEM. NO. 2, 1974.

74-0311 SHERMAN M M
WIND POWERED WATER PUMPS IN INDIA. PAST, PRESENT AND FUTURE DEVELOPMENTS.
ALL INDIA WORKSHOP ON FARM MACHINERY RESEARCH AND DEVELOPMENT, 7TH, PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA, APRIL 8-11, 1974. 26P.

WITH EMPHASIS ON INDIA, THE WORLD HISTORY OF NON-ELECTRIC GENERATING WINDMILLS IS SKETCHED. IT IS RECOMMENDED THAT APPROVAL AND ASSISTANCE BE GIVEN BY THE GOVERNMENT OF INDIA FOR WIDE SCALE RESEARCH AND IMPLEMENTATION OF LOW COST WINDMILLS DURING THE FIFTH FIVE YEAR PLAN.

74-0312 SHINYANGA WATER SUPPLY SURVEY. DRAFT FINAL REPORT.
AMERSFOORT, NETHERLANDS, D.H.V. CONSULTING ENGINEERS AND ARNHEM, NETHERLANDS, ILACO INTERNATIONAL LAND DEVELOPMENT CONSULTANTS, APRIL 1974. P. 9-17, 43-56, AND 211-218.

THE REPORT DEALS FOR THE MAJOR PART WITH THE PLANNING AND DESIGN OF RURAL WATER SUPPLIES FOR DOMESTIC CONSUMPTION, OF THE SHINYANGA REGION'S POPULATION. METEOROLOGICAL DATA ARE GIVEN FOR A NUMBER OF STATIONS. THE USE OF MULTI-BLADE WINDMILLS FOR RURAL WATER SUPPLY IS STUDIED. IT IS CONCLUDED THAT ONLY SMALL CAPACITIES OF PUMPED WATER IN THE RANGE OF 20-15 CU M/DAY CAN BE OBTAINED IN THE SHINYANGA REGION, IF LESS RELIABLE OPERATION (FLUCTUATING WATER PRODUCTION) IS NOT A DISADVANTAGE.

74-0313 SMIT J
ALTERNATIVE SOURCES OF ENERGY.
POLYTECH. TIJDSCHR. ELEKTROTECH. ELEKTRON. 29(14): 443-451, JULY 10, 1974.

74-0314 SMITH G E
WINDMILL MANUFACTURERS. REVISED ED.
CAMBRIDGE, UNIVERSITY OF CAMBRIDGE, DEPARTMENT OF ARCHITECTURE, MARCH 1974.

74-0315 SMITH K
.75 KW WINDCYCLE.
ALTERN. SOURCES ENERGY NO. 14: 2-4, MAY 1974.

DESCRIBED IS THE WIND-CYCLE, A DESIGN CONCEIVED TO BE BUILT WITH A MINIMUM OF TOOLS, MATERIALS AND COST. IT REQUIRES NO WELDING, FIBERGLASSING OR MACHINE WORK, AND USES A SAILWING TURBINE AND A BICYCLE TRANSMISSION.

74-0316 SOLAR ENERGY. STORAGE: MAKING H WHILE THE SUN SHINES.
MOSAIC 5(2): 23, SPRING 1974.

THE PRODUCTION OF HYDROGEN BY SOLAR AND WIND POWER PLANTS AS A MEANS OF ENERGY STORAGE IS MENTIONED.

74-0317 SOLAR ENERGY. WINDPOWER: A NEW LOOK AT AN OLD DRAFT.
MOSAIC 5(2): 20-21 SPRING 1974.

A BRIEF DISCUSSION IS PRESENTED ON THE POTENTIAL OF THE WIND FOR ELECTRIC POWER GENERATION.

74-0318 STAVEREN P VAN
LARGE WIND POWER PLANT IN THE NORTH SEA, DEVELOPMENT AND CONSTRUCTION PROPOSAL.
IND. COUNC. OCEANOLOGY, IRO, WIND ENERGY GROUP. REPORT. JULY 1, 1974. 26P.

AFTER A BRIEF HISTORICAL REVIEW OF APPLICATIONS AND DEVELOPMENT OF WIND

TURBINES, FUTURE POSSIBILITIES OF HARNESSING WIND ENERGY ARE CONSIDERED, AND ESPECIALLY THE REALIZATION OF LARGE WIND POWER PLANTS IN THE NORTH SEA. FROM RESULTS OF THIS STUDY IT IS CONCLUDED THAT THE SET UP OF A RESEARCH AND DEVELOPMENT PROGRAMME WILL BE ECONOMICALLY FEASIBLE. THE START ON CONSTRUCTING THESE PLANTS IS TO BE EXPECTED IN 1983.

74-0319 STAVEREN P VAN
SUMMARY OF WIND ENERGY STUDIES WITH WHICH TNO IS CONCERNED.
ORGANIZATION FOR INDUSTRIAL RESEARCH TNO, PROJECT GROUP TURBOMACHINES. REPORT. AUGUST 1974. WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, SWEDEN, AUGUST 29-30, 1974. 1P.

74-0320 STEINHART C E, STEINHART J
THE FIRES OF CULTURE: ENERGY YESTERDAY AND TOMORROW.
N. SCITUATE, MASSACHUSETTS, DUXBURY PRESS, 1974. 273P.

THIS NON-TECHNICAL DISCUSSION OF THE HISTORY AND FUTURE OF ENERGY ADDRESSES BIOLOGICAL ENERGY; FOSSIL FUELS; NUCLEAR ENERGY; WIND, HYDROELECTRIC, GEOTHERMAL, SOLAR, AND OTHER ALTERNATIVE ENERGY SOURCES; ELECTRICITY; AND FUTURE ENERGY PROSPECTS AND POLICY.

74-0321 STEYN R VAN
BIBLIOGRAPHY ON WIND ENERGY.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, AUGUST 1974. WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, SWEDEN, AUGUST 29-30, 1974. 303P.

74-0322 STODDARD F
WINDPOWER DEVELOPMENT PROGRAM AT THE UNIVERSITY OF MASSACHUSETTS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 75-78.

74-0323 STOLPE H
SURVEY OF ENERGY RESOURCES--OIL, GAS, COAL, WOOD, PEAT, WATER, WIND, SUN, NUCLEAR POWER, ETC.
KEM. TIDSKR. 86(1): 26, 1974.

74-0324 SWANSON R K, JOHNSON C C, SMITH R T
WIND POWER DEVELOPMENT IN THE UNITED STATES.
SAN ANTONIO, TEXAS, SOUTHWEST RESEARCH INSTITUTE, FEBRUARY 15, 1974.

74-0325 TAGG J R
BRIEF SURVEY OF THE HISTORY AND PRESENT STATE OF KNOWLEDGE OF THE USE OF WIND POWER.
ENERGY AND HUMANITY, PPL SERIES ON MANKIND AND THE ENGINEER. STEVENAGE, HERTS, PETER PEREGRINUS, 1974. P. 82-92.

74-0326 TARVER S C
WIND POWER.
ENV. SCI. TECHNOL. 8(4): 294, 1974.

74-0327 TEMPLIN R J
AERODYNAMIC PERFORMANCE THEORY FOR THE NRC VERTICAL-AXIS WIND TURBINE.
NTIS, JUNE 1974. 38P.
LTR-LA-160, N76-16618

A THEORY SUITABLE FOR DIGITAL COMPUTATION WAS DEVELOPED THAT ACCOUNTS FOR THE MAIN FEATURES OF THE PERFORMANCE OF THE NRC VERTICAL AXIS WIND TURBINE. THE THEORY TAKES INTO ACCOUNT THE CURVED BLADE SHAPE AND THE EFFECTS OF AIRFOIL STALLING ON PERFORMANCE. A COMPARISON IS MADE BETWEEN THEORETICAL AND EXPERIMENTAL POWER COEFFICIENT AND ROTOR DRAG COEFFICIENT. NUMERICAL RESULTS ARE PRESENTED TO SHOW THE THEORETICAL EFFECTS OF GEOMETRIC VARIABLES SUCH AS BLADE SOLIDITY AND ROTOR HEIGHT-DIAMETER RATIO, AND OF VARIATIONS IN AEROFOIL AERODYNAMIC CHARACTERISTICS.

74-0328 THRING M W, CROOKES R J
ENERGY AND HUMANITY.
STEVENAGE, ENGLAND, PETER PEREGRINUS, 1974. 195P.

PROBLEMS OF MEETING THE INCREASING DEMANDS FOR ENERGY WITH REGARD TO EXISTING SOURCES OF ENERGY AND THEIR ASSOCIATED PROBLEMS. AVAILABILITY

OF FUTURE SOURCES, AND DETERMINATION OF REALISTIC OBJECTIVES FOR THE YEAR 2000 ARE PRESENTED. WORLD ENERGY RESOURCES AND DEMANDS, NON-RENEWABLE RESOURCES (HYDROCARBON FUELS, LIQUID FUELS, AND SOLID FUELS), AND NUCLEAR ENERGY ARE DISCUSSED.

74-0329 VAN GOOL W
SOME ASPECTS OF ENERGY GENERATION AND ENERGY STORAGE.
ELEKROTECHNIEK 52(13): 714-719, OCTOBER 1974.

74-0330 VANSANT J H
A WIND POWERED ELECTRICAL SYSTEM FOR REMOTE AREAS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 199-213.

AN IREQ SEARCH FOR NEW METHODS OF SUPPLYING ELECTRICAL POWER TO REMOTE REGIONS OF QUEBEC HAS LED TO A DESIGN STUDY OF A WIND POWERED GENERATING SYSTEM. IN ORDER TO SATISFY THE DESIGN REQUIREMENTS AND TO MAKE USE OF EXISTING TECHNOLOGY, A WIND POWERED SYSTEM WITH COMPRESSED AIR STORAGE WAS SELECTED FOR THE STUDY. OBJECTIVES ARE TO SELECT SPECIFIC COMPONENTS, ESTIMATE THE SYSTEM PERFORMANCE AND MAKE ECONOMIC EVALUATIONS OF POSSIBLE FUTURE INSTALLATIONS. THIS PRESENTATION REVIEWS SOME OF THE CONSIDERATIONS INCLUDED IN THE DESIGN STUDIES.

74-0331 VANSANT J H
A WIND POWERED ELECTRICAL SYSTEM FOR REMOTE AREAS.
VARENNES, QUEBEC, HYDRO-QUEBEC RES. INST. REPORT, MAY 1974. 7P.

SEE 74-0330

74-0332 VRIES O DE
AERODYNAMISCHE ASPECTEN WINDGEDREVEN GENERATOREN; ENIGE ORIENTERENDE BESCHOUWINGEN. (AERODYNAMICAL ASPECTS OF WINDDRIVEN GENERATORS; SOME PRELIMINARY CONSIDERATIONS).
THE NETHERLANDS, NATIONAL AEROSPACE LABORATORY, REP. NO. NLR TR 74130 L, 1974. 104P. (IN DUTCH)

THIS REPORT INVESTIGATES THE POSSIBILITIES FOR THE NLR TO CONTRIBUTE TO AERODYNAMICAL RESEARCH ON WIND ROTORS. VERTICAL AXIS ROTORS ARE COMPARED TO HORIZONTAL AXIS ROTORS. ALSO THE MUTUAL INTERFERENCE DUE TO THE WIND SHADE OF MANY WINDMILLS PLACED TOGETHER IS DISCUSSED, BASED ON AERODYNAMICAL CALCULATIONS. NLR CAN CONTRIBUTE TO DEVELOPMENT OF CALCULATION METHODS AND WINDTUNNEL INVESTIGATION.

74-0333 WAGSTAFF H R
A GEOGRAPHY OF ENERGY.
DUBUQUE, IOWA, WM. C. BROWN, 1974. 122P.

THIS BOOK BRIEFLY DISCUSSES THE FACTORS INVOLVED IN THE PRODUCTION, TRANSPORTATION AND CONSUMPTION OF ENERGY, AND THE IMPACT OF THESE ACTIVITIES ON THE ENVIRONMENT. COAL MINING AND TRANSPORT; PETROLEUM PRODUCTION AND TRANSPORT; MANUFACTURED AND NATURAL GAS PRODUCTION AND TRANSPORT; HYDROPOWER; NUCLEAR, GEOTHERMAL, SOLAR, AND WIND POWER; ELECTRICITY TRANSMISSION; AND ENERGY CONSUMPTION ARE INCLUDED.

74-0334 WEGENER SLEESWYK A
SOLUTION OF THE DIMENSIONAL PROBLEM OF LARGE WIND TURBINES.
GRONINGEN, UNIVERSITY OF GRONINGEN, LAB. FYSICHE METAALKUNDE, TECH. REP., 1974. 24P. (IN FRENCH)

74-0335 WENDELL L L
PROGRAM DESCRIPTIONS. SUPPLEMENT TO MESOSCALE WIND FIELDS AND TRANSPORT ESTIMATES DETERMINED FROM A NETWORK OF WIND TOWERS.
NOAA TECH. MEM. ERL ARL-43, MAY 1974. 52P.

A COMPUTER PROGRAM HAS BEEN DEVELOPED TO ANALYZE OBJECTIVELY TWO-DIMENSIONAL WIND DATA FROM A MESOSCALE NETWORK OF STATIONS. THE RESULT IS A GRAPHIC DISPLAY OF THE NETWORK WIND FIELD AT ANY PARTICULAR TIME AND A PLOT OF COMPUTED AIR TRAJECTORIES AS A FUNCTION OF TIME AND POINT OF ORIGIN. A BRIEF DESCRIPTION, A LIST OF INPUT VARIABLES, AND PROGRAM LISTINGS FOR THE COMPUTER PROGRAM ARE PROVIDED.

74-0336 WIERINGEN J S VAN

WIND POWER: A LITERATURE SURVEY.
EINDHOVEN, NETHERLANDS, PHILIPS RESEARCH LAB., NAT. LAB. TECH. NOTE NO. 72/74, MARCH 1974. 19P.

THE MOST IMPORTANT LITERATURE ON WIND ENERGY IS REVIEWED. THE POSSIBILITIES AND LIMITATIONS OF POWER EXTRACTION ARE GIVEN. IT IS CONCLUDED THAT WIND POWER IS A SERIOUS CANDIDATE FOR MEETING PART OF THE FUTURE POWER DEMANDS.

74-0337 WIND ENERGY: ACHIEVEMENTS AND POTENTIAL.
SYMPOSIUM PROCEEDINGS. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974.
SYMPOSIUM ON WIND ENERGY: ACHIEVEMENTS AND POTENTIAL, UNIVERSITY OF SHERBROOKE, MAY 29, 1974.

FOURTEEN PAPERS ARE INCLUDED IN THIS PROCEEDINGS.

74-0338 WIND GENERATORS.
ARCH. DES. 3: 189, 1974.

DESCRIBED ARE TWO SMALL COMMERCIAL WIND GENERATORS MANUFACTURED BY AIR CITY LTD., LONDON.

74-0339 WIND POWER.
SWEDEN, SWEDISH STATE POWER BOARD, 1974.

74-0340 WIND POWER.
WHOLE EARTH EPILOG (ACCESS TO TOOLS). 1ST. ED. N.Y., PENGUIN BOOKS, SEPTEMBER 1974. P. 536-537.

PRACTICAL INFORMATION ON WIND POWER UTILIZATION, WINDMILLS, WINDMILL DESIGNERS, MANUFACTURERS AND DEALERS IS GIVEN.

74-0341 WIND POWER IN SWEDEN. A PRELIMINARY FEASIBILITY STUDY.
STOCKHOLM, SWEDEN, STU WIND ENERGY GROUP, AUGUST 1974.

74-0342 WINDMILLS FOR ENERGY SUPPLY.
ELEKTROTECH. Z. AUSG. B 26(20): 515, 1974. (IN GERMAN)

THIS SHORT ARTICLE DESCRIBES RECENT WIND ENERGY PROGRAMS IN GREAT BRITAIN (DR. BRUCKNER) AND IN THE USA (NASA/NSF).

73-0120 AERO ENGINEERS BUILD BETTER WINDMILLS--WINDMILLS, THE CHIMES OF FREE ELECTRICITY.
NEW SCI. 57(827): 24, JANUARY 4, 1973.

THIS IS A SHORT NOTE WITH ILLUSTRATIONS ON THE VERTICAL AXIS TURBINE OF THE NATIONAL RESEARCH COUNCIL OF CANADA AND ON THE PRINCETON SAILWING. A BRIEF SUMMARY OF WINDMILL HISTORY IS INCLUDED.

73-0121 ALLISON H J, RAMAKUMAR R, HUGHES W L
A FILED MODULATED FREQUENCY DOWN CONVERSION POWER SYSTEM.
IEEE TRANS. IND. APPL. IA9(2): 220-226, 1973.

A NEW CONCEPT IN POWER GENERATION HAS BEEN THEORETICALLY DEVELOPED AND EXPERIMENTALLY TESTED AT OKLAHOMA STATE UNIVERSITY. THE GENERATOR DESIGN INCORPORATES NEW TECHNIQUES IN FIELD MODULATION AND SOLID STATE ALTERNATOR OUTPUT PROCESSING. THE RESULTING GENERATOR IS SMALLER AND LIGHTER THAN COMPARABLE COMMERCIAL MODELS PRESENTLY AVAILABLE, AND IT WILL OPERATE SO THAT FREQUENCY OUTPUT IS INDEPENDENT OF THE SHAFT SPEED OF THE PRIME MOVER.

73-0122 BARNHART E
WIND POWER.
J. NEW ALCHEM. NO. 1: 12-14, 1973.

THIS IS A SHORT DESCRIPTION OF THREE SMALL WINDMILLS, HOME-MADE FROM WASTE MATERIALS: 1) WIND TUBINE GENERATOR, 2) BICYCLE WHEEL GENERATOR AND 3) SAVONIUS ROTOR WATER PUMP.

73-0123 BODEK A
HOW TO CONSTRUCT A CHEAP WIND MACHINE FOR PUMPING WATER.
BRACE RES. INST. PUBL. L.5, REVISED FEBRUARY 1973.

73-0124 BRAND R VAN DEN
GENERATION OF ELECTRICAL ENERGY WITH A SMALL WINDMILL.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY. REPORT EM73-11, NOVEMBER 1973. 79P. (IN DUTCH)

THIS REPORT TREATS OF SOME PROBLEMS WHICH CAN ARISE AT DESIGNING A SMALL WIND DYNAMO, I.E. A WINDMILL WITH A GENERATOR (AUTO DYNAMO) FOR GENERATION OF ELECTRICAL ENERGY. THE (D.C.) SYSTEM ALSO INCLUDES AN ENERGY BUFFER IN THE FORM OF A SIZABLE ACCUMULATOR BATTERY. BECAUSE OF THE SERIOUS LACK OF RELEVANT TECHNICAL DATA ABOUT AUTO DYNAMOS, PRESENTED FIRST OF ALL ARE MEASUREMENTS ON TWO AUTO DYNAMOS. TO ILLUSTRATE A POSSIBLE USE OF THE MEASURING RESULTS, A CALCULATION EXAMPLE IS GIVEN, THAT ALSO INTENDS TO BE AN EFFORT TO MAKE A CONTRIBUTION TO THE OPTIMIZATION PROBLEM OF THE MILL-GENERATOR SYSTEM.

73-0125 BUDGEN H P
A COMMENT ON TOWERS FOR WINDMILLS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J. M., ED. NTIS, DECEMBER 1973. P. 204-205.
PB-231341

THIS IS A SHORT NOTE ON THE DESIGN AND PRICES OF WINDMILL TOWERS USED BY THE BRACE RESEARCH INSTITUTE. A BRIEF HISTORICAL REVIEW OF WINDMILL CONSTRUCTION IS INCLUDED.

73-0126 ENERGY GENERATION BY WINDMILLS.
IHO, GUSTO B V, A F D PRODUKTON-TWIKKELING, FEASIBILITY STUDY OW67305, SCHIEDAM, MAY 1973. (IN DUTCH)

73-0127 ENERGY ENVIRONMENT PRODUCTIVITY.
SYMPOSIUM ON RANN: RESEARCH APPLIED TO NATIONAL NEEDS, 1ST., WASHINGTON, D.C., NOVEMBER 18-20, 1973. PROCEEDINGS. NTIS, 1973. 248P.
SYMPOSIUM ON RANN: RESEARCH APPLIED TO NATIONAL NEEDS, 1ST., WASHINGTON, D.C., NOVEMBER 18-20, 1973.
PB-252603

THIS REPORT RECORDS THE PRESENTATIONS MADE AT THE FIRST RANN SYMPOSIUM AND PROVIDES EXAMPLES OF WHAT CAN BE ACHIEVED WHEN THE CAPABILITIES OF SCIENTISTS AND ENGINEERS ARE DIRECTED TOWARD NATIONAL PROBLEMS. THE ENERGY SECTION COVERS SUCH AREAS AS CONSERVATION PROGRAMS, ENERGY UNDER THE OCEANS, COAL GASIFICATION, GEOTHERMAL ENERGY, WIND ENERGY CONVERSION

AND SOLAR ENERGY. ENVIRONMENT IS CONCERNED WITH DISASTER MITIGATION, ENVIRONMENTAL THREATS TO MAN, THE MISSOURI LEAD BELT PROJECT, HUMAN HEALTH AND MERCURY, WEATHER MODIFICATION AND MANAGEMENT OF TEXAS COASTAL RESOURCES. PRODUCTIVITY INCLUDES SUCH AREAS AS RESOURCE ALLOCATION IN PUBLIC SAFETY SERVICES, TELECOMMUNICATIONS IN HEALTH CARE DELIVERY, ENZYNME ENGINEERING IN THE FOOD AND CHEMICAL INDUSTRIES, AUTOMATION IN MECHANICAL MANUFACTURING INDUSTRIES AND MAGNETIC SEPARATION IN THE MINING AND PROCESSING INDUSTRIES.

73-0128 FREE ELECTRICITY FROM THE WIND.
ADELAIDE, AUSTRALIA, DUNLITE ELECTRICAL CO., 1973.

73-0129 GALANIS N, DELISLE A
THEORIE DE L'HELICE AEROMOTRICE. (THEORY OF THE WINDSCREW).
UNIVERSITE DE SHERBROOKE, CANADA, DEPARTMENT DE GENIE MECHANIQUE, RAPP TECH MEC/73, 1973. (IN FRENCH)

73-0130 GWYNNE P
WIND AND SUN BRING POWER TO THE PEOPLE.
NEW SCI. 60: 571, 1973.

73-0131 HAUSZ W
USE OF HYDROGEN AND HYDROGEN-RICH COMPONENTS AS A MEANS OF STORING AND TRANSPORTING ENERGY.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 130-134.
PB-231341

THE AUTHOR CONCLUDES THAT USING HYDROGEN FOR TRANSPORT AND STORAGE CAN LEAD TO VERY CLEAN, FLEXIBLE SYSTEMS THAT WITH IMPROVING TECHNOLOGY AND DEPLETION OF NATURAL FUEL RESOURCES CAN BECOME COMPETITIVE. WHILE THE PRIMARY RESOURCE OF ENERGY IS SHOWN HERE AS NUCLEAR, THE BASIC CONCEPT CAN APPLY FOR ANY THERMAL SOURCE, OR FOR WIND ENERGY, ETC.

73-0132 HERONEMUS W E
A PROPOSED NATIONAL WIND POWER R + D PROGRAM.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS, SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 197-203.
PB-231341

73-0133 HUTTER U
SOME EXTEMPORANEOUS COMMENTS ON OUR EXPERIENCES WITH TOWERS FOR WIND GENERATORS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 206-207.
PB-231341

73-0134 ODUM H T
ENERGY, ECOLOGY, AND ECONOMICS.
AMBIO 2(6): 220-227, 1973.

THE ENERGY CONTROL OF THE ECONOMY AND THE RELATIONSHIP TO THE ENVIRONMENT ARE DISCUSSED. THE TRUE VALUE OF ENERGY TO SOCIETY IS THE NET ENERGY, WHICH IS FOUND AFTER THE ENERGY COSTS OF GETTING AND CONCENTRATING THAT ENERGY ARE SUBTRACTED. WORLDWIDE INFLATION IS DRIVEN IN PART BY THE INCREASING FRACTION OF FOSSIL FUELS THAT HAVE TO BE USED IN GETTING MORE FOSSIL AND OTHER FUELS. MANY CALCULATIONS OF ENERGY RESERVES WHICH ARE SUPPOSED TO OFFER YEARS OF SUPPLY ARE EXPRESSED AS GROSS ENERGY RATHER THAN NET ENERGY AND THUS MAY BE OF MUCH SHORTER DURATION THAN OFTEN STATED. SOCIETIES COMPETE FOR ECONOMIC SURVIVAL BY LOTKA'S PRINCIPLE, WHICH SAYS THAT SYSTEMS WIN AND DOMINATE THAT MAXIMIZE THEIR USEFUL TOTAL POWER FROM ALL SOURCES AND FLEXIBLY DISTRIBUTE THIS POWER TOWARD NEEDS AFFECTING SURVIVAL. ENERGY SOURCES WHICH ARE NOW MARGINAL, BEING SUPPORTED BY HIDDEN SUBSIDIES BASED ON FOSSIL FUEL, BECOME LESS ECONOMIC WHEN THE HIDDEN SUBSIDY IS REMOVED. INCREASING ENERGY EFFICIENCY WITH NEW TECHNOLOGY IS NOT AN ENERGY SOLUTION, SINCE MOST TECHNOLOGICAL INNOVATIONS ARE REALLY DIVERSIONS OF CHEAP ENERGY INTO HIDDEN SUBSIDIES IN THE FORM OF FANCY, ENERGY-EXPENSIVE STRUCTURES. AN ECONOMY MUST MAXIMIZE ITS USE OF ENERGY FROM SUN, WIND, WATERS, AND WAVES. ENVIRONMENTAL TECHNOLOGY WHICH DUPLICATES THE WORK AVAILABLE FROM THE ECOLOGICAL SECTOR IS AN ECONOMIC HANDICAP. USE OF SOLAR ENERGY HAS ALREADY BEEN MAXIMIZED BY FORESTS AND FOOD PRODUCING PLANTS. THE ABILITY TO DO WORK DEPENDS ON THE ENERGY QUALITY AS WELL AS QUANTITY. MANY KINDS

OF GROWTH-PRIMING ACTIVITIES MAY FAVOR ECONOMIC VITALITY DURING PERIODS OF EXPANDING ENERGY AVAILABILITIES. THE MANY HIGH DENSITY AND GROWTH PROMOTING POLICIES AND STRUCTURES BECOME AN ENERGY LIABILITY DURING PERIODS WHEN EXPANSION OF ENERGY SOURCES IS NOT POSSIBLE, BECAUSE THEIR HIGH ENERGY COST IS NO LONGER ACCELERATING ENERGY YIELD.

73-0135 POWE R E
TECHNICAL FEASIBILITY STUDY FOR THE DEVELOPMENT OF A LARGE CAPACITY WIND POWERED ELECTRICAL GENERATING SYSTEM.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 177-179.
PB-231341

THIS DESCRIBES A PROJECT STUDY AT MONTANA STATE UNIVERSITY USING VERTICAL AIRFOILS MOVING ALONG A CLOSED HORIZONTAL TRACK EXTRACTING 10-20 MW POWER FROM WIND.

73-0136 LINES C W
PERCY THOMAS WIND GENERATOR DESIGNS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 11-18.
PB-231341

THE AUTHOR PRESENTS AND DISCUSSES THE WIND GENERATOR DESIGNS OF PERCY H. THOMAS: "ELECTRIC POWER FROM THE WIND", MARCH 1945, "THE WIND POWER AEROGENERATOR-TWIN WHEEL TYPE", MARCH 1946, "AERODYNAMICS OF THE WIND TURBINE", JANUARY 1949, AND "FITTING WIND POWER TO THE UTILITY NETWORK", FEBRUARY 1954.

73-0137 LISSAMAN P B S
WIND MACHINES.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 208.
PB-231341

THIS IS A BRIEF SUMMARY OF THE AIAA SYMPOSIA: "THE ANCIENT INTERFACE, BLACKBOARD TO BLUEWATER."

73-0138 MARIER D
SOME NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 12: 2-3, OCTOBER-NOVEMBER 1973.

73-0139 MEYER H
THE USE OF PAPER HONEYCOMB FOR PROTOTYPE BLADE CONSTRUCTION FOR SMALL TO MEDIUM-SIZED WIND DRIVEN GENERATORS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 73-74.
PB-231341

73-0140 REPORT OF THE COMMITTEE ON APPLICATIONS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 222-224.
PB-231341

73-0141 REPORT OF THE COMMITTEE ON ENERGY STORAGE AND ENERGY CONVERSION SYSTEMS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 218-221.
PB-231341

73-0142 REPORT OF THE COMMITTEE ON ROTOR CHARACTERISTICS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 213-217.
PB-231341

73-0143 REPORT OF THE COMMITTEE ON WIND CHARACTERISTICS AND SITING.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 209-212.
PB-231341

73-0144 REPORT OF THE NCST EXPERT COMMITTEE ON WIND POWER. PART 1. (MAIN REPORT, RECOMMENDATIONS AND CONCLUSIONS).
GOVERNMENT OF INDIA, DEPARTMENT OF SCIENCE AND TECHNOLOGY, JUNE 1973. 26P.

RECOMMENDATIONS ARE GIVEN FOR THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS IN INDIA.

73-0145 ROSE W
THE VILLAGE CARPENTER.
YORKSHIRE, ENGLAND, E.P. PUBLISHING LTD., 1973. 146P.

CHAPTER XI IS ON WIND-MILL REPAIRS. THE OLD POST-AND-TOWER-MILLS OF ENGLAND ARE THOSE DISCUSSED.

73-0146 SHERMAN M M
A SAIL WING WINDMILL IN INDIA.
J. NEW ALCHEM. NO. 1, 1973.

73-0147 SHERMAN M M
LOW COST SAIL WING WINDMILL - MADURAI PROTO TYPE.
WOODS HOLE, MASS., NEW ALCHEMY INSTITUTE, 1973.

73-0148 SHERMAN M M
SAIL WINDMILL IN INDIA.
ALTERN. SOURCES ENERGY NO. 12: 4-5, OCTOBER-NOVEMBER 1973.

73-0149 SMITH B E
SMITH-PUTNAM WIND TURBINE EXPERIMENT.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 5-7.
PB-231341

A BRIEF HISTORICAL REVIEW IS GIVEN OF THE DEVELOPMENT, CONSTRUCTION AND OPERATION OF THE SMITH-PUTNAM WIND TURBINE.

73-0150 SWEENEY T E, NIXON W B
AN INTRODUCTION TO THE PRINCETON SAILWING WINDMILL.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 70-72.
PB-231341

73-0151 TAYLOR P A
SOME COMPARISONS BETWEEN OBSERVED WIND PROFILES AT RISO AND THEORETICAL PREDICTIONS FOR FLOW OVER INHOMOGENOUS TERRAIN.
R. METEOROL. SOC. Q. J. 99(420): 329-336, APRIL 1973.

73-0152 THOMAS R L
NASA PRESENTATION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 244-253.

73-0153 TITTERINGTON W A
STATUS AND APPLICABILITY OF SOLID POLYMER ELECTROLYTE TECHNOLOGY TO ELECTROLYTIC HYDROGEN AND OXYGEN PRODUCTION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 135-136.
PB-231341

THE GENERAL ELECTRIC COMPANY SOLID POLYMER ELECTROLYTE (SPE) WATER ELECTROLYSIS TECHNOLOGY IS PRESENTED AS A POTENTIAL ENERGY CONVERSION METHOD FOR WIND-DRIVEN GENERATOR SYSTEMS. UNDER DEVELOPMENT SINCE 1967, THIS TECHNOLOGY IS RELATIVELY NEW, AND FURTHER SIGNIFICANT IMPROVEMENTS ARE PROJECTED OVER THE NEXT 5 TO 15 YEARS. ELECTROLYSIS LIFE AND PERFORMANCE DATA ARE PRESENTED FROM LABORATORY-SIZED SINGLE CELLS WITH HIGH CELL CURRENT DENSITY SELECTED (1000 ASF) FOR NORMAL OPERATION.

73-0154 TRY AND CATCH THE WIND.
TECHNOL. REV. 51-52, MAY 1973.

THIS ARTICLE BRIEFLY DESCRIBES THE DESIGN AND TESTING OF A SMALL DARRIEUS TYPE VERTICAL AXIS WIND TURBINE AT THE NATIONAL RESEARCH COUNCIL OF CANADA.

73-0155 WILCOX C
MOTION PICTURE HISTORY OF THE ERECTION AND OPERATION OF THE SMITH-PUTNAM WIND GENERATOR.

WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 8-10.
PB-231341

SUMMARIZED IS A DISCUSSION REFERRING TO A COLOR MOVIE PRESENTING SCENES AT VARIOUS STAGES IN THE ASSEMBLY OF THE MAJOR SUBSYSTEMS OF THE SMITH-PUTNAM WIND GENERATOR.

73-0156 WOLF M
THE POTENITAL IMPACTS OF SOLAR ENERGY.
IEEE ELECTRON AND AEROSPACE SYSTEM CONVENTION, WASHINGTON, D.C.,
SEPTEMBER 17-19, 1973. RECORD. N.Y., IEEE, 1973. P. 95-106.

73-0157 MOSHER C A
WHERE THERE IS A WIND, THERE IS A WAY.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 27-32.
PB-231341

72-0050 BEURSKENS J
PROBLEMEN BIJ ONTWERPEN VAN WINDMOLENS. BEVEILIGING EN REGELING VAN WINDMOLENS. (PROBLEMS OF DESIGNING WINDMILLS. SAFEGUARDING AND CONTROLLING WINDMILLS).
BUXTEL, THE NETHERLANDS, DE KLEINE AARDE IN VIER SEIZOENEN, 1972. P. 68-75 (IN DUTCH)

DESCRIBED ARE THE IMPORTANT ELEMENTS OF WIND TURBINE SYSTEMS AND OF THE DATA ONE SHOULD KNOW WHEN DESIGNING A SMALL WIND TURBINE IN THE NETHERLANDS. REVIEWED ARE DIFFERENT TYPES OF CONTROLLING MECHANISMS SAFEGUARDING THE WIND TURBINE.

72-0051 DELITTLE R J
THE WINDMILL, YESTERDAY AND TODAY.
LONDON, JOHN BAKER, 1972. 101 P.

THIS IS A BOOK ON ENGLISH WINDMILLS INCLUDING A DISCUSSION OF VARIOUS TYPES, CONSTRUCTION, AND MANY PHOTOGRAPHS.

72-0052 GALANIS N, DELISLE A
L'ENERGIE EOLIENNE ET LA CHAUFFAGE DOMESTIQUE. (WIND ENERGY AND DOMESTIC HEATING).
UNIVERSITE DE SHERBROOKE, CANADA, DEPARTMENT DE GENIE MECANIQUE, RAPP. TECH. MEC/72/4, 1972. (IN FRENCH)

72-0053 LATIF K
WIND POWER POTENTIAL AND ITS UTILIZATION IN COASTAL AREAS OF WEST PAKISTAN.
INDUS 14(5): 6-27, JUNE 1972.

72-0054 MACPHERSON R B
DESIGN DEVELOPMENT AND TESTING OF A LOW HEAD HIGH EFFICIENCY KINETIC ENERGY MACHINE - AN ALTERNATIVE FOR THE FUTURE.
ANNUAL CONFERENCE AND EXPOSITION ON APPLICATIONS OF MARINE TECHNOLOGY TO HUMAN NEEDS, 8TH, WASHINGTON, D.C., SEPTEMBER 1972.

72-0055 MERCADIER Y
ETUDE AERODYNAMIQUE DES HELICES AEROMOTRICES. (AERODYNAMIC STUDY OF WIND SCREWS).
CANADA, UNIVERSITE DE SHERBROOKE, DEP. GENIE MEC., RAPP. TECH. MEC/72/5, 1972. (IN FRENCH)

72-0056 NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 1973: HEARING BEFORE THE SPECIAL SUBCOMMITTEE ON THE NATIONAL SCIENCE FOUNDATION, MAY 4, 1972.
WASHINGTON, D.C., GOV'T. PRINT. OFF., 1972. 636 P.

THE 1973 NATIONAL SCIENCE FOUNDATION BUDGET, INCLUDING ENERGY RESEARCH FUNDS, IS EXAMINED. REPORTS ON WIND AND SOLAR POWER SYSTEMS ARE INCLUDED.

72-0057 POWER FROM THE WIND.
ELK RIVER, MINNESOTA, UNITED POWER ASSOCIATION, UNITED POWER NEWS, JANUARY 1972.

72-0058 ROTH R
MODELS FOR WIND PROFILES OVER ROUGH AND SMOOTH SURFACES.
NTIS, UCRL-TRANS-10721, 1972. 48 P.

72-0059 SALIEVA R B
BASIC PRINCIPLES FOR CHOOSING OPTIMUM ACCUMULATOR PARAMETERS IN UTILIZING SOLAR AND WIND ENERGY.
REPORTS TO FIRST ALL-UNION CONFERENCE ON REPLENISHABLE ENERGY SOURCES, ENERGIYA, MOSCOW, NO. 2. 1972.

72-0060 WINDMILL TURBINE DEVELOPED AT PRINCETON.
AVIAT. WEEK SPACE TECHNOL. 97(20): 47, NOVEMBER 13, 1972.

71-0030 AILLERET P
L'ENERGIE EOLIENNE DANS 25 ANS DE VIE TECHNIQUE ET ECONOMIQUE D'EDF. (WIND ENERGY DURING 25 YEARS OF TECHNICAL AND ECONOMICAL ACTIVITIES OF THE EDF).
CHATOU, FRANCE, ELECTRICITE DE FRANCE, 1971. (IN FRENCH)

71-0031 BABARYKINE V
AUTOMATED OBSERVATION - SOVIET AUTOMATED WEATHER STATIONS.
MPI BULL. NO. 12: 18-21, 1971.

71-0032 BREIPOHL A M
BAYESIAN DECISION THEORY: PROMISE AND PROBLEMS.
RELIABILITY AND MAINTAINABILITY CONFERENCE, 10TH, ANAHEIM, CAL., JUNE 27-30, 1971. PROCEEDINGS. P. 49-52.

ELEMENTARY EXAMPLES WITH GROSS ABSTRACTIONS OF REAL PROBLEMS ARE TREATED TO ASSESS THE QUALITIES OF THE BAYESIAN DECISION THEORY IN TREATING DECISION PROBLEMS. THE CONSTITUENTS OF A DECISION PROBLEM ARE DISPLAYED IN DISCUSSING THE CHOICE OF THREE POSSIBLE SYSTEMS TO CONVERT WIND INTO ELECTRIC ENERGY. THE CURRENT POWER VS. POLLUTION PROBLEM IS ABSTRACTED INTO A DECISION THEORY CONTEXT TO ILLUSTRATE SOME OF THE DIFFICULTIES INVOLVED IN THE DECISION THEORY.

71-0033 CALVERT N G
WIND POWER IN EASTERN CRETE.
NEWCOMEN SOC. TRANS. 44: 137-144, 1971/72.

THE AUTHOR CLASSIFIES THE AEGEAN TYPE WINDMILL OF EASTERN CRETE ACCORDING TO CONSTRUCTION AND USAGE (WHEEL DESIGN, TOWER DESIGN, ETC.). FIELD MEASUREMENTS BY THE AUTHOR WERE LIMITED TO WIND SPEED AND ROTATIONAL SPEED. CUT-IN VELOCITIES OF 2.2 M/SEC WERE OBSERVED. IN MODEL TESTS IN ENGLAND, A POWER COEFFICIENT OF 0.3 WAS MEASURED.

71-0034 DELISLE J F
STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND METEOROLOGICAL SERVICE TECH. INF. CIRC. NO. 144, MAY 1971.

71-0035 FATEEV E M
WIND ENERGY AND ITS USE.
AKADEMIIA NAUK SSSR. INSTITUT GEOGRAFII. NATURAL RESOURCES OF THE SOVIET UNION: THEIR USE AND RENEWAL. EDITED BY I. P. GERASIMOV, D. L. ARMAND, AND K. M. YEFRON. TRANSLATED FROM THE RUSSIAN BY JACEK I. ROMANOWSKI. ENGLISH EDITION EDITED BY W. A. DOUGLAS JACKSON. SAN FRANCISCO, W. H. FREEMAN, 1971.

71-0036 HAGEN L J, SKIDMORE E L
TURBULENT VELOCITY FLUCTUATIONS AND VERTICAL FLOW AS AFFECTED BY WINDBREAK POROSITY.
ASAE TRANS, 14(4): 634-637, JULY-AUG., 1971.

71-0037 HIRSJAERVI A, WAILES R
FINNISH MILLS PART III. HOLLOW POST MILLS.
NEWCOMEN SOC. TRANS. 44: 99-118, 1971/72.

71-0038 LAAK F VAN DE
THE USE OF WIND POWER IN RURAL WATER SUPPLIES.
RURAL WATER SUPPLY CONFERENCE, PROCEEDINGS. BRALUP RES. PAP. NO. 21, 1971.

71-0039 MERCADIER Y A P
CONVERSION DE L'ENERGIE EOLIENNE EN ENERGIE CALORIFIQUE; CONCEPTION D'UNE TURBINE EOLIENNE. (CONVERSION OF WIND ENERGY INTO THERMIC ENERGY; DESIGN OF A WIND TURBINE).
CANADA, UNIVERSITY OF SHERBROOKE, MASTER'S THESIS, AUGUST 1971.

71-0040 SIPMAN A
DE MOLENS SOAIS ZE WAREN EN SOALS IK HEN HEB GEKEND; VANG. VOERING EN PAL. (WINDMILLS, PAST AND PRESENT; STAY, LINING AND RATCHET).
ZUTPHEN, NETHERLANDS, DE WALBURG PERS., 1971. 57 P. (IN DUTCH)

71-0041 TITOV L F
WIND DRIVEN WAVES.
JERUSALEM, ISRAEL. PROGRAM FOR SCIENTIFIC TRANSLATIONS, 1971. 244 P.

(TRANSLATION FROM RUSSIAN)

A SURVEY OF THEORY AND COMPUTATION OF WIND WAVES IN THE SEA IS PRESENTED. EXISTING TECHNIQUES FOR CALCULATING WIND-WAVE ELEMENTS ARE DISCUSSED, AND ATTENTION IS GIVEN TO THEIR PRACTICAL UTILIZATION.

71-0042 WEAFER K F
THE SEARCH FOR TOMORROW'S POWER.
NAT. GEOGR. MAG. 142(5): 650-681, 1972.

71-0043 WIND-BLOWN GENERATORS.
PARIS, AEROWATT S.A., REPORT AW9.71, 1971. 23 P.

THIS REPORT OUTLINES THE OPERATING CHARACTERISTICS OF SOME OF THE SHELF WINDMILLS MADE BY AEROWATT. THESE GENERATORS ARE SMALL SIZE 4.1 KW MAXIMUM. THESE MACHINES ARE IN USE FOR POWER GENERATION AT REMOTE LOCATIONS SUCH AS A LIGHTHOUSE.

70-0022 BARON T H, REPOLE K
A SIMPLE ELECTRIC TRANSMISSION SYSTEM FOR A FREE RUNNING WINDMILL.
QUEBEC, CAN., BRACE RES. INST., MCGILL UNIV., AUGUST 1970. 29 P.

70-0023 BENNING M L
NOVEL AERODYNAMIC WIND-POWERED PUMPS.
BARNSTORF, GERMANY, LUBING, MASCHINENFABRIK, 1970.

70-0024 HANSEN E
PUMPEN MIT MAUI - UND WINDANTRIEB. (PUMPS WITH MOLE AND WIND POWER).
UBERSICHT 21(7): 516-520, 522, JULY 11, 1970. (IN GERMAN)

70-0025 HEMAR D, PRUNIERAS J
CONTRIBUTION A LA DEFINITION D'UNE STATION D'AEROGENERATEUR.
(CONTRIBUTION TO THE DEFINITION OF A WIND GENERATING PLANT).
ANNALES DES PUNTS ET CHAUSSEES 6: 305-326, 1970. (IN FRENCH)

70-0026 HIRSJAERVI A, WAILES R
FINNISH MILLS PART II. MAMSEL OR SMOCK MILLS.
NEWCOMEN SOC. TRANS. 43: 113-128, 1970/71.

70-0027 KADIVAR M S
POTENTIAL FOR WIND POWER DEVELOPMENT IN EASTERN CANADA.
BRACE RES. INST. PUBL. CP48, JANUARY 1970.

70-0028 MOSALEV V F
ON BENDING OF A FLEXIBLE BLADE BY A GYROSCOPIC MOMENT DURING ORIENTATION OF A ROTATING HEAD INTO THE WIND WITH A TAIL.
TRUDY VNIIEM (ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF ELECTROMECHANICS) 34: 1970.

70-0030 "DE TRAANROEIER", ENERGIE - MONUMENT VAN HET VERLEDEN. ("DE TRAANROEIER", ENERGY MONUMENT OF THE PAST).
THE NETHERLANDS, N.V. TEXELSCHE ELECTRICITEITS MAATSCHAPPIJ DEN BURG TEXEL, 1970. 54 P. (IN DUTCH)

THIS IS A COLLECTION OF ARTICLES AND PUBLICATIONS CONCERNING THE RECONSTRUCTION OF AN OLD DUTCH CORNGRINDING WINDMILL FOR GENERATING ELECTRICITY FOR THE LOCAL NETWORK. THE MILL IS EQUIPPED WITH A FULLY AUTOMATIC REGULATING SYSTEM AND A 50 KW 380 V ELECTRICITY GENERATING PLANT.

70-0031 YABUKI K, MIYAGAWA H
STUDIES ON THE EFFECT OF WIND SPEED UPON THE PHOTOSYNTHESIS. 2. THE RELATION BETWEEN WIND SPEED AND PHOTOSYNTHESIS. WIND POWER GENERATION.
SOC. AGRIC. METEOROL. JAP. J. AGRIC. METEOROL. 26(3): 137-141, DECEMBER 1970. (IN JAPANESE)

70-0032 ZANBAIGEN L VAN
NEDERLANDSE MOLENS; IN OUDE ANSICHTEN. (DUTCH WINDMILLS IN OLD PICTURES).
ZALTBOMMEL, NETHERLANDS, EUROPEESE BIBLIOTHEEK., 1970. 160 P. (IN DUTCH)

69-0016 BAUER A B
FASTER THAN THE WIND.
AIAA SYMPOSIUM ON THE AERO-HYDRONAUTICS OF SAILING, MARINA DEL RAY CALIFORNIA YACHT CLUB, APRIL 26, 1969. PROCEEDINGS. P. 113-132.

THIS ARTICLE DESCRIBES A WINDDRIVEN VEHICLE ON LAND OR WATER THAT IS ABLE TO RUN DOWNWIND FASTER THAN THE WIND SPEED. MATHEMATICAL ANALYSIS OF THE PERFORMANCE IS GIVEN. TRIAL RUNS IN WINDWARD AND DOWNWIND DIRECTION SHOW THE PRACTICABILITY OF SUCH A SYSTEM.

69-0017 EASTER B H
COMPUTER AIDED DESIGN OF POWER SYSTEMS USING ENERGY STORAGE.
PH.D. THESIS. ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NO. 70-21,377, 1969. 130 P.

SCOPE AND METHOD OF STUDY: THE OBJECTIVE OF THIS STUDY IS THE DEVELOPMENT OF A DESIGN TECHNIQUE FOR THE COMPUTER-AIDED DESIGN OF POWER SYSTEMS WHICH HAVE ENERGY STORAGE UNITS AS AN INTEGRAL PART OF THE SYSTEM. AN INTRODUCTION TO UNCONVENTIONAL POWER SOURCES REVEALS THE NEED FOR AN ENERGY STORAGE DEVICE AS AN INTEGRAL PART OF A POWER SYSTEM WHICH UTILIZES AN UNCONVENTIONAL SOURCE. THE SYSTEM TO BE MODELED IS THE ONE CURRENTLY UNDER INVESTIGATION BY OKLAHOMA STATE UNIVERSITY. THIS SYSTEM CONSISTS OF A WIND-POWERED GENERATOR SUPPLYING POWER TO AN ELECTROLYSIS CELL WHICH IN TURN STORES HYDROGEN AND OXYGEN AT HIGH PRESSURES. AN APPROPRIATE BACKGROUND STUDY IS MADE OF WIND GENERATION STUDIES AND SIMULATION SYSTEMS. THE SUITABILITY OF THE SIMULATION LANGUAGE, GPSS (GENERAL PURPOSE SIMULATION SYSTEM), IS PRESENTED IN DETAIL. AN INTRODUCTION TO THE FUNDAMENTALS OF GPSS IS GIVEN FOR THOSE WHO ARE UNFAMILIAR WITH THIS SIMULATION LANGAUGE. THE COMPUTER-AIDED DESIGN PROCEDURE IS OUTLINED AND EACH PORTION IS DISCUSSED. THE APPLICABILITY OF THIS DESIGN PROCEDURE TO A VARIETY OF NONLINEAR DESIGN PROBLEMS IS STRESSED. AN EXAMPLE POWER SYSTEM IS CARRIED THROUGH EACH STAGE OF THE DESIGN PROCEDURE AND THE FINAL COMPONENTS OF THE SYSTEM ARE SELECTED. THIS SAMPLE DEMONSTRATES THE VARIOUS STEPS IN THE DESIGN PROCEDURE. FINDINGS AND CONCLUSIONS: THE COMPUTER-AIDED DESIGN PROCEDURE THAT WAS DEVELOPED IS APPLICABLE TO ANY NONLINEAR PROCESS WHOSE NONLINEAR TRANSFER FUNCTIONS OCCUR SEQUENTIALLY. THESE NONLINEARITIES MAY BE TIME-INVARIANT, TIME-VARYING, OR STATISTICAL. THIS PROCEDURE STRESSES THE INTERPLAY BETWEEN COMPUTER SOLUTIONS AND ENGINEERING JUDGEMENT. A TECHNIQUE IS DEVELOPED FOR OBTAINING SOLUTIONS AT MANY POINTS ON A SEARCH GRID BY REPEATED GPSS SIMULATIONS IN ONE PROGRAM. THUS, ONE OF THE HYBRID COMPUTER TECHNIQUES IS NOW AVAILABLE TO USERS OF DIGITAL SIMULATION PROGRAMS.

69-0018 GLUSHCHENKO V P
PRIMENENIE VETRODVIGATELEI V SEL'SKOM KHOZIAISTVE. (APPLICATION OF WINDMILLS IN AGRICULTURE).
MOSKA, MASHGIZ, 1969. 97 P. (IN RUSSIAN)

69-0019 O'MALLEY M J
ELECTRIC POWER GENERATING SYSTEMS.
U.S. PATENT NO. 3,426,214, FEBRUARY 4, 1969.

69-0020 SHEFTER Y I
WAYS AND TECHNICAL MEANS OF AN EFFECTIVE EXPLOITATION OF WIND POWER IN LIVESTOCK HUSBANDRY.
TEKHNOL. PROIZVOD MOLOKA I MIASA V EVR. CHASTI SSSR, 1969. P. 334-339.

69-0021 TRACTON M
SANTA BARBARA WINDMILL.
PEACE CORPS REPORT, SANTA BARBARA WINDMILL, OFFICE OF THE MAYOR. SANTA BARBARA, ILOILO, PHILIPPINES, 1969. 19 P.

68-0015 CHILCOTT R E
NOTES SUR L'UTILISATION DE L'EOLIENNE RAPID BRACE COMME SOURCE MOTRICE.
BRACE RES. INST. PUBL. NO. T38, 1968. 11P. TRANSLATION OF T37.

68-0016 CHILCOTT R E
REPORT ON VISIT TO ST. KITTS-NEVIS, FEBRUARY 12-17, 1968 TO INITIATE A WINDMILL WATER PUMPING PROJECT.
BRACE RES. INST. PUBL. I40, FEBRUARY 1968. 7 P.

68-0017 CHILCOTT R E, LAKE E B
PROPOSAL FOR THE ESTABLISHMENT OF A 10 HP WINDMILL WATER PUMPING PILOT PLANT IN NEVIS, WEST INDIES.
BRACE RES. INST. PUBL. NO. I45, JUNE 1968. 8 P.

68-0018 CHILCOTT R E, WEYTS R H
SPECIFICATION OF THE BRACE 10 HP AIRSCREW WINDMILLS; 15 ASSEMBLY AND 70 DETAIL DRAWINGS.
BRACE RES. INST. PUBL. T43, SEPTEMBER 1968.

68-0019 FONSECA H D
BARRAGEM ANEMOMOTRIZ. (WIND BARRAGE, AN INSTALLATION TO CAPTURE WIND ENERGY).
LUANDA, ANGOLA, SERVICO METEOROLOGICA DE ANGELO, SEPTEMBER 1968. (IN PORTUGUESE)

DESCRIBED IS A SPECIAL TYPE OF A WIND AUGMENTING SYSTEM THAT CLAIMS TO CONVERT WIND ENERGY IN A MORE SIMPLE AND EFFICIENT WAY THAN CONVENTIONAL SYSTEMS WITH THE SAME CROSS AREA. THE AUGMENTOR CONSISTS OF A BARRAGE CLOSING A VALLEY, COMPOSED OF CYLINDRICAL FRAMES, PILED UP SO THAT WIND TUNNEL-LIKE APERTURES ARE FORMED IN WHICH WIND TURBINES ARE PLACED. DIMENSIONS AND POWER OUTPUT CHARACTERISTICS ARE GIVEN. WIND DATA ARE GIVEN OF THE (LATE) PORTUGUESE TERRITORIES AND APPROPRIATE SITES ARE INDICATED WHERE THIS METHOD COULD BE USED EFFECTIVELY.

68-0020 GLADWELL J K
A FIXED VENTURI WIND GENERATOR.
ELECT. REV. 182: 585, APRIL 19, 1968.

DESCRIBED IS A SMALL WIND GENERATOR USED FOR CHARGING BATTERIES FOR AUTOMATIC MARINE BEACONS HAVING A 12 V 32 W LAMP. THE WIND GENERATOR IS MOUNTED IN THE SAME NON-CORROSIVE ALUMINIUM STRUCTURE AS THE BEACON. IN THIS STRUCTURE A VENTURI IS BUILT TO FUNNEL THE WIND INTO THE FAN. THE VENTURI WAS SHOWN TO BE 100 PERCENT EFFICIENT WITH WINDS VARYING IN A DIRECTION 50 DEGREES EITHER SIDE OF THE FIXED AXIS.

68-0021 GUILLOT P
POWER SOURCES THAT CAN BE USED IN TELECOMMUNICATIONS. PART 2.
TELECOMMUN. J 35(10): 533-543, 1968.

IN THE FIRST PART OF THIS ARTICLE, PUBLISHED IN THE SEPTEMBER ISSUE OF THE TELECOMMUNICATION JOURNAL, CONVENTIONAL SOURCES OF ENERGY WERE DESCRIBED CLOSING WITH THE STUDY OF ENGINE-GENERATING SETS. THE DESCRIPTION OF CONVENTIONAL SOURCES OF ENERGY WILL CONCLUDE WITH SOME CONSIDERATIONS ON WIND-DRIVEN GENERATORS; THE SECOND PART OF THE ARTICLE WILL THEN GO ON TO DESCRIBE SOME NEWLY DEVELOPED SOURCES OF ENERGY.

68-0022 LANTAGNE M, WARD G T
L'UTILISATION DE L'ENERGIE EOLIENNE DANS LA VALLEE DU SAINT-LAURENT: ETUDE DES DONNES METEOROLOGIQUES DISPONIBLES.
BRACE RES. INST. PUBL. NO. I51, 1968. 7 P.

68-0023 LANTAGNE M, WARD G T
WIND POWER STUDY OF THE ST. LAWRENCE LOWLANDS: SURVEY OF AVAILABLE WIND DATA.
BRACE RES. INST. PUBL. NO. I52, OCTOBER 1968. TRANSLATION OF I51.

68-0024 MANUEL K
CORRELATING THE DRAINAGE NEEDS WITH AVAILABILITY OF WIND POWER IN QUEBEC.
BRACE RES. INST. PUBL. CP58, 1968.

68-0025 RAPHE J
14 SIMPLE WINDMILL CONSTRUCTIONS.
PARIS, SOC. PARISIENNE D'EDITION, 1968. 64 P. (IN FRENCH)

67-0016 CHILCOTT R E
NOTES ON THE DEVELOPMENT OF THE BRACE AIRSCREW WINDMILL AS A PRIME MOVER.
BRACE RES. INST. PUBL. NO. T37, SEPTEMBER 1967. (SUPERCEDED BY R38, 69-0002)

67-0017 DEVELOPING UNCONVENTIONAL ENERGY SOURCES FOR USE IN DEVELOPING COUNTRIES. RESEARCH PROPOSAL.
STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, OFFICE OF ENGINEERING RESEARCH, 1967.

67-0018 LAWAND T A
NOTES ON THE SELECTION OF A SUITABLE WATER PUMPING SYSTEM FOR THE GREENLAND WINDMILL.
BRACE RES. INST. PUBL. NO. I36, MAY 1967.

67-0019 SHEFTER Y I
ON METHODS AND LEVELS OF AUTOMATION OF WIND POWER-PRODUCING STATIONS.
DOKL. VASKNIL. NO. 1, 1967.

67-0020 ZLOTZKY J
WIND ENERGY APPLIED TO THE GENERATION OF ELECTRICITY.
REV. ELECTROTEC. 53(5): 202-210, 1967.

THIS ARTICLE IS A GENERAL REVIEW ON THE POSSIBILITIES OF GENERATING ELECTRICITY BY WIND ENERGY IN ARGENTINA. A LIST OF PUBLICATIONS ON VARIOUS ASPECTS OF THE PROJECT IS FOLLOWED BY A BRIEF DESCRIPTION OF A PROTOTYPE 50 KVA WIND GENERATOR. THE USE OF THIS GENERATOR FOR DIRECT PUMPING FROM WELLS AND WORKING IN PARALLEL WITH THE EXTERNAL NETWORK IS DESCRIBED. THE LOADING IS VARIED DEPENDING ON THE VELOCITY OF THE WIND. SUBJECTS DISCUSSED GENERALLY ARE THE QUALITY OF WIND GENERATED ELECTRICITY, LOW POWER GENERATORS FOR BATTERY CHARGING AND DOMESTIC PURPOSES, MEDIUM POWER GENERATORS MAINLY FOR IRRIGATION, AND HIGH POWER GENERATORS FOR SUPPLYING ENERGY TO CONVENTIONAL ELECTRICAL MACHINERY.

66-0015 FARRIES K G, MASON M T
WINDMILLS OF SURREY AND INNER LONDON.
EDINBURGH, CHARLES SKILTON, 1966.

66-0016 HALITSKY J, MAGONY G A, HALPERN P
TURBULENCE DUE TO TOPOGRAPHICAL EFFECTS, REPORT NO. 2. 1 JANUARY 1965 TO 30 JUNE 1965.
BRONX, NEW YORK UNIVERSITY, DEPARTMENT OF METEOROLOGY AND OCEANOGRAPHY, GEOPHYS. SCI. RES. LAB. REP. NO. TR66-5, FEBRUARY 14, 1966. 74P.

WIND TUNNEL TESTS WERE UNDERTAKEN TO EXPLORE REYNOLDS NUMBER AND BACKGROUND FLOW TURBULENCE EFFECTS ON THE FLOW FIELD IN THE LEE OF A MOUNTAIN RIDGE ORIENTED NORMAL TO THE AIR STREAM. THREE TYPES OF TUNNEL AIR STREAMS WERE USED. THE RESULTS WERE COMPARED AMONG THEMSELVES AND WITH THE RESULTS OF FULL SCALE PIBAL OBSERVATIONS OVER THE PROTOTYPE OF THE MODEL RIDGE.

66-0017 LAWAND T A
THE EVALUATION OF A WINDMILL WATER PUMPING IRRIGATION SYSTEM.
QUEBEC, BRACE. RES. INST., APRIL 1966. 4 P.

66-0018 SEN GUPTA R N
WIND DRIVEN MACHINES FOR DEVELOPING SMALL SCALE POWER UNITS TO SERVE REMOTE REGIONS NOT COVERED BY NATIONAL OR REGIONAL POWER GRIDS.
SEMINAR ON THE ROLE OF ENGINEERS IN THE 4TH FIVE YEAR PLAN, PATNA, INDIA, JANUARY-FEBRUARY 1966.

66-0019 SMALL-SCALE POWER GENERATION--WIND-DRIVEN GENERATING PLANTS.
NEW YORK, U.N. DEPT. ECON. SOC. AFF., SALES NO. 1966. II. B. 7., 1966. P. 58-61.

65-0012 CAILLEUX A
L'ENERGIE EOLIENNE EN FRANCE ET DANS LE MONDE. (WIND ENERGY IN FRANCE AND IN THE WORLD).
ANN. GEOGR. NO. 403: 257-270, 1965.

65-0013 CLAUSNIZER R
IMPORTANCE OF WIND POWER FOR GERMAN ELECTRICITY SUPPLY.
ELEKTRIZITAETSWIRTSCHAFT 64(7): 180-183, 1965. (IN GERMAN)

VARIOUS TEST INSTALLATIONS HAVE PROVED THE PRACTICABILITY OF PARALLEL OPERATION WITH THE SUPPLY SYSTEM. FURTHER, TO INCREASE THE POWERS OF SINGLE STATIONS TO 1000 KW APPEARS TECHNICALLY POSSIBLE. BUT FOR GERMAN CONDITIONS IT DOES NOT APPEAR POSSIBLE TO ACHIEVE ECONOMIC EFFICIENCY, EVEN IF LARGE NUMBERS WERE PRODUCED. THE REASONS FOR THIS ARE THE LARGE DIMENSIONS, THE REQUISITE RESERVES OF APPARATUS, THE LOW VALUE OF THE POWER, AND THE SHORT LIFE EXPECTATION.

65-0014 DASH J, SYDNEY D B E
THE WINDMILLS AND COPPER WALLS OF BARBADOS.
J. BARBADOS MUS. 31(2): 1965.

65-0015 DELISLE J F
EXTREME SURFACE WINDS IN NEW ZEALAND.
N. Z. J. SCI. 8: 422-430, 1965.

65-0016 LAZARESCU E
CHARACTERISTICS OF WIND POWER UTILIZATION AT SUITABLE SITES IN THE MOLDAU REGION.
ENERGETICA 13(1): 29-32, 1965. (IN RUMANIAN)

65-0017 NEEDHAM J
POWER-SOURCES AND THEIR EMPLOYMENT. III., WIND FORCE, THE WINDMILL IN EAST AND WEST.
SCIENCE AND CIVILIZATION IN CHINA. VOL. 4: PHYSICS AND TECHNOLOGY, PART II: MECHANICAL ENGINEERING, CAMBRIDGE UNIVERSITY PRESS, LONDON, 1965. P. 555-568.

65-0018 VISWANATH R, SEN GUPTA R N
WIND POWER POTENTIALITIES AND WIND MACHINES SUITABLE FOR USE IN INDIA.
SYMPOSIUM INDUSTRIES AND INDUSTRIAL POTENTIALS IN JAMMU AND KASHMIR, INDIA, 1965.

64-0074 ANGELINI A M
REFLECTIONS ON THE ECONOMIC VALUE OF GEOTHERMAL ENERGY, WIND POWER AND SOLAR ENERGY, ESPECIALLY AFTER CONVERSION TO ELECTRICAL ENERGY.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 40-44.

64-0075 BREUVERY E S DE
NEW SOURCES OF ENERGY AND ENERGY DEVELOPMENT.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 10-15.

64-0076 GOLDING E W
POWER FROM LOCAL ENERGY RESOURCES.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 149-155.

TO AID DEVELOPMENT AND TO IMPROVE LIVING CONDITIONS IN MANY REMOTE, THINLY POPULATED AREAS A SUPPLY OF ENERGY IS A VERY IMPORTANT REQUIREMENT. IMPORTATION OF THIS ENERGY, EITHER THROUGH ELECTRICAL TRANSMISSION OR IN THE FORM OF FUEL, IS OFTEN PROHIBITIVELY EXPENSIVE. AN ALTERNATIVE, WHICH MAY BE MORE ECONOMICAL, IS THE EXPLOITATION OF LOCAL ENERGY RESOURCES SUCH AS WIND POWER, SOLAR ENERGY OR ORGANIC WASTES. THESE RESOURCES HAVE INDIVIDUAL CHARACTERISTICS WHICH NEED SPECIAL CONSIDERATION IN RELATION TO THE POSSIBLE POWER LOADS; AND THE LOADS SHOULD BE PLANNED TO MATCH THE UNCONVENTIONAL METHODS OF POWER PRODUCTION. THE USE OF LOCAL ENERGY RESOURCES IN COMBINATION MAY OFFER THE BEST PROSPECT OF SUCCESS IN PROVIDING A VALUABLE SERVICE TO REMOTE COMMUNITIES AND EXPERIMENTAL SCHEMES SHOULD BE ESTABLISHED TO TEST THE POSSIBILITIES UNDER PRACTICAL CONDITIONS.

64-0077 HUTTER U
PRACTICAL EXPERIENCE GAINED FROM THE DEVELOPMENT OF A 100 KW WIND POWER INSTALLATION.
BRENNSTAFF-WAERME-KRAFT 16(7): 333-341, JULY 1964. TRANSLATION: BRACE RES. INST. PUBL. T42, MAY 1966.

64-0078 NETSCHIRT B C, LOF G O G
NEW SOURCES OF ENERGY IN THE WORLD ENERGY ECONOMY.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 89-102.

63-0030 ALADAR L K
THE BIG MODERN WINDMILLS.
BUDAPEST, MOESZAKI KOENYVKIADO, 1963. 164 P. (IN HUNGARIAN)

63-0031 ARGAND A
L'ENERGIE EOLIENNE. (WIND ENERGY).
PARIS, PROGRES-SCIENCES-TECHNIQUES, 1963. (IN FRENCH)

63-0032 CHERET I
STUDY OF WIND IN WEST AFRICA - POSSIBILITY OF USING WINDPUMPS FOR WATER ELEVATION.
INTERAFRICAN COMMITTEE FOR HYDRAULIC STUDIES, 1963.

63-0033 GIUDICE G L
UNA STAZIONE EOLICA A PALERMO. (A WIND POWER PLANT AT PALERMO).
TERMOTECNICA 17: 44-48, 1963. (IN ITALIAN)

THIS REPORT IS ON 2 YEARS OPERATION OF AN EXPERIMENTAL WIND POWER PLANT IN WHICH A D-C MOTOR DROVE AN ALTERNATOR FOR CONNECTION.

63-0034 GLAUERT H
WINDMILLS AND FANS.
DURAND, W.R., ED. AERODYNAMIC THEORY IV: 324-332. NEW YORK, DOVER PUBL., 1963.

63-0035 REPORT ON WIND ENERGY PREPARED BY INTERNATIONAL EXPERT.
UPPER VOLTA. MINISTRY OF PUBLIC WORKS. INTERAFRICAN COMMITTEE FOR HYDRAULIC STUDIES, 1963.

63-0036 RAO M S P, RADHAKRISHNAN S P
A STUDY OF THE HOURLY WIND SPEEDS AT CALCUTTA (DUM DUM) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., JUNE 1963.

THE HOURLY WIND SPEED DATA OF CALCUTTA (DUM DUM) FOR THE YEARS 1958 TO 1960 HAVE BEEN ANALYZED. THE FREQUENCY DISTRIBUTION AND THE CUMULATIVE FREQUENCIES OF THE HOURLY WIND SPEEDS WERE COMPUTED AND USED TO WORK OUT THE ENERGY EXTRACTABLE FROM WIND. THE NUMBER OF HOURS OF LOW WIND, THE SPELLS OF SUCH LOW WINDS, AND THE DIURNAL VARIATION ARE DISCUSSED. THE ANNUAL MEAN WIND SPEED WORKS OUT TO 9 KM/HR. THE ANNUAL ENERGY OUTPUT OF A WIND ELECTRIC GENERATOR WITH 30 M2 SWEPT AREA, AND 12 PERCENT OVERALL POWER COEFFICIENT IS 1009 KWH. THE WATER PUMPING CAPACITY OF A WP-2 TYPE WINDMILL IS 30 500 KL (6,710,000 GAL) PER ANNUM OR 18,400 GAL PER DAY.

63-0037 STOCKHUYZEN F
THE DUTCH WINDMILL.
NEW YORK, UNIVERSE BOOKS, 1963.

63-0038 WARD G T
PROPOSAL SUBMITTED TO THE FREEDOM FROM HUNGER CAMPAIGN, FAO, FOR THE DEVELOPMENT OF A LOW COST TWO-BULLOCK POWER WIND-ROTOR WIND MACHINE FOR WATER PUMPING IN UNDERDEVELOPED ARID AREAS.
BRACE RES. INST. PUBL. I26, NOVEMBER 1963. 10 P.

62-0024 ARAVINDKSHANAN P S
STRESS ANALYSIS FOR 32 FT. 4 POST TOWER FOR WINDMILLS.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, ENG. REP. NO. ER-10-62, 1962.

62-0025 CHERET I
ETUDE DE REGIME DES VENTS EN AFRIQUE OCCIDENTALE, POSSIBILITIES D'UTILISATION DES EOLIENNES POUR L'EXHAURE DE L'EAU. (STUDY OF THE WIND REGIME IN WESTERN AFRICA, POSSIBILITIES OF UTILIZING WINDMILLS FOR WATER PUMPING).
NANCY, FRANCE, BERZEN-LEVRAULT, SERVICE DE L'HYDRAULIQUE DE L'A. U. F., 1962. (IN FRENCH)

62-0026 CLAUSNIZER G
WIND POWER.
BRENNSTAFF-WAERME-KRAFT 14(7): 321-326, 1962. (IN GERMAN)

THIS ARTICLE IS A REVIEW OF THE PAPERS ON WIND POWER PRESENTED TO THE UNITED NATIONS CONFERENCE ON NEW ENERGY SOURCES, ROME, 1961. THEY DISCUSS THE PROBLEMS ENCOUNTERED IN HARNESSING AND USING THE ENERGY OF THE WIND AND DESCRIBE THE INVESTIGATIONS MADE IN MANY PARTS OF THE WORLD HAVING WIDELY-DIFFERENT CLIMATIC, GEOGRAPHICAL AND ECONOMIC CONDITIONS. THE COUNTRIES INTERESTED INCLUDED GREAT BRITAIN, FRANCE, DENMARK, WESTERN GERMANY, SPAIN, GREECE, HUNGARY, U.S.A., ALGERIA, EGYPT, ISRAEL, INDIA, ARGENTINA AND JAPAN. WIND POWER STUDIES CAN BE BROADLY DIVIDED INTO FOUR CATEGORIES: WIND MEASUREMENTS AND WIND BEHAVIOUR WITH THE OBJECT OF SELECTING SUITABLE SITES FOR WIND-DRIVEN PLANT; THE DESIGN OF THE PLANT AND THE MECHANICAL PROBLEMS INVOLVED; THE SMALL-SCALE GENERATION OF ELECTRICITY BY AUTONOMOUS PLANT; AND THE LARGE-SCALE GENERATION OF ELECTRICITY TO BE FED INTO A NETWORK. MANY COUNTRIES HAVE MADE EXTENSIVE WIND SURVEYS AND DENMARK, IN PARTICULAR, HAS INSTALLED, AT GEDSER, A 200 KW WIND DRIVEN GENERATOR WHICH SUPPLIES ELECTRICITY TO THE NETWORK.

62-0027 EKBATE M S, VARADAPAJAN R, GUPTE C G
CRITERIA FOR DESIGN OF WINDMILLS FOR LOW TO MODERATE WIND VELOCITIES.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB. TECH. NOTE TN-WP-10-62, AUGUST 1962. 25 P.

THE CRITERIA FOR THE DESIGN OF WINDMILLS FOR LOW TO MODERATE WIND VELOCITIES HAVE BEEN EXAMINED AND TWO DESIGNS OF WINDMILLS FOR PUMPING WATER ARE DESCRIBED. THE ELEMENTARY THEORIES OF WINDMILLS - THE MOMENTUM THEORY AND THE BLADE ELEMENT THEORY - GENERAL REQUIREMENTS AND OPTIMUM VALUES OF DESIGN VARIABLES ARE DISCUSSED. DIFFERENT DESIGNS OF ROTORS FOR BLADES HAVE BEEN STUDIED AND THE THEORETICAL VALUES OF TORQUE AND POWER DEVELOPED HAVE BEEN DETERMINED. FROM AN ANALYSIS OF THE PERFORMANCE CHARACTERISTICS, THE SPECIFICATIONS FOR TWO TYPES OF WINDMILLS, WHICH WOULD BE MOST SUITABLE FOR CONDITIONS IN INDIA, HAVE BEEN DRAWN UP.

62-0028 HABERMAN W L, CASTER E B
PERFORMANCE OF VERTICAL AXIS (CYCLOIDAL) PROPELLERS ACCORDING TO ISAY'S THEORY.
INT. SHIPBUILD. PROGR. 9(90): 81-90, 1962.

A THEORETICAL METHOD PROPOSED BY ISAY FOR EVALUATING THE PERFORMANCE OF VERTICAL AXIS PROPELLERS WAS PROGRAMMED BY THE DAVID TAYLOR MODEL BASIN FOR USE ON HIGH-SPEED COMPUTERS. THE RESULTS OF NUMERICAL COMPUTATIONS OF THRUST AND TORQUE COEFFICIENT AND EFFICIENCY ARE PRESENTED FOR A SIXBLADED VERTICAL AXIS PROPELLER FOR A WIDE RANGE OF ADVANCE COEFFICIENTS AND MAXIMUM BLADE ANGLES. FROM THE RESULTS, IT IS CONCLUDED THAT, DUE TO CERTAIN ERRONEOUS ASSUMPTIONS, THE THEORETICAL METHOD AS PRESENTED BY ISAY CANNOT BE UTILIZED TO PREDICT THE PERFORMANCE OF VERTICAL AXIS PROPELLERS IN A QUALITATIVE WAY.

62-0029 HUET Y, PRUNIERAS J
CONTRIBUTION A LA MISE AU POINT D'AEROGENERATEURS DANS LES ESTABLISSEMENTS DE SIGNALISATION MARITIME. (CONTRIBUTION TO THE INSTALLATION OF WIND GENERATORS AT SEA SIGNAL POSTS).
REVUE AISM, JULY-OCTOBER 1962. (IN FRENCH)

62-0030 JUUL J
D. E. F. WIND POWER COMMISSION REPORT.
ELEKTROTEKNIKEREN 58(14): 326-330, 1962. (IN DANISH)

A COMMISSION OF THE DANISH POWER STATIONS ISSUED A REPORT ON THE USES OF WIND POWER FOR THE GENERATION OF ELECTRICITY. IT IS SHOWN THAT CURRENT OBTAINED FROM EXISTING WIND POWER STATIONS IS SLIGHTLY MORE EXPENSIVE THAN THAT OBTAINED FROM THE SWEDISH WATER POWER STATIONS, BUT CHEAPER THAN THAT OBTAINED FROM EXISTING STEAM POWER STATIONS IN DENMARK. BY USING MORE EFFICIENT EQUIPMENT, THE COST OF CURRENT OBTAINED FROM THIS POWER STATION CAN BE REDUCED EVEN MORE, TO A LEVEL OF 3.8 OERE PER KWH.

62-0031 KOGAN A, NISSIM E
SHROUDED AEROGENERATOR DESIGN STUDY. PART 1 -- TWO-DIMENSIONAL SHROUD PERFORMANCE.
ANNUAL CONFERENCE ON AVIATION AND ASTRONAUTICS, 4TH. PROCEEDINGS.
JERUSALEM, WEIZMANN SCIENCE PRESS OF ISRAEL, 1962. P. 67-82.

THIS IS A PRELIMINARY STUDY OF THE PERFORMANCE OF A SHROUDED WINDMILL. A ONE-DIMENSIONAL APPROXIMATION ANALYSIS REVEALS THE DEPENDENCE OF GENERATOR POWER COEFFICIENT ON TURBINE LOAD FACTOR CD, DIFFUSER PRESSURE RECOVERY CPR, AND OVERALL PRESSURE COEFFICIENT CP. THE PERFORMANCE OF TWO DIMENSIONAL AND "HALF-MODEL" CONFIGURATIONS IS TESTED BY SIMULATING A TURBINE ROTOR BY AN ENERGY-DISSIPATING SCREEN. THE SMALL DEPENDENCE OF CPR AND CP UPON CD IS DEMONSTRATED EXPERIMENTALLY. A MAXIMUM POWER COEFFICIENT AND A CORRESPONDING OPTIMUM LOAD FACTOR ARE CALCULATED ON THIS BASIS AS FUNCTIONS OF CPR AND CP; COCPT IS A FUNCTION CPR ONLY.

62-0032 RAMAKRISHNAN K P, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEED OF VERAVAL (GUJARAT) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0033 RAMAKRISHNAN K P, SIVARAMAN K R
THE CONTRIBUTION FROM WIND POWER TO THE ENERGY REQUIREMENTS OF INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0034 RAMANATHAN R, NARASIMASWAMY K N
A STUDY OF THE HOURLY WIND SPEEDS AT BOMBAY (COLUBA) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0035 RAMANATHAN R, NARASIMASWAMY K N
A STUDY OF THE HOURLY WIND SPEEDS AT POONA FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0036 RAMANATHAN R, VISHWANATH S
ESTIMATED ANNUAL ENERGY OUTPUT OF TWO TYPES OF WIND ELECTRIC GENERATORS.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962. 20P.

62-0037 RAMANATHAN R, VISHWANATH S
A STUDY OF THE HOURLY WIND SPEEDS AT MADRAS (MEENAMBAKKAM) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0038 RAO M S P, RADHAKRISHNAN S R
A STUDY OF THE HOURLY WIND SPEEDS AT HYDERABAD FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0039 REVIEW OF PROGRESS ON THE UTILIZATION OF WIND POWER FROM MARCH 1961 TO JANUARY 1962.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-3-62, 1962.

62-0040 RHODES P S
BALLYCOPELAND WINDMILL.
BELFAST, IRELAND, COUNTY DOWN, 1962.

62-0041 VENKITESHWARAN S P, RAMAKRISHNAN K P
HARNESSING THE WINDS OF INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, REP. NO. SR-WP-4-62, 1962.

62-0042 VINDKRAFTUDVALGETS BETAENKNING.

COPENHAGEN, DENMARK, DANSKE ELVAERKES FORENNING, 1962. (IN DANISH)

62-0043 VISWANATHAN R, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEEDS AT AHAMADABAD FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, TECH. NOTE NO. TN-WP-18-62, DECEMBER 1962.

62-0044 VISWANATHAN R, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEEDS AT BANGALORE (CENTRAL OBSERVATORY) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, TECH. NOTE NO. TN-WP-15-62, DECEMBER 1962. 20 P.

61-0020 CLAUSNIZER R
WIND AND WATER AS A SOURCE OF ENERGY - COMPARISON.
ELEKTRIZITAETSWIRTSCHAFT 60(15): 536-539, 1961. (IN GERMAN)

AN ECONOMIC COMPARISON IS MADE OF WATER AND WIND ENERGY, IN ORDER TO INDICATE IN WHICH CONDITIONS WIND ENERGY CAN BE COMPETITIVE.

61-0021 REVIEW OF PROGRESS ON THE UTILIZATION OF WIND POWER (1 DECEMBER 1960 - 28 FEBRUARY 1961).
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-2-61, 1961.

60-0017 GOLDING E W
WIND AS A SOURCE OF ENERGY IN SCOTLAND.
SYMPOSIUM ON NATURAL RESOURCES IN SCOTLAND, EDINBURGH, OCTOBER 31 - NOVEMBER 2, 1960. 16 P.

THE FACTORS INFLUENCING THE COST OF SUPPLYING ENERGY TO ANY PARTICULAR AREA ARE DISCUSSED IN RELATION TO BOTH CONVENTIONAL AND UNCONVENTIONAL SOURCES OF ENERGY. WIND POWER CHARACTERISTICS ARE THEN CONSIDERED AND DATA FOR WIND POWER POTENTIAL IN SCOTLAND ARE GIVEN. THESE ARE BASED ON A WIND POWER SURVEY MADE, A FEW YEARS AGO, BY THE ELECTRICAL RESEARCH ASSOCIATION. THE CONCLUSION REACHED IS THAT THE TOTAL WIND POWER CAPACITY WHICH MIGHT BE INSTALLED ECONOMICALLY IN SCOTTISH COASTAL AREAS IS RATHER GREATER THAN THAT FOR HYDRO-ELECTRIC POWER IN THE WHOLE COUNTRY. DIFFERENT SIZES OF WIND POWER PLANTS ARE CONSIDERED WITH THREE FORMS OF UTILIZATION AND SUGGESTIONS FOR WORK TO BE DONE TO FURTHER WIND POWER DEVELOPMENT ARE MADE.

60-0018 JAROSZEWICZ Z
PROBLEMS OF WIND POWER EXPLOITATION IN POLAND AND IN THE WORLD.
PRZEGL. ELEKTROTECH. 36(3): 103-106, 1960. (IN POLISH)

EXHAUSTION OF COMBUSTIBLE FUELS MAY OCCUR IN THE FORESEEABLE FUTURE AND ATOMIC POWER PLANTS STILL PRESENT CONSIDERABLE PROBLEMS. WIND POWER IS UNIVERSALLY AVAILABLE AND RECENT PROGRESS IN CONSTRUCTION OF WIND-DRIVEN ELECTRIC GENERATORS HAS PROVED THAT IT CAN BE ECONOMICALLY EXPLOITED, EITHER BY SMALL LOCAL UNITS 0.5-10 KW OR BY A SYSTEM OF LARGE UNITS 50-500 KW, OPERATING DIRECTLY ON NET. STABILITY IS ACHIEVED FOR VARIABLE WIND SPEEDS AND LOADING CONDITIONS IF THE RATINGS OF INDIVIDUAL UNITS ARE SMALL COMPARED WITH THE NET POWER. COST COMPARISON WITH COMBUSTIBLE AND NUCLEAR FUEL CELLS IS SHOWN TO BE FAVOURABLE. FURTHER STABILITY AND RELIABILITY CAN BE ACHIEVED BY COMBINING WIND AND DIESEL SETS AND BY USING WIND STORAGE PUMPING IN HYDRAULIC STATIONS.

60-0019 POWER RESOURCES OTHER THAN THOSE REGARDED AS BASIC.
WORLD POWER CONFERENCE, SECTIONAL MEETING, MADRID, JUNE 1960.
PROCEEDINGS. VOL. 5. P. 2785-2969.

60-0020 REVIEW OF PROGRESS ON UTILIZATION OF WIND POWER (16 SEPTEMBER, 1959 - 30 NOVEMBER, 1960).
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-1-60, NOVEMBER 1960. 43 P.

DESCRIBED ARE PROJECTS IN INDIA: MANUFACTURE AND DISTRIBUTION OF WATER PUMPING WINDMILLS, AVAILABILITY OF WIND ELECTRIC GENERATORS, AND A SURVEY OF INACCESSIBLE AREAS (WITH WIND DATA).

60-0021 VERBATIM RECORD OF THE DISCUSSION ON POWER RESOURCES OTHER THAN THOSE REGARDED AS BASIC.
WORLD POWER CONFERENCE. SECTIONAL MEETING, MADRID, JUNE 1960. VOL. 5, SECTION II C, P. 2937-2939.

60-0022 WARD G T
REPORTS ON VISITS TO EDUCATIONAL AND RESEARCH ESTABLISHMENTS STUDYING WATER RESOURCE UTILIZATION, SOLAR ENERGY AND WIND-POWER IN ISRAEL, EGYPT, USSR AND ITALY.
BRACE RES. INST. PUBL. I4, DECEMBER 1960.

60-0023 WIND-DRIVEN DEVICES FOR PUMPING WATER AND GENERATING ELECTRIC POWER.
WASHINGTON, D.C., U.S. DEPT. OF COMMERCE. REPORT, OFFICE OF TECH. SERVICES, FOR AGENCY FOR INTERNATIONAL DEVELOPMENT, 1960. 50 P.

BASIC INFORMATION IS GIVEN FOR THE USE OF WIND POWER IN AREAS REMOTE FROM A UTILITY NETWORK WHERE FUEL PRICES ARE HIGH. A DESCRIPTION IS GIVEN OF WIND MEASUREMENT INSTRUMENTS. NOTES ON WORKING PRINCIPLES AND ECONOMICS OF WATER PUMPING AND ELECTRICITY GENERATING WIND DRIVEN MACHINES ARE GIVEN. DESCRIBED ARE A 1/10 HP 6 FT AND A 1/4 HP 10 FT WIND TURBINE.

59-0022 BERNFELD D
THE UTILIZATION OF WIND POWER IN ROUMANIA.
ENERGETICA 7(7): 278, 1959. (IN GERMAN)

59-0023 HUTTER U
WIND POWER FOR REMOTE MICROWAVE STATIONS.
AUTOMATIC POWER, 1959. 16 P.

THIS PAPER PUTS SOME OF HUTTER'S AERODYNAMIC CONCEPTS AND EXPERIENCE IN AN EASILY UNDERSTOOD FORMAT. THE SUBJECTS DEALT WITH INCLUDE WIND BEHAVIOR, TIP SPEED RATIOS, MATCHING THE POWER OUTPUT TO THE LOAD, AND A DESCRIPTION OF HUTTER'S OWN DESIGN, THE WE-10. THE WE-10 WAS A 10 METER, 10 KW WIND GENERATOR THAT WAS IN PRODUCTION FROM 1950-1960 AND DISTRIBUTED IN THE UNITED STATES BY AUTOMATIC POWER INC., HOUSTON TEXAS.

59-0024 VASHKEVICH K P
REGULATIN OF HIGH-SPEED WIND MOTORS WITH ROTATION OF BLADES BY AERODYNAMIC FORCES.
PROMYSHLENNAYA AERODINAMIKA (INDUSTRIAL AERODYNAMICS) NO. 8, MOSCOW, OBORNGIZ PUBLICATIONS, 1959.

58-0021 DIRSCHKA A
WIND POWER PLANTS.
WASSER UND BODEN 12: 1958.

58-0022 THE LIGHT ALLOY WIND TURBINE PROPELLERS OF ELECTRICITE DE FRANCE.
REV. ALUMINIUM 35: 1229-1236, 1958. (IN FRENCH)

WIND POWER BEING MUCH MORE ABUNDANT THAN HYDRO POWER AND MOREOVER PRACTICALLY UNLIMITED, SPECIALISTS HAVE PAID, IN THE VARIOUS COUNTRIES, A PARTICULAR ATTENTION TO THE FINDING OF SOLUTIONS WHICH WOULD BE APPROPRIATE TO GET IT HARNESSED. ELECTRICITE DE FRANCE TOOK AN ACTIVE PART IN THIS RESEARCH. AFTER HAVING COLLECTED THE ESSENTIAL STATISTICAL DATA THROUGH ANEMOMETRIC MEASURES, THEY FOSTERED THE BUILDING OF TWO AEROGENERATORS WITH LIGHT ALLOY PROPELLERS, AT PRESENT UNDER EXPERIMENTATION AT NOGENT-LE ROI (EURE-ET-LOIR) AND AT SAINT-REMY-DES-LANDES (MANCHE). THE DIAMETERS OF THE PROPELLERS ARE 99 FT AND 69 FT 7 INCH. THEIR POWER CAPACITY IS RESPECTIVELY 640 KW AT 52 FT/SEC AND 132 AT 39 FT/SEC.

57-0026 SABININ G K
ON A NEW SCHEME FOR A WINDMILL GENERATOR WITH PNEUMATIC POWER TRANSMISSION.
PROM. AERODINAMIKA NO. 8: 197-205, 1957. (IN RUSSIAN)

57-0027 WINDMILL 'DE HOOP', WERVERSHOOF, NOORD HOLLAND.
ELEKTROTECHNIEK 35(16): 376-379, 1957. (IN DUTCH)

AN OLD-FASHIONED DUTCH WINDMILL HAS BEEN EQUIPPED WITH A 40 KW ASYNCHRONOUS ELECTROMOTOR CONNECTED WITH THE UTILITY NETWORK, IN FEEBLE WINDS BOTH THE WIND ROTOR AND THE ELECTROMOTOR WILL SUPPLY ENERGY TO THE GRINDING MILLSTONES. IN STRONG WINDS THE WIND-DRIVEN ELECTROMOTOR ACTS AS AN ASYNCHRONOUS GENERATOR, PROVIDING THE UTILITY NETWORK WITH ENERGY. A CIRCUIT DIAGRAM AND SOME OPERATION CHARACTERISTICS OF THE PLANT ARE GIVEN.

56-0039 ABE S
ON THE THEORY OF WINDMILLS.
INST. HIGH SPACE MECH. REP. 7(67): 135-148, 1956.

THE THEORY OF THE CHARACTERISTICS OF WINDMILLS UNDER THE CONSTANT WIND SPEED IS STATED WITH SPECIAL REFERENCE TO (I) THE EFFECT OF THE NUMBER OF BLADES, (II) THE MUTUAL INTERFERENCE OF THE BLADE ELEMENTS TO THE LIFT COEFFICIENT, (III) THE EFFECT OF THE INDUCED ROTATIONAL VELOCITY IN THE SLIPSTREAM AND (IV) THE STARTING CHARACTERISTICS. THE POWER COEFFICIENT CURVE OF THE MODEL WINDMILLS CALCULATED OUT BY THIS THEORY IS SHOWN TO COINCIDE FAIRLY WELL WITH THE EXPERIMENTAL RESULTS. THE BEST DISTRIBUTION OF THE CIRCULATION WHICH GIVES THE MAXIMUM POWER COEFFICIENT IS THEN FOUND FOR THE GIVEN BLADE NUMBER, FOR THE GIVEN RATIO OF THE TIP SPEED TO THE WIND SPEED, AND FOR THE GIVEN RATIO OF THE DRAG COEFFICIENT. SEVERAL DIAGRAMS ARE ALSO DRAWN UP FOR THE PURPOSE OF THE DESIGN.

56-0040 MEDIUM OUTPUT WIND GENERATOR.
ELECTR. TIMES 130: 606, 1956.

56-0041 MULLETT L F
WIND AS A COMMERCIAL SOURCE OF ENERGY.
ENGINEERING CONFERENCE, CANBERRA, 1956.

56-0042 SMALL POWER WIND TURBINES.
PARIS, ASS. FR. NORMALISATION, FASC. DE DOCUMENTATION FDE NO. 50-001, 1956. 5 P. (IN FRENCH)

55-0032 CHIPLONKAR M W, NANDGAONKAR M L
A WIND SURVEY FOR WIND POWER.
UNIV. POONA J., SCI. TECH. SECT. 10: 112-124, 1952-1955.

INCLUDED IS A DETAILED WIND SURVEY OF WESTERN AND CENTRAL INDIA. THE WIND REGIME SHOWS A STABLE PATTERN OF AN ANNUAL CYCLE, A MAXIMUM IN JUNE, JULY AND A MINIMUM AROUND DECEMBER. ENERGY PATTERN FACTORS AND VELOCITY DURATION CURVES HAVE BEEN CALCULATED FOR VARIOUS DISTRICTS. IT IS CONCLUDED THAT THE BOMBAY STATE AND THE DISTRICTS OF HYDERABAD ARE FAVOURABLE AREAS.

55-0033 GOLDING E
THE GENERATION OF ELECTRICITY BY WIND POWER.
BATH, GT. BRITAIN, PITMAN PRESS, 1955. (AVAILABLE UNIVERSITY MICROFILMS, ANN ARBOR, MICHIGAN).

55-0034 GOLDING E W
POWER FOR THE ARID ZONES. THE HARNESSING OF WIND POWER AND SOLAR ENERGY.
DISCOVERY 16(3): 120-124, 1955.

55-0035 GOLDING E W
RESEARCH PROJECT EXPERIMENTAL DEVELOPMENT SCHEME UTILIZING LOCAL ENERGY SOURCES.
UNESCO, ADVIS. COMM. ARID ZONE RES., 10TH SESS. UNESCO/NS/AZ/256.
NOVEMBER 7, 1955. 27 P.

THE ADVANTAGES OF MANDERA IN SOMALILAND AS A SUITABLE SITE FOR AN EXPERIMENTAL PROJECT ON THE UTILIZATION OF WIND, SOLAR RADIATION AND WASTE MATERIALS AS A SOURCE OF ENERGY ARE DISCUSSED. DATA ON AVAILABLE AMOUNTS OF ENERGY ARE GIVEN. PRESENT AND FUTURE NEEDS OF THE INHABITANTS ARE STUDIED AND SUGGESTIONS ARE MADE FOR THE EQUIPMENT TO BE INSTALLED FOR THE PRODUCTION AND UTILIZATION OF ENERGY. A DETAILED ESTIMATE OF COST IS ADDED IN AN APPENDIX.

55-0036 THOMAS P H
THE ECONOMIC AVAILABILITY OF WIND ENERGY.
WATER POW. 7: 419-421, 1955.

55-0037 WIND POWER GENERATION. 100 KW PLANT ERECTED AT COSTA HEAD.
ELECTR. REV. 156: 1131, 1955.

55-0038 WIND POWER IN THE ORKNEYS.
ELECTR. TIMES 127: 1018, 1955.

54-0038 ARGAND A, GOLDING E W, SERRA L, STODHART A H
WIND POWER TERMINOLOGY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 44. LONDON, H.M.S.O., 1954. P. 417-423.

THE AUTHORS GIVE A LIST OF VARIOUS TERMS IN ENGLISH AND FRENCH REFERRING TO WIND POWER UTILIZATION.

54-0039 ARGAND A
CLASSIFICATION OF DOCUMENTS RELATING TO WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 43. LONDON, H.M.S.O., 1954. P. 413-416.

THIS PAPER IS A PROPOSAL FOR CLASSIFICATION OF WIND POWER DOCUMENTS.

54-0040 ARGAND A
NOTE ON MR. ANDREAU'S TRIAL PLANT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 32. LONDON, H.M.S.O., 1954. P. 273-274.

THIS IS A SMALL NOTE ON RESULTS OF SOME PRELIMINARY TESTS OF THE PERFORMANCE OF A HOLLOW PROPELLER, USED IN THE ANDREAU TYPE WIND TURBINE.

54-0041 ARGAND A
NOTE ON THE RATED WIND SPEED FOR AN AEROMOTEUR PLACED ON A GIVEN SITE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 31. LONDON, H.M.S.O., 1954. P. 271-272.

THIS IS A SMALL NOTE ON CHOICE OF RATED WIND SPEED TAKING INTO ACCOUNT EFFICIENCY OF THE WIND TURBINE, GENERATOR, TRANSMISSION AND THE SHAPE OF VELOCITY DURATION CURVE. NO ANALYSIS IS GIVEN. IT CONCLUDES THAT THE LOWEST KWH PRICE IS NOT OBTAINED WITH AN INSTALLED CAPACITY FOR MAXIMUM ENERGY EXTRACTION.

54-0042 CASPAR W
DATA FOR DISTRIBUTION OF WIND VELOCITY IN GERMANY FOR WIND POWER GENERATION.
BAD KISSINGEN, CLIMATE DIVISION OF THE GERMAN WEATHER SERVICE, 1954.

54-0043 CASPAR W
WIND DISTRIBUTION DATA IN GERMANY FOR THE UTILIZATION OF WIND ENERGY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 3, 1954. 107 P.

A GRAPHICAL PRESENTATION OF WIND VELOCITY AND WIND ENERGY DISTRIBUTION, AND SEASONAL AND DAILY VARIATIONS OF MEAN WIND SPEEDS FOR SOME 50 RECORDING INSTRUMENTS IN 40 METEOROLOGICAL STATIONS IN WESTERN GERMANY ARE PRESENTED. INCLUDED ARE A TOPOGRAPHICAL MAP AND LOCATION OF WINDMEASURING INSTRUMENTS FOR EVERY STATION.

54-0044 CHAPLIN S
ENFIELD ANEMO-ELECTRIC POWER PLANT DEVELOPMENTS IN GREAT BRITAIN.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 33. LONDON, H.M.S.O., 1954. P. 275-280.

THE AUTHOR GIVES A DETAILED DESCRIPTION OF THE ENFIELD 100 KW PLANT, TO BE BUILT ACCORDING TO THE PRINCIPLES PROPOSED BY ANDREAU (FRANCE). THE WIND TURBINE HAS HOLLOW PROPELLERS, WHICH ON ROTATING DRAW UP AIR THROUGH THE HOLLOW TUBULAR TOWER SHAFT, IN WHICH IS INSTALLED AN AIR TURBINE COUPLED TO A SYNCHRONOUS GENERATOR.

54-0045 CHRISTALLER H
INSTRUMENTS AVAILABLE IN GERMANY FOR MEASURING WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 25. LONDON, H.M.S.O., 1954. P. 189-191.

THIS IS A SURVEY OF THE BEST AVAILABLE GERMAN INSTRUMENTS FOR MEASURING WIND POWER.

54-0046 CHRISTALLER H
THE PRESENT DEVELOPMENT AND THE EXISTING POSITION OF THE UTILIZATION OF WIND POWER IN GERMANY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 4. LONDON, H.M.S.O., 1954. P. 11-16.

THIS IS A GENERAL NOTE ON THE UTILIZATION OF WIND POWER, SPECIFICALLY IN GERMANY. THE COASTS AND NORTHERN GERMAN PLAINS OFFER THE BEST POTENTIALITIES FOR WIND POWER UTILIZATION. THE AUTHOR STATES THE NEED FOR EVALUATING EXPERIMENTALLY THE FLUCTUATING MECHANICAL STRESSES IN BLADES AND TOWER. HE ALSO CONSIDERS GENERATORS RUNNING AT CONSTANT SPEED BY ADJUSTING BLADE PITCH MORE FAVOURABLE THAN THE COMBINATION OF VARIABLE FREQUENCY GENERATORS (AC OR DC) WITH RECTIFIERS. HE MEMORATES THE COMBINED RESEARCH ACTIVITIES OF THE 'VEREINIGUNG DEUTSCHER ELEKTRIZITAETSWERKE' AND THE RESEARCH ASSOCIATION FOR WIND POWER, STUTTGART. THE LATTER INTENDS TO ERECT A 100 KW INSTALLATION, FEEDING INTO THE UTILITY NETWORK.

54-0047 CHRISTALLER H
WIND VELOCITY AND ECONOMIC ROTATIONAL SPEED OF WINDMILLS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 35. LONDON, H.M.S.O., 1954. P. 285-292.

DISCUSSED ARE SOME PRACTICAL QUESTIONS LINKED WITH THE FIXING OF THE ROTATIONAL SPEED OF A WINDMILL.

54-0048 CRESCENT C
NOTE ON THE UTILIZATION OF WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 8. LONDON, H.M.S.O., 1954. P. 47-48.

THIS SMALL NOTE DESCRIBES RESEARCH ACTIVITIES AND PARTICIPATING ORGANIZATIONS IN FRANCE. THE AUTHOR STATES THAT A HUNDRED MEASURING INSTRUMENTS, EVALUATING WIND ENERGY DENSITY, HAVE BEEN SET UP IN FRANCE, NORTHERN AFRICA AND OTHER CERTAIN TERRITORIES OF THE FRENCH UNION. HE SUMMARIZES SOME ATTRACTIVE DISTRICTS FOR WIND POWER UTILIZATION.

54-0049 FRANKENBERGER E
THE DAILY REGIME OF USABLE WIND ENERGY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 18. LONDON H.M.S.O., 1954. P. 133-136.

SOME RESULTS ARE GIVEN OF THE METEOROLOGICAL OBSERVATIONS NEAR QUICKBORN/HOLSTEIN MADE BY THE METEOROLOGICAL OFFICE FOR NORTH WESTERN GERMANY IN 1951. THEY CONTAIN THE MAGNITUDE AND SEASONAL CHANGES OF THE DAILY COURSE OF THE USABLE WIND ENERGY.

54-0050 GOLDING E W
MEMORANDUM ON THE MEASUREMENT OF WIND VELOCITY AND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 26. LONDON, H.M.S.O., 1954. P. 193-205.

THE AVAILABLE ENERGY IN A CERTAIN WIND REGIME CAN BE CALCULATED FROM VELOCITY DURATION CURVES OBTAINED BY HOURLY MEAN VELOCITY RECORDINGS. IT CAN EASILY BE SHOWN THAT THE ACTUAL ENERGY IN FLUCTUATING WINDS ALWAYS EXCEEDS THIS CALCULATED VALUE. THE ENERGY TO BE EXTRACTED, HOWEVER, HAS BEEN LIMITED BY THE ACTUAL WIND TURBINE CHARACTERISTICS, SUCH AS CUT-IN SPEED, FURLING VELOCITY, AND THE INERTIA OF THE MACHINE IN FOLLOWING QUICK VELOCITY FLUCTUATIONS. A DISCUSSION OF THIS MATTER INCLUDING EXAMPLES HAS BEEN PRESENTED IN THIS ARTICLE.

54-0051 GOLDING E W
NOTE ON THE ESTIMATION OF THE TOTAL PRACTICABLE INSTALLED CAPACITY OF WIND POWER PLANT IN ANY COUNTRY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 1. LONDON, H.M.S.O., 1954. P. 1-3.

IN THE UNITED KINGDOM AN ATTEMPT IS BEING MADE TO ESTIMATE THE TOTALLY POSSIBLE WIND ENERGY CAPACITY THAT CAN BE INSTALLED IN ALL SITES WHICH ARE HILLS OR RIDGES, CHOSEN BY STUDY OF WIND CHARTS OR BY ACTUAL INSPECTION. THE STUDY IS BASED ON STANDARD WIND TURBINES OF 50 M PROPELLER DIAMETER, MUTUALLY SPACED AT 400 M.

54-0052 GOLDING E W
POSSIBILITIES OF WIND POWER.
LECTURE DELIVERED BEFORE INSTITUTION OF EGYPTIAN ENGINEERS, CAIRO, NOVEMBER 22, 1954.

54-0053 HALDANE T G N
PROBLEMS IN LARGE SCALE WIND POWER GENERATION.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 2. LONDON, H.M.S.O., 1954. P. 5-7.

THIS NOTE IS ON PROBLEMS IN LARGE-SCALE ELECTRICITY GENERATION BY WIND POWER IN GREAT BRITAIN. THE PRESENT RESEARCH IS AIMED AT SAVING COAL RATHER THAN PRODUCING FIRM POWER. A FEW 100 KW WINDMILLS HAVE BEEN TESTED IN GREAT BRITAIN AS A PROTOTPYE FOR 1000 TO 2000 KW PLANTS TO BE CONSTRUCTED.

54-0054 HALDANE T G N
THE LOCATION AND OPERATION OF WIND-DRIVEN PLANT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 21. LONDON, H.M.S.O., 1954. P. 147-148.

IN THIS SHORT NOTE THE AUTHOR ASSUMES THAT RESULTS OF A STUDY OF CORRELATION BETWEEN WIND REGIMES AND RAINFALL COULD BE QUITE SUFFICIENT TO COMBINE UTILIZATION OF WIND POWER AND HYDRO-ELECTRIC SYSTEMS.

54-0055 JONES R L
WIND-POWER POTENTIAL; A SMALL-SCALE EXPERIMENT.
NEW ZEALAND, DOMINION PHYS. LAB., DEPT. SCI. IND. RES., REP. NO. R 200, JUNE 29, 1953. 10 P. ALSO: O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 45. LONDON, H.M.S.O., 1954. P. 423-433.

A SMALL-SCALE EXPERIMENT WAS CARRIED OUT AT MOORE'S VALLEY GEOPHYSICAL FIELD LABORATORY TO INVESTIGATE THE RELATIONSHIP BETWEEN WIND VELOCITY AND ELECTRIC POWER GENERATED BY A PROPELLER-DYNAMO UNIT OVER A PERIOD OF 17 MONTHS. THE RESULTS FOR FOUR MONTHS ARE ANALYZED IN DETAIL.

54-0056 JUUL J
CONVERSION OF WIND POWER PLANT FROM DIRECT CURRENT TO ALTERNATING CURRENT OUTPUT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 39. LONDON, H.M.S.O., 1954. P. 371-379.

THIS REPORT IS ON RECONSTRUCTION OF THE DISMANTLED SMIDTH BOGOE DC PLANT INTO A 40 KW AC POWER PLANT CONNECTED TO THE SEAS UTILITY NETWORK. DISCUSSION ON OPERATING EXPERIENCE ILLUSTRATED WITH PERFORMANCE CHARACTERISTICS AND A DETAILED CIRCUIT DIAGRAM OF THE PLANT IS INCLUDED.

54-0057 JUUL J
WIND POWER PLANTS IN DENMARK.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 40. LONDON, H.M.S.O., 1954. P. 381-387.

THIS REPORT IS ON THE ACTIVITIES OF THE DANISH SOUTH EAST ZEALAND ELECTRICITY COMPANY SEAS, CONCERNING DESIGN, ERECTION, AND OPERATION OF THE 8 M PROPELLER DIAMETER VESTER EGESBORG TRIAL MILL. IN A PRELIMINARY STAGE WIND MEASUREMENTS WERE CARRIED OUT AND A LARGE NUMBER OF WING PROFILES HAD BEEN TESTED IN A WIND TUNNEL.

54-0058 MASTERSON C E
LABORATORY EXPERIMENTS ON THE TECHNIQUE OF SITE SELECTION USING AN ELECTROLYTIC TANK.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 20. LONDON, H.M.S.O., 1954. P. 145-146.

54-0059 MONTAGNON P E
GENERATION OF ELECTRICITY FROM WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 9. LONDON, H.M.S.O., 1954. P. 49-50.

THIS SMALL NOTE ON THE POSSIBILITY OF GENERATING ELECTRICITY FROM WIND POWER MENTIONS EXPERIENCE WITH PLANTS IN THE U.S.A., DENMARK AND GREAT BRITAIN.

54-0060 MUNRO H
WIND-POWER DIVERSITY AROUND THE IRISH COAST.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 19. LONDON, H.M.S.O., 1954. P. 137-143.

FROM THE EXAMINATION OF WIND DATA IN IRELAND IT WOULD APPEAR THAT, AT BEST, THE FIRM VALUE EQUAL TO 10 PERCENT RATED VALUE COULD BE ALLOTTED TO NETWORK-FEEDING WIND POWER STATIONS.

54-0061 NILAKANTAN P, VARADARAGAN R
STUDIES ON THE UTILIZATION OF WIND POWER IN INDIA. PRELIMINARY SURVEY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 6. LONDON, H.M.S.O., 1954. P. 27-41.

THIS IS AN ECONOMIC STUDY ON THE USE OF WIND POWER IN INDIA FOR WATER SUPPLY, BASED ON THE MULTIBLADE WINDMILL TYPE. VELOCITY AND POWER DURATION CURVES, AS WELL AS OUTPUT CHARACTERISTICS ARE SUPPLIED FOR SEVERAL SITES IN INDIA. DESIGN SPECIFICATIONS ARE GIVEN FOR AN EXPERIMENTAL MODEL OF A DOUBLE WHEEL WINDMILL PUMPING PLANT WITH AUXILIARY WIND GENERATOR.

54-0062 PRINSENMOLEN-COMMISSIE: WIND VELOCITY MEASUREMENTS IN HOLLAND.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 27. LONDON, H.M.S.O., 1954. P. 129-131.

54-0063 SANTORINI P
DIRECT METHOD OF MEASURING WIND ENERGY USED BY THE ATHENS NATIONAL TECHNICAL UNIVERSITY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 30. LONDON, H.M.S.O., 1954. P. 259-269.

EXPERIMENTS DURING ALMOST ONE YEAR WITH A SMALL WIND POWER PLANT SHOWED THAT THE ENERGY PRODUCED WAS NOT PROPORTIONAL TO THE CUBE OF THE WIND SPEED BUT MUCH LOWER. SOME OBJECTIONS ARE MADE TO DEVELOPMENT AND CONSTRUCTION OF LARGE PLANTS.

54-0064 SERRA L
ESTIMATION OF THE QUANTITY OF WIND ENERGY ANNUALLY UTILIZABLE IN FRANCE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 5. LONDON, H.M.S.O., 1954. P. 17-26.

FROM AVAILABLE DATA ON THE WIND REGIME IN FRANCE, A STUDY IS MADE TO ESTIMATE THE TOTALLY UTILIZABLE QUANTITY OF WIND ENERGY, BASED ON 50 M DIAMETER WIND POWER UNITS GENERATING ANNUALLY 4000 KWH PER KW INSTALLED.

54-0065 SERRA L
NOTE ON THE WIND REGIME IN FRANCE COMPARED WITH THAT OF SOME OF THE WATER COURSES.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH PAP. NO. 12. LONDON, H.M.S.O., 1954. P. 91-94.

THIS NOTE IS ON A LONG RANGE STUDY ON AVAILABLE POWER FROM DIFFERENT WIND REGIMES IN FRANCE COMPARED WITH LOCALLY AVAILABLE HYDRO-ELECTRIC ENERGY. FOR THE PYRENEES AND THE ALPS IT IS CONCLUDED THAT, USING INTERCONNECTED SYSTEMS, WIND POWER CAN PROVIDE AN APPRECIABLE ENERGY CONTRIBUTION DURING THE WINTER PERIOD.

54-0066 SERRA L
VARIATIONS OF THE WIND WITH LOCAL RELIEF. RESULTS OF WIND TUNNEL TESTS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 14. LONDON, H.M.S.O., 1954. P. 103-111.

THIS PAPER REPORTS RESULTS OF AN INVESTIGATION ON MODELS IN A WIND TUNNEL.

54-0067 SERRA L
WIND REGIMES IN FRANCE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 13. LONDON, H.M.S.O., 1954. P. 95-101.

RESULTS OF WIND DATA RECORDED DURING THREE YEARS AT 90 STATIONS IN FRANCE COORDINATED BY ELECTRICITE DE FRANCE ARE GIVEN.

54-0068 STASTIK WIND POWER ELECTRICAL GENERATING STATION A.C.S., ITALY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 34. LONDON, H.M.S.O., 1954. P. 281-284.

THE STASTIK AEROGENERATOR CONSISTS OF A REINFORCED CEMENT BASE AND A

REVOLVING BASE AND IN THE CENTRE AN AXIAL AND RADIAL BEARING. THE CENTRE OF THE REVOLVING BASE SUPPORTS A SYSTEM OF VERTICAL COLUMNS AND A VARIABLE AND INDEFINITE NUMBER (ACCORDING TO THE DIMENSIONS, USE AND DESIRED CHARACTERISTICS) OF PARALLEL HORIZONTAL AXIS BLADE ROTORS. LATERAL SHAFTS ORIENT THE APPARATUS ACCORDING TO THE DIRECTION OF THE WIND. A SPECIAL SYSTEM OF REGULATORS ENABLES THE ROTORS TO TURN AT ALMOST CONSTANT SPEED IN SPITE OF VARIATIONS IN WIND SPEEDS. THIS REPORT DEALS WITH THE SPECIAL CHARACTERISTICS OF THE STASTIK INVENTION COMPARED WITH CONVENTIONAL WIND GENERATORS.

54-0069 STODHART A H
THE GENERAL REQUIREMENTS OF SITES FOR WIND-DRIVEN GENERATORS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 23. LONDON, H.M.S.O., 1954. P. 181-184.

DISCUSSED ARE REQUIREMENTS FOR SITE SELECTION. MAJOR REQUIREMENTS ARE: 1. THE DISTRICT SHOULD BE WINDY. 2. SMOOTHLY CONTOURED HILLS WITH GOOD EXPOSURE AND PREFERABLY RIDGE-SHAPED SHOULD BE SELECTED. 3. ACCESS TO THE HILL SHOULD BE SATISFACTORY AND THE NEAREST POWER LINE SHOULD BE AT NO GREAT DISTANCE. 4. THE POSSIBILITIES OF (A) COMBINING WIND AND WATER POWER AND (B) GROUPING THE WIND GENERATORS IN "WIND POWER AREAS".

54-0070 TAGG J R
METHODS OF MEASUREMENTS USED IN WIND VELOCITY SURVEYS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 24. LONDON, H.M.S.O., 1954. P. 185-188.

54-0071 TAYLOR F S
POWER TO-DAY AND TO-MORROW: THE APPLICATION OF ENERGY TO HUMAN NEEDS.
LONDON, FREDERICK MULLER, 1954. 192 P.

A SURVEY OF THE FUELS AND POWER THAT HAVE DETERMINED THE CHARACTER OF HUMAN CIVILIZATION IS PRESENTED. MINING, COMBUSTION AND USES OF COAL; THE EXPLORATION, TRANSPORTATION AND FUELS DERIVED FROM PETROLEUM; WIND POWER; WATER POWER; SOLAR ENERGY; HEAT PUMP; ROCKET FUELS; NUCLEAR ENERGY; AND ELECTRICAL POWER ARE DISCUSSED IN GENERAL TERMS.

54-0072 TECHNICAL PAPERS.
ORGANIZATION FOR EUROPEAN ECONOMIC CO-OPERATION O.E.E.C., COMMITTEE FOR PRODUCTIVITY AND APPLIED RESEARCH P.R.A., WORKING PARTY NO. 2. (WIND POWER). TECHNICAL PAPERS PRESENTED TO THE WIND POWER WORKING PARTY. LONDON, H.M.S.O., 1954. 433 P.

54-0073 VEZZANI R
RESEARCHES ON THE UTILIZATION OF WIND POWER IN ITALY.
O.E.E.C., P.R.A. WOKRING PARTY NO. 2. TECH. PAP. NO. 7. LONDON, H.M.S.O., 1954. P. 43-46.

THIS ARTICLE SURVEYS THE ACTIVITIES ON WIND POWER UTILIZATION IN ITALY SINCE 1940.

53-0040 CASPAR W
WIND DATA FOR THE UTILIZATION OF WIND POWER IN WESTERN GERMANY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 2: 11-21, 1953. (IN GERMAN)

A GRAPHICAL PRESENTATION OF WIND VELOCITY AND WIND ENERGY DISTRIBUTION, AND SEASONAL AND DAILY VARIATIONS OF MEAN WIND SPEEDS FOR SOME 50 RECORDING INSTRUMENTS IN 40 METEOROLOGICAL STATIONS IN WESTERN GERMANY ARE PRESENTED. INCLUDED ARE A TOPOGRAPHICAL MAP AND THE LOCATION OF WINDMEASURING INSTRUMENTS FOR EVERY STATION.

53-0041 FRANKENBERGER E
THE DAILY REGIME OF USABLE WIND ENERGY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 1: 16-19, 1953. (IN GERMAN)

DAILY VARIATIONS OF AVAILABLE WIND ENERGY ARE DISCUSSED.

53-0042 GOLDING E W
THE ECONOMIC AND PRACTICAL ASPECTS OF UTILIZING WIND ENERGY IN ARID AREAS.
PARIS, UNESCO, UNESCO-NS/AZ/139, AUGUST 10, 1953. 40 P.

ARID AREAS OF THE WORLD, WITH THEIR USUALLY HIGH COST OF ENERGY DERIVED FROM CONVENTIONAL SOURCES, MAY, UNDER CERTAIN CONDITIONS, BENEFIT GREATLY FROM THE DEVELOPMENT OF WIND ENERGY.

53-0043 LACROIX G
UTILIZATION OF WIND ENERGY IN ARID AREAS. REPORT NO. 1: CONSTRUCTION OF WIND TURBINES.
PARIS, UNESCO, UNESCO/NS/AZ/143, 1953. (IN GERMAN)

INCLUDED IS AN EXHAUSTIVE REVIEW OF THE THEORETICAL AND PRACTICAL ASPECTS OF VARIOUS TYPES OF WIND MOTORS, A DESCRIPTION OF WIND MOTORS ALREADY BUILT OR PLANNED, AND A COMPREHENSIVE BIBLIOGRAPHY.

53-0044 100-KW WIND-DRIVEN ELECTRIC GENERATOR.
ENGINEERING 175: 213-214, 1953.

DESCRIBED IS THE CONSTRUCTION OF THE 100 KW ANDREAU TYPE WIND TURBINE OF ENFIELD CABLES LTD., LONDON.

53-0045 STEFANIAK H S
WIND WHEEL MAXIMUM POWER.
FORSCH. GEB. INGWES. 19(1): 24-27, 1953. (IN GERMAN)

THIS IS A THEORETICAL STUDY OF THE OPTIMUM AERODYNAMIC CONDITIONS FOR A WIND WHEEL.

53-0046 THERMAL PLANT AS A VITAL ALLY OF WIND POWER.
OIL ENG. GAS. TURB. 21(241): 89, 1953.

53-0047 WIND POWER. THE ANEMO-ELECTRIC ENFIELD EQUIPMENT.
ELECTR. REV. 152: 377-379, 1953.

THIS ARTICLE IS A DESCRIPTION OF THE 100 KW ANDREAU-ENFIELD WIND TURBINE.

53-0048 WINDMILL ELECTRIC POWER.
ELECTR. TIMES 87: 103, JANUARY 1953.

DESCRIBED, WITH AN ILLUSTRATION, IS A 3-PHASE, 220-V, 100-KW, WIND-OPERATED ASYNCHRONOUS GENERATING EQUIPMENT IN BALACLAVA. THE WHEEL HAS 3 BLADES EACH 11 M. LONG, CENTERED 25 M. ABOVE GROUND LEVEL AND RUNNING AT 30 R.P.M., THE MAXIMUM OUTPUT BEING REACHED WITH A WIND SPEED OF 11 M./SEC. ON REACHING SYNCHROUNOUS SPEED THE GENERATOR IS SWITCHED AUTOMATICALLY IN PARALLEL WITH THE LOCAL SUPPLY NETWORK. THE OUTPUT IS ABOUT 400,000 UNITS PER ANNUM; 5000-KW GROUPS OF THIS TYPE ARE SUGGESTED.

52-0034 AYRES E, SCARLOTT C A
ENERGY SOURCES -- THE WEALTH OF THE WORLD.
NEW YORK, MCGRAW-HILL, 1952. 344 P.

WORLD ENERGY RESOURCES, ENERGY CONVERSION PROCESSES, AND THE CHIEF SOURCES OF ENERGY WASTE ARE EXAMINED. AN ENERGY BALANCE SHEET IS PRESENTED TO OUTLINE THE DISTRIBUTION AMONG ENERGY SOURCES AND APPLICATIONS. CONTAINS PHOTOGRAPHS AND TABLES.

52-0035 BURLANDO F, VEZZANI R, ANASTASI A
WIND ELECTRIC ENERGY BASED ON AERODYNAMICS.
ELETTROTECNICA 39(1): 29, 1952. (IN ITALIAN)

52-0036 HOFFMEISTER J
ANGULAR WIND SPEED DISTRIBUTIONS AND VELOCITY HISTOGRAMS FOR WIND POWER PLANTS.
ANGEW. MET. 1(4): 121-127, 1952. (IN GERMAN)

52-0037 LUNGSTROM O
STUDIES OF NEW MOTOR-SAILING SHIP CONCEPTS FOR FREIGHT AND PASSENGER TRANSPORT.
GOTHENBURG, SWEDISH SHIP RES. INST., 1952.

52-0038 MARSHALL C W
SUPPLEMENTARY SOURCES OF POWER: WIND, VOLCANIC HEAT, SUN AND TIDE.
ROY. SOC. ARTS J. 100: 452-468, 1952.

52-0039 RAPPORT OMTRENT DE PROEFNEMINGEN IN DE BENTHUIZER MOLEN, BETREFFENDE TANDEMBEDRIJF EN ELECTRICITEITSOPWEKKING. (REPORT ON THE EXPERIMENTS WITH AN OLD DUTCH WINDMILL TO COMBINE PUMPING WITH GENERATING ELECTRICITY).
THE NETHERLANDS, DE HOLLANDSCHE MOLEN, AMSTERDAM AND TNO, 'S GRAVENHAGE, JANUARY 1952. 20 P.

DESCRIBED IS THE OPERATION OF A DUTCH WINDMILL PROVIDED WITH AN AUXILIARY ELECTRIC MOTOR, WHICH, IN SUFFICIENTLY STRONG WIND, FUNCTIONS AS A GENERATOR FEEDING ELECTRIC ENERGY INTO THE LOW-TENSION GRID. WITH A 10-HOUR WORKING DAY, THE WIND FURNISHES 34,000 TO 50,000 KILOWATT-HOURS A YEAR.

52-0040 STAMBACK E
WIND POWER PLANTS.
SCHWEIZ. BAUZTG. 70(12): 167, 1952.

52-0041 TANAKA Y
ON THE TIP LOSS OF WINDMILLS.
KOGOSHIMA PREF. JUN. COLL. MEM. REPORT NO. 3, 1952. P. 1-11. (IN JAPANESE)

51-0031 ANASTASI A
WIND ENERGY.
ELETTROTECNICA 38(9): 428-31, 1951. (IN ITALIAN)

51-0032 HOENISCH W
WIND ENERGY TODAY: IS THERE ANY DISCUSSION LEFT?
ENERGIE AND TECHNIK: 8-12, DECEMBER 1951. (IN GERMAN)

51-0033 KAZHINSKY B, KARMISHIN A V
WIND POWER MULTI-WHEEL PLANTS.
TECHNIKA MOLODEZHI NO. 12, 1951. (IN RUSSIAN)

51-0034 NUMACHI F, ABE S
ON ADAPTIBILITY OF WINDMILLS IN JAPAN.
JAP. SOC. APPL. MECH. J. 2(11): 111, 1949. (IN JAPANESE) ALSO: INST. HIGH SP. MECH. MEM., TOHOKU UNIV. 5(41), 1951. (IN JAPANESE)

51-0035 PAKUSCH H W
ELECTRICITY SUPPLY BY WINDMILLS.
SCHWEIZ. ELEKTROTECH. VER. BULL. 45(25), 1951. (IN FRENCH) ALSO: ELECKTRO-POST. NO. 17, 1951.

THESE ARTICLES REPORT ON THE WIND POWER PLANT ON THE NEUWERK ISLANDS IN THE NORTH SEA.

51-0036 WIND AS A SUPPLEMENTARY POWER SOURCE.
ELECTR. ENG. MERCH. 28: 67, 1951.

50-0027 CRESTA A
UTILIZATION OF WIND ENERGY.
TECH. IND., OCTOBER 1950. (IN ITALIAN)

50-0028 ENGLISH WIND POWER GENERATION PLANTS ON THE ORKNEY ISLANDS.
ELECTR. TIMES 117: 147, 1950.

50-0029 GOLDING E W
ELECTRICITY FROM THE WIND.
DISCOVERY, MARCH 1950.

50-0030 HUTTER U
CONSIDERATIONS ON WIND POWER UTILIZATION.
TECHNIK BAUERN GAERTN. NO. 1, 1950. (IN GERMAN)

50-0031 KUEPFER W
A WIND POWER PLANT FOR THE AUTOMATIC TELEPHONE EXCHANGE AT SIMPLON-DORF.
TECH. MITT. PTT 28(1): 38-39, 1950. (IN GERMAN)

50-0032 ORKNEY WINDMILL GENERATOR.
ELECTR. REV. 146 (3766): 173, 1950; ALSO ELECTR. TIMES 117: 147, 1950.

50-0033 SEIFERTH R
REMARKS ON THE ENERGY GENERATION BY WIND POWER AFTER E.R.A. REPORT W/T 16.
ARCH. ENERGWIRT 23, 1950. (IN GERMAN)

49-0029 ANDREAU J
WIND ENERGY AND THE AUTOMOBILE.
SOC. ING. AUTO. J., DECEMBER 1949. P. 413-424. (IN FRENCH)

49-0030 FATEEV E M
OSNOVY AGREGATIROVANIYA VETRUDVIGATELEY S RABOCHIMI MASHINAMI. (THE BASIS OF LINKING WINDMILLS WITH MACHINES).
TRUDY VSESOYUZNOGO NAUCHNO-ISSLEDOVATELSKOGO INSTITUTA MEKHANIZATSSI SELSKOGO KHOZYAYSTVA VOL. 12, 1949.

49-0031 GUILLOTON R
MAXIMUM POWER OF WIND GENERATORS.
REV. GEN. MEC., DECEMBER 1949. P. 509-516. (IN FRENCH)

49-0032 HALDANE T G N
POWER FROM THE WIND.
TIMES REV. IND. 3(33): 22-23, 1949.

49-0033 IYER D V
WIND DATA FOR WINDMILLS.
SCIENT. NOTES MET. DEP. INDIA, 1(63), 1949.

49-0034 LARGE-SCALE WIND POWER GENERATION.
ENGINEER 188(4900): 738, 1949.

THIS IS A BRIEF SURVEY OF THE ACTIVITIES OF THE BRITISH ELECTRICAL RESEARCH ASSOCIATION, E.R.A., ON LARGE-SCALE ELECTRICITY GENERATION BY WIND POWER.

49-0035 WIND POWER GENERATION.
ELECTR. TIMES, DECEMBER 15, 1949.

48-0027 CLARK H O, WAILES R
BRAKE-WHEELS AND WALLOWERS (SUMMARY).
ENGINEERING 165: 453-455, 1948.

THE AUTHOR DESCRIBES CONSTRUCTION OF BRAKES AND WALLOWERS IN OLD FASHIONED WINDMILLS.

48-0028 FATEEV E M
WIND ENGINES AND WIND INSTALLATIONS.
VETRODVIGATELLI I VETROUSTANOVKI, STATE PUBLISHING HOUSE OF AGRICULTURAL LITERATURE, MOSCOW, 1948. TRANSL: NTIS, MARCH 1975. 391 P.
NASA-TT-F-16170, N75-22904

A COMPREHENSIVE THEORETICAL TREATMENT OF AERODYNAMICS IS PRESENTED ALONG WITH A DESCRIPTION OF WINDTUNNELS, THE AERODYNAMIC CHARACTERISTICS OF WIND ENGINES, TOWERS, AND RELATED EQUIPMENT. METHODS OF ADJUSTMENT OF WIND ENGINES TO THE WIND ARE DESCRIBED ALONG WITH SEVERAL WAYS OF REGULATING THE NUMBER OF REVOLUTIONS AND THE POWER OF WIND ENGINES. WIND ENERGY, ANEMOGRAPHS, WIND ENGINES WORKING WITH PISTON AND CENTRIFUGAL PUMPS, AND VARIOUS AGRICULTURAL MACHINES ARE DISCUSSED ALONG WITH WINDMILLS AND WIND-POWER STATIONS.

48-0029 HONNEF H
WIND-POWER GENERATION. NEW DESIGN FOR HIGH SPEED TURBINE.
ELECTR. REV. 143 (3695): 433-434, 1948. ALSO: ELECTR. ENG. 67(12): 1159, 1948.

AS A RESULT OF RESEARCHES AND EXPERIMENTS CARRIED ON FOR MORE THAN TWENTY YEARS WITH SINGLE STEEL TOWER PLANTS, MODELS IN WIND TUNNELS AND OTHER METHODS, THE AUTHOR HAS DEVELOPED HIGH-SPEED 10 MW AIR TURBINES. THIS ARTICLE COVERS TOWER CONSTRUCTION, WIND WHEELS, PERFORMANCE AND ECONOMICS.

48-0030 POWER FROM THE WIND.
ENGINEER 186(4837): 364-365, 1948.

THE PRESENT STATE OF WIND POWER UTILIZATION AND SOME RUSSIAN AND GERMAN LARGE RESEARCH PROJECTS ARE DISCUSSED.

47-0023 HAMM H W
GERMAN WIND TURBINE PROJECTS PLANNED DURING THE HITLER ERA.
OFF. MILIT. GOV. OF GERMANY, FIAT FINAL REPORT NO. 1111, MAY 1947.

47-0024 ROBERTS C R
WIND-DRIVEN GENERATING PLANT.
ELECTR. ENG. MERCH., JUNE 16, 1947.

46-0016 ARSANDAUX L
CONSEQUENCES OF THE INCREASE OF WIND GENERATOR POWER.
CONGRESS DU VENT. PROCEEDINGS, 1946. P. 91-96. (IN FRENCH)

REFERRING TO A PROPOSAL BY LANAUD AND POGGI TO CONSTRUCT A 1000 KW WIND GENERATOR, THE AUTHOR CONSIDERS SOME CONSTRUCTIONAL AND ECONOMIC ASPECTS WHEN INCREASING THE (LINEAR) SIZE OF A MACHINE. FOR A GIVEN TYPE THE POWER INCREASES WITH THE SQUARE, THE WEIGHT (INCLUDING TOWER) WITH THE CUBE AND SO THE KWH PRICE WITH THE 2/3 POWER OF SIZE. THE AUTHOR COMPARES MAXIMUM POWER OUTPUT WITH FIXED BLADES (BETWEEN CERTAIN VELOCITY LIMITS) TO CONSTANT POWER OUTPUT IN THE UPPER VELOCITY RANGE, THE LATTER REDUCING AERODYNAMIC EFFICIENCY SOMEWHAT, BUT KEEPING THE LOADS ON BLADES AND STRUCTURE LIMITED. CONSIDERATIONS ARE GIVEN TO THE NON-UNIFORMITY OF THE FLOW, TO PROBLEMS OF THE INERTIA OF THE ROTOR INCREASING WITH THE FOURTH POWER OF SIZE, AND INSTALLATION AND MAINTENANCE OF HEAVY GENERATORS ON HIGH TOWERS.

46-0017 BASIAUX-DEFRANCE P
BENOIST TYPE WIND TURBINE.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 127-131. (IN FRENCH)

46-0018 BASIAUX-DEFRANCE P
LE CONGRES DU VENT, CARCASSONE, SEPTEMBER 1946. (THE CONGRESS ON WIND).
TECH. MOD. 39(516): 83, 1947. (IN FRENCH)

46-0019 BASIAUX-DEFRANCE P
WIND DRIVEN WATER PUMPING STATIONS. SMALL POWER SOURCES AND PRIVATE ENTERPRISE. SEARCH FOR WIND POWER SITES. AESTHETICS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 84-90. (IN FRENCH)

THE AUTHOR DISCUSSES THE USE OF WIND ENERGY IN COMBINATION WITH PUMPED WATER STORAGE, IN CASE APPROPRIATE SITES EXIST. SEASONAL FLUCTUATIONS IN WATER DELIVERY BY RIVERS OFTEN NECESSITATE THE STORAGE OF WATER USED FOR IRRIGATION PURPOSES OR ELECTRICITY PRODUCTION. WIND ENERGY SYSTEMS OF INDIVIDUAL FARMERS CAN BE SUPPLEMENTED BY HYDRO SYSTEMS, AT THE SAME TIME ALLOWING EXCESS ENERGY TO BE STORED. SOME SUITABLE SITES IN FRANCE ARE DISCUSSED.

46-0020 BERTHOLON N
WIND GENERATOR GROUP ALTERVENT FOR ONE PHASE A.C. GENERATION.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 109-112. (IN FRENCH)

THE AUTHOR SUMMARIZES THE ADVANTAGES OF USING A SINGLE PHASE DC GENERATOR WITH PERMANENT MAGNETS IN COMBINATION WITH RECENTLY DEVELOPED RECTIFIERS TO THE TRADITIONAL USE OF DC GENERATORS, WHEN GENERATING DC WITH AN AEROGENERATOR. A DESCRIPTION IS GIVEN OF THE AEROGENERATOR, 'ALTERVENT': 2 M DIAMETER, 250 W, 3 VARIABLE PITCH BLADES, ROTOR DOWNSTREAM OF TOWER.

46-0021 CARLEVARO E
RECENT PROGRESS IN WIND MOTORS AND FUTURE DEVELOPMENTS.
ELETTROTECHNICA 33, DECEMBER 10-25, 1946. (IN ITALIAN)

46-0022 BOUCHET R
NOTES SUR DES ESSAIS D'EOLIENNES.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 140-154. (IN FRENCH)

THE AUTHOR DESCRIBES 4 OUT OF 20 DIFFERENT MODELS OF 40 CM DIAMETER WHICH WERE BUILT BY HIM AND TESTED. LATER ON EXPERIMENTS WERE PERFORMED WITH 4 DIFFERENT MACHINES OF 4 METER DIAMETER, INCLUDING ONE WITH SPEED REGULATION BY BLADE CONING, AND ANOTHER WITH FEATHERING OF TWO OPPOSING BLADES FIXED ON ONE AXIS. DISCUSSED IN DETAIL ARE MERITS OF DIFFERENT CONTROL MECHANISMS.

46-0023 GAISSET E
TECHNICAL CONSIDERATIONS ON THE UTILIZATION OF WIND POWER.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 27-37. (IN FRENCH)

46-0024 GAISSET E
WIND TURBINE ELECTRICITY PRODUCTION.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 135-139. (IN FRENCH)

46-0025 GAYRARD D
HARNESSING WIND ENERGY AND AESTHETICS.

CONGRES DU VENT. PROCEEDINGS, 1946. P. 132-134. (IN FRENCH)

46-0026 LANAUD H
REPORT ON WIND ENERGY.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 38-48. (IN FRENCH)

46-0027 LAFOND J
SUMMARIZING REPORT ON WIND ENERGY.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 113-121. (IN FRENCH)

46-0028 LANOY H
THE AMERICAN 1000 AND 1500 KW LARGE WIND POWER PLANTS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 105-108. (IN FRENCH)

46-0029 LANOY H
REPORT ON INTERESTING APPLICATIONS OF WIND POWERED GENERATORS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 101-104. (IN FRENCH)

46-0030 MICANEL E
CONNECTION OF SMALL WIND POWER PLANTS WITH THE UTILITY NETWORK.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 49-57. (IN FRENCH)

46-0031 SAVONIUS S J
THE SAVONIUS ROTOR, APPENDIX C.
NEW YORK UNIVERSITY, COLLEGE OF ENGINEERING, JANUARY 31, 1946. P. 249-263.

46-0032 TYPE CONSTANTIN AND FORTIER-BEAULIEU WIND TURBINES.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 73-77. (IN FRENCH)

46-0033 VERTICAL-AXIS FORTIER-BEAULIEU TURBINE.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 78-83. (IN FRENCH)

45-0010 ELECTRIC POWER FROM THE WIND - 1.
ELECTR. WORLD 123: 73-75, 1945.

DISCUSSED IS THE FEASIBILITY FOR USE OF WIND POWER AS AN ADJUNCT TO EXISTING POWER SOURCES FOUND IN A FEDERAL POWER COMMISSION STUDY. DETAILS OF THE DESIGN AND ADVANTAGEOUS OPERATION OF A 7500 KW TWIN-WHEEL UNIT ON A 500 FT TOWER ARE ALSO COVERED.

45-0011 ELECTRIC POWER FROM THE WIND - 2.
ELECTR. WORLD 123: 102-104, 1945.

EVIDENCE POINTS STRONGLY TO WIND AS A CONSISTENT AND RELIABLE POWER SOURCE IF APPROPRIATELY APPLIED. ANALYSIS OF WEATHER BUREAU RECORDS INDICATES THAT THE DEGREE OF VARIATION AND DURATION OF PERIODS OF DEFICIENCY MAY WELL PROVE LESS MARKED THAN FOR HYDRO POWER.

45-0012 THOMAS WIND-POWER UNIT.
ELECTR. TIMES VOL. 108, JUNE 21, 1945.

45-0013 WIND POWER. PLANS FOR 7500 KW UNITS.
ELECTR. REV. 137(3528): 18, 1945.

45-0014 WIND-POWER STUDIES SUGGEST FUTURE COMMERCIAL POSSIBILITIES.
POWER 89(6): 64-66, JUNE 1945.

ENGINEERING STUDIES MADE UNDER THE DIRECTION OF THE FEDERAL POWER COMMISSION SHOW THAT RECENT DEVELOPMENTS HAVE BROUGHT LARGE-SCALE ELECTRIC POWER GENERATION FROM THE WIND WITHIN OUR GRASP. DESIGNS FOR UNITS UP TO 7500-KW ON TOWERS 500 FT HIGH ARE SUGGESTED.

44-0005 SORENSEN E
THE MOST SUITABLE DESIGN OF WIND POWER PLANTS.
Z. VER. DT. ING. 88(9/10), 1944. (IN GERMAN)

44-0006 VEZZANI R
CALCULATION ON THE BLADES OF HIGH SPEED WINDMILLS.
ANNALI LAVORI PUBL. 22, 1944. (IN ITALIAN)

44-0007 WEINIG F
APPLICATION OF AERODYNAMICS FOR WIND WHEELS.
Z. VER. DT. ING. 88(9/10), 1944. (IN GERMAN)

43-0020 CAMERON BROWN C A
A PRACTICAL VIEW OF WIND POWER.
ELECTR. TIMES 104: 240-242, AUGUST 26, 1943.

43-0021 LANOY H
UTILIZATION OF WIND POWER FOR ELECTRICITY PRODUCTION.
J. ELECTR., DECEMBER 1943. (IN FRENCH)

43-0022 MODERN USES FOR WIND POWER; LATEST DEVELOPMENTS IN DIRECT DRIVEN AIR-SCREW-PLANT.
ELECTRICIAN 130: 487-488, MAY 14, 1943.

43-0023 TSCHANTER E
SYNCHRONOUS GENERATORS FOR LARGE WIND POWER PLANTS.
Z. VER. DT. ING. 87(21/22): 329, 1943. (IN GERMAN)

43-0024 WIND POWER.
ELECTR. REV. 133: 246, 1943.

42-0022 A REMARKABLE GROUP OF 500 W WIND GENERATORS.
AUTO-VOLT, OCTOBER/NOVEMBER, 1942. (IN FRENCH)

42-0023 AVRAMESCO M A, IOAN V
WIND POWER PLANTS.
BUL. A.P.D.E., ROMANIA, 11, APRIL/JUNE, 1942. 12 P. (IN RUMANIAN)

42-0024 FLEISCHMANN A
PRESENT STATE OF WIND POWER UTILIZATION. REPORT PRESENTED AT VDE-BEZIRK ESSEN, MAY 21, 1942. SUMMARY.
ELEKTROTECH. Z. 63: 283, 1942. (IN GERMAN)

THIS REPORT DISCUSSES THE PRESENT STATE OF WIND POWER UTILIZATION IN THE U.S.A., AND IN EUROPE, ESPECIALLY THE ACTIVITIES OF THE VENTIMOTOR G.M.B.H., WEIMAR, GERMANY.

42-0025 HARNESSING THE WIND.
OIL POWER 17, APRIL 1942, 6 P.

MANY ILLUSTRATIONS ACCOMPANY THIS DESCRIPTION OF THE ERECTION OF A LARGE ELECTRIC WIND POWER PLANT.

42-0026 MEYER G W
UTILIZATION OF WIND POWER. REPORT OF A LECTURE BEFORE KREIS TETSCHEN/BODENBACH, (SUDETENGAU), OCTOBER 8, 1942. SUMMARY. (IN GERMAN)
ELEKTROTECH. Z. 64(9/10): 139, 1943. (IN GERMAN)

42-0027 1000 KW WIND-POWER ELECTRIC GENERATING PLANT.
ENGINEERING 154: 81-83, 1942.

42-0028 POWER FROM WIND.
FLIGHT, MAY 12, 1942.

42-0029 PRINSENMOLENBOEK. (INVESTIGATION ON WINDMILL POWER).
WAGENINGEN, H. VEENMAN EN ZONEN, 1942. 206 P.

42-0030 ROGGE E
SMALL WIND POWER SETS AND PLANS FOR THE UTILIZATION OF WIND POWER FOR HEAT ACCUMULATION IN DENMARK.
ELEKTRIZITAETSVERWERTUNG 17(11/12): 197-203, 1942/43.

DENMARK, A FLAT COUNTRY WITH REGULAR, BUT RARELY STORMY WINDS, SEEMS PREDESTINED FOR THE INSTALLATION OF WIND POWER SETS FOR PRODUCING ELECTRIC ENERGY AND INDEED IN THE FIRST TWO DECADES OF THIS CENTURY A CONSIDERABLE NUMBER OF SUCH PLANTS WERE IN USE; SOME OF THEM ARE IN OPERATION UP TO THIS DAY. THE SCARCITY OF SOLID AND LIQUID FUEL IN RECENT TIMES HAS REVIVED THE INTEREST FOR THIS SOURCE OF ENERGY AND THE DANISH AUTHORITIES HAVE ARRANGED TESTS FOR THE MOST IMPORTANT MODELS OF WIND POWER SETS CONSTRUCTED IN DENMARK, PARTICULARS OF WHICH ARE GIVEN IN A TABLE AND A SERIES OF GRAPHS. IN THESE SETS A WELL CONSTRUCTED WOODEN AIR SCREW DIRECTLY DRIVES A SMALL DYNAMO. THE ENERGY PRODUCED IS MAINLY USED FOR LIGHTING, BUT WAR TIME DIFFICULTIES IN CONNECTION WITH ROOM HEATING HAVE CAUSED STUDIES TO BE MADE AS TO THE POSSIBILITY OF STORING THE ENERGY PRODUCED BY HEATING A GREAT MASS OF WATER WELL PROTECTED AGAINST HEAT LOSSES, USING THE WARM WATER PARTLY FOR GENERAL PURPOSES ALL THE YEAR ROUND, PARTLY FOR HEATING PURPOSES DURING THE WINTER. CALCULATIONS SHOW, HOWEVER, THAT STORING ELECTRICAL ENERGY IN THIS WAY, EVEN IF TECHNICALLY POSSIBLE, WOULD HARDLY BE ECONOMICAL.

42-0031 VEZZANI R
THE ITALIAN PROBLEM OF THE UTILIZATION OF WIND ENERGY.
ANNALI LARORI PUBL. 20(3): 136-171, 1942. (IN ITALIAN) ALSO: Z. VER. DT. ING. 87(1/2): 29, 1943. (IN GERMAN)

FROM WIND VELOCITY MEASUREMENTS DURING 1938-40 IT IS CONCLUDED THAT ITALY AND ITS COLONIAL TERRITORIES IN AFRICA CAN BE DIVIDED IN LOW AND HIGH VELOCITY REGIONS. IN THE LATTER AREAS THE UTILIZATION OF WIND POWER SEEMS TO BE ECONOMICALLY FEASIBLE. IN NORTHERN AFRICA IMPORTANT SAVINGS ON IMPORTED FUEL CAN BE MADE BY INTRODUCING MEDIUM WIND POWER PLANTS FOR IRRIGATION PURPOSES INSTEAD OF DIESEL UNITS. SPECIAL EMPHASIS IS LAID ON SIMPLE CONSTRUCTIONS, LOW MAINTENANCE COSTS AND PROTECTION AGAINST SAND-STORMS. ALSO A VERTICAL AXIS WIND TURBINE (SAVONIUS-ROTOR-TYPE) IS DESCRIBED.

42-0032 WILBUR J B
SMITH-PUTNAM WIND-TURBINE PROJECT.
BOSTON SOC. CIVIL ENG. J. 29(3): 211-228, 1942.

41-0021 FOTTINGER H, HERTWIG M, KLOSS M
BETRACHTUNGEN UBER DEN GROSSWINDKRAFTWERKENTWURF MAN/KLEINHENZUND VORSCHLAEGE FUER DIE WEIBERENTWICKLUNG. (DELIBERATIONS ON THE MAN-KLEINHENZ LARGE WIND POWER PLANT DESIGN AND RECOMMENDATIONS FOR FURTHER DEVELOPMENT).
2. TECHNISCHER BERICHT DER RAW. (SECOND TECHNICAL REPORT OF THE RAW). BERLIN, 1941.

41-0022 HUTTER U
DEVELOPMENT OF HIGH POWER ROTORS.
BER. NO. 4, DER VENTIMOTOR G.M.B.H., WEIMAR, 1941. (IN GERMAN)

41-0023 MODERN WIND-POWER PLANT.
AM. SOC. NAVAL ENG. J. 53: 679-684, 1941.

41-0024 MOERCH D V
MODERN WIND POWER PLANTS.
INGENIOREN 40: 49-56, JUNE 14, 1941. (IN DANISH). ALSO: ROYAL DUTCH AIRLINES KLM, REPT. NO. TW555 GVC-R 128, JANUARY 5, 1949, APPL. 1, 8 P. (IN DUTCH). ALSO: TRANSLATION: NTIS, NASA-TT-F-15982, OCTOBER 1974.

THESE ARTICLES REPORT ON A LECTURE HELD BEFORE THE DANISH ENGINEERS SOCIETY, APRIL 23, 1941: "IS WIND POWER REVELANT FOR ELECTRICITY SUPPLY IN DENMARK?", DISCUSSING THE 17.5 M DIAMETER 60 KW FLS WIND TURBINE.

41-0025 1000 KW WINDMILL.
ENGINEER 172: 43, 1941.

41-0026 WARTENA R
WINDGENERATOREN.
DEVENTER, THE NETHERLANDS, KLUWER, 1941. 61 P.

41-0027 WIND-DRIVEN GENERATOR TO CAP GRANDPA'S KNOB.
ELECTR. WORLD 115(14): 1157, 1941. ALSO: ELEKTRIZITAETSWIRTSCHAFT 40(20): 330-331, 1941.

41-0028 WIND POWER PLANTS FOR THE TROPICS.
ELEKTRIZITAETSWIRTSCHAFT 40(1): 14, 1941. (IN GERMAN)

41-0029 WIND TURBINES.
SOCIETE S.K.F., NOTICE TSP NO. 107, APRIL 1941.

40-0006 PERLI S
WIND POWER PLANTS.
ELEKTRICHESTVO NO. 2: 47-52, 1940. (IN RUSSIAN) ALSO: ELEKTROTECH. Z. 61(50): 1154, 1940. (IN GERMAN)

40-0007 WITTE H
UTILIZATION OF WIND ENERGY FOR ELECTRICITY GENERATION.
ELEKTRIZITAETSWIRTSCHAFT 39(29): 392-393, 1940. (IN GERMAN)

AN INVESTIGATION BY THE "REICHSARBEITGE-MEINSCHAFT WINDKRAFT" ON THE ECONOMIC POSSIBILITIES OF ERECTION OF WIND POWER PLANTS IS SUMMARIZED.

39-0007 ACKERET J, CAILLE C
MODEL TESTS OF A WIND POWER STATION.
SCHWEIZ. BAUZTG. 114: 41-42, JULY 22, 1939. (IN GERMAN)

WIND TUNNEL TESTS ARE CARRIED OUT ON A MODEL OF A THREE BLADED VARIABLE PITCH PROPELLER. ESTIMATED RESULTS WITH A 50 M DIAMETER TURBINE ARE RELATED TO THE WIND REGIME OF BROCHEN (1142 M ALTITUDE) IN GERMANY.

39-0008 BEATT A W
POWER FROM THE WIND.
WIRELESS WORLD 45: 271-272, 1939.

39-0009 STRUBREITHER W
WIND TURBINE.
AUSTRIAN PATENT NO. 155,578, FEBRUARY 25, 1939.

38-0010 CAMERON BROWN C A
LIGHT FROM WIND-POWER.
J. MINIST. AGRIC. 45: 357-365, 1938.

38-0011 PEDDER J B R
WINDMILLS FOR PUMPING IN NIGERIA.
NIGERIA, PUBLIC WORKS DEPARTMENT, TECH. PAP. NO. 7, JANUARY 29, 1938. 25 P.

THIS ARTICLE REPORTS ON EXPERIENCE WITH TWO SMALL WIND POWERED WATER PUMPING PLANTS IN NIGERIA. WIND DATA AND WINDMILL TEST RESULTS ARE PRESENTED IN TABLES.

38-0012 ROGGE E
OVERALL EFFICIENCY OF WIND POWER PLANTS FOR ELECTRICITY GENERATION.
ELECTROTECH. Z. 59(1): 17-18, 1938. (IN GERMAN)

37-0011 CONRAD W
CALCULATIONS OF THE ARMS OF HIGH SPEED WINDMILLS.
FORSCH. GEB. INGWES. 8(1): 2-5, 1937. (IN GERMAN)

A MATHEMATICAL THEORY OF THE DESIGN AND EFFICIENCY OF HIGH-SPEED WINDMILLS IS DEVELOPED. RESULTS OBTAINED IN A WIND CHANNEL WITH A TWO-ARMED WINDMILL DESIGNED IN ACCORDANCE WITH THE THEORY AGREES WITH THEORETICAL DEDUCTIONS.

37-0012 GANDER J S
WIND ENGINE POWER.
MECH. WORLD 101: 1-2, 1937.

37-0013 KLEIN G J
THE DESIGN OF HIGH-SPEED WINDMILLS SUITABLE FOR DRIVING ELECTRIC GENERATORS.
OTTAWA, NAV. RES. LAB., N.R.L. REP. PAA-32, JUNE 14, 1937.

37-0014 MAYERSOHN M
UTILIZATION OF WIND ENERGY.
INST. ROM. ENERGY BUL., SEPTEMBER 1937. (IN RUMANIAN)

37-0015 OP DE HIPT H
WINDMUHLEN-PRAXIS.
LEIPZIG, VERLAG VER WOCHENSCHRIFT "DIE MUHLE", 1937. 127 P.

37-0016 OP DE HIPT H
PRACTICE OF WINDMILLS.
BERLIN, PAUL PAREY, 1937.

37-0017 PANUNZIO S
UTILIZATION OF WIND ENERGY IN TRIPOLI.
SOC. ITALIANA PROGR. SCI., RIUNIONE 25, 5(PT.1): 133-173, FEBRUARY/MARCH 1937. (IN ITALIAN)

THIS EXTENSIVE ARTICLE INCLUDES DIAGRAMS AND TABLES.

36-0007 DEBENHAM E
WIND POWER IN THE ANTARCTIC.
MECH. ENG. 58: 185, MARCH 1936.

A BRIEF SUMMARY IS PRESENTED OF A PAPER IN WHICH THE AUTHOR OUTLINES THE GREAT WIND POWER TO BE FOUND IN THE ANTARCTIC.

36-0008 FALES E N
PROPELLER DESIGN AS APPLIED TO WINDMILLS.
J. AERONAUT. SCI. 3: 278-281, 1936.

36-0009 POGGI L
ELEMENTARY AERODYNAMIC THEORY OF GYROPLANE TYPE OF WIND MOTOR.
AEROTECNICA 16: 723-731, OCTOBER 1936. (IN ITALIAN)

36-0010 POGGI L, STRINGARI A
STUDY ON A TYPE OF AIR MOTOR FOR GREAT POWER.
AEROTECNICA 16: 7-22, OCTOBER 19, 1936. (IN ITALIAN)

COVERED ARE THE GENERAL MATHEMATICAL THEORY OF AIR MOTORS AND THE AUTHOR'S DESIGN OF VERTICAL AXIS AIR MOTOR WITH AUTOMATICALLY ADJUSTABLE WINGS.

36-0011 SAUER T
PROJECT OF A 10,000 KW WIND POWER PLANT AT AI-PETRI/KRIM.
ELEKTRIZITAETSVERWERTUNG 11(4): 85, 1936/37. (IN GERMAN)

36-0012 WINDMILLS.
LUBRICATION 22: 105-108, SEPTEMBER 1936.

WIND MOTOR DESIGN, PARTS CONSTRUCTION AND LUBRICATION ARE DISCUSSED.

35-0008 BILAU K
THE GENERATION OF ELECTRICITY BY GIANT WIND POWER PLANTS.
ELEKTROTECH. Z. 56(18): 525-526, 1935. (IN GERMAN)

ELECTRICITY GENERATION BY LARGE WIND POWER PLANTS WILL BE ECONOMICALLY IMPOSSIBLE, AS THE AUTHOR STATES IN A LETTER TO THE EDITOR. COMMENTS ARE MADE ON ECONOMICAL ASPECTS AND ON CONSTRUCTION PROBLEMS TO BE FACED.

35-0009 HEYS J W VAN
WHAT EVERYONE SHOULD KNOW ABOUT WIND POWER.
BERLIN-STEGLITZ, F. MITTELBACK, 1933. 82 P. SUMMARY IN: ELEKTROTECH. Z. 56(11): 335, 1935.

35-0010 MADARAS J
ECONOMICAL POSSIBILITIES OF UTILIZATION OF WIND POWER IN BRAZIL.
REV. CLUB ENGENH., RIO DE JANEIRO 1: 523-527, AUGUST 1935. (IN SPANISH)

35-0011 TASSE Y R
WIND AS A PRODUCER OF ELECTRICITY.
REV. TRIMESTR. CAN. 21: 278-306, SEPTEMBER 1935. (IN FRENCH)

THIS ARTICLE REVIEWS AMERICAN AND EUROPEAN EQUIPMENT, WITH SPECIAL REFERENCE TO HEBCO AND SAVONIUS AEROMOTORS.

34-0007 CARTY J
ELECTRIC POWER FROM THE WIND.
INST. ELECTR. ENG. STUD. QUART. J. 4: 107-112, 1934.

34-0008 HAVINGA A
TESTS WITH WINDMILL MODELS.
INGENIEUR,'S-GRAV. 49(8): W17-23, 1934. (IN DUTCH)

THIS IS A REPORT FROM THE GOVERNMENT RESEARCH STATION OF AVIATION IN AMSTERDAM. IT GIVES RESULTS OF AERODYNAMIC MEASUREMENTS IN WIND TUNNELS OF SOME TYPES OF OLD DUTCH WINDMILLS.

34-0009 LEON G
TURBINE.
U.S. PATENT NO. 1,973,290, SEPTEMBER 11,1934.

34-0010 RONSE A
DE WINDMULENS. (THE WINDMILLS).
ANTWERP, AMSTERDAM, C. DE VRIES-BROUWERS P.V.B.A., 1976. 185 P. (IN DUTCH) REPRINT OF BOOK ORIGINALLY PUBLISHED IN 1934.

OLD DUTCH CORNGRINDING AND DRAINING MILLS IN FLANDERS AND HOLLAND ARE DESCRIBED.

33-0007 ELECTRICITY FROM THE WIND.
ELECTRICIAN 111: 649, 1933.

COVERED ARE THE MADARAS PROJECT IN NEW JERSEY AND SOME RUSSIAN WIND GENERATOR PROJECTS.

33-0008 SAVONIUS S J
M AND M READER INVENTS REVOLUTIONARY ROTOR.
MOD. MECH. 10: 64, OCTOBER 1933.

33-0009 SEKTOROV V R
DEVELOPMENT OF THE CONSTRUCTION OF WIND GENERATORS IN RUSSIA.
ELEKTRICHESTVO NO. 2, 1933. (IN RUSSIAN)

33-0010 SEKTOROV V R
REPORT ON THE OPERATING CHARACTERISTICS OF THE INITIAL 100 KW AERO-ELECTRIC GENERATOR AT BALAKLAVA.
ELEKTRICHESTVO, NO. 2, 1933. (IN RUSSIAN)

33-0011 BAUMHAUER A G VON
TESTS OF MODELS OF A WINDMILL.
INGENIEUR 48(35): W160-164, SEPTEMBER 1, 1933. (IN DUTCH)

A MODEL OF A DUTCH WINDMILL WAS TESTED IN THE WIND CHANNEL OF THE NATIONAL INSTITUTE FOR AERONAUTICAL RESEARCH. THE MEASUREMENTS COMPRISE TORQUE AND ROTATIONAL SPEED OF THE WINDMILL, SPEED OF THE AIR CURRENT, AND ALSO THE TEMPERATURE AND PRESSURE OF THE AIR. AT FIRST THE TORQUE WAS MEASURED BY A PRONY'S BRAKE. AN ELECTRICAL DYNAMOMETER WAS MORE SATISFACTORY AS IT ALLOWED FOR STABLE CONDITIONS EVEN IN THE RANGE WHERE THE TORQUE INCREASES WITH THE ROTATIONAL SPEED. THE RESULTS ARE EXPRESSED IN SO-CALLED PRESSURE HEAD COEFFICIENTS AS USED IN GOETTINGEN. THERE IS A GOOD AGREEMENT WITH SIMILAR MEASUREMENTS. IT IS FOUND THAT THE ENERGY COEFFICIENT IS APPRECIABLY INCREASED BY THE FAIRING OF THE BACK OF THE BLADES. THE MAXIMUM VALUE OF THE ENERGY COEFFICIENT DOES NOT DIFFER MUCH WITH THE RESULTS OF THE BEST MODERN WINDMILLS. THESE TESTS DO NOT ALLOW TO SAY WHETHER THE CONDITIONS OF THE TEST AND THE SMALL SCALE ON WHICH IT WAS CARRIED OUT CAUSE AN APPRECIABLE DIFFERENCE WITH FULL SCALE.

33-0012 WARRILOW W E
ELECTRICITY FROM WIND POWER.
ELECTRICIAN 111: 724-725, 1933.

THIS PAPER DESCRIBES THE 50,000 KW WIND POWER PLANT DESIGNED BY H. HONNEF. A PICTURE OF A 1:100 SCALE MODEL IS SHOWN.

32-0011 BILAU K
WIND GENERATED ELECTRICITY.
ELEKTROTECH. Z. 53(3): 65, 1932. (IN GERMAN)

PRESENTED ARE SOME ECONOMIC ASPECTS OF WIND POWER UTILIZATION. A LOT OF PROBLEMS HAVE TO BE SOLVED TO MAKE WIND POWER A FEASIBLE SOURCE OF ENERGY.

32-0012 HONNEF H
WINDKRAFTWERKE UND IHR INFLUSS AUF DIE DEUTSCHE WIRTSCHAFT. (WIND POWER PLANTS AND ITS INFLUENCE ON THE GERMAN ECONOMY).
BERLIN, ELGAWE-TAGESFRAGEN, 1932. 22 P. (IN GERMAN)

THE AUTHOR DESCRIBES HIS IDEAS OF WIND POWER PLANTS, WITH ILLUSTRATIONS.

32-0013 SERRAGLI G
THEORETICAL INVESTIGATION OF OPERATING PRINCIPLES OF AERODYNAMIC SHROUD FOR WINDMILLS.
AEROTECNICA 12: 34-44, JUNE 1932. (IN ITALIAN)

THE SELF-ADJUSTING REFLECTORS OF THE SHROUD PERMIT CONSTANT SPEED OPERATION OF THE WINDMILL.

32-0014 WILL TOWERS LIKE THESE DOT THE LAND?
ELECTR. WORLD 99: 914, 1932.

FROM A DRAWING AN IDEA MAY BE HAD OF WHAT THE WIND-ROTOR GENERATING PLANT WHICH MAY BE BUILT AT WEST BURLINGTON, N.J., WILL LOOK LIKE IF THE PLAN BECOMES FACT. ONE OF THE PROPOSED TWENTY 90 FT CYLINDRICAL TOWERS IS NEARING COMPLETION FOR TRIAL PURPOSES.

31-0012 ARNDT L
WIND MOTORS.
DINGLERS POLYTECH. J. 346: 150-153, SEPTEMBER 1931. (IN GERMAN)

REVIEWED BRIEFLY ARE VARIOUS TYPES OF WIND MOTORS.

31-0013 CONSTANT-SPEED WINDMILL FOR AIRCRAFT GENERATORS.
ENGINEERING 131: 745, JUNE 5, 1931.

A MILL FOR SUPPLYING CURRENT FOR AN AIRCRAFT RADIO IS DESCRIBED.

31-0014 CONSTANT-SPEED WINDMILLS.
AEROPLANE, OCTOBER 28, 1931.

31-0015 DARRIEUS G J M
TURBINE HAVING ITS ROTATING SHAFT TRANSVERSE TO THE FLOW OF THE CURRENT.
U.S. PATENT NO. 1,835,018, DECEMBER 8, 1931.

31-0016 DETTMAR G
ELECTRICAL ENGINEERING IN CHINA.
ELEKTROTECH. Z. 52(7): 199-204, 1931. (IN GERMAN)

31-0017 A DEVICE FOR EXTRACTING POWER FROM FLOWING MEDIA.
SUWAG PROPELLER - ROTORENBAU G.M.B.H., BRITISH PATENT NO. 337,899, JULY 28, 1931.

31-0018 KRASOVSKIY N V
WIND POWER RESOURCES OF U.S.S.R.
ELEKTRICHESTVO, NO. 22(PART 2): 1250-1253, 1931. (IN RUSSIAN)

31-0019 SABININ G K
TEORIYA I AERODINAMICHESKIY RASCHET VETRYANYKH DVIGATELEY. (THEORY AND AERODYNAMIC CALCULATION OF WINDMILLS).
TRUDY TSENTRALNOGO AERO-GIDRONAMICHESKOGO INSTITUTA NO. 104, MOSCOW-LENINGRAD, 1931.

31-0020 SAVONIUS S J
ROTOR INVENTION MAY BRING BACK WINDMILL.
POP. SCI. MON. 119(2): 54, 1931.

31-0021 SAVONIUS S J
THE S-ROTOR.
SCIENCE (SUPPL.) 73: 14, 1931.

31-0022 SAVONIUS S J
WINDMILL OF THE ROTOR TYPE PROVIDES WATER SUPPLY.
POP. MECH. MAG. 56(1): 98, 1931.

31-0023 SERRAGLI G
AERODYNAMIC PROBLEMS OF WIND-DRIVEN MOTORS.
IL POLITECNICO NO. 5, 1931.

31-0024 SERRAGLI G
THE MOTION OF A WINDMILL WITH ORIENTABLE BLADES PLACED IN A VARIABLE CURRENT.
AEROTECNICA, MAY 1931.

30-0006 CARLACINI F
NEW TYPE OF ELECTRIC AIR MOTOR.
INDUSTRIA 54: 62-66, FEBRUARY 15, 1930. (IN ITALIAN)

THE PRINCIPLES OF GENERATING ELECTRIC POWER BY MEANS OF WINDMILLS ARE DISCUSSED, AS WELL AS THE FEATURES OF ELECTRIC POWER-GENERATING DARRIEUS "AEROMOTORS" WITH BLADES FROM 8-20 M IN LENGTH.

30-0007 NEVEUX V
MODERN WINDMILLS AND THEIR APPLICATIONS.
INDUSTRIE ELECTR. 39: 197-208, MAY 10, 1930. (IN FRENCH)
SAVONIUS, DARCHE TURBINES, MACMASTER TURBINES

MAC MASTER, DARCHE, CONSTANTIN AND DARRIEUS TYPES, WIND TURBINE G.D. OF SOCIETE DES APPLICATIONS AERODYNAMIQUES ET INDUSTRIELLES, AND THE SAVONIUS ROTOR ARE DESCRIBED.

30-0008 SEKTOROV V R
WIND POWER ACTIVITIES OF ZAGI IN RUSSIA.
WORLD POWER CONFERENCE, 2D., 1930. PAPER 307. (IN GERMAN)

30-0009 UTILIZING THE WIND AS A SOURCE OF POWER.
DUN'S INT. REV. 55: 30-33, 58, APRIL 1930.

THIS ILLUSTRATED ARTICLE GIVES A GENERAL DESCRIPTION OF USING WINDMILLS FOR POWER GENERATION.

30-0010 WINDMILL GENERATORS.
ELECTRICIAN 105: 121, JULY 25, 1930.

DESCRIBED IS A PLANT MANUFACTURED BY F.A. WILKINSON AND PARTNERS, HATFIELD ENGLAND.

30-0011 ZIMMERMAN R R
COMPUTATION OF WIND-POWER RESOURCES IN THE REGION OF NOVAYA, BUKHARA AND CHARJUG.
VESTNIK IRRIGATSII 8(5): 37-55, 1930. (IN RUSSIAN)

29-0005 NEU L
RATIONAL UTILIZATION OF WIND POWER.
SOC. FR. ELECTR. BULL. SERIES 4. 9(94): 570-574, 1929. (IN FRENCH)
ALSO: WORLD POWER CONFERENCE, TRANS. TOKYO, 1929. VOL. 1, P. 631-636.

29-0006 PAWLOWSKI A
UTILIZATION OF WIND POWER.
POLYTECH. WEEKBL. 23: 658-660, SEPTEMBER 12, 1929. (IN DUTCH)

A WIND TURBINE DEVELOPED BY CAPUZAC, AND OTHER TYPES LATELY DEVELOPED IN FRANCE, ARE DESCRIBED.

29-0007 SANCERY R
THE REMARKABLE STATUS OF WIND POWER UTILIZATION IN DENMARK.
SCI ET VIE NO. 146, AUGUST 1929. (IN FRENCH)

29-0008 SAVONIUS S J
ROTOR ADAPTED TO BE DRIVEN BY WIND OR FLOWING WATER.
U.S. PATENT NO. 1,697,574, JANUARY 1, 1929.

29-0009 SCHIFF M
WINDMILL GENERATORS.
SIBLEY J. ENG. 43: 330, 356, NOVEMBER 1929.

THIS ARTICLE GIVES A BRIEF DESCRIPTION OF WINDMILL GENERATORS USED BY THE U.S. AIR MAIL SERVICE.

29-0010 WINDMILL GENERATING SET.
ELECTRICIAN 102: 140, FEBRUARY 1, 1929.

A PLANT MANUFACTURED BY F.A. WILKINSON AND PARTNERS IS DESCRIBED.

28-0012 CONSTANTIN L
THE PROPULSION OF SHIPS BY WIND; FLETTNER ROTORS AND WIND TURBINES.
NATURE (PARIS) P. 14-17, JANUARY 18 1928. (IN FRENCH)

THE AUTHOR COMPARES FLETTNER ROTORS TO WIND TURBINES AS A RATIONAL MEANS FOR SHIP PROPULSION.

28-0013 LOCK C N H
A DISCUSSION OF: THE THEORY OF AN IDEAL WINDMILL BY G. SABININ.
A.R.C. R. + M. TECH. REP. NO. T2615, 1928.

28-0014 MORGAN W D
WIND POWER ELECTRIC GENERATOR.
POWER PLANT ENG. 32: 148, JANUARY 15, 1928.

THIS DESCRIBES BRIEFLY A WIND POWER GENERATOR IN SOUTHERN CALIFORNIA TO PRODUCE ELECTRICITY.

28-0015 A NEW MODEL WINDMILL USED AS A SOURCE OF ELECTRICITY.
DUN'S INT. REV. 51: 59-60, MARCH 1928.

THIS ARTICLE DESCRIBES A WINDMILL USED FOR GENERATING ELECTRICITY FOR A FARM IN INDIANA.

28-0016 SABININ G K
THE THEORY OF AN IDEAL WINDMILL.
MOSCOW, TRANSACTIONS OF THE CENTRAL AERO-HYDRODYNAMICAL INSTITUTE, MAY 1928.

27-0006 BETZ A
WINDMILLS IN THE LIGHT OF MODERN RESEARCH.
NACA TECH. MEM. TM474, AUGUST 1928, P. 29-47. ALSO NATURWISSENSCHAFTEN 15(46): 905-914, 1927.

THE INTRODUCTION DEALS WITH THE MAIN PROBLEMS CONCERNING WINDMILLS. THE THEORETICAL PROBLEM ON THE EXTRACTION OF POWER FROM AN AIR STREAM BY A WIND ROTOR IS TREATED IN EXTENSION. CONSIDERING A ROTOR HAVING A FIXED DIAMETER IT IS SHOWN THAT ONE CANNOT INCREASE THE GENERATED POWER BY INCREASING THE BLADE SURFACE. A RELATION BETWEEN THE BLADE SURFACE (OR THE NUMBER OF BLADES) AND THE TIP SPEED RATIO OF THE ROTOR IS GIVEN. THE TIP SPEED RATIO, HOWEVER, IS LIMITED BY INCREASING THE ENERGY LOSSES DUE TO HIGHER REVOLUTION FREQUENCIES.

27-0007 BILAU K
WINDMUEHLENBAU EINST UND JETZT.
LEIPZIG, VERLAG DER WOCHENGEITSCHRIFT "DIE MUEHLE", M. SCHAEFER, 1927. 72P.

27-0008 THE LYKKEGAARD WINDMILL MANUFACTURING COMPANY. REPORT.
COPENHAGEN, DENMARK, THE LYKKEGAARD WINDMILL MANUFACTURING COMPANY, 1927. 18 P.

THIS REPORT GIVES DESCRIPTIONS OF VARIOUS TYPES OF WINDMILLS MANUFACTURED BY THE LYKKEGAARD COMPANY, SUCH AS WIND-ELECTRIC PLANTS (0.1 TO 35 KW), WINDMILLS FOR HIGH CAPACITY GRAIN MILLS, WINDMILLS AS MOTIVE POWER FOR FARM MACHINERY, DRAINAGE PLANTS (CAPACITY 3 TO 4000 CU M/HOUR), AND WATER SUPPLY FOR TOWNS, VILLAGES AND FARMS.

26-0007 AMANS M
ON THE AERODYNAMIC THEORY OF WINDMILLS.
ACAD. SCI. PARIS. COMPTES RENDUS HEBD. SEANCES 182: 841-843, MARCH 29, 1926. (IN FRENCH)

THIS PAPER DESCRIBES EXPERIMENTAL WORK ON THE PROFILES AND THE ANGLES OF VANES.

26-0008 BETZ A
WIND ENERGY AND ITS UTILIZATION THROUGH WINDMILLS.
NATURWISSENSCHAFTEN 4(14): 338, 1927. (ANALYSIS) ALSO GOETTINGEN, VANDENHOECK AND RUPRECHT, 1926. 64 P. (IN GERMAN)

26-0009 LUBOWSKY K
WIND POWER DRIVES FOR SMALL POWER PLANTS.
Z. VER. FT. ING. 70: 31-32, JANUARY 2, 1926. (IN GERMAN)

26-0010 MARGOULIS W
CENTRAL AEROHYDRODYNAMIC INSTITUTE OF MOSCOW, RUSSIA. (SABININ WINDMILL).
NACA TECH. MEMO. TM NO. 386, 1926.

26-0011 PAGLIANI S
UTILIZATION OF WIND POWER.
NUOVO CIMENTO, NEW SERIES 3: 236-246, MAY 1926. (IN ITALIAN)

VARIOUS TYPES OF WIND MOTORS AND THE ORIGIN OF KINETIC ENERGY OF WIND ARE DISCUSSED.

26-0012 POWER FROM THE WIND.
SCI. AM. 134(2): 114-115, FEBRUARY 1926.

26-0013 PRYTZ K
TESTS WITH WINDMILLS AND WATER RAISING ENGINES BY THE STATE INSTRUMENT COMMITTEE.
TEKNISCKE FORENINGS TIDSSKRIFT 50: 113-145, APRIL 1926. (IN DANISH)

TESTS WITH VARIOUS TYPES OF WINDMILLS AND TURBINES DRIVING DYNAMOS OR PUMPS ARE DESCRIBED. ALSO COVERED ARE POWER TRANSMISSION AND CONSUMPTION, EFFICIENCY, ETC.

26-0014 SAVONIUS S J
IMPROVEMENT IN OR RELATING TO WIND ROTOR FOR PRODUCING ROTARY POWER AND GENERATING CROSS DRIVE.
BRITISH PATENT NO. 244,414, SEPTEMBER 9, 1926.

26-0015 SAVONIUS S J
THE WING ROTOR IN THEORY AND PRACTICE.
HELSINGFORS, FINLAND, SAVONIUS + CO., 1926.

26-0016 UTILIZING THE POWER OF THE WIND AS A SOURCE OF ELECTRICITY.
DUN'S INT. REV. 47: 57, JUNE 1926.

THIS ARTICLE DESCRIBES BRIEFLY A WINDMILL INSTALLED ON A FARM IN INDIANA FOR THE GENERATION OF ELECTRICITY.

26-0017 WINDMILL ELECTRICITY GENERATORS: REPORT BY THE INSTITUTE OF AGRICULTURAL ENGINEERING, UNIVERSITY OF OXFORD.
ELECTR. REV. 98: 885-886, JUNE 11, 1926.

SEVEN PLANTS WERE TESTED FOR COSTS PER KWH.

26-0018 WINDMILLS FOR THE GENERATION OF ELECTRICITY.
ENGINEER 141: 586-587, JUNE 4, 1926.

INVESTIGATIONS BY THE OXFORD INSTITUTE OF AGRICULTURAL ENGINEERING ARE DISCUSSED.

26-0019 WING ROTORS, SAVONIUS SYSTEM.
GENIE CIV. 88: 236, MARCH 6, 1926. (IN FRENCH)

26-0020 WIND-DRIVEN ELECTRIC GENERATORS.
ENGINEERING 122: 150, JULY 30, 1926.

THIS IS A BRIEF ACCOUNT OF TESTS CARRIED OUT BY THE OXFORD INSTITUTE OF AGRICULTURAL ENGINEERING.

25-0016 APPLIED AERODYNAMICS (PHOTO OF WINDMILL DESIGNED BY MAJ. BUELOVE).
AVIATION, APRIL 27, 1925.

25-0017 BILAU K
THE UTILIZATION OF WIND POWER.
ZENTRALBL. BAUVERW. 45(33): 393-395, 1925. (IN GERMAN)

THIS PAPER DISCUSSES THE EXTENT TO WHICH WIND POWER CAN BE UTILIZED FOR GENERATING ELECTRICITY.

25-0018 CONRAD W
POLITICAL ECONOMICAL IMPORTANCE OF WIND POWER IN GERMANY.
THESIS, UNIV. FRANKFURT, A.M., 1925.

25-0019 DELAUGHE G
MODERN THEORIES OF AERODYNAMICS ON THE MAGNUS EFFECT AND ROTATING FLETTNER SAILS.
GENIE CIV. 86: 425-433, MAY 2, 1925. (IN FRENCH)

25-0020 KLEMIN A
SAVONIUS WING ROTOR; A FURTHER APPLICATION OF THE MAGNUS EFFECT TO WINDMILLS AND TO BOAT PROPULSION.
MECH. ENG. 47(11): 911-912, 1925.

25-0021 NEVEUX V
WINDMILLS AND THEIR USE IN GENERATING ELECTRICITY.
ELECTRICIAN 56: 385-389, SEPTEMBER 1, 1925. (IN FRENCH)

25-0022 THOM A, SMALL J
VELOCITY OF WIND IN CONICAL DUCTS.
ENGINEER 139: 262-263, MARCH 6, 1925.

THE ARTICLE DESCRIBES EXPERIMENTS UNDERTAKEN TO SEE WHETHER USE OF A CONICAL DUCT INCREASES THE EFFICIENCY OF A WINDMILL.

25-0023 RAILWAY SIGNALS OPERATED BY WINDMILL.
ELECTR. WORLD 86: 1004-1005, NOVEMBER 14, 1925.

25-0024 SAVONIUS S J
SAVONIUS ROTOR.
MECH. WORLD 78: 149, 1925.

25-0025 SAVONIUS S J
THE WING ROTOR.
THE ENGINEER 140: 193, 1925.

25-0026 WINDMILLS GENERATE SIGNAL CURRENT.
RAILWAY REV. 77: 715, NOVEMBER 7, 1925.

25-0027 THE WING ROTOR.
POWER 62: 572, OCTOBER 13, 1925.

24-0009 BAUDISCH H
TURNING WINDMILLS INTO THE WIND.
ELEKTROTECH. MASCHBAU. 42: 617-620, OCTOBER 19, 1924. (IN GERMAN)

THIS PAPER DISCUSSES REGULATION, REVIEWS FORCES INVOLVED, AND GIVES FORMULAS.

24-0010 BOSSELMANN R
CONTROL METHOD FOR WINDMILLS.
Z. VER. DEUTSCH ING. 68: 48-52, JANUARY 19, 1924.

24-0011 CONSTANTIN L
AN INEXHAUSTIBLE AND CHEAP SOURCE OF ENERGY: THE WIND.
NATURE (PARIS), JUNE 21, 1924. P. 395-400. (IN FRENCH)

THE AUTHOR PROPOSES THE CONSTRUCTION OF 30 TO 40 M DIAMETER WIND TURBINES. HE DISCUSSES SHORTLY CENTRIFUGAL, BENDING AND GRAVITY FORCES ACTING ON THE BLADES. HE PROPOSES TO COMBINE WIND ENERGY PLANTS WITH STEAM PRODUCTION AND TURBO-ELECTRIC PLANTS.

24-0012 FLETTNER'S SAILLESS SHIP EXPLAINED.
POWER 60(27): 1056, DECEMBER 1924.

24-0013 HAMMEL L
WINDMUEHLEN UND WINDMOTOREN; IHRE KONSTRUKTION, AUSFUHRUNG UND VERWENDUNG IN GEWERBE UND LANDWIRTSCHAFT, SOWIE INSBESONDERE ZUR ELEKTRIZITATS- UND GEMEINDE- WASSERVERSORGUNG.
FRANKFURT A. MAIN, AKADEMISCH-TECHNISCHEN VERLAG, 1924. 35 P.

24-0014 HAMMEL L
DIE AUSNUTZUNG DER WINDKRAFTE UNTER BESONDERER BERUCKSICHTIGUNG DER LANDISCHEN GEMEINDE-WASSER-UND ELEKTRIZITATS-VERSORGUNG.
3. NEUBEARB. UND VERM. AUFL. BER'INE, P. PAREY, 1924. 119 P.

24-0015 LARSEN A
ELECTRICAL CONVERTERS FOR THE UTILIZATION OF THE WIND POWER.
INGENIOREN 33: 567-572, DECEMBER 16, 1924.

IN ORDER TO OBTAIN MAXIMUM POWER OUTPUT FROM A WINDMILL IT IS NECESSARY TO VARY ITS SPEED IN SAME PROPORTION AS SPEED OF WIND CHANGES.

24-0016 PANCRATZ F J
WIND POWER FOR FARM ELECTRIC PLANTS.
MECH. ENG. 46(11): 675-682, 1924.

THE ARTICLE COVERS TEST DATA ON A 15-FT WHEEL, LOSSES DUE TO AIR DRAG, BEST SIZE OF WHEEL FOR FARM ELECTRIC LIGHT PLANTS, AND A COMBINATION PLANT FOR GENERATING ELECTRIC POWER AND PUMPING.

24-0017 RIEFSTAHL L
ELECTRICITY FROM WIND POWER.
GEWERBEFLEISS 103: 165-172, OCTOBER 1924. (IN GERMAN)

THIS ARTICLE GIVES THE PARTICULARS OF AN A.E.G. WIND ELECTRIC PLANT AS INSTALLED ON AN ESTATE WITH A 60-CELL STORAGE BATTERY CAPACITY OF 580 AMPERE HOURS.

24-0018 RIEFSTAHL L
MODERN INSTALLATIONS FOR THE GENERATION OF ELECTRICITY BY WIND POWER.
PRAKT. MASCH. - KONSTR. 57: 49-51, FEBRUARY 15, 1924. (IN GERMAN)

THIS ARTICLE DISCUSSES THE USE OF THE A.E.G. SYSTEM FOR WIND POWER PLANTS WITH SPECIAL REFERENCE TO THEIR ECONOMIC ASPECTS.

24-0019 STERR P VAN DER
WIND POWER.
Z. VER. DEUTSCH ING. 68: 106-108, FEBRUARY 2, 1924. (IN GERMAN)

THIS ARTICLE DESCRIBES A PROCESS TO CALCULATE THE REGULARITY OF WIND POWER.

24-0020 THE BOAT WITH PROPULSIVE CYLINDERS, FLETTNER SYSTEM.
GENIE CIV. 85: 526-527, DECEMBER 6, 1924. (IN FRENCH)

24-0021 WIND-DRIVEN ELECTRICAL AND OTHER INSTALLATIONS.
ENGINEER 137: 318, MARCH 21, 1924.

THE BURNS WINDMILL IS DESCRIBED.

23-0003 BRANGWYN F, PRESTON H
WINDMILLS.
WISCASSEL, MAINE, SOCIETY FOR THE PRESERVATION OF OLD WINDMILLS, 1923.
126 P.

23-0004 CRABTREE J H
POWER FROM THE WIND.
POWER ENG. 18: 59-61, FEBRUARY 1923.

THE AUTHOR DESCRIBES THE MAIN TYPES OF BRITISH WINDMILLS AND THE OUTSTANDING FEATURES OF THEIR OPERATION.

23-0005 DELAMARRE A
WIND MOTORS AND THEIR APPLICATIONS.
OUTILLAGE 7: 694-699, JULY 7, 1923. (IN FRENCH)

23-0006 JOHANSEN I F
WIND POWER PLANTS.
TEKNISKE FORENINGS TIDSSKRIFT 47: 15-20, JANUARY 17, 1923. (IN DANISH)

23-0007 MUNK M M
GENERAL THEORY OF WINDMILLS.
NACA TECH. NOTE NO. 164, 1923.

23-0008 SCOTT A H
THE VALUE OF WINDMILLS FOR PUMPING WATER IN WESTERN AUSTRALIA.
PERTH, WESTERN AUSTRALIA, DEPARTMENT OF AGRICULTURE, BULL. NO. 115, 1923.

23-0009 STERLING W
WIND-DRIVEN GENERATORS.
INST. ELECT. ENG. J. 61: 1096-1099, OCTOBER 1923.

THE AUTHOR DESCRIBES A WIND-DRIVEN GENERATING SET AND GIVES ACTUAL RESULTS OF A PLANT OVER A PERIOD OF SEVERAL MONTHS.

23-0010 WALTER C
WIND POWER IN GERMANY.
Z. VER. DEUTSCH ING. 67: 1037-1041, NOVEMBER 10, 1923.

23-0011 WERREN A
THE CONNECTION OF ELECTRIC PLANTS WITH WINDMILLS.
Z. VER. DEUTSCH ING. 67: 1097-1099, DECEMBER 8, 1923. (IN GERMAN)

TOPICS COVERED ARE PROPERTIES OF WIND, INVESTIGATION OF YIELD OF ENERGY FROM WIND AND INFLUENCE OF AUTOMATIC REGULATION OF WIND WHEEL, AND PROPERTIES OF DIFFERENT TYPES OF D.C. AND THREE-PHASE MOTORS.

23-0012 WIND-DRIVEN ELECTRIC GENERATORS.
PRACT. ENG. 67: 123-124, MARCH 1923.

A WIND POWER PLANT MANUFACTURED BY THE GLASCOW ELECTRICAL ENGINEERING CO., LTD., IS DESCRIBED.

23-0013 WIND-DRIVEN ELECTRIC LIGHTING PLANT.
ENGINEERING 116: 571, NOVEMBER 2, 1923.

DESCRIBED IS A PLANT CONSTRUCTED BY THE LAMBERT ENGINEERING COMPANY, HARROW, ENGLAND.

22-0003 BOSSELMANN R
PROPOSALS FOR D.C. CENTRAL STATION DRIVEN BY WIND POWER.
ELEKTR. KRAFTBETR. BAHNEN 20: 261-263, DECEMBER 10, 1922. (IN GERMAN)

22-0004 FREE POWER.
POWER PLANT ENG. 26: 868, SEPTEMBER 1, 1922.

22-0005 HERZOG K
THE USE OF ASYNCHRONOUS GENERATORS IN WIND MOTORS.
ELEKTROTECH. Z. 43: 961-963, JULY 28, 1922. (IN GERMAN)

THIS ARTICLE PRINTS OUT THE ADVANTAGES AND DISADVANTAGES OF THREE-PHASE-CURRENT GENERATION BY MEANS OF WIND MOTORS IN MOUNTAINOUS REGIONS.

22-0006 JOCHUM M L
TURBINE A VENT. (WIND TURBINE).
SWISS PATENT NO. 96045, SEPTEMBER 10, 1922. (IN FRENCH)

22-0007 WINDMILL STORES ELECTRICITY FOR ELEVEN DAY'S USE.
POP. MECH. 37: 254, FEBRUARY 1922.

22-0008 WIND-POWER FOR THE GENERATION OF ELECTRICITY.
ELECTRICIAN 88: 509, APRIL 28, 1922.

BRIEFLY DESCRIBED IS A SYSTEM FOR THE GENERATION OF ELECTRICITY BY MEANS OF AUTOMATIC HIGH-SPEED WIND DYNAMOS, DESIGNED BY F.A. WILKINSON AND PARTNERS.

21-0003 BASIAUX-DEFRANCE P
SOME CONSIDERATIONS ON UTILIZING WIND ENERGY.
REV. GEN. ELECT. 9(7): 214-216, 1921. (IN FRENCH)

THE AUTHOR DESCRIBES IN GENERAL TERMS THE NECESSITY OF FINDING A PRACTICAL SOLUTION TO THE WIND POWER UTILIZATION PROBLEM AND GIVES SOME DIRECTIVES TO SOLVE THIS PROBLEM.

21-0004 HARNESSING THE WIND TO MAKE ELECTRICITY FOR FARM.
ELECTR. REV. 79: 662, OCTOBER 29, 1921.

THIS ARTICLE DESCRIBES THE "AEROELECTRIC" WINDMILL, GENERATOR AND STORAGE BATTERY COMBINATION MANUFACTURED BY THE PERKINS CORPORATION, MISHAWAKA, INDIANA.

21-0005 HOFF W
THEORY OF THE IDEAL WINDMILL.
NACA TECH. NOTE 46, 1921.

21-0006 LIEBE H
THE WIND TURBINE AND ITS USE FOR THE GENERATION OF ELECTRICITY.
Z. VER. DEUTSCH ING. 65: 1082-1086, 1113-1115, 1921. (IN GERMAN)

COVERED ARE THE DESIGN AND EFFICIENCY OF WIND TURBINES, GENERATION OF ELECTRICITY WITH SMALL SEPARATE PLANTS, AND GENERATION OF DIRECT AND THREE-PHASE CURRENT.

21-0007 PFLEIDERER C
APPLICATION OF THE ELEMENTARY TURBINE THEORY TO THE CALCULATION OF WINDMILLS.
Z. ANGEW. MECH. 1(3): 180-188, 1921. (IN GERMAN)

THE AUTHOR TRIES TO FASHION THE SHAPE OF A BLADE IN SUCH A MANNER THAT FROM A GIVEN WHEEL SURFACE A MAXIMUM OUTPUT CAN BE OBTAINED.

21-0008 SCHOU E
FUNDAMENTAL PRINCIPLES OF MODERN WINDMILLS.
INGENIOREN 30: 209-220, APRIL 16, 1921. (IN DANISH)

21-0009 WINDMILLS FOR THE GENERATION OF ELECTRICITY.
ELEKTROTECH. ANZEIGER 38: 1-2, 5-6, 9-10, JANUARY 1921. (IN GERMAN)

20-0005 ADLER E
THE UTILIZATION OF WIND POWER FOR THE GENERATION OF ELECTRICITY.
INGENIOEREN 29: 595-598, 1920. (IN DANISH)

THE ARTICLE DISCUSSES DENMARK'S UTILIZATION OF WINDPOWER BECAUSE OF ITS CLIMATE AND THE WORK OF PROF. LA COUR.

20-0006 BAUDISCH H
CONTRIBUTIONS TO THE CALCULATION OF WIND POWER MACHINES.
Z. GES. TURBWES. 17(11): 125-128, 1920; 17(12): 136-139, 1920. (IN GERMAN)

20-0007 MAYERSOHN M
STUDY AND DESIGN OF WIND POWER PLANT.
Z. VER. DEUTSCH ING. 64: 925-931, 1920. (IN GERMAN) SUMMARY: ENGINEERING 110: 769, 1920.

THESE ARTICLES ARE SUMMARIES OF A DISSERTATION PRESENTED TO THE BERLIN TECHNICAL HIGH SCHOOL.

20-0008 MUNK M M
WIND DRIVEN AIRSCREWS.
Z. FLUGTECH. MOTORLUFTSCHIFF 11(15): 220-223, 1920. (IN GERMAN) ALSO: NACA TECH. MEMO. NO. 201, 1920.

20-0009 SCHITTKE R
WIND POWER AS A FULL SUBSTITUTE FOR COAL.
ELEKTROTECH. ANZEIGER. 37: 636, AUGUST 24, 1920.

20-0010 WEISS E
WIND TURBINES.
NATURE (PARIS) 48: 257-259, OCTOBER 23, 1920.

SEVERAL TYPES OF WIND TURBINES ARE DESCRIBED.

19-0003 BLAZDELL C
A SIX-FOOT EXPERIMENTAL WIND MOTOR.
MODEL ENG. ELECTR. 40: 145-151, AUGUST 14, 1919; 171-178, AUGUST 21, 1919.

19-0004 SCHUBACH P
WIND POWER FOR ELECTRICITY GENERATION.
ELEKTROTECH. MASCHBAU. 36: 385, AUGUST 25, 1918. (IN GERMAN) ALSO: MECH. ENG. 41: 58-59, JANUARY 1919.

19-0005 TORNER G
ELECTRICITY GENERATION THROUGH WIND TURBINES.
ELEKTROTECH. ANZEIGER 36: 239-240, MAY 29, 1919; 253-254, JUNE 5, 1919; 257-258, JUNE 8, 1919. (IN GERMAN)

19-0006 VINDING P
WINDMILLS.
COPENHAGEN, J. JORGENSEN + CO., 1919. 40 P. (IN DANISH) ALSO: INGENIOEREN 28: 401-411, 467-468, 511-512, 537, 601-603, 1919. (IN DANISH)

THIS BOOK CONTAINS FORMULAE FOR FINDING CORRECT SKEW OF SAILS, POWER DEVELOPED BY GIVEN WIND VELOCITY PRESSURE ON SAILS, AND VELOCITY OF ARMS.

17-0001 CULVER F S
PERFORMANCE OF TWO SUCCESSFUL WINDMILL GENERATING PLANTS.
ELECTR. WORLD 69: 367-369, FEBRUARY 24, 1917.

THIS DESCRIBES RESULTS OBTAINED WITH TWO EXPERIMENTAL ELECTRIC GENERATING SETS IN WISCONSIN.

12-0005 STERTZ O
MODERN WIND TURBINES.
LEIPZIG, VOIGHT, 1912. 174 P. (IN GERMAN)

03-0004 THE ROYAL AGRICULTURAL SOCIETY'S WINDMILL TRIALS.
ENGINEER 95: 431-442, 1903.

THIS IS A DETAILED REPORT OF THE ROYAL AGRICULTURAL SOCIETY'S WINDMILL TRIAL. 21 WATER PUMPING WINDMILLS OF THE MULTI-BLADE TYPE HAVE BEEN PROVIDED BY 17 COMPETITORS. MANY CONSTRUCTION DETAILS ARE SHOWN, SUCH AS ROTORS, POWER TRANSMISSIONS, TOWERS, CONTROL MECHANISMS AND WATER PUMPS. EACH TURBINE WAS INSTALLED ON A 40 FT HIGH TOWER.

99-0001 BARBOUR E H
WELLS AND WINDMILLS IN NEBRASKA.
U.S.G.S. WATER SUPPLY AND IRRIGATION PAPERS, NO. 29, 1899. 85 P.

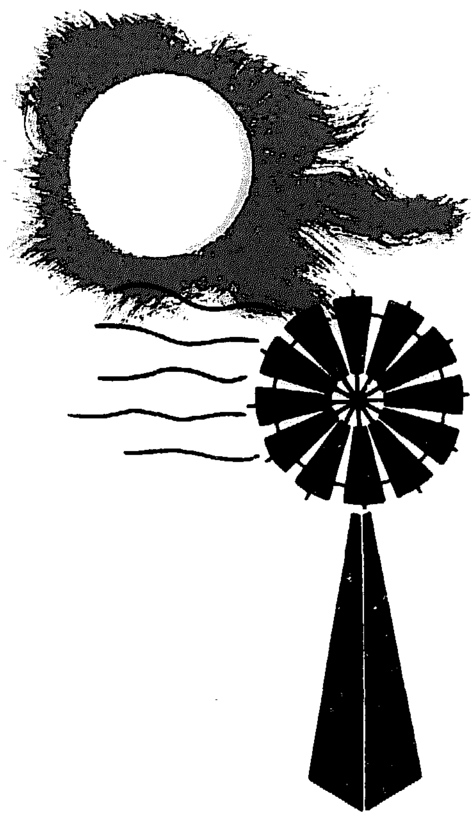
97-0001 BARBOUR E H
THE HOMEMADE WINDMILLS OF NEBRASKA.
BULL. U.S. AGRIC. EXP. STA. 11(4): 1897. 78 P.

INDEXES

The following indexes (author, subject, report number, and conference proceedings) are for the Second Supplement only. If the Second Supplement is merged with the Basic Volume and First Supplement the indexes provided with the First Supplement must be retained.

AUTHOR INDEX

CONFERENCE PROCEEDINGS INDEX



ENERGY FROM THE WIND

Annotated Bibliography

THIRD SUPPLEMENT

April 1982

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Supplement Three of ENERGY FROM THE WIND – ANNOTATED BIBLIOGRAPHY adds another 2455 references to the 3381 collected in the previous three volumes (Basic Volume, 1975; First Supplement, 1977; Second Supplement, 1979). The entire file is now on computer, resulting in a data base of over 6300 references on wind energy which is searchable by author, subject, report number, publisher, date, or other parameters. See more information about the search service, WINDSEARCH, on the following pages.

This volume is formatted, as were the others, to be combined with the earlier volumes if desired, or to stand alone. Entry numbers for each year begin with the next consecutive number following the last entry number for that year in Supplement Two.

This volume includes Author, Subject, Report Number, and Conference Proceedings Indexes just for Supplement Three. A volume of cumulative indexes covering all four volumes is available separately. The Basic Volume and First Supplement were manually produced and have a cumbersome "Broad Subject or Type of Material Index". The new Subject Index (in the volume of Cumulative Indexes) uses a detailed thesaurus and is far superior. It is also very useful for defining search strategies for WINDSEARCH.

Future supplements are planned, to be issued at more frequent intervals. A change in scope is also planned. Originally there was so little in the literature on wind energy that anything mentioning it was picked up. Today the literature is so voluminous that future supplements will only cite references to publications which have wind energy as the only, or one of few, emphases. This will help to keep future volumes smaller, less expensive, easier to use, and more relevant.

As always, comments or suggestions are welcome at any time – especially references to publications somehow missed, or corrections to existing entries. Please contact me directly:

Barbara L. Burke
Engineering Sciences Branch Library
Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

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We are offering WINDSEARCH – access to the data base at low, cost-recovery rates. You may find that a fairly inexpensive WINDSEARCH is much more cost-effective than manually searching the four volumes of ENERGY FROM THE WIND. You simply submit a statement of the subject of your search, including all relevant keywords, synonyms, and other requirements (language, date, geographic location, type of material, etc.). Through various combinations of these parameters we produce a special listing of relevant citations.

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WINDSEARCH

ENERGY FROM THE WIND - ANNOTATED BIBLIOGRAPHY

The computer system used to produce ENERGY FROM THE WIND has a search component which allows the running of custom literature searches tailored to the requestor's needs. Keywords can be combined using the Boolean "and", "or", or "and not" to produce specialized lists of references on narrower aspects of wind energy. Any part of the references can be searched. The most common, and efficient, use of the system is to combine descriptors from the Subject Index. These can be further combined with free terms, date of publication, language, issuing agency, or any other parameters which can be easily identified in the reference.

SAMPLE SEARCHES:

1. All references on "design — small scale" and ("developing countries" or "remote areas" or "appropriate technology").
2. All references from the Brace Research Institute.
3. All references to "patents" on "vertical axis" turbines from 1976 to date.

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BIBLIOGRAPHY

The bibliography is organized by year, in entry number order. So that this supplement may be merged with the previous volumes if desired, entry numbers are assigned to follow consecutively those entry numbers used in the earlier volumes. Therefore, in most years entry numbers do not begin with "1", but with a number to immediately follow the last entry number used for that year in the Second Supplement.

The Third Supplement may be merged with the first three volumes, or left separate. The indexes in this supplement are for the Third Supplement only, so that if the four volumes are merged, the old indexes must be retained. A volume of Cumulative Indexes covering all four volumes has been produced, and is available separately. For information on the Cumulative Indexes, contact Publications, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523.

1981-0001 AKINS R E
METHODS FOR ANALYSIS OF WIND RIPPLE IN WIND TURBINES.
NTIS, APRIL 1981. 75 P.
SAND-81-7006

EFFICIENT AND ECONOMICAL UTILIZATION OF WIND POWER WILL REQUIRE THE ABILITY TO MEASURE AND ULTIMATELY PREDICT THE EFFECTS FLUCTUATIONS IN THE INCIDENT WIND WILL HAVE ON A WIND TURBINE. IN ORDER TO BEGIN TO QUANTITATIVELY ASSESS THESE EFFECTS, EXPERIMENTAL TECHNIQUES HAVE BEEN DEVELOPED WHICH ALLOW ANALYSIS OF FULL-SCALE PERFORMANCE OF WIND TURBINES WITH PARTICULAR EMPHASIS ON THE EFFECTS CAUSED BY TURBULENCE IN THE INCIDENT WIND.

1981-0002 ARONSON E A, CASKEY D L, CASKEY B C
SOLSTOR DESCRIPTION AND USER'S GUIDE.
NTIS, MARCH 1981. 131 P.
SAND-79-2330

THIS REPORT DESCRIBES THE COMPUTER SIMULATION CODE SOLSTOR. THE CODE SIMULATES ENERGY SYSTEMS IN WHICH ELECTRICITY IS GENERATED BY EITHER A PHOTOVOLTAIC (PV) SYSTEM OR A WIND TURBINE GENERATOR (WTG). STORAGE MAY OR MAY NOT BE PRESENT. BACKUP ELECTRICITY, IF NEEDED, IS PROVIDED EITHER FROM A UTILITY GRID OR FROM A FUEL-BURNING GENERATOR. SOLSTOR MINIMIZES THE LIFE CYCLE COST OF PROVIDING ENERGY BY CHOOSING THE OPTIMAL SOLAR OR WIND SYSTEM COMPONENT SIZES. RATES FOR ELECTRICITY PURCHASED FROM THE GRID CAN INCLUDE TIME-OF-DAY (TOD) ENERGY CHARGES AS WELL AS TIME-OF-DAY PEAK DEMAND CHARGES. SELL-BACK TO THE GRID OF EXCESS COLLECTED ENERGY IS ALSO CONSIDERED.

1981-0003 BALMER T, METZGER B
GEARING UP FOR WIND TURBINES.
ALTERN. SOURCES ENERGY NO. 49: 33-35, MAY/JUNE 1981.

1981-0004 BANKAITIS H
LIGHTNING ACCOMMODATION SYSTEM FOR WIND TURBINE GENERATOR SAFETY.
NTIS, 1981. 14 P.
DOE/NASA/20320-31, NASA-TM-82601

WIND TURBINE GENERATORS ARE BEING EVALUATED AS ALTERNATE SOURCES OF ELECTRICAL ENERGY. THE WIND TURBINE SAFETY PROGRAM IDENTIFIES THE NATURALLY OCCURRING LIGHTNING PHENOMENON AS A HAZARD WITH THE POTENTIAL TO CAUSE LOSS OF PROGRAM OBJECTIVES, INJURE PERSONNEL, DAMAGE SYSTEM INSTRUMENTATION, STRUCTURE OR SUPPORT EQUIPMENT AND FACILITIES. THE LEWIS RESEARCH CENTER IS RESPONSIBLE FOR THE DEVELOPMENT OF LARGE WIND TURBINES IN THE 100 KW TO MULTIMEGAWATT SIZE RANGE. IN SUPPORT OF THIS PROGRAM, SEVERAL CANDIDATE METHODS OF LIGHTNING ACCOMMODATION FOR EACH BLADE HAVE BEEN DESIGNED, ANALYZED, AND TESTED BY SUBMITTING SAMPLE BLADE SECTIONS TO SIMULATED LIGHTNING. AT THE PRESENT TIME, LIGHTNING ACCOMMODATION SYSTEMS FOR COMPOSITE BLADES ARE BEING INDIVIDUALLY DEVELOPED. THEIR EFFECTIVENESS IS EVALUATED BY SUBMITTING THE SYSTEMS TO SIMULATED LIGHTNING STRIKES. THE TEST DATA IS ANALYZED AND SYSTEM DESIGNS ARE REVIEWED ON THE BASIS OF THE ANALYSIS. THIS ACTIVITY IS DIRECTED AT DEFINING DESIGN AND PROCEDURAL CONSTRAINTS, REQUIREMENTS FOR SAFETY DEVICES AND WARNING METHODS, SPECIAL PROCEDURES, PROTECTIVE EQUIPMENT AND PERSONNEL TRAINING.

1981-0005 BARNA P S
SCALE MODEL STUDIES FOR IMPROVEMENT OF FLOW PATTERNS OF A LOW-SPEED TUNNEL.
NTIS, MARCH 1981. 29 P.
N81-18065, NASA-CR-164030

FLOW ALONG A NACELLE WAS INVESTIGATED WITH AND WITHOUT AN ORIFICE PLATE INSERTED INTO THE AIRSTREAM. THE FLOW BECAME MORE UNIFORM IN TRANSIT THROUGH THE ORIFICE WHEN COMPARED WITH THE UPSTREAM FLOW AND REMAINED MORE UNIFORM IMMEDIATELY DOWNSTREAM FROM THE ORIFICE. NO IMPROVEMENT WAS FOUND FARTHER DOWNSTREAM WITH OR WITHOUT THE ORIFICE PLATE. VARIOUS WINDMILLS WERE STUDIED TO DETERMINE THEIR EFFECTS ON THE DOWNSTREAM FLOW PATTERN. THE WINDMILL RETARDED FLOW VELOCITY INSIDE THE CIRCLE INSCRIBED BY THE TIP OF FREE WHEELING PROPELLERS (USED AS SUBSTITUTE WINDMILLS), WHILE THE MAIN STREAM PASSED OVER THE BLADES SEEMINGLY UNRESTRICTED AND WITHOUT SHOWING ANY INCREASE IN DIAMETER. RESULTS SHOW THAT BY VARYING A TORQUE, THE FLOW ACROSS A WINDMILL CAN BE EFFECTIVELY REDISTRIBUTED, AN EFFECT THAT COULD BE GAINFULLY EMPLOYED IN SITUATIONS WHERE THE MAIN FLOW INTO A DIFFUSER IS CONCENTRATED NEAR THE CENTER. THE CONSTRUCTION OF THE 1/24 SCALE MODEL TUNNEL AND THE VELOCITY TRANSVERSES OBTAINED ON THE MODEL ARE DISCUSSED. THE TRANSVERSES INDICATE THAT THE VELOCITY DISTRIBUTION MAY BE CONSIDERED WORSE IN THE VERTICAL THAN IN THE HORIZONTAL PLANE.

1981-0006 BASE T E, PHILLIPS P, ROBERTSON G, NOWAK E S
ON THE WAKE OF A DARRIEUS TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 51-66.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IN THE PAPER, THE THEORY AND EXPERIMENTAL MEASUREMENTS ON THE AERODYNAMIC DECAY OF A WAKE FROM HIGH PERFORMANCE VERTICAL AXIS WIND TURBINE WILL BE DISCUSSED. IN THE INITIAL EXPERIMENTAL STUDY, THE WAKE DOWNSTREAM OF A MODEL DARRIEUS ROTOR, 28 CM DIAMETER AND A HEIGHT OF 45.5 CM, WAS MEASURED IN THE UNIVERSITY BOUNDARY LAYER WIND TUNNEL. THE WIND TURBINE WAS RUN AT THE DESIGN TIP SPEED RATIO OF 5.5. IT WAS FOUND THAT THE WAKE DECAYED AT A SLOWER RATE WITH DISTANCE DOWNSTREAM OF THE TURBINE, THAN A WAKE FROM A SCREEN WITH SIMILAR TROPOSKEIN SHAPE AND DRAG FORCE CHARACTERISTICS AS THE DARRIEUS ROTOR. THE INITIAL WIND TUNNEL RESULTS INDICATED THAT THE VERTICAL AXIS WIND TURBINES SHOULD BE SPACED AT LEAST FORTY DIAMETERS APART TO AVOID MUTUAL POWER DEPRECIATION GREATER THAN TEN PER CENT.

1981-0007 BEANS E W
AN APPROXIMATE METHOD FOR SOLUTION TO VARIABLE MOMENT OF INERTIA PROBLEMS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 173-176.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE "WEATHERING VANING" MOTION OF A WIND TURBINE WITH A MOVING ROTOR IS AN OSCILLATORY PROBLEM WITH A VARIABLE MOMENT OF INERTIA. THE ANALYSIS OF SUCH A MOTION REQUIRES THE SOLUTION OF A NON-LINEAR DIFFERENTIAL EQUATION. IN THIS ARTICLE AN APPROXIMATION METHOD IS PRESENTED FOR REDUCING THE PROBLEM TO AN EQUIVALENT CONSTANT MOMENT OF INERTIA PROBLEM. THE METHOD IS BASED ON THE ASSUMPTION THAT A MOVING ROTOR IS AN INTEGRATOR AND, THEREFORE, THE PROBLEM WILL BEHAVE AS IF IT HAS AN AVERAGE MOMENT OF INERTIA. IT IS FURTHER ASSUMED THAT THIS WILL BE A VALID SOLUTION TO THE PROBLEM IF THE ROTATING SPEED OF THE WIND TURBINE IS INFINITE. THE METHOD CONSISTS OF DETERMINING THE INTEGRATED AVERAGE OF THE MOMENT OF INERTIA FOR A SINGLE ROTATION. THIS AVERAGED VALUE CAN THEN BE USED TO DETERMINE EQUIVALENT NATURAL FREQUENCY OF THE SYSTEM AND OTHER DYNAMIC PROPERTIES. THE METHOD

IS SHOWN TO BE VALID BY SOLVING THE NON-LINEAR DIFFERENTIAL EQUATION FOR VARIOUS ROTATING SPEEDS.

1981-0008 BEAULIEU G, NOISEUX D
COMPUTATION OF THE MODES AND POLAR MOMENT OF INERTIA OF THE BLADES OF AN HAWT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 177-187.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NUMERICAL SOLUTION OF THE COUPLED DIFFERENTIAL EQUATIONS OF MOTION OF THE BLADES OF AN HORIZONTAL AXIS WIND TURBINE IS A MORE DIRECT APPROACH THAN THE TECHNIQUE OF FINITE ELEMENTS, PERMITTING THE OPTIMIZATION OF THE DESIGN AT RELATIVELY LOW COST. THE PROCEDURE CONSISTS OF TRANSFORMING THE EQUATION OF MOTION INTO A SET OF FIRST ORDER EQUATIONS AND SOLVING THEM WITH FOURTH ORDER RUNGE-KUTTA INTEGRATORS. THIS TECHNIQUE IS APPLIED TO A TWISTED, TAPERED BLADE OF VARIABLE CROSS SECTION AND STIFFNESS INCLUDING DISCONTINUITIES. THE FIRST SIX NATURAL FREQUENCIES AND MODE SHAPES ARE OBTAINED. THIS TECHNIQUE IS EXTENDED TO OBTAIN THE POLAR MOMENT OF INERTIA OF THE BLADES AS A FUNCTION OF FREQUENCY AND ROTATIONAL SPEED. A GOOD MATCH WITH THE EXPERIMENTAL RESULTS IS ACHIEVED.

1981-0009 BELEW W W, WOOD B L, MARIE T L, REINHARDT C L
WIND ENERGY SYSTEMS INFORMATION USER STUDY.
NTIS, JANUARY 1981. 254 P.
SERI/TR-751-749

THIS REPORT DESCRIBES THE RESULTS OF A SERIES OF TELEPHONE INTERVIEWS WITH USERS OF INFORMATION ON WIND ENERGY SYSTEMS. THESE RESULTS, PART OF A LARGE STUDY ON MANY DIFFERENT SOLAR TECHNOLOGIES, IDENTIFY TYPES OF INFORMATION EACH GROUP NEEDED AND THE BEST WAYS TO GET INFORMATION TO EACH GROUP. THE REPORT IS ONE OF 10 DISCUSSING STUDY RESULTS. RESULTS FROM 10 WIND ENERGY GROUPS ARE ANALYZED IN THIS REPORT: DOE-FUNDED RESEARCHERS, NON-DOE-FUNDED RESEARCHERS, REPRESENTATIVES OF MANUFACTURERS, DISTRIBUTORS, ENGINEERS (2 GROUPS), REPRESENTATIVES OF UTILITIES, EDUCATORS, COOPERATIVE EXTENSION SERVICE COUNTY AGENTS, AND SMALL SYSTEM USERS. THE DATA WILL BE USED AS INPUT TO THE DETERMINATION OF INFORMATION PRODUCTS AND SERVICES THE SOLAR ENERGY RESEARCH INSTITUTE, THE SOLAR ENERGY INFORMATION DATA BANK NETWORK, AND THE ENTIRE INFORMATION OUTREACH COMMUNITY SHOULD BE PREPARING AND DISSEMINATING.

1981-0010 BERGESON L, CLEMMER G L, YORK J E, BATES A P, MAYS J H
WIND PROPULSION FOR SHIPS OF THE AMERICAN MERCHANT MARINE. FINAL REPORT.
NTIS, MARCH 1981. 276 P.
PB81-162455

THIS REPORT PRESENTS THE TECHNICAL AND ECONOMIC RATIONALE FOR UTILIZING WIND PROPULSION SYSTEMS FOR COMMERCIAL SHIPPING--SPECIFICALLY VESSELS OF THE AMERICAN MERCHANT MARINE. ALTERNATIVE RIG CONFIGURATIONS RANGING FROM FORE-AND-AFT AND SQUARE SAILS TO WING SAILS AND WIND TURBINES ARE EVALUATED FOR THEIR AERODYNAMIC EFFICIENCY, TECHNICAL FEASIBILITY AND COST. AN INTEGRATED, ANALYTICAL COMPUTER MODEL IS DESCRIBED AND USED FOR THE PARAMETRIC ANALYSIS OF CONVENTIONALLY POWERED AND MOTOR SAILING VESSELS. U.S.-FOREIGN OCEANBORNE TRADE ROUTES ARE EVALUATED FOR THEIR SAIL-ASSIST POTENTIAL. THE CONCEPTUAL DESIGN OF A 20,000 CDWT SAIL-ASSIST MULTIPURPOSE DRY CARGO VESSEL IS PRESENTED AND DISCUSSED.

1981-0011 BOARDMAN R W, PATTON R, CURTICE D H
IMPACT OF DISPERSED SOLAR AND WIND SYSTEMS ON ELECTRIC DISTRIBUTION PLANNING AND OPERATION.
NTIS, FEBRUARY 1981. 189 P.
ORNL/SUB-7662/1

SMALL-SCALE DISPERSED SOLAR PHOTOVOLTAIC AND WIND GENERATION (DSW) WILL AFFECT THE GENERATION, TRANSMISSION, AND DISTRIBUTION SYSTEMS OF AN ELECTRIC UTILITY. THIS STUDY EXAMINES THE TECHNICAL AND ECONOMIC IMPACTS OF DISPERSING DSW DEVICES WITHIN THE DISTRIBUTION SYSTEM.

1981-0012 BOTTRELL G W
PASSIVE CYCLIC PITCH CONTROL FOR HORIZONTAL AXIS WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 271-275.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A NEW FLEXIBLE ROTOR CONCEPT, CALLED THE BALANCED-PITCH ROTOR, IS DESCRIBED. THE SYSTEM PROVIDES PASSIVE ADJUSTMENT OF CYCLIC PITCH IN RESPONSE TO UNBALANCED PITCHING MOMENTS ACROSS THE ROTOR DISK. VARIOUS APPLICATIONS ARE DESCRIBED AND PERFORMANCE PREDICTIONS ARE MADE FOR WIND SHEAR AND CROSS WIND OPERATING CONDITIONS. COMPARISONS WITH THE TEETERED HUB ARE MADE AND SIGNIFICANT COST SAVINGS ARE PREDICTED.

1981-0013 BROOKS B M
MOD-0 WIND TURBINE DYNAMICS TEST CORRELATIONS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 287-293.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE BEHAVIOR OF THE TEETERED, DOWNWIND, FREE YAW, MOD-0 WIND TURBINE, AS REPRESENTED BY NASA DYNAMIC TEST DATA, WAS USED TO SUPPORT CONFIDENCE IN THE HAMILTON STANDARD COMPUTER CODE SIMULATIONS. TRIM POSITION, PERFORMANCE AT TRIM, AND TEETER RESPONSE AS PREDICTED BY THE COMPUTER CODES WERE COMPARED TO TEST RESULTS. USING THE COMPUTER CODES, OTHER POSSIBLE CONFIGURATIONS FOR MOD-0 WERE INVESTIGATED. SEVERAL NEW TEST CONFIGURATIONS ARE RECOMMENDED FOR EXPLORING FREE YAW BEHAVIOR. IT IS SHOWN THAT ELIMINATING ROTOR TILT AND OPTIMIZING CONING AND BLADE TWIST CAN CONTRIBUTE TO GOOD FREE YAW BEHAVIOR AND STABILITY. THE EFFECTS OF ROTOR TEETER, TEETER GRAVITY BALANCE, INFLOW AND OTHER PHYSICAL AND OPERATING PARAMETERS WERE ALSO INVESTIGATED.

1981-0014 BROWNING J A
THE HYDRAULIC WINDMILL.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 151-154.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE HYDRAULIC WINDMILL PUMPS PRESSURIZED OIL FROM ROTOR SHAFT LEVEL TO THE GROUND WHERE A MOTOR-GENERATOR PRODUCES ELECTRICITY. ALTERNATIVELY, THE USEFUL OUTPUT MAY BE HEAT. ROTOR SPEED IS GOVERNED BY A FLOW VALVE. OVER PRESSURE, THE RESULT OF HIGH WIND VELOCITY, ROTATES THE TAIL TO MOVE THE ROTOR BLADES OUT-OF-THE-WIND. LOSS OF OIL PRESSURE CAUSES A BRAKE TO CLOSE AS WELL AS TO SWING THE TAIL TO ITS MAXIMUM DISTANCE FROM THE ROTOR PLANE.

1981-0015 CARNE T G
GUY CABLE DESIGN AND DAMPING FOR VERTICAL AXIS WIND TURBINES.
NTIS, MAY 1981. 35 P.
SAND-80-2669

GUY CABLES ARE FREQUENTLY USED TO SUPPORT VERTICAL AXIS WIND TURBINES SINCE GUYING THE TURBINE REDUCES SOME OF THE STRUCTURAL REQUIREMENTS ON THE TOWER. THE GUYS MUST BE DESIGNED TO PROVIDE BOTH THE REQUIRED STRENGTH AND THE REQUIRED STIFFNESS AT THE TOP OF THE TURBINE. THE AXIAL LOAD WHICH THE GUYS APPLY TO THE TOWER, BEARINGS, AND FOUNDATIONS IS AN UNDESIRABLE CONSEQUENCE OF USING GUYS TO SUPPORT THE TURBINE. LIMITING THE AXIAL LOAD SO THAT IT DOES NOT SIGNIFICANTLY AFFECT THE COST OF THE TURBINE IS AN IMPORTANT OBJECTIVE OF THE CABLE DESIGN. THE LATERAL VIBRATION OF THE CABLES IS ANOTHER FEATURE OF THE CABLE DESIGN WHICH NEEDS TO BE CONSIDERED. THESE ASPECTS OF THE CABLE DESIGN ARE DISCUSSED IN THIS PAPER, AND A TECHNIQUE FOR DAMPING CABLE VIBRATIONS IS MATHEMATICALLY ANALYZED AND DEMONSTRATED WITH EXPERIMENTAL DATA.

1981-0016 CARNE T G
GUY CABLE DESIGN AND DAMPING FOR VERTICAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 255-264.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

GUY CABLES ARE FREQUENTLY USED TO SUPPORT VERTICAL AXIS WIND TURBINES SINCE GUYING THE TURBINE REDUCES SOME OF THE STRUCTURAL REQUIREMENTS ON THE TOWER. THE GUYS MUST BE DESIGNED TO PROVIDE BOTH THE REQUIRED STRENGTH AND THE REQUIRED STIFFNESS AT THE TOP OF THE TURBINE. THE AXIAL LOAD WHICH THE GUYS APPLY TO THE TOWER, BEARINGS, AND FOUNDATIONS IS AN UNDESIRABLE CONSEQUENCE OF USING GUYS TO SUPPORT THE TURBINE. LIMITING THE AXIAL LOAD SO THAT IT DOES NOT SIGNIFICANTLY AFFECT THE COST OF THE TURBINE IS AN IMPORTANT OBJECTIVE OF THE CABLE DESIGN. THE LATERAL VIBRATION OF THE CABLES IS ANOTHER FEATURE OF THE CABLE DESIGN WHICH NEEDS TO BE CONSIDERED. THESE ASPECTS OF THE CABLE DESIGN ARE DISCUSSED IN THIS PAPER, AND A TECHNIQUE FOR DAMPING CABLE VIBRATIONS IS MATHEMATICALLY ANALYZED AND DEMONSTRATED WITH EXPERIMENTAL DATA.

1981-0017 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 305-314.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS. IT HAS BEEN DEMONSTRATED THAT A SLIP CLUTCH LOCATED BETWEEN THE MOTOR AND BRAKE CAN REDUCE PEAK TORQUES BY THIRTY-EIGHT PERCENT.

1981-0018 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
NTIS, MARCH 1981. 51 P.
SAND-80-2646

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS. IT HAS BEEN DEMONSTRATED THAT A SLIP CLUTCH LOCATED BETWEEN THE MOTOR AND BRAKE CAN REDUCE PEAK TORQUES BY THIRTY-EIGHT PERCENT.

1981-0019 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
NTIS, 1981. 17 P.
SAND-80-2646C, CONF-810226-1

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS.

1981-0020 CURRIN H
NORTH WIND 4 KW "PASSIVE" CONTROL SYSTEM DESIGN.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 265-270.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN OVERVIEW OF A MECHANICAL ROTOR CONTROL DESIGN IS PRESENTED. OPERATION AT CONSTANT RPM AND RAPID RESPONSE ARE OBTAINED BY USING BLADE PITCH MOMENTS FOR BOTH SENSING CONTROL NEED AND BLADE PITCH ACTUATION. THE BASIC CONCEPT, STATIC OR EQUILIBRIUM DESIGN, AND DYNAMIC ANALYSIS ARE BRIEFLY PRESENTED.

1981-0021 CURTICE D, PATTON J
OPERATION OF SMALL WIND TURBINES ON A DISTRIBUTION SYSTEM. FINAL REPORT.
NTIS, MARCH 1981. 193 P.
RFP-3177-2

THIS STUDY HAS ANALYZED TECHNICAL INTERCONNECTION PROBLEMS ASSOCIATED WITH THE DISPERSED WIND TURBINE (WT) APPLICATION SCENARIO: WTS CONNECTED ON DISTRIBUTION SYSTEMS PRODUCING AC POWER DIRECTLY OR DC POWER FED INTO AN INVERTER, WITHOUT STORAGE SYSTEMS, FEEDING BACK SURPLUS POWER WHENEVER THE WIND IS BLOWING. ITS SPECIFIC

OBJECTIVES INCLUDED ANALYSIS OF: UTILITY PERSONNEL SAFETY; DISTRIBUTION SYSTEM AND WT PROTECTION EQUIPMENT; WTS' EFFECTS ON DISTRIBUTION FEEDER VOLTAGE AND REGULATION EQUIPMENT, AND LINE LOSSES; AND DEVELOPMENT OF A METHOD TO ANALYZE UTILITY LOAD-FREQUENCY CONTROL PROBLEMS WITH LOAD PATTERNS PRODUCED BY CUSTOMER DEMAND AND THE WTS' INTERMITTENT POWER OUTPUT.

1981-0022 CURTICE D, PATTON J
OPERATION OF SMALL WIND TURBINES ON A DISTRIBUTION SYSTEM. EXECUTIVE SUMMARY.
NTIS, MARCH 1981. 25 P.
RFP-3177-1

1981-0023 DEVELOPMENT OF SMALL WIND SYSTEMS IN THE USA.
INT. POWER GENERATION 4(1): 77-79, FEBRUARY 1981.

IN PARALLEL WITH THE WELL-KNOWN MOD PROGRAMME, THE WIND PROGRAMME OF THE US DOE ALSO ENCOMPASSES THE TESTING OF SMALL WIND GENERATOR SYSTEMS, UP TO 100 KW, AT A TEST SITE AT ROCKY FLATS, COLORADO. THIS PART OF THE PROGRAMME IS OPERATED FOR THE DOE BY ROCKWELL INTERNATIONAL AND IT IS INTENDED TO TEST MORE THAN 100 MACHINES AT THIS SITE.

1981-0024 DREIER M E, HOFFMAN J A
WIND ENERGY SYSTEM TIME-DOMAIN (WEST) ANALYZERS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 211-219.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

USING THE LATEST HYBRID ELECTRONICS TECHNOLOGY, A PORTABLE ANALYZER WHICH SIMULATES IN REAL TIME THE COMPLEX NONLINEAR DYNAMICS OF HORIZONTAL AXIS WIND ENERGY SYSTEMS HAS BEEN CONSTRUCTED. MATH MODELS FOR AN AEROELASTIC ROTOR FEATURING NONLINEAR AERODYNAMIC AND INERTIAL TERMS HAVE BEEN IMPLEMENTED WITH HIGH SPEED DIGITAL CONTROLLERS AND ANALOG CALCULATION; THIS ROTOR MODEL IS THEN COMBINED WITH OTHER MATH MODELS OF ELASTIC SUPPORTS, CONTROL SYSTEMS, A POWER TRAIN AND GIMBALLED ROTOR KINEMATICS. THE ANALYZER ALSO FEATURES A STROBOSCOPIC DISPLAY SYSTEM GRAPHICALLY DEPICTING DISTRIBUTED BLADE LOADS, MOTION, AND OTHER AERODYNAMIC FUNCTIONS ON A CATHODE RAY TUBE. THE VIEWER SEES A CLEAR PICTURE OF ROTOR DYNAMICS IN THE START-UP, SHUT-DOWN, AND TRIM STATES, AS WELL AS OPERATION IN SPECIAL TRANSIENT CONDITIONS SUCH AS GUST AND EMERGENCY SHUTDOWN. LIMITED CORRELATION EFFORTS HAVE SHOWN GOOD COMPARISON BETWEEN THE RESULTS OF THIS ANALYZER AND OTHER SOPHISTICATED DIGITAL SIMULATIONS; THE DIGITAL SIMULATION RESULTS HAVE BEEN SUCCESSFULLY CORRELATED WITH TEST DATA.

1981-0025 DUGUNDJI J, WENDELL J H
REVIEW OF ANALYSIS FOR ROTATING SYSTEMS WITH PERIODIC COEFFICIENTS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 165-172.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE PRESENT ARTICLE REVIEWS TWO OF THE MORE COMMON PROCEDURES FOR ANALYZING THE STABILITY AND FORCED RESPONSE OF EQUATIONS WITH PERIODIC COEFFICIENTS, NAMELY, THE USE OF FLOQUET METHODS, AND THE USE OF MULTIBLADE COORDINATE AND HARMONIC BALANCE METHODS. THE ANALYSIS PROCEDURES OF THESE PERIODIC COEFFICIENT SYSTEMS ARE COMPARED WITH THOSE OF THE MORE FAMILIAR CONSTANT COEFFICIENT SYSTEM.

1981-0026 EGOLF T A, LANDGREBE A J
THE UTRC WIND ENERGY CONVERSION SYSTEM PERFORMANCE ANALYSIS FOR HORIZONTAL AXIS WIND TURBINES (WECSPER).
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 27-34.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE THEORY FOR THE UTRC WIND ENERGY CONVERSION SYSTEM PERFORMANCE ANALYSIS (WECSPER) FOR THE PREDICTION OF HORIZONTAL AXIS WIND TURBINE PERFORMANCE IS PRESENTED. MAJOR FEATURES OF THE ANALYSIS ARE THE ABILITY TO: (1) TREAT THE WIND TURBINE BLADES AS LIFTING LINES WITH A PRESCRIBED WAKE MODEL; (2) SOLVE FOR THE WAKE-INDUCED INFLOW AND BLADE CIRCULATION USING REAL NONLINEAR AIRFOIL DATA; AND (3) ITERATE INTERNALLY TO OBTAIN A COMPATIBLE WAKE TRANSPORT VELOCITY AND BLADE LOADING SOLUTION. THIS ANALYSIS ALSO PROVIDES AN APPROXIMATE TREATMENT OF WAKE DISTORTIONS DUE TO TOWER SHADOW OR WIND SHEAR PROFILES. FINALLY, SELECTED RESULTS OF INTERNAL UTRC APPLICATION OF THE ANALYSIS TO EXISTING WIND TURBINES AND CORRELATION WITH LIMITED TEST DATA ARE DESCRIBED.

1981-0027 ENDLICH R M, LUDWIG F L, BHUMRALKAR C M, ESTOQUE M A
A PRACTICAL METHOD FOR ESTIMATING WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
NTIS, 1981. 178 P.
PNL-3808

TERRAIN FEATURES AND VARIATIONS IN THE DEPTH OF THE ATMOSPHERIC BOUNDARY LAYER PRODUCE LOCAL VARIATIONS IN WIND, AND THESE VARIATIONS ARE NOT DEPICTED WELL BY STANDARD WEATHER REPORTS. WE HAVE DEVELOPED A METHOD TO COMPUTE LOCAL WINDS FOR USE IN ESTIMATING THE WIND ENERGY AVAILABLE AT ANY POTENTIAL SITE FOR A WIND TURBINE. THE METHOD USES THE TERRAIN HEIGHTS FOR AN AREA SURROUNDING THE SITE AND A SERIES OF WIND AND PRESSURE REPORTS FROM THE NEAREST FOUR OR FIVE NATIONAL WEATHER SERVICE STATIONS. AN INITIAL ESTIMATE OF THE WINDS IN THE ATMOSPHERIC BOUNDARY LAYER IS MADE, THEN THESE WINDS ARE ADJUSTED TO SATISFY THE CONTINUITY EQUATION. IN THIS MANNER THE FLOW IS MADE TO REFLECT THE INFLUENCES OF THE TERRAIN AND THE SHAPE OF THE BOUNDARY-LAYER TOP. WE HAVE APPLIED THE METHOD TO SEVEN SITES IN THE UNITED STATES FOR 1977. FOR FOUR OF THE SITES, THE WINDFLOW MODEL WAS "TUNED" BY ALTERING ITS ADJUSTABLE FEATURES AND COMPARING THE CORRESPONDING WIND SIMULATIONS TO WIND MEASURMENTS THAT WERE MADE AT THE SITES UNDER THE AUSPICES OF THE PACIFIC NORTHWEST LABORATORY (PNL). FOR THE OTHER THREE SITES, SIMULATIONS WERE MADE WITHOUT TUNING THE MODEL. THIS REPORT DESCRIBES IN DETAIL OUR METHODOLOGY AND RESULTS, AND PROVIDES DESCRIPTIONS OF THE COMPUTER PROGRAMS, INSTRUCTIONS FOR USING THEM, AND COMPLETE PROGRAM LISTINGS.

1981-0028 EXPLOITING ORKNEY WINDS.
INT. POWER GENERATION 4(2): 9, 11, MARCH 1981.

THE USE OF WIND POWER HAS TAKEN A BIG STEP FORWARD IN THE UK WITH THE ANNOUNCEMENT THAT THE CONSTRUCTION OF A 3 MW WIND TURBINE GENERATOR IS TO GO AHEAD IN THE ORKNEY ISLANDS. THE MACHINE IS EXPECTED TO COST MORE THAN 5.6 MILLION AND THE MACHINE SHOULD BE IN OPERATION BY 1983/4, SUPPLYING POWER FOR THE ORKNEY GRID SYSTEM. A 250 KW WIND GENERATOR IS TO BE ERECTED ON AN ADJACENT SITE TO PROVIDE DATA FOR OPERATING THE LARGER MACHINE.

1981-0029 FADDOUL J R

TEST EVALUATION OF A LAMINATED WOOD WIND TURBINE BLADE CONCEPT.
NTIS, MAY 1981. 45 P.
DOE/NASA/20320-30, NASA-TM-81719

BECAUSE OF THE HIGH STIFFNESS AND FATIGUE STRENGTH OF WOOD (AS COMPARED TO DENSITY) ALONG WITH THE LOW COST MANUFACTURING TECHNIQUES AVAILABLE, A LAMINATED WOOD WIND TURBINE BLADE APPLICATION HAS BEEN STUDIED. THIS REPORT PRESENTS THE RESULTS OF THE TESTING PERFORMED ON ELEMENTS OF THE WOOD BLADE-TO-HUB TRANSITION SECTION WHICH USES STEEL STUDS CAST INTO A LAMINATED WOOD SPAR WITH A FILLED EPOXY.

1981-0030 FALLEN M, ZIEGLER J
PERFORMANCE CALCULATION OF A WIND POWER CONVERTER WITH A VERTICAL AXIS.
BRENNST.-WAERME-KRAFT 33(2): 54-59, FEBRUARY 1981. (IN GERMAN)

THE BASIS FOR THE PERFORMANCE CALCULATION IS THE DART CALCULATION MODEL BY STRICKLAND WHICH WAS MODIFIED FOR THE H-DARRIEUS ROTOR. THE ESSENTIAL EQUATIONS ARE SHOWN WHICH CAN BE SOLVED BY ITERATION ONLY. THE EFFECTS OF THE NUMBER OF BLADES, GEOMETRY OF THE WHEEL AND PROFILE FORM ON THE PERFORMANCE COEFFICIENT ARE DETERMINED BY CALCULATION. THE RESULTS ARE COMPARED WITH THOSE OF OTHER WIND MILL DESIGNS.

1981-0031 FINLAYSON A N
MAKING WINDPOWER AN IMPORTANT PART OF A NATIONAL ENERGY PLAN.
ASME PAPER 81-PET-11, 1981. 5 P.

A NEW AND RADICAL WIND TURBINE CONCEPT ILLUSTRATES A PROPOSED PHILOSOPHY FOR WIDESPREAD CONVERSION OF RENEWABLE ENERGY. WITH AN UNUSUALLY BROAD OPERATIONAL RANGE AND HIGH EFFICIENCY, THIS DEVICE DEMONSTRATES THE PRACTICAL USE OF A LOW DENSITY, CYCLIC ENERGY SOURCE. DUE TO ITS SIMPLICITY, LONGEVITY, AND USE OF READILY AVAILABLE MATERIALS AND TECHNOLOGY, THIS UNIT COULD PROVIDE LOW COST SUPPLEMENTAL SPACE AND WATER HEATING AS A SIGNIFICANT CONTRIBUTION TO A NATIONAL ENERGY PLAN.

1981-0032 FLAVIN C
WIND POWER: A TURNING POINT.
WORLDWATCH PAPER 45. WASHINGTON, D.C., WORLDWATCH INSTITUTE, JULY 1981. 56 P.

THIS IS A GENERAL REVIEW OF THE CURRENT STATUS OF WIND POWER AS AN ENERGY SOURCE IN THE WORLD TODAY.

1981-0033 FRANK A L
WINDMILL CLUSTERS AND GIANT TURBINES LOG MANY UPS, ONE DOWN.
SOL. AGE 6(6): 17, JUNE 1981.

RECENT DEVELOPMENTS IN LARGE-SCALE WIND PROJECTS ARE DESCRIBED, INCLUDING FAILURE OF A 500 KW TURBINE IN CALIFORNIA.

1981-0034 FREEMAN D L, HADLEY D L, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 2. THE NORTH CENTRAL REGION.
NTIS, FEBRUARY 1981. 191 P.
PNL-3195-WERA-2

THE NORTH CENTRAL ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA: ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE NORTH CENTRAL REGION (IOWA, MINNESOTA, NEBRASKA, NORTH DAKOTA, AND SOUTH DAKOTA). AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IS PROVIDED IN THE REGIONAL DISCUSSION, AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS, OVER SEVERAL TIME SCALES, IN THE WIND RESOURCE AT SELECTED STATIONS IN EACH STATE ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED DIRECTION AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0035 FROST W, LIN M-C
TWO-DIMENSIONAL TURBULENCE MODELS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 155-161.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

TWO-DIMENSIONAL TURBULENCE MODELS DESCRIBED IN THE NASA TECHNICAL PAPER 1359, "ENGINEERING HANDBOOK ON THE ATMOSPHERIC AND ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT", ARE COMPARED WITH EXPERIMENTAL MEASUREMENTS MADE USING AN ARRAY OF INSTRUMENTED TOWERS. DISCUSSION OF THE SPATIAL CORRELATION COEFFICIENT, THE TWO-POINT SPECTRUM OR CROSS SPECTRUM, AND THE COHERENCE FUNCTION IS GIVEN. THE PREDICTION TECHNIQUES IN GENERAL AGREE REASONABLY WELL WITH THE EXPERIMENTAL RESULTS. MEASUREMENTS OF THE INTEGRAL LENGTH SCALE HOWEVER, DO NOT CORRELATE WELL WITH THE PREDICTION MODEL RECOMMENDED IN THE DESIGN HANDBOOK.

1981-0036 FUNG T K, SCHEFFLER R L, STOLPE J
WIND ENERGY - A UTILITY PERSPECTIVE.
IEEE TRANS. POWER APPAR. SYST. PAS-100(3): 1176-1182, MARCH 1981.

OF ALL THE RENEWABLE ENERGY SYSTEMS, WIND TURBINE GENERATORS (WTGS) ARE LIKELY TO MAKE THE EARLIEST SIGNIFICANT COST-EFFECTIVE CONTRIBUTION TO THE UTILITY GRID. IN ORDER TO ACCELERATE THE COMMERCIAL DEPLOYMENT OF WTGS, SEVERAL ISSUES MUST BE ADDRESSED IN A TIMELY MANNER. THIS PAPER PRESENTS SOME OF THE ISSUES FACING THE UTILITY INDUSTRY AS THEY RELATE TO IMPLEMENTATION OF AN EFFECTIVE WIND ENERGY PROGRAM. IN ADDITION, THE SOUTHERN CALIFORNIA EDISON COMPANY'S WIND ENERGY PROGRAM IS PRESENTED, WHICH IS DESIGNED TO PROVIDE PERTINENT ANSWERS TO THE TECHNICAL, ECONOMIC AND ENVIRONMENTAL ISSUES CONCERNING WTG INSTALLATIONS AND THEIR COMMERCIAL VIABILITY AS A FUTURE GENERATION RESOURCE.

1981-0037 GLASGOW J C, MILLER D R, CORRIGAN R D
COMPARISON OF UPWIND AND DOWNWIND ROTOR OPERATIONS OF THE DOE/NASA 100 KW MOD-0 WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 225-234.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

TESTS HAVE BEEN CONDUCTED ON A 38 M DIAMETER HORIZONTAL AXIS WIND TURBINE, WHICH HAD FIRST A ROTOR DOWNWIND OF THE SUPPORTING TRUSS TOWER AND THEN UPWIND OF THE TOWER. ASIDE FROM THE PLACEMENT OF THE ROTOR AND THE DIRECTION OF ROTATION OF THE DRIVE TRAIN, THE WIND TURBINE WAS IDENTICAL FOR BOTH TESTS. THREE ASPECTS OF THE TEST RESULTS ARE COMPARED: ROTOR BLADE BENDING LOADS, ROTOR TEETER RESPONSE, AND NACELLE YAW MOMENTS. AS A RESULT OF THE TESTS, IT IS SHOWN THAT WHILE MEAN FLATWISE BENDING MOMENTS WERE UNAFFECTED BY THE PLACEMENT OF

THE ROTOR, CYCLIC FLATWISE BENDING TENDED TO INCREASE WITH WIND SPEED FOR THE DOWNWIND ROTOR WHILE REMAINING SOMEWHAT UNIFORM WITH WIND SPEED FOR THE UPWIND ROTOR, REFLECTING THE EFFECTS OF INCREASED FLOW DISTURBANCE FOR A DOWNWIND ROTOR. ROTOR TEETER RESPONSE WAS NOT SIGNIFICANTLY AFFECTED BY THE ROTOR LOCATION RELATIVE TO THE TOWER, BUT APPEARS TO REFLECT REDUCED TEETER STABILITY NEAR RATED WIND SPEED FOR BOTH CONFIGURATIONS. TEETER STABILITY APPEARS TO RETURN ABOVE RATED WIND SPEED, HOWEVER. NACELLE YAW MOMENTS ARE HIGHER FOR THE UPWIND ROTOR BUT DO NOT INDICATE SIGNIFICANT DESIGN PROBLEMS FOR EITHER CONFIGURATION.

1981-0038 GLASGOW J C, MILLER D R, CORRIGAN R D
COMPARISON OF UPWIND AND DOWNWIND ROTOR OPERATIONS OF THE DOE/NASA 100 KW MOD-0 WIND TURBINE.
NTIS, 1981. 10 P.
DOE/NASA/1028-31, NASA-TM-81744, N81-22472

TESTS HAVE BEEN CONDUCTED ON A 38 M DIAMETER HORIZONTAL AXIS WIND TURBINE, WHICH HAD FIRST A ROTOR DOWNWIND OF THE SUPPORTING TRUSS TOWER AND THEN UPWIND OF THE TOWER. ASIDE FROM THE PLACEMENT OF THE ROTOR AND THE DIRECTION OF ROTATION OF THE DRIVE TRAIN, THE WIND TURBINE WAS IDENTICAL FOR BOTH TESTS. THREE ASPECTS OF THE TEST RESULTS ARE COMPARED: ROTOR BLADE BENDING LOADS, ROTOR TEETER RESPONSE, AND NACELLE YAW MOMENTS. AS A RESULT OF THE TESTS, IT IS SHOWN THAT WHILE MEAN FLATWISE BENDING MOMENTS WERE UNAFFECTED BY THE PLACEMENT OF THE ROTOR, CYCLIC FLATWISE BENDING TENDED TO INCREASE WITH WIND SPEED FOR THE DOWNWIND ROTOR WHILE REMAINING SOMEWHAT UNIFORM WITH WIND SPEED FOR THE UPWIND ROTOR, REFLECTING THE EFFECTS OF INCREASED FLOW DISTURBANCE FOR A DOWNWIND ROTOR. ROTOR TEETER RESPONSE WAS NOT SIGNIFICANTLY AFFECTED BY THE ROTOR LOCATION RELATIVE TO THE TOWER, BUT APPEARS TO REFLECT REDUCED TEETER STABILITY NEAR RATED WIND SPEED FOR BOTH CONFIGURATIONS. TEETER STABILITY APPEARS TO RETURN ABOVE RATED WIND SPEED, HOWEVER. NACELLE YAW MOMENTS ARE HIGHER FOR THE UPWIND ROTOR BUT DO NOT INDICATE SIGNIFICANT DESIGN PROBLEMS FOR EITHER CONFIGURATION.

1981-0039 GREENE G C
MEASURED AND CALCULATED CHARACTERISTICS OF WIND TURBINE NOISE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 355-362.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER PRESENTS THE RESULTS OF AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF WIND TURBINE NOISE. NOISE CALCULATIONS INDICATE THAT FOR CONFIGURATIONS WITH THE ROTOR DOWNWIND OF THE SUPPORT TOWER, THE PRIMARY SOURCE OF NOISE IS THE RAPID CHANGE IN ROTOR LOADING WHICH OCCURS AS THE ROTOR PASSES THROUGH THE TOWER WAKE. NOISE MEASUREMENTS ARE PRESENTED FOR SOLID AND TRUSS-TYPE TOWER MODELS WITH BOTH UPWIND AND DOWNWIND ROTORS. UPWIND ROTOR CONFIGURATIONS ARE SHOWN TO BE SIGNIFICANTLY QUIETER THAN DOWNWIND CONFIGURATIONS. THE MODEL DATA SUGGEST THAT AVERAGED NOISE MEASUREMENTS AND NOISE CALCULATIONS BASED ON AVERAGED TOWER WAKE CHARACTERISTICS MAY NOT ACCURATELY REPRESENT THE IMPULSIVE NOISE CHARACTERISTICS OF DOWNWIND ROTOR CONFIGURATIONS.

1981-0040 HAM N D
FLUTTER OF DARRIEUS WIND TURBINE BLADES: CORRELATION OF THEORY AND EXPERIMENT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 199-200.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

1981-0041 HIESTER T R, PENNELL W T
METEOROLOGICAL ASPECTS OF SITING LARGE WIND TURBINES.
NTIS, JANUARY 1981. 512 P.
PNL-2522

THIS REPORT, WHICH FOCUSES ON THE METEOROLOGICAL ASPECTS OF SITING LARGE WIND TURBINES (TURBINES WITH A RATED OUTPUT EXCEEDING 100 KW), HAS FOUR MAIN GOALS. THE FIRST IS TO OUTLINE THE ELEMENTS OF A SITING STRATEGY THAT WILL IDENTIFY THE MOST FAVORABLE WIND ENERGY SITES IN A REGION AND THAT WILL PROVIDE SUFFICIENT WIND DATA TO MAKE RESPONSIBLE ECONOMIC EVALUATIONS OF THE SITE WIND RESOURCE POSSIBLE. THE SECOND IS TO CRITIQUE AND SUMMARIZE SITING TECHNIQUES THAT WERE STUDIED IN THE DEPARTMENT OF ENERGY (DOE) WIND ENERGY PROGRAM. THE THIRD GOAL IS TO EDUCATE UTILITY TECHNICAL PERSONNEL, ENGINEERING CONSULTANTS, AND METEOROLOGICAL CONSULTANTS (WHO MAY HAVE NOT YET UNDERTAKEN WIND ENERGY CONSULTING) ON METEOROLOGICAL PHENOMENA RELEVANT TO WIND TURBINE SITING IN ORDER TO ENHANCE DIALOGUES BETWEEN THESE GROUPS. THE FOURTH GOAL IS TO MINIMIZE THE CHANCES OF FAILURE OF EARLY SITING PROGRAMS DUE TO INSUFFICIENT UNDERSTANDING OF WIND BEHAVIOR.

1981-0042 HINRICHSEN E N, NOLAN P J
DYNAMICS AND STABILITY OF WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 315-323.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER DESCRIBES THE DYNAMIC AND STABILITY PROPERTIES OF WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS. BOTH SYNCHRONOUS AND INDUCTION GENERATORS ARE CONSIDERED. A COMPARISON IS MADE BETWEEN WIND TURBINES, STEAM, AND HYDRO UNITS. THE UNUSUAL PHENOMENA ASSOCIATED WITH WIND TURBINES ARE EMPHASIZED. THE GENERAL CONTROL REQUIREMENTS ARE DISCUSSED, AS WELL AS VARIOUS SCHEMES FOR TORSIONAL DAMPING SUCH AS SPEED SENSITIVE STABILIZER AND BLADE PITCH CONTROL. INTERACTION BETWEEN ADJACENT WIND TURBINES IN A "WIND FARM" IS ALSO CONSIDERED.

1981-0043 HOFFER T, REALE T, ELFIQI A
ICING ON WIND ENERGY SYSTEMS.
NTIS, JANUARY 1981. 75 P.
DOE/ET/23170-80/1

A PARTICULARLY IMPORTANT ASPECT TO CONSIDER PRIOR TO THE INSTALLATION OF A WIND ENERGY SYSTEM IS THE POTENTIAL FOR ATMOSPHERIC ICING. THIS REPORT PRESENTS PROCEDURES FOR ANALYZING METEOROLOGICAL DATA TO DETERMINE THE MAXIMUM POSSIBLE ICING TO BE EXPECTED AT SPECIFIED LOCATIONS. MODELS DEVELOPED TO SIMULATE THE MAXIMUM POSSIBLE ICE BUILDUP ON AN EXPOSED SURFACE USING THE RAINFALL AND CLOUD WATER DATA AS INPUT ARE ALSO PRESENTED. IN ADDITION TO THE MAXIMAL DYNAMIC AND STATIC ICING LOADS, COMPARATIVE ICING VALUES BASED ON AN ATTEMPT TO SIMULATE ACTUAL FIELD CONDITIONS ARE ALSO SHOWN. INCLUDED ARE ASSUMPTIONS OF DROPLET SPLASHING AND WATER DRAINAGE FOR THE GLAZE CASES AND ATMOSPHERIC MIXING DURING OROGRAPHIC LIFTING FOR RIME CASES.

1981-0044 HOHENEMSER K H, SWIFT A H P
DYNAMICS OF AN EXPERIMENTAL TWO BLADED HORIZONTAL AXIS WIND TURBINE WITH BLADE CYCLIC PITCH VARIATION.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 277-286.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE HORIZONTAL AXIS WIND TURBINE UNDER STUDY INCORPORATES THE COMBINATION OF TWO FEATURES: THE APPLICATION OF BLADE CYCLIC PITCH VARIATION AND THE USE OF YAW ANGLE CONTROL FOR ROTOR SPEED AND TORQUE REGULATION. DUE TO ITS "EMASCULATION" BY PASSIVE CYCLIC PITCH VARIATION THE ROTOR CAN BE RAPIDLY YAWED WITHOUT ENCOUNTERING GYROSCOPIC AND AERODYNAMIC HUB MOMENTS AND WITHOUT NOTICEABLE OUT-OF-PLANE BLADE EXCURSIONS. THE TWO BLADED UPWIND ROTOR IS VANE STABILIZED AND OF VERY SIMPLE AND RUGGED DESIGN. THE PRINCIPLE WAS FIRST CHECKED OUT WITH A SMALL SCALE WIND TUNNEL MODEL AND THEN TESTED IN THE ATMOSPHERE WITH A 7.6 METER DIAMETER EXPERIMENTAL FULLY INSTRUMENTED WIND TURBINE DRIVING A 3 PHASE ALTERNATOR. THE ROTOR TO TAIL VANE FURL ANGLE WAS CONTROLLED THROUGH AN ELECTRIC ACTUATOR BY A MANUALLY OPERATED TOGGLE SWITCH OVERRIDDEN BY AN AUTOMATIC ROTOR OVERSPEED RELAY. THE PAPER SUMMARIZES THE TEST RESULTS WITH RESPECT TO STRUCTURAL DYNAMICS AND YAW DYNAMICS.

1981-0045 HOLLEY W E, THRESHER R W, LIN S-R
WIND TURBULENCE INPUTS FOR HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 101-112.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IN ORDER TO PREDICT WIND TURBINE RESPONSE CHARACTERISTICS IN THE PRESENCE OF ATMOSPHERIC TURBULENCE, TWO MAJOR MODELING STEPS ARE REQUIRED. FIRST, THE IMPORTANT ATMOSPHERIC SOURCES FOR THE FORCE EXCITATIONS FELT BY THE WIND TURBINE SYSTEM MUST BE IDENTIFIED AND CHARACTERIZED. SECOND, A DYNAMIC MODEL MUST BE DEVELOPED WHICH DESCRIBES HOW THESE EXCITATIONS ARE TRANSMITTED THROUGH THE STRUCTURE AND POWER TRAIN. THE GOAL OF THIS PAPER IS TO ESTABLISH THE FIRST MODELING STEP, THAT OF QUANTIFYING THE IMPORTANT EXCITATIONS DUE TO THE ATMOSPHERIC TURBULENCE. THE DYNAMIC MODELING OF THE SECOND STEP IS UNDERTAKEN IN THE ACCOMPANYING PAPER. (SEE ENTRY 1981-0112).

1981-0046 HOOKE W H
A REVIEW OF REMOTE-SENSOR POTENTIAL FOR WIND-ENERGY STUDIES.
NTIS, MARCH 1981. 183 P.
DOE/ET/23151-80/1

THIS REPORT EVALUATES A NUMBER OF REMOTE-SENSING SYSTEMS SUCH AS RADARS, LIDARS, AND ACOUSTIC ECHO SOUNDERS WHICH ARE POTENTIAL ALTERNATIVES TO THE CUP- AND PROPELLER-ANEMOMETERS ROUTINELY USED IN WIND ENERGY SITING. THE HIGH COSTS AND DEMANDING OPERATION REQUIREMENTS OF THESE SENSORS CURRENTLY PRECLUDE THEIR USE IN THE EARLY STAGES OF A MULTI-PHASE WIND ENERGY STRATEGY, BUT THEY CAN BE USED EFFECTIVELY IN THE LATTERMOST STAGES OF THE SITING PROCESS--NECESSARY ONLY FOR THE SITING OF LARGE WIND-ENERGY CONVERSION SYSTEMS (WECS) OR CLUSTERS. FOUR TECHNIQUES WHICH APPEAR TO BE OPERATIONAL NOW ARE: OPTICAL TRANSVERSE WIND SENSORS, ACOUSTIC DOPPLER SOUNDERS, TIME-OF-FLIGHT AND CONTINUOUS WAVE (CW) DOPPLER LIDAR, AND FREQUENCY-MODULATED, CONTINUOUS WAVE (FW-CW) DOPPLER RADAR.

1981-0047 HOWES H E, BOWES M A, PERLEY R
DEVELOPMENT OF A 40 KILOWATT WIND TURBINE GENERATOR. PHASE I. DESIGN AND ANALYSIS.
NTIS, FEBRUARY 1981. 296 P.
RFP-3094-2

KAMAN AEROSPACE CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DESIGN, FABRICATE AND TEST A HORIZONTAL AXIS WIND TURBINE GENERATOR CAPABLE OF PRODUCING 40 KW ELECTRICAL OUTPUT POWER IN A 20 MPH WIND. THIS REPORT PRESENTS THE RESULTS OF THE PHASE I PROGRAM EFFORT COVERING DESIGN TRADEOFF STUDIES, PRELIMINARY DESIGN AND ANALYSIS, AND THE FINAL DESIGN EFFORT. ADDITIONAL WORK COVERED UNDER PHASE I INCLUDED COST STUDIES AND TEST PLANNING ACTIVITIES. THE PROGRAM IS CURRENTLY IN THE CONTRACTOR TEST STAGE OF PHASE II.

1981-0048 HOWES H E, BOWES M A, PERLEY R
DEVELOPMENT OF A 40 KILOWATT WIND TURBINE GENERATOR. PHASE I. DESIGN AND ANALYSIS. EXECUTIVE SUMMARY.
NTIS, FEBRUARY 1981. 22 P.
RFP-3094-1

1981-0049 IGRA O
RESEARCH AND DEVELOPMENT FOR SHROUDED WIND TURBINES.
ENERGY CONVERS. MANAGE. 21(1): 13-48, 1981.

IN ORDER TO EXPLOIT WIND POWER AS ECONOMICALLY AS POSSIBLE, IT WAS SUGGESTED THAT THE WIND TURBINE SHOULD BE ENCLOSED INSIDE A SPECIALLY DESIGNED SHROUD. VARIOUS GEOMETRIES ARE DISCUSSED; IT IS SHOWN THAT WITH A FAIRLY COMPACT SHROUD A SIGNIFICANT POWER AUGMENTATION CAN BE ACHIEVED. FOR IMPROVING THE SHROUD PERFORMANCE, THE USE OF A RING-SHAPED FLAP OR BOUNDARY LAYER CONTROL TECHNIQUE IS INTRODUCED. IT IS SHOWN THAT UP TO 80% IMPROVEMENT IN THE SHROUD POWER AUGMENTATION CAN BE OBTAINED BY THE USE OF AN APPROPRIATE RING-SHAPED FLAP WHILE PROPER BLEEDING OF THE SHROUD'S EXTERNAL FLOW INTO ITS INNER REAR PART WILL INCREASE ITS POWER AUGMENTATION BY ABOUT 25%. THE PRESENT REVIEW ALSO DISCUSSED THE DESIGN AND PERFORMANCE OF AN AXIAL FLOW TURBINE WHICH IS THE MOST SUITABLE FOR THE PROPOSED SHROUDS. IT IS SHOWN THAT SUCH A TURBINE PRODUCES A FAIRLY STABLE OUTPUT FOR VARYING WIND SPEEDS WHILE EXHIBITING A FAIRLY HIGH EFFICIENCY. BASED ON THE REPORTED RESEARCH WITH SHROUDS, A PILOT PLANT PRODUCING 1 HP AT 5 M/S WITH A 3 M DIAMETER TURBINE WAS BUILT. ITS DESIGN AND PRELIMINARY FIELD TEST RESULTS ARE ALSO INCLUDED IN THE REVIEW.

1981-0050 JANETZKE D C, KAZA K R V
WHIRL FLUTTER ANALYSIS OF A HORIZONTAL-AXIS WIND TURBINE WITH A TWO-BLADED TEETERING ROTOR.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 201-210.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN INVESTIGATION TO EXPLORE THE POSSIBILITY OF WHIRL FLUTTER AND TO FIND THE EFFECT OF PITCH-FLAP COUPLING (DELTA-3) ON TEETERING MOTION OF THE DOE/NASA MOD-2 WIND TURBINE IS PRESENTED. THE EQUATIONS OF MOTION ARE DERIVED FOR AN IDEALIZED FIVE-DEGREE-OF-FREEDOM MATHEMATICAL MODEL OF A HORIZONTAL-AXIS WIND TURBINE WITH A TWO-BLADED TEETERING ROTOR. THE MODEL ACCOUNTS FOR THE OUT-OF-PLANE BENDING MOTION OF EACH BLADE, THE TEETERING MOTION OF THE ROTOR, AND BOTH THE PITCHING AND YAWING MOTIONS OF THE ROTOR SUPPORT. RESULTS SHOW THAT THE MOD-2 DESIGN IS FREE FROM WHIRL FLUTTER. SELECTED RESULTS ARE PRESENTED INDICATING THE EFFECT OF VARIATIONS IN ROTOR SUPPORT DAMPING, ROTOR SUPPORT STIFFNESS, AND DELTA-3 ON PITCHING, YAWING, TEETERING, AND BLADE BENDING MOTIONS.

1981-0051 JARASS L
WIND ENERGY: AN ASSESSMENT OF THE TECHNICAL AND ECONOMIC POTENTIAL: A CASE STUDY FOR THE FEDERAL REPUBLIC OF GERMANY, COMMISSIONED BY THE INTERNATIONAL ENERGY AGENCY.
BERLIN, NEW YORK, SPRINGER-VERLAG, 1981. TRANSLATION OF "WINDENERGIE".

1981-0052 GRIFFIN T, TATE M
USING A WIND ELECTRIC SYSTEM TO GENERATE POWER INTO A UTILITY GRID: A PROJECT IN SOUTH CENTRAL RURAL MINNESOTA.
NTIS, 1981. 22 P.
DOE/R5/10134-1

DESIGN SPECIFICATIONS ARE PRESENTED FOR THE NEWLY DESIGNED JACOBS 10 KVA WIND TURBINE SYSTEM.

1981-0053 JENG D R, KEITH T G, ALIAKBARKHANAFJEH A
AERODYNAMIC PERFORMANCE PREDICTION OF HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 9-18.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE PURPOSE OF THIS WORK IS TO DESCRIBE A NEW METHOD FOR CALCULATING THE AERODYNAMIC PERFORMANCE OF HORIZONTAL AXIS WIND TURBINES. THE METHOD, ENTITLED THE HELICAL VORTEX METHOD, DIRECTLY CALCULATES THE LOCAL INDUCED VELOCITY DUE TO HELICAL VORTICES THAT ORIGINATE AT THE ROTOR BLADE. FURTHERMORE, THE METHOD DOES NOT REQUIRE A SPECIFIED CIRCULATION DISTRIBUTION. RESULTS OF THE METHOD ARE COMPARED TO SIMILAR RESULTS OBTAINED FROM WILSON PROP CODE METHODS (PRANDTL, GOLDSTEIN, NASA AND NO TIP LOSS) AS WELL AS TO EXISTING EXPERIMENTAL DATA TAKEN FROM THE NASA MOD-0 WIND TURBINE. IT IS SHOWN THAT RESULTS OF THE PROPOSED METHOD AGREE WELL WITH EXPERIMENTAL VALUES OF THE POWER OUTPUT BOTH NEAR CUT-IN AND AT RATED WIND SPEEDS. FURTHER, IT IS FOUND THAT THE METHOD DOES NOT EXPERIENCE SOME OF THE NUMERICAL DIFFICULTIES ENCOUNTERED BY THE PROP CODE WHEN RUN AT LOW WIND VELOCITIES.

1981-0054 KELLEY N D
ACOUSTIC NOISE GENERATION BY THE DOE/NASA MOD-1 WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 375-387.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE RESULTS OF A SERIES OF MEASUREMENTS TAKEN OVER THE PAST YEAR OF THE ACOUSTIC EMISSIONS FROM THE DOE/NASA MOD-1 WIND TURBINE HAVE SHOWN THE MAXIMUM ACOUSTIC ENERGY IS CONCENTRATED IN THE LOW FREQUENCY RANGE, OFTEN BELOW 100 HZ. THE TEMPORAL AS WELL AS THE FREQUENCY CHARACTERISTICS OF THE TURBINE SOUNDS HAVE BEEN SHOWN TO BE IMPORTANT SINCE THE MOD-1 IS CAPABLE OF RADIATING BOTH COHERENT AND INCOHERENT NOISE. THE COHERENT SOUNDS ARE USUALLY IMPULSIVE AND ARE MANIFESTED IN AN AVERAGED FREQUENCY DOMAIN PLOT AS LARGE NUMBERS OF DISCRETE ENERGY BANDS EXTENDING FROM THE BLADE PASSAGE FREQUENCY TO BEYOND 50 HZ ON OCCASION. IT IS THESE IMPULSIVE SOUNDS WHICH ARE IDENTIFIED AS THE PRINCIPAL SOURCE OF THE ANNOYANCE TO A DOZEN FAMILIES LIVING WITHIN 3 KM OF THE TURBINE. THE SOURCE OF THE COHERENT NOISE APPEARS TO BE THE RAPID, UNSTEADY BLADE LOADS ENCOUNTERED AS THE BLADE PASSES THROUGH THE WAKE OF THE TOWER STRUCTURE. ANNOYING LEVELS ARE OCCASIONALLY REACHED AT NEARBY HOMES DUE TO THE INTERACTION OF THE LOW-FREQUENCY, HIGH ENERGY PEAKS IN THE ACOUSTIC IMPULSES AND THE STRUCTURAL MODES OF THE HOMES AS WELL AS BY DIRECT RADIATION OUTDOORS. THE PEAK LEVELS OF THESE IMPULSES CAN BE ENHANCED OR SUBDUED THROUGH COMPLEX PROPAGATION.

1981-0055 KLIMAS P C
RECENT DARRIEUS VERTICAL AXIS WIND TURBINE AERODYNAMICAL EXPERIMENTS AT SANDIA NATIONAL LABORATORIES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 67-76.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

EXPERIMENTS CONTRIBUTING TO THE UNDERSTANDING OF THE AERODYNAMICS OF AIRFOILS OPERATING IN THE VERTICAL AXIS WIND TURBINE (VAWT) ENVIRONMENT ARE DESCRIBED. THESE EXPERIMENTS ARE ULTIMATELY INTENDED TO REDUCE VAWT COST OF ENERGY AND INCREASE SYSTEM RELIABILITY. THEY INCLUDE CHORDWISE PRESSURE SURVEYS, CIRCUMFERENTIAL BLADE ACCELERATION SURVEYS, EFFECTS OF BLADE CAMBER, PITCH AND OFFSET, BLADE BLOWING, AND USE OF SECTIONS DESIGNED SPECIFICALLY FOR VAWT APPLICATION.

1981-0056 LAWLESS-BUTTERFIELD C, GUERRERO J V, PYKKONEN K, STATES L
ISSUES AND EXAMPLES OF DEVELOPING UTILITY INTERCONNECTION GUIDELINES FOR SMALL POWER PRODUCTION.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JANUARY 1981. 92 P.
TM-IP/81-5

THIS REPORT WILL SUMMARIZE WHAT SEVERAL STATES ARE DOING TO ESTABLISH INTERCONNECTION GUIDELINES UNDER PURPA RULES FOR SMALL POWER PRODUCERS, IN PARTICULAR SMALL (UNDER 100 KW) WIND ENERGY CONVERSION SYSTEMS (SWECS). THE EMPHASIS OF THE REPORT IS TO DISCUSS ISSUES RELEVANT TO INTERCONNECTING SWECS.

1981-0057 LINSCOTT B S, DENNETT J T, GORDON L H
THE MOD-2 WIND TURBINE DEVELOPMENT PROJECT.
NTIS, JULY 1981. 23 P.
DOE/NASA/20305-5, NASA-TM-82681

THE MOD-2 IS DESCRIBED. IT HAS A 2.5 MW POWER RATING, IS HORIZONTAL AXIS, AND WAS DESIGNED FOR GENERATION OF ELECTRICAL POWER ON UTILITY NETWORKS. THREE MACHINES HAVE BEEN BUILT AND ARE LOCATED IN A CLUSTER AT GOODNOE HILLS, WASHINGTON. ALL TECHNICAL ASPECTS OF THE PROJECT ARE DESCRIBED: DESIGN APPROACH, SIGNIFICANT INNOVATION FEATURES, THE MECHANICAL SYSTEM, THE ELECTRICAL POWER SYSTEM, THE CONTROL SYSTEM, AND THE SAFETY SYSTEM.

1981-0058 LIU H, TSAO I S
WIND ENERGY POTENTIAL IN A TYPHOON ENVIRONMENT.
CONFERENCE ON WIND ENERGY TECHNOLOGY, KANSAS CITY, MISSOURI, MARCH 1981. 4 P.

TAIWAN EXPERIENCES AN AVERAGE OF FOUR TYPHOONS PER YEAR, BRINGING WITH EACH HIGH WINDS AND HEAVY RAINS. THE QUESTION IN THE UTILIZATION OF WIND ENERGY IN A TYPHOON ENVIRONMENT IS NOT WHETHER THE WIND ENERGY CONTAINED IN TYPHOONS CAN BE HARNESSED BUT RATHER WHETHER WINDMILLS CAN WITHSTAND THE FIERCE FORCES GENERATED BY THE TYPHOON WIND. THE QUESTION HAS BEEN ANSWERED HEREIN BY COMPARING THE WIND INTENSITY ASSOCIATED WITH A GIVEN RECURRENCE INTERVAL TO THE SURVIVAL SPEED OF WINDMILLS. IT WAS FOUND THAT WINDMILLS HAVING A SURVIVAL SPEED OF 56 M/S (125 MPH) ARE ADEQUATE FOR THE WEST COAST OF TAIWAN. HIGHER SURVIVAL SPEEDS MAY BE NEEDED ON THE EAST COAST, AND ARE DEFINITELY NEEDED FOR SPECIAL PLACES SUCH AS THE ORCHARD ISLAND. THE PAPER ALSO PROVIDES A PRELIMINARY ASSESSMENT OF TAIWAN'S WIND ENERGY POTENTIAL, THE DIRECTION THE NATION SHOULD PROCEED IN DEVELOPING HER WIND ENERGY RESOURCE, AND POSSIBLE INTERACTION WITH U.S. WIND ENERGY RESEARCHERS AND THE WINDMILL INDUSTRY.

1981-0059 LOBITZ D W
DYNAMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE ROTORS.
NTIS, 1981. 8 P.
SAND-80-2820C, CONF-810226-2

THE DYNAMIC RESPONSE CHARACTERISTICS OF THE VAWT ROTOR ARE IMPORTANT FACTORS GOVERNING THE SAFETY AND FATIGUE LIFE OF VAWT SYSTEMS. THE PRINCIPAL PROBLEMS ARE THE DETERMINATION OF CRITICAL ROTOR SPEEDS (RESONANCES) AND THE ASSESSMENT OF FORCED VIBRATION RESPONSE AMPLITUDES. THE SOLUTION TO THESE PROBLEMS IS COMPLICATED BY CENTRIFUGAL AND CORIOLIS EFFECTS WHICH CAN HAVE SUBSTANTIAL INFLUENCE ON ROTOR RESONANT FREQUENCIES AND MODE SHAPES. THIS PAPER WILL DESCRIBE AND DISCUSS THE PRIMARY TOOLS NOW IN USE AT SANDIA NATIONAL LABORATORIES FOR ROTOR ANALYSIS. THESE TOOLS INCLUDE A LUMPED SPRINGMASS MODEL (VAWTDYN) AND ALSO FINITE-ELEMENT BASED APPROACHES. THE DISCUSSION WILL CENTER ON THE ACCURACY AND COMPLETENESS OF CURRENT CAPABILITIES AND PLANS FOR FUTURE RESEARCH.

1981-0060 LOBITZ D W
DYNAMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE ROTORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 189-197.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE DYNAMIC RESPONSE CHARACTERISTICS OF THE VAWT ROTOR ARE IMPORTANT FACTORS GOVERNING THE SAFETY AND FATIGUE LIFE OF VAWT SYSTEMS. THE PRINCIPAL PROBLEMS ARE THE DETERMINATION OF CRITICAL ROTOR SPEEDS (RESONANCES) AND THE ASSESSMENT OF FORCED VIBRATION RESPONSE AMPLITUDES. THE SOLUTION TO THESE PROBLEMS IS COMPLICATED BY CENTRIFUGAL AND CORIOLIS EFFECTS WHICH CAN HAVE SUBSTANTIAL INFLUENCE ON ROTOR RESONANT FREQUENCIES AND MODE SHAPES. THIS PAPER WILL DESCRIBE AND DISCUSS THE PRIMARY TOOLS NOW IN USE AT SANDIA NATIONAL LABORATORIES FOR ROTOR ANALYSIS. THESE TOOLS INCLUDE A LUMPED SPRINGMASS MODEL (VAWTDYN) AND ALSO FINITE-ELEMENT BASED APPROACHES. THE DISCUSSION WILL CENTER ON THE ACCURACY AND COMPLETENESS OF CURRENT CAPABILITIES AND PLANS FOR FUTURE RESEARCH

1981-0061 LOEFFLER A L
FLOW FIELD ANALYSIS AND PERFORMANCE OF WIND TURBINES EMPLOYING SLOTTED DIFFUSERS.
ASME TRANS. J. SOL. ENERGY ENG. 103(1): 17-22, FEBRUARY 1981.

OPERATION OF DIFFUSER-AUGMENTED WIND TURBINES (DAWTS) UTILIZING SLOTTED WALLS FOR TANGENTIAL BLOWING AS A BOUNDARY LAYER CONTROL MEASURE HAS BEEN ANALYZED USING THE METHOD OF SINGULARITIES (MOS). THE DIFFUSER WALL AND THE DROP IN TOTAL PRESSURE THROUGH THE TURBINE ARE REPRESENTED BY A SERIES OF RING VORTICES ALONG THE DIFFUSER SURFACE AND ALONG THE WAKE BOUNDARY. DIFFUSER INCLUDED ANGLES OF 60 TO 80 DEGREES ARE CONSIDERED, IN CONTRAST TO THE CONVENTIONAL RANGE OF 7 TO 10 DEGREES. AGREEMENT WITH GRUMMAN RESEARCH DEPARTMENT EXPERIMENTAL DATA WITH RESPECT TO OVERALL PERFORMANCE AND PRESSURE AND VELOCITY DISTRIBUTIONS IS REASONABLY GOOD. IN PARTICULAR, THE EXISTENCE OF THE OBSERVED LARGE PRESSURE REDUCTION AT THE DIFFUSER EXIT PLANE IS PREDICTED. A CONSEQUENCE OF THIS AGREEMENT IS THAT REYNOLDS NUMBER SCALING EFFECTS ARE SMALL FOR SLOTTED DAWTS, SO THAT MOS ANALYSES HOLD PROMISE FOR OTHER INNOVATIVE DIFFUSER DESIGNS AND FLOW PROBLEMS.

1981-0062 LOOIJESTEIJN C J, VALTER G P
THE EXPERIMENTAL WIND TURBINE AT PETTEN.
ENERGIESPECTRUM 5(2): 34-39, FEBRUARY 1981. (IN DUTCH)

THE EXPERIMENTAL WIND TURBINE AT PETTEN IN THE NETHERLANDS HAS AN AXLE HEIGHT ABOVE GROUND OF 22 METRES AND A ROTOR DIAMETER OF 25 METRES. THE ROTOR AXLE IS ALMOST HORIZONTAL AND IS MOUNTED ON A STEEL TOWER SUPPORTED ON A CONCRETE PANEL BASE. THE ROTOR HUB SUPPORTS TWO BLADES EACH WITH AN AEROFOIL SECTION AND A WIDTH OF 180 CM AT THE ROOT AND 30 CM AT THE TIP. EACH BLADE TIP IS INCLINED INWARDS ON THE LEEWARD SIDE AT AN ANGLE BETWEEN 0 DEGREES AND ABOUT 16 DEGREES DURING THE GENERATION PERIOD. SOME ROTOR FEATURES ALREADY DETERMINED INCLUDE ROTOR COUPLES IN KN/M, UP TO 60 FOR VARIOUS WIND SPEEDS AND BLADE ANGLES. NOMINAL SPEEDS ARE ROTOR 80 RPM, GENERATOR 900-1600 RPM, WHICH LEADS TO A REGULATED POWER OUTPUT AT 720 V CONNECTOR TO A CONVERTER TO GIVE 10 KV MAINS OUTPUT UP TO 400 KW (GENERATOR) OR 300 KW (TURBINE). A PARKING POSITION, WITH EACH BLADE ANGLE 90 DEGREES IS AVAILABLE, AND THIS MAY WITHSTAND WIND VELOCITIES UP TO 72 M/SEC.

1981-0063 MARIER D
WINDPOWER FOR THE HOMEOWNER: A GUIDE TO SELECTING, SITING AND INSTALLING AN ELECTRICITY-GENERATING WIND POWER SYSTEM.
MILACA, MINNESOTA, ALTERNATIVE SOURCES OF ENERGY, INC., 1981. 381 P.

THIS BOOK SHOWS YOU HOW TO: SELECT A SITE AND MEASURE WIND SPEEDS; CHOOSE THE GENERATOR AND EQUIPMENT WHICH MEET YOUR INDIVIDUAL NEEDS; DETERMINE FINANCING AND PAYBACK; FIND APPLIANCES YOU CAN USE; CONNECT (OR DISCONNECT) TO YOUR UTILITY; DISCUSS THE FUTURE OF WIND POWER, AND MORE.

1981-0064 MARTINEZ R, WIDNALL S E, HARRIS W L
PREDICTIONS OF LOW-FREQUENCY AND IMPULSIVE SOUND RADIATION FROM HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 401-409.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER DEVELOPS THEORETICAL MODELS TO PREDICT THE RADIATION OF LOW-FREQUENCY AND IMPULSIVE SOUND FROM HORIZONTAL-AXIS WIND TURBINES DUE TO THREE SOURCES: (1) STEADY BLADE LOADS; (2) UNSTEADY BLADE LOADS DUE TO OPERATION IN A GROUND SHEAR; (3) UNSTEADY LOADS FELT BY THE BLADES AS THEY CROSS THE TOWER WAKE. THESE MODELS ARE THEN USED TO PREDICT THE ACOUSTIC OUTPUT OF MOD-1, THE LARGE WIND TURBINE OPERATED NEAR BOONE, N.C. PREDICTED ACOUSTIC TIME SIGNALS ARE COMPARED TO THOSE ACTUALLY MEASURED NEAR MOD-1; GOOD AGREEMENT IS OBTAINED.

1981-0065 MCNERNEY G M
ACCELEROMETER MEASUREMENTS OF AERODYNAMIC TORQUE ON THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
NTIS, APRIL 1981. 23 P.
SAND-80-2776

AN EXPERIMENT WAS CONDUCTED ON THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE, USING ROTOR SHAFT TORQUE AND ROTOR ANGULAR ACCELERATION DATA TO DEDUCE THE FUNCTIONAL FORMS OF THE AERODYNAMIC TORQUE. AN ANALYSIS OF THE EXPERIMENT, ALONG WITH ERRORS ENCOUNTERED, IS PRESENTED AND THE RESULTS LISTED IN BOTH GRAPHIC AND ANALYTICAL FORM.

1981-0066 MCNERNEY G M
AUTOMATIC CONTROL ALGORITHM EFFECTS ON ENERGY PRODUCTION.

WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 333-342.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

ALGORITHM CONTROL STRATEGY FOR UNATTENDED WIND TURBINE OPERATION IS A POTENTIALLY IMPORTANT ASPECT OF WIND ENERGY PRODUCTION THAT HAS THUS FAR ESCAPED TREATMENT IN THE LITERATURE. EARLY EXPERIENCE IN AUTOMATIC OPERATION OF THE SANDIA 17-M VAWT HAS DEMONSTRATED THE NEED FOR A SYSTEMATIC STUDY OF CONTROL ALGORITHMS. TO THIS END, A COMPUTER MODEL HAS BEEN DEVELOPED USING ACTUAL WIND TIME SERIES AND TURBINE PERFORMANCE DATA TO SIMULATE THE POWER PRODUCED BY THE SANDIA 17-M VAWT OPERATING IN AUTOMATIC CONTROL. THE MODEL HAS BEEN USED TO INVESTIGATE THE INFLUENCE OF STARTING ALGORITHMS ON ANNUAL ENERGY PRODUCTION. THE RESULTS INDICATE THAT, DEPENDING ON TURBINE AND LOCAL WIND CHARACTERISTICS, A BAD CHOICE OF A CONTROL ALGORITHM CAN SIGNIFICANTLY REDUCE OVERALL ENERGY PRODUCTION. THE MODEL CAN BE USED TO SELECT CONTROL ALGORITHMS AND THRESHOLD PARAMETERS THAT MAXIMIZE LONG-TERM ENERGY PRODUCTION. AN ATTEMPT HAS BEEN MADE TO GENERALIZE THESE RESULTS FROM LOCAL SITE AND TURBINE CHARACTERISTICS TO OBTAIN GENERAL GUIDELINES FOR CONTROL ALGORITHM DESIGN.

1981-0067 METZGER F B, KLATTE R J
STATUS REPORT ON DOWNWIND ROTOR HORIZONTAL AXIS WIND TURBINE NOISE PREDICTION.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 425-430.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NASA AND INDUSTRY ARE CURRENTLY COOPERATING IN THE CONDUCT OF EXTENSIVE EXPERIMENTAL AND ANALYTICAL STUDIES TO UNDERSTAND AND PREDICT THE NOISE OF LARGE, HORIZONTAL-AXIS WIND TURBINES. THIS EFFORT CONSISTS OF (1) OBTAINING HIGH QUALITY NOISE DATA UNDER WELL-CONTROLLED AND DOCUMENTED TEST CONDITIONS, (2) ESTABLISHING THE ANNOYANCE CRITERIA FOR IMPULSE NOISE OF THE TYPE GENERATED BY HORIZONTAL-AXIS WIND TURBINES WITH ROTORS DOWNWIND OF THE SUPPORT TOWER, (3) DEFINING THE WAKE CHARACTERISTICS DOWNWIND AT THE AXIAL LOCATION OF THE PLANE OF ROTATION, (4) COMPARING PREDICTIONS WITH MEASUREMENTS MADE BY USE OF WAKE DATA, AND (5) COMPARING PREDICTIONS WITH ANNOYANCE CRITERIA. THIS REPORT BRIEFLY SUMMARIZES THE STATUS OF WORK BY HAMILTON STANDARD IN THE ABOVE AREAS WHICH WAS DONE IN SUPPORT OF THE COOPERATIVE NASA AND INDUSTRY STUDIES.

1981-0068 MOMENT R L
THE TECHNOLOGIES OF SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, MARCH 1981. 6 P.
TM-TD/81-6

1981-0069 MORETTI P M, THRESHER R W
OVERVIEW OF WIND ENERGY SYSTEMS: ISSUES IN DEVELOPMENT AND APPLICATION.
ASME TRANS. J. SOL. ENERGY ENG. 103(1): 3-10, FEBRUARY 1981.

AN OVERVIEW OF THE CURRENT STATUS OF WIND ENERGY TECHNOLOGY AND SYSTEM DEVELOPMENT IS PRESENTED WITH MAJOR EMPHASIS PLACED ON KEY ISSUES WHICH FACE THE COMMERCIALIZATION OF WIND TECHNOLOGY. THE BASIC FUNDAMENTALS OF THE TECHNOLOGY ARE REVIEWED AND THE DIRECTION OF CURRENT DEVELOPMENT IS OUTLINED. ECONOMIC CONSIDERATIONS ARE DISCUSSED BOTH FROM A MACHINE DEVELOPMENT POINT OF VIEW AND THE UTILITY-INDUSTRY COST-OF-SERVICE APPROACH. IN ADDITION, THE PROBLEMS ASSOCIATED WITH WIND TURBINE PERFORMANCE TESTING ARE DISCUSSED AND A SHORT REVIEW OF OPERATIONAL EXPERIENCE IS PROVIDED. THESE TOPICS ARE ALL CONSIDERED IN THE CONTEXT OF PROVIDING THE READER WITH AN UNDERSTANDING OF WIND SYSTEM TECHNOLOGY, A GENERAL KNOWLEDGE OF CURRENT PROBLEMS, AND THE EXPECTED TRENDS FOR THE FUTURE.

1981-0070 NATHAN G K, GOH T N
WIND MEASUREMENTS IN AN EQUATORIAL REGION (SINGAPORE).
SOL. ENERGY 26(3): 275-278, 1981.

THERE ARE MORE THAN 10,000 ISLANDS IN SOUTH-EAST ASIA, AND THE PROSPECTS FOR USING WIND ENERGY THERE APPEAR GOOD. WIND MEASUREMENTS OF SUFFICIENT RELIABILITY ARE, HOWEVER, NOT READILY AVAILABLE. THE AUTHORS PRESENT A SUMMARY OF WIND DATA IN A FEW OF THESE ISLANDS AROUND SINGAPORE, PROVIDING A BASIS FOR EVALUATION OF WIND ENERGY POTENTIAL IN THE REGION.

1981-0071 NEUSTADTER H E, SPERA D A
APPLICATIONS OF THE DOE/NASA WIND TURBINE ENGINEERING INFORMATION SYSTEM.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 113-120.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NASA LEWIS RESEARCH CENTER MANAGES FOR THE DEPARTMENT OF ENERGY, THE TECHNOLOGY AND ENGINEERING DEVELOPMENT OF LARGE HORIZONTAL AXIS WIND TURBINES. IN SUPPORT OF THIS ACTIVITY EACH WIND TURBINE HAS A VARIETY OF INFORMATION SYSTEMS USED TO ACQUIRE, PROCESS AND ANALYZE DATA. IN GENERAL FOUR CATEGORIES OF DATA SYSTEMS, EACH RESPONDING TO A DISTINCT INFORMATION NEED, CAN BE IDENTIFIED. THE CATEGORIES ARE: CONTROL, TECHNOLOGY, ENGINEERING AND PERFORMANCE. THE FOCUS OF THIS REPORT IS ON THE INFORMATION THAT CAN BE EXTRACTED BY STATISTICAL ANALYSIS OF DATA OBTAINED FROM THE TECHNOLOGY AND ENGINEERING INFORMATION SYSTEMS. THESE SYSTEMS CONSIST OF THE FOLLOWING ELEMENTS: (1) SENSORS WHICH MEASURE CRITICAL PARAMETERS (E.G., WIND SPEED AND DIRECTION, OUTPUT POWER, BLADE LOADS AND COMPONENT VIBRATIONS); (2) REMOTE MULTIPLEXING UNITS (RMUS) ON EACH WIND TURBINE WHICH FREQUENCY-MODULATE, MULTIPLEX AND TRANSMIT SENSOR OUTPUTS; (3) ON-SITE INSTRUMENTATION TO RECORD, PROCESS AND DISPLAY THE SENSOR OUTPUT; AND (4) STATISTICAL ANALYSIS OF DATA AT THE NASA-LEWIS RESEARCH CENTER IN CLEVELAND, OHIO. TWO EXAMPLES OF THE CAPABILITIES OF THESE SYSTEMS ARE PRESENTED. THE FIRST ILLUSTRATES THE STANDARDIZED FORMAT FOR APPLICATION OF STATISTICAL ANALYSIS TO EACH DIRECTLY MEASURED PARAMETER. THE SECOND SHOWS THE USE OF A MODEL TO ESTIMATE THE VARIABILITY OF THE ROTOR THRUST LOADING, WHICH IS A DERIVED PARAMETER.

1981-0072 NOLA F J
ELECTRICAL POWER GENERATING SYSTEM.
U.S. PATENT APPLICATION. NTIS, MARCH 16, 1981.
PAT-APPL-6-243 683, NASA-CASE-MFS-25302-1, N81-22280

AN ALTERNATING CURRENT POWER GENERATION SYSTEM ADOPTED TO INJECT POWER IN AN ALREADY POWERED POWER LINE IS DISCUSSED. THE POWER GENERATING SYSTEM SERVES TO ADJUSTABLY COUPLE AN INDUCTION MOTOR, AS A GENERATOR, TO AN AC POWER LINE WHEREIN THE MOTOR AND POWER LINE ARE CONNECTED THROUGH A TRIAC. THE TRIAC IS REGULATED TO NORMALLY TURN ON AT A RELATIVELY LATE POINT IN EACH HALF CYCLE OF ITS OPERATION, WHEREBY AT LESS THAN OPERATING SPEED, AND THUS WHEN THE INDUCTION MOTOR FUNCTIONS AS A MOTOR RATHER THAN AS A GENERATOR, POWER CONSUMPTION FROM THE LINE IS SUBSTANTIALLY REDUCED. THE PRINCIPAL APPLICATION WILL BE FOR WINDMILL POWERED GENERATION.

1981-0073 NOUN R J
LAND-USE IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, FEBRUARY 1981. 6 P.
SERI/TP-744-1099

UTILITIES CONSIDERING WIND FARMS MUST ASSESS LAND USE IMPLICATIONS, SUCH AS PROXIMITY OF SITES TO TRANSMISSION LINES, ENVIRONMENTAL IMPACTS, AESTHETICS, LEGAL CONCERNS, AS WELL AS ALTERNATIVE USES FOR THE LAND.

1981-0074 NOUN R J, LOTKER M, FRIESEMA H P
UTILITY SITING OF WECS: A PRELIMINARY LEGAL-REGULATORY ASSESSMENT.
NTIS, MAY 1981. 105 P.
SERI/TR-744-778

ELECTRIC UTILITIES INVESTIGATING WIND ENERGY AS A POWER GENERATION SOURCE WILL NEED TO CONSIDER A NUMBER OF LEGAL AND REGULATORY QUESTIONS RAISED BY WIND ENERGY SYSTEM SITING: LAND ACQUISITION AND USE; AESTHETIC CONTROLS; PUBLIC ACCEPTANCE; AND WIND RIGHTS. THESE ARE DISCUSSED.

1981-0075 O'LONE R G
UTILITIES TURN TO ADVANCED WINDMILLS.
AVIAT. WEEK SPACE TECHNOL. 114(12): 42-44, MARCH 23, 1981.

THE THREE MOD-2'S ERECTED IN EASTERN WASHINGTON, NEAR GOLDENDALE, ARE DESCRIBED. THE UNITS ARE PRODUCING ELECTRICITY FOR THE BONNEVILLE POWER ADMINISTRATION.

1981-0076 OSBORN W C, DOWNEY W T
NEAR-TERM HIGH POTENTIAL COUNTIES FOR SWECS. FINAL REPORT.
NTIS, FEBRUARY 1981. 103 P.
SERI/TR-98282-11

THE PURPOSE OF THE REPORT IS TO PROVIDE UP-TO-DATE MARKET INFORMATION TO MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TO ASSIST THEM IN DEVELOPING MARKETING STRATEGIES FOR THEIR PRODUCTS. THE DATA HAVE BEEN ARRANGED IN A FORMAT THAT PERMITS RAPID INDENTIFICATION OF A PARTICULAR LOCATION OR MARKET SEGMENT FOR FURTHER INVESTIGATION. IN ADDITION, EXTENSIVE BACK-UP INFORMATION IS AVAILABLE BY STATE AND COUNTY IN STATE SWECS MARKET REPORTS IN AN APPENDIX. IT IS HOPED THAT THE INFORMATION IN THIS REPORT AND THE APPENDIX WILL BE USEFUL TO SWECS MANUFACTURERS FOR PLANNING NEW MARKETING AND ADVERTISING ACTIVITIES.

1981-0077 OSBORN W C, DOWNEY W T
NEAR-TERM HIGH POTENTIAL COUNTIES FOR SWECS. FINAL REPORT. APPENDIX.
NTIS, FEBRUARY 1981. 506 P.
SERI/TR-98282-11(APP.)

THIS APPENDIX PROVIDES BY STATE AND COUNTY THE RESULTS AND BACKGROUND DATA OF THE NEAR TERM HIGH-POTENTIAL COUNTIES FOR SWECS. BECAUSE THE APPENDIX IS DESIGNED TO BE USED APART FROM THE REPORT ITSELF, IT INCLUDES A BRIEF SUMMARY OF THE METHODOLOGY USED TO COMPARE MARKET POTENTIAL. (FOR A MORE DETAILED DISCUSSION OF THE METHODOLOGY, THE READER SHOULD CONSULT THE REPORT ITSELF.) IT ALSO INCLUDES A GUIDE TO THE STATE SWECS MARKET DATA REPORTS AND SOME EXAMPLES OF HOW A SWECS MANUFACTURER MIGHT USE THE DATA IN MARKET PLANNING. FINALLY, THE STATE REPORTS ARE PROVIDED, PRESENTING ESSENTIAL MARKET INFORMATION FOR EVERY RURAL COUNTY IN THE COUNTRY.

1981-0078 PARASCHIVOIU I
DOUBLE-MULTIPLE STREAMTUBE MODEL FOR DARRIEUS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 19-25.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN ANALYTICAL MODEL IS PROPOSED FOR CALCULATING THE ROTOR PERFORMANCE AND AERODYNAMIC BLADE FORCES FOR DARRIEUS WIND TURBINES WITH CURVED BLADES. THE METHOD OF ANALYSIS USES A MULTIPLE-STREAMTUBE MODEL, DIVIDED INTO TWO PARTS: ONE MODELING THE UPSTREAM HALF-CYCLE OF THE ROTOR AND THE OTHER, THE DOWNSTREAM HALF-CYCLE. THE UPWIND AND DOWNWIND COMPONENTS OF THE INDUCED VELOCITIES AT EACH LEVEL OF THE ROTOR WERE OBTAINED USING THE PRINCIPLE OF TWO ACTUATOR DISKS IN TANDEM. VARIATION OF THE INDUCED VELOCITIES IN THE TWO PARTS OF THE ROTOR PRODUCES LARGER FORCES IN THE UPSTREAM ZONE AND SMALLER FORCES IN THE DOWNSTREAM ZONE. COMPARISONS OF THE OVERALL ROTOR PERFORMANCE WITH PREVIOUS METHODS AND FIELD TEST DATA SHOW THE IMPORTANT IMPROVEMENT OBTAINED WITH THE PRESENT MODEL. THE CALCULATIONS WERE MADE USING THE COMPUTER CODE CARDAA DEVELOPED AT IREQ. THE DOUBLE-MULTIPLE STREAMTUBE MODEL, PRESENTED IN THIS PAPER, HAS TWO MAJOR ADVANTAGES: IT REQUIRES A MUCH SHORTER COMPUTER TIME THAN THE THREE-DIMENSIONAL VORTEX MODEL AND IS MORE ACCURATE THAN MULTIPLE-STREAMTUBE MODEL IN PREDICTING THE AERODYNAMIC BLADE LOADS.

1981-0079 PARK J
THE WIND POWER BOOK.
PALO ALTO, CALIFORNIA, CHESHIRE BOOKS, 1981. 253 P.

1981-0080 PATON D L, BASS A, SMITH D G, ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 3. GREAT LAKES REGION.
NTIS, FEBRUARY 1981. 187 P.
PNL-3195-WERA-3

THE GREAT LAKES REGION ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA, ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE GREAT LAKES REGION: ILLINOIS, INDIANA, MICHIGAN, OHIO, WISCONSIN. AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY, AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IN THE REGIONAL DISCUSSION AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS OVER SEVERAL TIME SCALES ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND OF HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED, DIRECTION, AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0081 PERCIVAL D, HARPER J
ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME I: A METHODOLOGY.
NTIS, FEBRUARY 1981. 97 P.
SERI/TR-732-604(VOL.I)

THIS REPORT DESCRIBES A METHOD ELECTRIC UTILITIES CAN USE TO DETERMINE THE VALUE OF WIND ENERGY SYSTEMS. IT IS PERFORMED BY A PACKAGE OF COMPUTER MODELS AVAILABLE FROM SERI THAT CAN BE USED WITH MOST UTILITY PLANNING

MODELS. THE FINAL OUTPUT OF THESE MODELS GIVES A FINANCIAL VALUE ($/KW) OF THE WIND ENERGY SYSTEM UNDER CONSIDERATION IN THE SPECIFIC UTILITY SYSTEM. THIS REPORT, FIRST OF TWO VOLUMES, DESCRIBES THE VALUE DETERMINATION METHOD AND GIVES DETAILED DISCUSSION ON EACH COMPUTER PROGRAM AVAILABLE FROM SERI. THE SECOND VOLUME IS A USER'S GUIDE FOR THESE PROGRAMS.

1981-0082 PERCIVAL D, HARPER J
ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME II: A USER'S GUIDE.
NTIS, FEBRUARY 1981. 116 P.
SERI/TR-732-604(VOL.II)

THIS IS VOLUME TWO OF A TWO-VOLUME REPORT WHICH DESCRIBES A METHOD ELECTRIC UTILITIES CAN USE TO DETERMINE THE VALUE OF WIND ENERGY SYSTEMS. VOLUME I DESCRIBES THE METHOD, WHICH USES A PACKAGE OF COMPUTER MODELS AVAILABLE FROM SERI, AS WELL AS PROVIDING A DETAILED DISCUSSION ON EACH COMPUTER PROGRAM IN THE PACKAGE. THIS VOLUME IS A USER'S GUIDE FOR THESE PROGRAMS.

1981-0083 PERCIVAL D, HARPER J
VALUE ANALYSIS OF WIND ENERGY SYSTEMS TO ELECTRIC UTILITIES.
NTIS, JANUARY 1981. 9 P.
SERI/TP-732-1064

A METHOD HAS BEEN DEVELOPED FOR DETERMINING THE VALUE OF UTILITY-OPERATED WIND ENERGY SYSTEMS TO ELECTRIC UTILITIES. THE ANALYSIS IS PERFORMED BY A PACKAGE OF COMPUTER MODELS THAT INTERFACE WITH MOST CONVENTIONAL UTILITY PLANNING MODELS. WEATHER DATA ARE CONVERTED TO WIND TURBINE OUTPUT POWERS, WHICH ARE USED TO MODIFY THE UTILITY LOAD REPRESENTATION. EXECUTION OF THE UTILITY PLANNING MODELS WITH BOTH THE ORIGINAL AND MODIFIED LOAD REPRESENTATION YIELDS THE GROSS AND MARGINAL VALUE ($/RATED KW) OF THE ADDED WIND ENERGY SYSTEMS. THIS VALUE IS THEN COMPARED WITH COST ESTIMATES TO DETERMINE IF FOR ECONOMIC REASONS THE WIND ENERGY SYSTEMS SHOULD BE INCLUDED IN FUTURE GENERATION PLANS.

1981-0084 PERKINS F W, JONES R
THE EFFECT OF DELTA-3 ON A YAWING HAWT BLADE AND ON YAW DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 295-301.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A SINGLE DEGREE OF FREEDOM AEROELASTIC COMPUTER MODEL, WMSTAB3, HAS BEEN EMPLOYED TO PERFORM A PARAMETRIC ANALYSIS OF HAWT BLADE BEHAVIOR DURING YAW MANEUVERS. OVER 1,000 DIFFERENT COMBINATIONS OF DELTA-3 AND NORMAL FREQUENCY WERE ANALYZED. THE EFFECT OF DELTA-3 AND FLAPPING STIFFNESS ON FLAPPING FREQUENCY, PHASE, AND MAGNITUDE ARE DISCUSSED. THE MOMENTS TRANSMITTED TO THE FIXED SYSTEM DURING YAW MANEUVERS ARE CALCULATED AND REDUCED TO TIME CONSTANTS OF RESPONSE TO STEP CHANGES IN WIND DIRECTION. THE SIGNIFICANCE OF THE TIME CONSTANTS FOR THE CONFIGURATIONS CONSIDERED RELATIVE TO YAW RESPONSE RATE AND LAG ANGLE IS DISCUSSED, ALONG WITH THEIR POSSIBLE SIGNIFICANCE FOR LARGE HAWT.

1981-0085 PERLEY R
KAMAN 40 KW WIND TURBINE GENERATOR - CONTROL SYSTEM DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 325-332.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE KAMAN 40 KW WIND TURBINE GENERATOR DESIGN INCORPORATES AN INDUCTION GENERATOR FOR APPLICATIONS WHERE A UTILITY IS PRESENT AND A SYNCHRONOUS GENERATOR FOR STANDALONE APPLICATIONS. A COMBINATION OF FEED FORWARD AND FEEDBACK CONTROL IS USED TO ACHIEVE SYNCHRONOUS SPEED PRIOR TO CONNECTING THE GENERATOR TO THE LOAD, AND TO CONTROL THE POWER LEVEL ONCE THE GENERATOR IS CONNECTED. THE DYNAMICS OF THE DRIVE TRAIN AFFECT SEVERAL ASPECTS OF THE SYSTEM OPERATION. THESE HAVE BEEN ANALYZED TO ARRIVE AT THE REQUIRED SHAFT STIFFNESS. THE ROTOR PARAMETERS THAT AFFECT THE STABILITY OF THE FEEDBACK CONTROL LOOP VARY CONSIDERABLY OVER THE WIND SPEED RANGE ENCOUNTERED. THEREFORE, THE CONTROLLER GAIN WAS MADE A FUNCTION OF WIND SPEED IN ORDER TO MAINTAIN CONSISTENT OPERATION OVER THE WHOLE WIND SPEED RANGE. THE VELOCITY REQUIREMENT FOR THE PITCH CONTROL MECHANISM IS RELATED TO THE NATURE OF THE WIND GUSTS TO BE ENCOUNTERED, THE DYNAMICS OF THE SYSTEM, AND THE ACCEPTABLE POWER FLUCTUATIONS AND GENERATOR DROPOUT RATE. A MODEL WAS DEVELOPED THAT ALLOWS THE PROBABLE DROPOUT RATE TO BE DETERMINED FROM A STATISTICAL MODEL OF WIND GUSTS AND THE VARIOUS SYSTEM PARAMETERS, INCLUDING THE ACCEPTABLE POWER FLUCTUATION.

1981-0086 PLACE T W
RESIDENTIAL ENERGY STORAGE FLYWHEEL WITH A WIND TURBINE SUPPLY.
NTIS, APRIL 1981. 103 P.
SAND-79-7098

THE CONCEPTUAL DESIGN WAS DEVELOPED FOR A MINIMUM COST FLYWHEEL ENERGY STORAGE SYSTEM WHICH IS SUITABLE FOR MECHANICAL INTERFACING WITH A WIND-TURBINE ENERGY SOURCE. THE SYSTEM HAS 10 KWH STORAGE CAPACITY AND WILL PROVIDE 5 KW PEAK POWER OUTPUT. SPECIAL EMPHASIS WAS PLACED ON ASSURING THAT THE SYSTEM DESIGN IS ADAPTABLE FOR UPWARD-SCALING TO 50 KWH STORAGE CAPACITY AND 10 KW PEAK POWER OUTPUT. IN ACCORDANCE WITH THE SANDIA CONTRACT REQUIREMENTS, THE DESIGN IS BASED ON CURRENT TECHNOLOGY AND CAN BE BUILT USING CONVENTIONAL MANUFACTURING FACILITIES AND PROCESSES. THE SYSTEM WILL PROVIDE 76% ROUND TRIP EFFICIENCY AND 1%/H MAXIMUM RUNDOWN LOSS. FOR PRODUCTION RATES OF 100,000 UNITS PER YEAR, THE ESTIMATED SELLING PRICES FOR THE SYSTEM IN THE 10 KWH AND 50 KWH STORAGE SIZES ARE $3581 ($358/KWH) AND $9800 ($196/KWH), RESPECTIVELY. THIS REPORT TRACES THE EVOLUTION OF THE SYSTEM DESIGN FROM THE INITIAL BASELINE CONCEPT TO THE FINAL CONFIGURATION AND DISCUSSES THE TECHNICAL AND ECONOMIC CONSIDERATIONS AND DECISIONS WHICH SHAPED THAT EVOLUTION.

1981-0087 POWELL W R
AN ANALYTICAL EXPRESSION FOR THE AVERAGE OUTPUT POWER OF A WIND MACHINE.
SOL. ENERGY 26(1): 77-80, 1981.

THE OUTPUT POWER OF A WIND MACHINE IS A SIMPLE FUNCTION OF WIND SPEED, EXCEPT IN THE PARTIAL POWER RANGE VI LESS THAN V, WHICH IS LESS THAN VR, WHERE VI IS THE MINIMUM OR CUT-IN WIND SPEED AND VR IS THE RATED SPEED. TWO EARLIER MODELS OF OUTPUT POWER IN THIS RANGE ARE DISCUSSED AND A NEW FUNCTIONAL FORM IS SUGGESTED. THE NEW METHODOLOGY PERMITS THE AVERAGE POWER OF A WIND MACHINE IN WEIBULL DISTRIBUTION OF WIND SPEEDS TO BE ESTIMATED WITHOUT USING NUMERICAL METHODS AND NEVER PREDICTS NEGATIVE OUTPUT POWER AS WIND MACHINE PARAMETERS ARE VARIED. ANALYTICAL RESULTS FOR THE AVERAGE POWER ARE PRESENTED IN TERMS OF WIND AND WIND MACHINE PARAMETERS. THE METHODOLOGY DOES NOT INCLUDE THE EFFECT OF DIFFERENT MACHINE SPEED CONTROL OPTIONS (CONSTANT VS. VARIABLE RPM).

1981-0088 ROBBINS W H, THOMAS R L, BALDWIN D H

FEDERAL WIND PROJECTS.
WIND POWER DIG. NO. 21: 34-39, WINTER 1980-1981.

THIS ARTICLE DESCRIBES SEVERAL ONGOING WIND SYSTEM DEVELOPMENT PROJECTS MANAGED BY THE NASA LEWIS RESEARCH CENTER, ORIENTED PRIMARILY TOWARD UTILITY APPLICATION.

1981-0089 SAMMELLS A F, FEJER A A
WIND ENERGY FOR ELECTRIC VEHICLE RECHARGE.
POWERCONVERS. INT. 7(2): 63-65, 69, FEBRUARY 1981.

THIS ARTICLE DISCUSSES ENERGY SUPPLY FOR ELECTRIC VEHICLES INTENDED FOR LOCAL TRAFFIC IN SUBURBAN AREAS, WHERE INDIVIDUALLY OWNED WINDMILLS COULD BE USED FOR THIS PURPOSE. THESE WINDMILLS WOULD CHARGE LARGE STATIONARY BATTERIES AND THE BATTERIES WOULD TRANSFER THEIR CHARGE OVERNIGHT TO THE SMALL BATTERIES CARRIED BY THE VEHICLES. SUCH SYSTEMS, USING WIND GENERATORS OF RELATIVELY SMALL SIZE (5 TO 10 KW), ARE SIMPLE AND RUGGED AND SHOULD BE ABLE TO OPERATE OVER LONG PERIODS BETWEEN OVERHAULS. SINCE THEY WOULD BE EQUIPPED WITH AUTOMATIC CONTROLS, THEY COULD OPERATE UNATTENDED AND COULD BRING ABOUT A SIGNIFICANT NEAR-TERM SAVINGS IN THE FUEL REQUIRED FOR TRANSPORTATION.

1981-0090 SANDUSKY W F
CANDIDATE WIND-TURBINE-GENERATOR SITE ANNUAL DATA SUMMARY FOR JANUARY 1979 THROUGH DECEMBER 1979.
NTIS, MARCH 1981. 151 P.
PNL-3703

SUMMARIZED HOURLY METEOROLOGICAL DATA FOR FIFTEEN CANDIDATE AND WIND TURBINE GENERATOR SITES ARE PRESENTED IN THIS REPORT. THESE DATA ARE COLLECTED FOR THE DEPARTMENT OF ENERGY FOR THE PURPOSE OF EVALUATING THE WIND ENERGY POTENTIAL AT THESE SITES AND ARE USED TO ASSIST IN SELECTION OF POTENTIAL SITES FOR INSTALLATION AND TESTING OF LARGE WIND TURBINES IN ELECTRIC UTILITY SYSTEMS. FOR EACH SITE, DATA ARE GIVEN IN EIGHT TABLES AND ONE FIGURE. USE OF INFORMATION FROM THESE TABLES, WITH INFORMATION ABOUT SPECIFIC WIND TURBINES, SHOULD ALLOW THE USER TO ESTIMATE THE POTENTIAL FOR WIND ENERGY PRODUCTION AT EACH SITE.

1981-0091 SCHATZLE P R, KLIMAS P C, SPAHR H R
AERODYNAMIC INTERFERENCE BETWEEN TWO DARRIEUS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, APRIL 1981. 36 P.
SAND-81-0896

THE EFFECT OF AERODYNAMIC INTERFERENCE ON THE PERFORMANCE OF TWO CURVED BLADED DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES HAS BEEN CALCULATED USING A VORTEX/LIFTING LINE AERODYNAMIC MODEL. THE TURBINES HAVE A TOWER-TO-TOWER SEPARATION DISTANCE OF 1.5 TURBINE DIAMETERS, WITH THE LINE OF TURBINE CENTERS VARYING WITH RESPECT TO THE AMBIENT WIND DIRECTION. THE EFFECTS OF FREESTREAM TURBULENCE WERE NEGLECTED. FOR THE CASES EXAMINED, THE CALCULATIONS SHOWED THAT THE DOWNWIND TURBINE POWER DECREMENT (1) WAS SIGNIFICANT ONLY WHEN THE LINE OF TURBINE CENTERS WAS COINCIDENT WITH THE AMBIENT WIND DIRECTION, (2) INCREASED WITH INCREASING TIPSPEED RATIO, AND (3) IS DUE MORE TO INDUCED FLOW ANGULARITIES DOWNSTREAM THAN TO SPEED DEFICITS NEAR THE DOWNSTREAM TURBINE.

1981-0092 SCHIENBEIN L A
PERFORMANCE TESTING OF A 50 KW VAWT IN A BUILT-UP ENVIRONMENT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 129-138.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE RESULTS OF PERFORMANCE TESTS OF A DAF INDAL 50 KW VERTICAL AXIS WIND TURBINE CARRIED OUT AT THE COMPANY'S PLANT NEAR TORONTO, CANADA, ARE PRESENTED. RESULTS OF LIMITED FREE STREAM TURBULENCE AND VERTICAL WIND SHEAR MEASUREMENTS AT THE SITE ARE ALSO PRESENTED. THE CLOSE AGREEMENT BETWEEN MEASURED AND PREDICTED ENERGY OUTPUTS, REQUIRED TO VERIFY THE WIND TURBINE POWER OUTPUT PERFORMANCE RELATIONSHIP, WAS NOT ATTAINED. A DISCUSSION IS PRESENTED OF FACTORS THAT MAY HAVE CONTRIBUTED TO THE LACK OF BETTER AGREEMENT.

1981-0093 SCHLUETER R A, PARK G L, LOTFALLIAN M, DORSEY J, SHAYANFAR H
EFFECT OF WIND TURBINE GENERATOR MODEL AND SITING ON WIND POWER CHANGES OUT OF LARGE WECS ARRAYS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 343-352.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

PREVIOUS RESULTS HAVE BEEN CONCERNED WITH ESTABLISHING (1) WHETHER OPERATING PROBLEMS COULD EXIST WHEN WECS GENERATION IS SIGNIFICANT AND (2) THE PROPER MODIFICATION OF UNIT COMMITMENT, REGULATION, AND ECONOMIC DISPATCH REQUIRED TO PROVIDE SUFFICIENT SYSTEM SECURITY AND ALLEVIATE THE OPERATING PROBLEMS CAUSED BY WECS GENERATION CHANGES. THIS PAPER DISCUSSES METHODS OF REDUCING THE WECS GENERATION CHANGE THROUGH SELECTION OF THE WIND TURBINE MODEL FOR EACH SITE, SELECTION OF AN APPROPRIATE SITING CONFIGURATION, AND WIND ARRAY CONTROLS. AN ANALYSIS OF WIND GENERATION CHANGE FROM AN ECHELON AND A FARM FOR PASSAGE OF A THUNDERSTORM IS PRESENTED TO ESTABLISH THE FACTORS CONCERNING THE WIND TURBINE MODEL AND SITING CONFIGURATION THAT CONTRIBUTE TO THESE VARIATIONS. DETAILED SIMULATION RESULTS INDICATE MORE PRECISELY HOW THESE FACTORS CAN BE EXPLOITED TO MINIMIZE THE WECS GENERATION CHANGES OBSERVED. REDUCTION OF THE WIND GENERATION CHANGES OVER TEN MINUTES IS SHOWN TO REDUCE THE INCREASE IN SPINNING RESERVE, UNLOADABLE GENERATION AND LOAD FOLLOWING REQUIREMENTS ON UNIT COMMITMENT WHEN SIGNIFICANT WECS GENERATION IS PRESENT AND THE FARM PENETRATION CONSTRAINT IS SATISFIED. CONTROLS ON THE BLADE PITCH ANGLE OF ALL WIND TURBINES IN AN ARRAY OR A BATTERY CONTROL ARE SHOWN TO REDUCE BOTH THE WIND GENERATION CHANGE OUT OF AN ARRAY AND THE EFFECTIVE FARM PENETRATION IN ANTICIPATION OF A STORM SO THAT THE FARM PENETRATION CONSTRAINT MAY BE SATISFIED.

1981-0094 SCHROEDER T A, HORI A M, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 11. HAWAII AND PACIFIC ISLANDS REGION.
NTIS, FEBRUARY 1981. 127 P.
PNL-3195-WERA-11

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH DIVISION OF THE REGION. BACKGROUND ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED IS PRESENTED. AN INTRODUCTION AND OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE FOR EACH DIVISION ARE PROVIDED. ASSESSMENTS FOR INDIVIDUAL DIVISIONS ARE PRESENTED AS SEPARATE CHAPTERS. MUCH OF THE INFORMATION IN THE DIVISION CHAPTERS IS GIVEN IN GRAPHIC OR TABULAR FORM. THE SEQUENCES FOR EACH CHAPTER ARE SIMILAR, BUT SOME PRESENTATIONS USED FOR HAWAII ARE INAPPROPRIATE OR IMPRACTICAL FOR PRESENTATION WITH THE PACIFIC ISLANDS. HAWAII CHAPTER FIGURE AND TABLES ARE CITED BELOW AND APPROPRIATE PACIFIC ISLANDS FIGURE AND TABLE NUMBERS ARE INCLUDED IN BRACKETS.

1981-0095 SCOTT D
WORLD'S BIGGEST WIND MACHINE IS A ONE-ARMED MONSTER.
POP. SCI. 218(1): 83-85, 128-129, JANUARY 1981.

DESCRIBED IS THE GIANT WINDMILL, GROWIAN II, WHICH WILL BE BUILT BY MESSERSCHMIDT-BOLKOW-BLOHM, GERMANY'S LEADING AEROSPACE COMBINE. THE 5-MW WINDMILL WILL TOWER 395 FEET ABOVE THE GROUND, DWARFING THE GIANT 2-MW MACHINES IN JUTLAND, DENMARK, AND NEARLY TWICE THE HEIGHT OF THE MOD-2 IN SOUTHERN WASHINGTON. THE WINDMILL WILL HAVE A 238-FOOT BLADE WEIGHING 26 TONS, BALANCED BY A 35-TON COUNTERWEIGHT ON A STUBBY ARM.

1981-0096 SHELDAHL R E, KLIMAS P C
AERODYNAMIC CHARACTERISTICS OF SEVEN SYMMETRICAL AIRFOIL SECTIONS THROUGH 180-DEGREE ANGLE OF ATTACK FOR USE IN AERODYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
NTIS, MARCH 1981. 120 P.
SAND-80-2114

THIS REPORT DESCRIBES WIND TUNNEL TEST SERIES OBTAINED FOR FOUR SYMMETRICAL BLADE-CANDIDATE AIRFOIL SECTIONS (NACA-0009, -0012, -0012H, AND -0015).

1981-0097 SHELDAHL R E
COMPARISON OF FIELD AND WIND TUNNEL DARRIEUS WIND TURBINE DATA.
NTIS, JANUARY 1981. 21 P.
SAND-80-2469

A 2-M-DIA DARRIEUS VERTICAL AXIS WIND TURBINE WITH NACA-0012 BLADES WAS EXTENSIVELY TESTED IN THE VOUGHT CORPORATION LOW SPEED WIND TUNNEL. THIS SAME TURBINE WAS INSTALLED IN THE FIELD AT THE SANDIA NATIONAL LABORATORIES WIND TURBINE TEST SITE AND OPERATED TO DETERMINE IF FIELD DATA CORRESPONDED TO DATA OBTAINED IN THE WIND TUNNEL. IT IS BELIEVED THAT THE ACCURACY OF THE WIND TUNNEL TEST DATA WAS VERIFIED AND THUS THE CREDIBILITY OF THE DATA BASE FURTHER ESTABLISHED.

1981-0098 SHEPERDSON W
A MOUNTAIN OF WIND AND CONTROVERSY.
ALTERN. SOURCES ENERGY NO. 47: 22-24, JANUARY/FEBRUARY 1981.

OBJECTIONS OF RESIDENTS OF THE TOWN OF LINCOLN, VERMONT, TO THE CONSTRUCTION OF A WIND TURBINE ON LINCOLN MOUNTAIN ARE DISCUSSED. LINCOLN IS ONE OF THE CANDIDATE SITES FOR NASA'S LARGE SCALE, UTILITY CONNECTED, HORIZONTAL AXIS WIND TURBINE PROJECT.

1981-0099 SNYDER M H, WENTZ W H
DYNAMICS OF WAKES DOWNSTREAM OF WIND TURBINE TOWERS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 363-373.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NEAR-FIELD WAKES DOWNSTREAM OF CIRCULAR CYLINDERS AND OF 12-SIDED CYLINDERS WERE SURVEYED IN A WIND TUNNEL. LOCAL VELOCITY AND VELOCITY DEFICIT DIAGRAMS ARE PRESENTED. THE VARIATION OF TURBULENCE IN THE WAKE WAS SURVEYED AND THE FREQUENCY OF THE PERIODIC COMPONENT OF WAKE MOTION WAS DETERMINED. DIFFERENCES BETWEEN WAKES OF CIRCULAR CYLINDERS AND OF 12-SIDED CYLINDERS ARE DISCUSSED. ALSO EFFECTS OF STRAKES, ORIENTATION OF THE 12-SIDED CYLINDERS, AND ROUNDING OF THE CORNERS ARE NOTED.

1981-0100 SPENCER R H
NOISE GENERATION OF UPWIND ROTOR WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 419-423.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NOISE SOURCES OF WIND TURBINES WITH ROTORS UPSTREAM OF THE SUPPORT STRUCTURE ARE DISCUSSED ALONG WITH METHODOLOGY FOR SOUND LEVEL PREDICTION. ESTIMATED NOISE LEVELS FOR THE MOD-2 WIND TURBINE ARE PRESENTED OPERATING IN BOTH THE UPWIND AND DOWNWIND CONFIGURATIONS. RESULTS INDICATE THAT UPWIND ROTOR CONFIGURATIONS MAY BE ADVANTAGEOUS FROM AN ACOUSTICAL STANDPOINT.

1981-0101 SPERA D A
CALCULATION OF GUARANTEED MEAN POWER FROM WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 139-150.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

MUCH RESEARCH HAS BEEN DEVOTED TO THE NOMINAL POWER GENERATED BY WIND MACHINES, BUT LITTLE WORK HAS BEEN DONE ON THE SUBJECT OF GUARANTEED POWER. YET POWER GUARANTEES WILL BE PART OF THE COMMERCIALIZATION OF WIND ENERGY SYSTEMS. THIS PAPER DESCRIBES IN STEP-BY-STEP FASHION A PROPOSED METHOD FOR CALCULATING THE "GUARANTEED MEAN" POWER OUTPUT OF A WIND TURBINE GENERATOR. THE TERM "MEAN POWER" AS USED IN THIS STUDY REFERS TO THE AVERAGE POWER GENERATED AT SPECIFIED WIND SPEEDS DURING SHORT-TERM TESTS. EXTRAPOLATION TO AN ANNUAL MEAN POWER, BASED ON WIND STATISTICS, IS BEYOND THE SCOPE OF THIS PAPER. GUARANTEED ENERGY IS NOT ADDRESSED. THE DOE/NASA MOD-0A 200 KW PLANT IN CLAYTON, NEW MEXICO, IS USED AS A SAMPLE CASE. SUBJECTS DISCUSSED AND ILLUSTRATED ARE CORRELATION OF ANEMOMETERS, THE METHOD OF BINS FOR ANALYZING NON-STEADY DATA, THE PROP CODE FOR PREDICTING TURBINE POWER, AND STATISTICAL ANALYSIS OF DEVIATIONS IN TEST DATA FROM THEORY. GUARANTEED MEAN POWER DENSITY FOR THE CLAYTON MOD-0A SYSTEM WAS FOUND TO BE 8 WATTS PER SQUARE METER LESS THAN THEORETICAL POWER DENSITY AT ALL POWER LEVELS, WITH A CONFIDENCE LEVEL OF 0.999. THIS AMOUNTS TO 4 PERCENT OF RATED POWER.

1981-0102 STAFFORD R W, GREEB F J, SMITH M F, DES CHENES C, WEAVER N L
ECONOMIC ANALYSIS OF WIND-POWERED FARMHOUSE AND FARM BUILDING HEATING SYSTEMS. FINAL REPORT, JANUARY 1981.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JANUARY 1981. 361 P.
DOE/SEA-3408-20691/81/1

THE STUDY EVALUATED THE BREAK-EVEN VALUES OF WIND ENERGY FOR SELECTED FARMHOUSES AND FARM BUILDINGS FOCUSING ON THE EFFECTS OF THERMAL STORAGE ON THE USE OF WECS PRODUCTION AND VALUE. FARMHOUSE STRUCTURAL MODELS INCLUDE THREE TYPES DERIVED FROM A NATIONAL SURVEY--AN OLDER, A MORE MODERN, AND A PASSIVE SOLAR STRUCTURE. THE EIGHT FARM BUILDING APPLICATIONS THAT WERE ANALYZED INCLUDE: POULTRY-LAYERS, POULTRY-BROODING/LAYERS, POULTRY-BROILERS, POULTRY-TURKEYS, SWINE-FARROWING, SWINE-GROWING/FINISHING, DAIRY, AND LAMBING. THESE FARM BUILDINGS REPRESENT THE SPECTRUM OF ANIMAL TYPES, HEATING ENERGY USE, AND MAJOR CONTRIBUTIONS TO NATIONAL AGRICULTURAL ECONOMIC VALUES.

1981-0103 STATE FINANCIAL INCENTIVES FOR SMALL WIND ENERGY SYSTEMS.
WIND POWER DIG. NO. 21: 44-46, WINTER 1980-1981.

THIS ARTICLE OUTLINES INCENTIVES TO PURCHASERS OF RENEWABLE ENERGY SYSTEMS ON A STATE-BY-STATE BASIS.

1981-0104 STEVENS D G, SHEPHERD K P, GROSVELD F
WIND TURBINE ACOUSTIC STANDARDS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 431-435.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A PROGRAM IS BEING CONDUCTED TO DEVELOP NOISE STANDARDS FOR WIND TURBINES WHICH MINIMIZE ANNOYANCE AND WHICH CAN BE USED IN DESIGN SPECIFICATIONS. THE APPROACH CONSISTS OF PRESENTING WIND TURBINE NOISE STIMULI TO TEST SUBJECTS IN A LABORATORY LISTENING CHAMBER. THE RESPONSES OF THE SUBJECTS ARE RECORDED FOR A RANGE OF STIMULI WHICH ENCOMPASS THE DESIGNS, OPERATING CONDITIONS, AND AMBIENT NOISE LEVELS OF CURRENT AND FUTURE INSTALLATIONS. RESULTS TO DATE HAVE ESTABLISHED THE THRESHOLD OF DETECTABILITY FOR A RANGE OF IMPULSIVE STIMULI OF THE TYPE ASSOCIATED WITH BLADE/TOWER-WAKE INTERACTIONS. THE STATUS OF THE ONGOING PSYCHOACOUSTIC TESTS, THE SUBJECTIVE DATA, AND THE APPROACH TO THE DEVELOPMENT OF ACOUSTIC CRITERIA/STANDARDS ARE DESCRIBED.

1981-0105 STOECKER R R
A WIND POWERED HOME HEATING SYSTEM.
ALTERN. SOURCES ENERGY NO. 47: 25-27, JANUARY/FEBRUARY 1981.

THE PURPOSE OF THIS BRIEF NARRATIVE IS TO TRACE THE STEPS IN THE DESIGN AND CONSTRUCTION OF A MEDIUM SIZE WIND ELECTRIC SYSTEM.

1981-0106 STRICKLAND J H, SMITH T, SUN K
A VORTEX MODEL OF THE DARRIEUS TURBINE: AN ANALYTICAL AND EXPERIMENTAL STUDY.
NTIS, JUNE 1981. 189 P.
SAND-81-7017

IMPROVEMENTS IN A VORTEX/LIFTING, LINE-BASED DARRIEUS WIND TURBINE, AERODYNAMIC PERFORMANCE/LOADS MODEL ARE DESCRIBED. THESE IMPROVEMENTS INCLUDE CONSIDERATION OF DYNAMIC STALL, PITCHING CIRCULATION, AND ADDED MASS. VALIDATION OF THESE CALCULATIONS WAS DONE THROUGH WATER TOW TANK EXPERIMENTS. CERTAIN COMPUTER RUN TIME REDUCTION SCHEMES FOR THE CODE ARE DISCUSSED.

1981-0107 STRICKLAND J H, SMITH T, SUN K
A USER'S MANUAL FOR THE VERTICAL AXIS WIND TURBINE CODE VDART3.
NTIS, JUNE 1981. 70 P.
SAND-81-7020

THIS USER'S MANUAL PROVIDES DETAILS ON THE DARRIEUS WIND TURBINE AERODYNAMIC PERFORMANCE/LOADS PREDICTION COMPUTER CODE, VDART3. THE CODE IS THE LATEST GENERATION OF VORTEX-BASED MODELS AND INCLUDES THE EFFECTS OF DYNAMIC STALL, PITCHING CIRCULATION, AND ADDED MASS.

1981-0108 SULLIVAN T L
A REVIEW OF RESONANCE RESPONSE IN LARGE, HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 237-244.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

FIELD OPERATION OF THE MOD-0 AND MOD-1 WIND TURBINES HAS PROVIDED VALUABLE INFORMATION CONCERNING RESONANCE RESPONSE IN LARGE, TWO-BLADED, HORIZONTAL AXIS WIND TURBINES. OPERATIONAL EXPERIENCE HAS SHOWN THAT 1 PER REV EXCITATION EXISTS IN THE DRIVE TRAIN, HIGH AERODYNAMIC DAMPING PREVENTS RESONANCE RESPONSE OF THE BLADE FLATWISE MODES AND TEETERING THE HUB SUBSTANTIALLY REDUCES THE CHORDWISE BLADE RESPONSE TO ODD HARMONIC EXCITATION. THESE RESULTS CAN BE USED BY THE DESIGNER AS A GUIDE TO SYSTEM FREQUENCY PLACEMENT. IN ADDITION IT HAS BEEN FOUND THAT PRESENT ANALYTICAL TECHNIQUES CAN ACCURATELY PREDICT WIND TURBINE NATURAL FREQUENCIES.

1981-0109 SUNDAR R M, SULLIVAN J P
PERFORMANCE OF WIND TURBINES IN A TURBULENT ATMOSPHERE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 79-86.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE EFFECT OF ATMOSPHERIC TURBULENCE ON THE POWER FLUCTUATIONS OF LARGE WIND TURBINES IS STUDIED. THE SIGNIFICANCE OF SPATIAL NON-UNIFORMITIES OF THE WIND IS EMPHASIZED. THE TURBULENT WIND WITH CORRELATION IN TIME AND SPACE IS SIMULATED ON THE COMPUTER BY SHINOZUKAS METHOD. THE WIND TURBULENCE IS MODELLED ACCORDING TO THE DAVENPORT SPECTRUM WITH AN EXPONENTIAL SPATIAL CORRELATION FUNCTION. THE ROTOR AERODYNAMICS IS MODELLED BY SIMPLE BLADE ELEMENT THEORY. COMPARISON OF THE SPECTRUM OF POWER OUTPUT SIGNAL BETWEEN 1-D AND 3-D TURBULENCE, SHOWS THE SIGNIFICANT POWER FLUCTUATIONS CENTERED AROUND THE BLADE PASSAGE FREQUENCY.

1981-0110 TAYLOR D
WHAT'S IN THE WIND WITH RENEWABLES?
ELECTR. REV. 208(1): 16-17, JANUARY 9, 1981.

THE AUTHOR SURVEYS THE PROSPECTS FOR ELECTRICITY GENERATION FROM RENEWABLE SOURCES. HE TAKES A LOOK AT WIND AND TIDAL PROSPECTS.

1981-0111 THOMSON D W, ROTH S D
ENHANCEMENT OF FAR-FIELD SOUND LEVELS BY REFRACTIVE FOCUSING.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 397-400.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE ENHANCEMENT OF SOUND PRESSURE LEVELS RESULTING FROM REFRACTIVE FOCUSING HAS BEEN CALCULATED FOR METEOROLOGICAL CONDITIONS REPRESENTATIVE OF THOSE OBSERVED AT THE MOD-1 SITE NEAR BOONE, N.C. THE RESULTS SHOW THAT 10 TO 20 DB ENHANCEMENTS CAN OCCUR OVER RANGES OF SEVERAL HUNDRED METERS. LOCALIZED ENHANCEMENTS IN EXCESS OF 20 DB CAN OCCUR BUT WILL PROBABLY BE OF LIMITED DURATION AS A CONSEQUENCE OF NORMAL TEMPORALLY VARYING METEOROLOGICAL CONDITIONS.

1981-0112 THRESHER R W, HOLLEY W E, JAFAREY N
WIND RESPONSE CHARACTERISTICS OF HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 87-99.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IT WAS THE OBJECTIVE OF THE WORK REPORTED HERE, AND IN THE COMPANION PAPER (SEE ENTRY 1981-0045), TO TAKE A BROADER LOOK AT WIND TURBINE DYNAMIC RESPONSE TO TURBULENCE, AND ATTEMPT TO ASCERTAIN THE FEATURES OF TURBULENCE THAT WIND TURBINES ARE MOST SENSITIVE TO. A STATISTICAL DESCRIPTION OF THE WIND INPUT INCLUDING ALL THREE WIND COMPONENTS AND ALLOWING LINEAR WIND GRADIENTS ACROSS THE ROTOR DISK, WAS USED TOGETHER WITH QUASI-STATIC AERODYNAMIC THEORY AND AN ELEMENTARY STRUCTURAL MODEL INVOLVING ONLY A FEW DEGREES OF FREEDOM. THE IDEA WAS TO KEEP THE TURBINE MODEL SIMPLE AND SHOW THE BENEFITS OF THIS TYPE OF STATISTICAL WIND REPRESENTATION BEFORE ATTEMPTING TO USE A MORE COMPLEX TURBINE MODEL. AS FAR AS POSSIBLE, THE ANALYSIS WAS KEPT IN THE SIMPLEST FORM, WHILE STILL PRESERVING KEY PHYSICAL RESPONSES.

1981-0113 TROYER J
WIND POWERED TRANSPORT RETURNS.
WIND POWER DIG. NO. 21: 6-9, WINTER 1980-1981.

VARIOUS DESIGNS REALIZING THE POTENTIAL OF SAILING SHIPS FOR A PRACTICAL ALTERNATIVE TO PRESENT DAY, WORLD MERCHANT FLEETS ARE DESCRIBED.

1981-0114 UTILITIES BOOST WIND POWER.
ENG. NEWS-REC. 206(9): 17, FEBRUARY 26, 1981.

DEMONSTRATION PROJECTS IN CALIFORNIA, WISCONSIN, AND WYOMING ARE DESCRIBED. THE CALIFORNIA PROJECT IS TESTING A 3-MW VERTICAL AXIS TURBINE. THE WISCONSIN PROJECT IS INVESTIGATING THE FEASIBILITY OF THE UTILITY COMPANY SELLING 8 TO 25-KW TURBINES TO AREA FARMS. THE WYOMING PROJECT IS INSTALLING TURBINES AT MEDICINE BOW RATED AT 4 AND 2.5 MW TO BE TIED INTO A HYDROELECTRIC POWER SYSTEM.

1981-0115 VEERS P
RESIDUAL STRESSES IN DARRIEUS VERTICAL AXIS WIND TURBINE BLADES.
NTIS, APRIL 1981. 63 P.
SAND-81-0923

A NUMERICAL PACKAGE CALLED RESID HAS BEEN ASSEMBLED TO CALCULATE THE RESIDUAL STRESSES IN VAWT BLADES INDUCED DURING COLD FORMING. USING A STRENGTH OF MATERIALS-ELEMENTARY BEAM THEORY APPROACH, RESID MODELS THE MATERIAL RESPONSE WITH A BILINEAR STRESS-STRAIN CURVE, AND THE CROSS-SECTIONAL GEOMETRY WITH AN ARRAY OF "AREA INCREMENTS." THROUGH AN ITERATIVE SOLUTION PROCEDURE RESIDUAL STRESSES ARE PREDICTED FOR A SPECIFIED FINAL RADIUS OF CURVATURE OR APPLIED BENDING MOMENT. RESID RESULTS ARE COMPARED TO THEORETICAL SOLUTIONS FOR SIMPLE GEOMETRIES AND WITH MARC FINITE ELEMENT RESULTS FOR VAWT BLADE GEOMETRIES. CALCULATING RESIDUAL STRESS LEVELS, DETERMINING ACCEPTABLE RESIDUAL STRESS LEVELS, AND A METHOD OF REDUCING RESIDUAL STRESSES ARE DISCUSSED. A COMPLETE LISTING AND SAMPLE RUN ARE INCLUDED IN THE APPENDICES.

1981-0116 VITERNA L A
THE NASA-LERC WIND TURBINE SOUND PREDICTION CODE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 411-418.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

SINCE REGULAR OPERATION OF THE DOE/NASA MOD-1 WIND TURBINE BEGAN IN OCTOBER 1979 ABOUT 10 NEARBY HOUSEHOLDS HAVE COMPLAINED OF NOISE FROM THE MACHINE. DEVELOPMENT OF THE NASA-LERC WIND TURBINE SOUND PREDICTION CODE BEGAN IN MAY 1980 AS PART OF AN EFFORT TO UNDERSTAND AND REDUCE THE NOISE GENERATED BY MOD-1. TONE SOUND LEVELS PREDICTED WITH THIS CODE ARE IN GENERALLY GOOD AGREEMENT WITH MEASURED DATA TAKEN IN THE VICINITY OF THE MOD-1 WIND TURBINE (LESS THAN 2 ROTOR DIAMETERS). COMPARISON IN THE FAR FIELD INDICATES THAT PROPAGATION EFFECTS DUE TO TERRAIN AND ATMOSPHERIC CONDITIONS MAY BE AMPLIFYING THE ACTUAL SOUND LEVELS BY ABOUT 6 DB. PARAMETRIC ANALYSIS USING THE CODE HAS SHOWN THAT THE PREDOMINANT CONTRIBUTORS TO MOD-1 ROTOR NOISE ARE (1) THE VELOCITY DEFICIT IN THE WAKE OF THE SUPPORT TOWER, (2) THE HIGH ROTOR SPEED, AND (3) OFF-OPTIMUM OPERATION.

1981-0117 WALDON C A
AN OVERVIEW OF FATIGUE FAILURES AT THE ROCKY FLATS WIND SYSTEM TEST CENTER.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 121-128.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

INITIALLY, WIND ENERGY STATE-OF-THE-ART ADVANCEMENTS INVOLVED THE QUANTITY AND QUALITY OF THE POWER PRODUCED BY SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). AS WIND ENERGY COMMERCIALIZATION INCREASES, HOWEVER, SWECS MANUFACTURERS MUST RAPIDLY ADOPT RIGID RELIABILITY PROGRAMS. WIND MACHINES MUST NOT ONLY MEET DESIGN PERFORMANCE SPECIFICATIONS, BUT THEY MUST ALSO PERFORM WITHOUT COSTLY COMPONENT OR STRUCTURAL FAILURES TO ASSURE CONTINUED MARKET GROWTH. THIS PAPER IS INTENDED TO IDENTIFY POTENTIAL SWECS DESIGN PROBLEMS AND THEREBY IMPROVE PRODUCT QUALITY AND RELIABILITY. MASS PRODUCED COMPONENTS SUCH AS GEARBOXES, GENERATORS, BEARINGS, ETC., ARE GENERALLY RELIABLE DUE TO THEIR WIDESPREAD UNIFORM USE IN OTHER INDUSTRIES. THE LIKELIHOOD OF FAILURE INCREASES, THOUGH, IN THE INTERFACING OF THESE COMPONENTS AND IN SWECS COMPONENTS DESIGNED FOR A SPECIFIC SYSTEM USE. PROBLEMS RELATING TO THE STRUCTURAL INTEGRITY OF SUCH COMPONENTS ARE DISCUSSED AND ANALYZED IN THIS REPORT WITH TECHNIQUES CURRENTLY USED IN QUALITY ASSURANCE PROGRAMS IN OTHER MANUFACTURING INDUSTRIES.

1981-0118 WEBER R C, SEIFERT J
WIND: A POWER SOURCE FOR FORKLIFT TRUCKS.
MECH. ENG. 103(1): 30-35, JANUARY 1981.

WIND POWER IS NOW BEING SERIOUSLY CONSIDERED AS A SOURCE OF ENERGY TO POWER SEVERAL FORKLIFT TRUCKS, AN APPLICATION HERE SHOWN TO BE FEASIBLE EVEN AT MODERATE RATES OF INFLATION. THE DECISION INVOLVED IN THE PURCHASE OF A FORKLIFT TRUCK HAS HERETOFORE BEEN SIMPLY A CHOICE BETWEEN ELECTRIC OR PROPANE POWER. HOWEVER, AS THE ENERGY SITUATION WORSENS AND TECHNICAL ADVANCES IN THE AREA OF WIND GENERATION INCREASE, THE DECISION MATRIX TAKES ON THE ADDED DIMENSION OF WIND POWER. ON-SITE STUDIES TO DETERMINE WIND CHARACTERISTICS AND FORKLIFT TRUCK USE PATTERNS WERE CONDUCTED AT WISCONSIN CENTRIFUGAL INC. OF WAUKESHA, WIS. AN ECONOMIC ANALYSIS WAS THEN PERFORMED, AND IT SHOWED THAT WIND GENERATION DOES INDEED ENTER THE DECISION MATRIX. THE ON-SITE STUDIES AT WISCONSIN CENTRIFUGAL INC. INDICATE THAT THE WIND IS SUFFICIENT TO PROVIDE ENOUGH ENERGY FOR

RECHARGING APPROXIMATELY ONE BATTERY PER DAY. OBVIOUSLY, TRUCK USE PATTERNS WOULD DETERMINE THE PRACTICABILITY OF INSTALLATION OF A WIND SYSTEM.

1981-0119 WELLS R J
GE MOD-1 NOISE STUDY.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 389-395.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NOISE STUDIES OF THE MOD-1 WIND TURBINE GENERATOR ARE SUMMARIZED, AND A SIMPLE MATHEMATICAL MODEL IS PRESENTED WHICH IS ADEQUATE TO CORRELATE THE SOUND LEVELS FOUND NEAR THE MACHINE. A SIMPLE ACOUSTIC MEASURE IS SUGGESTED FOR USE IN EVALUATING FAR FIELD SOUND LEVELS. USE OF THIS MEASURE AS INPUT TO A CURRENTLY AVAILABLE SOUND COMPLAINT PREDICTION PROGRAM IS DISCUSSED. RESULTS OF A RECENT STATISTICAL SURVEY RELATIVE TO THE FAR FIELD VARIATION OF THIS ACOUSTIC MEASURE BECAUSE OF ATMOSPHERIC EFFECTS ARE DESCRIBED.

1981-0120 WENTZ W H, CALHOUN J T
ANALYTICAL STUDIES OF THE NEW AIRFOILS FOR WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 41-49.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

COMPUTER STUDIES HAVE BEEN CONDUCTED TO ANALYZE THE POTENTIAL GAINS ASSOCIATED WITH UTILIZING NEW AIRFOILS FOR LARGE WIND TURBINE ROTOR BLADES. ATTEMPTS TO INCLUDE 3-DIMENSIONAL STALLING EFFECTS ARE INCONCLUSIVE. IT IS RECOMMENDED THAT BLADE PRESSURE MEASUREMENTS BE MADE TO CLARIFY THE NATURE OF BLADE STALLING. IT IS ALSO RECOMMENDED THAT NEW NASA LAMINAR FLOW AIRFOILS BE USED AS ROTOR BLADE SECTIONS.

1981-0121 WILSON R E
AERODYNAMIC POTPOURRI.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 3-7.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AERODYNAMIC DEVELOPMENTS FOR VERTICAL AXIS AND HORIZONTAL AXIS WIND TURBINES ARE GIVEN THAT RELATE TO THE PERFORMANCE AND AERODYNAMIC LOADING OF THESE MACHINES. INCLUDED ARE: (1) A FIXED WAKE AERODYNAMIC MODEL OF THE DARRIEUS VERTICAL AXIS WIND TURBINE; (2) EXPERIMENTAL RESULTS THAT SUGGEST THE EXISTENCE OF A LAMINAR FLOW DARRIEUS VERTICAL AXIS TURBINE; (3) A SIMPLE AERODYNAMIC MODEL FOR THE TURBULENT WINDMILL/VORTEX RING STATE OF HORIZONTAL AXIS ROTORS; AND (4) A YAWING MOMENT OF A RIGID HUB HORIZONTAL AXIS WIND TURBINE THAT IS RELATED TO BLADE CONING.

1981-0122 WILSON R E, WALKER S N
FIXED WAKE ANALYSIS OF THE DARRIEUS ROTOR.
NTIS, JULY 1981. 89 P.
SAND-81-7026

DEVELOPMENT AND VALIDATION OF A DARRIEUS WIND TURBINE AERODYNAMIC PERFORMANCE PREDICTION MODEL IS DESCRIBED. USING A FIXED-WAKE APPROACH, THE MODEL COMBINES SOME OF THE MORE DESIRABLE FEATURES OF VORTEX-LIFTING LINE AND CONSERVATION OF MOMENTUM/STREAMTUBE APPROACHES. THE MODEL THUS ACCOUNTS FOR UP- AND DOWNWIND DIFFERENCES THAT ARE PREDICTED BY VORTEX APPROACHES WHILE RETAINING THE SHORT COMPUTER RUN TIMES FOUND WITH STREAMTUBE MODELS. THE MODEL TREATS THE EFFECTS OF STALL, CURVED BLADES, BLADE PITCH, AND BLADE ATTACHMENT LOCATION. RESULTS AGREE WITH THOSE OBTAINED WITH SANDIA NATIONAL LABORATORIES' 17-M-DIAMETER DARRIEUS VAWT.

1981-0123 THE WIND COMMERCIALIZATION BILL.
WIND POWER DIG. NO. 21: 47-48, WINTER 1980-1981.

THE "WIND ENERGY SYSTEMS ACT OF 1980", AN AGGRESSIVE SUPPORT PACKAGE FOR THE WIND ENERGY INDUSTRY THAT IS DESIGNED TO HELP "COMMERCIALIZE" WIND ENERGY TECHNOLOGY, IS REVIEWED HERE.

1981-0124 WRIGHT A D, SEXTON J H, BUTTERFIELD C P, THRESHER R W
SWECS TOWER DYNAMICS ANALYSIS METHODS AND RESULTS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 245-253.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AT THE ROCKY FLATS WIND SYSTEMS CENTER, SEVERAL DIFFERENT TOWER DYNAMICS ANALYSIS METHODS AND COMPUTER CODES ARE USED TO DETERMINE THE NATURAL FREQUENCIES AND MODE SHAPES OF BOTH GUYED AND FREESTANDING WIND TURBINE TOWERS. IN THIS PAPER THESE ANALYSIS METHODS ARE DESCRIBED AND THE RESULTS FOR TWO TYPES OF TOWERS, A GUYED TOWER AND A FREESTANDING TOWER, ARE SHOWN. THE ADVANTAGES AND DISADVANTAGES IN THE USE OF AND THE ACCURACY OF EACH METHOD ARE ALSO DESCRIBED.

1981-0125 YOUNG B J
THE VELOCITY FIELD OF A SYSTEM OF UNSTEADY CYCLOIDAL VORTICES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 35-40.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN ESSENTIAL DIFFERENCE BETWEEN TWO-DIMENSIONAL AND THREE-DIMENSIONAL MODELS OF CYCLOIDAL ROTORS IS THE PRESENCE OF UNSTEADY TRAILING CYCLOIDAL VORTICES IN THE WAKE. THE VELOCITY INDUCED BY THESE VORTICES IS THE PRIMARY MECHANISM PRODUCING FLOW RETARDATION FOR LOW SPAN/RADIUS RATIO, FINITE BLADE NUMBER ROTORS. AN IDEALIZED RIGID WAKE MODEL OF FINITE BLADE CYCLOIDAL ROTORS IS USED TO INVESTIGATE SOME CYCLOIDAL ROTOR PROBLEMS.

1981-0126 YU Y-Y
EXPERIENCE ON THE USE OF MOSTAB-HFW COMPUTER CODE FOR HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 221-223.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

EXPERIENCE GAINED FROM THE DYNAMIC ANALYSIS OF HORIZONTAL AXIS TURBINE ROTORS BASED ON THE USE OF THE MOSTAB-HFW COMPUTER CODE IS DESCRIBED. THREE TOPICS ARE COVERED, DEALING WITH THE FREQUENCIES OF A ROTATING BEAM, THE USE OF THE FUNDAMENTAL MODE OF A UNIFORM CANTILEVER BEAM, AND THE ANALYSIS OF RESONANCE DWELL.

IMMENSELY HIGH PEAK LOADS WERE GENERATED BY THE CODE FOR RESONANCE DWELL, INDICATING FURTHER NEED FOR INCLUDING STRUCTURAL DAMPING AND FOR TRANSIENT ANALYSIS CAPABILITY. THE EFFECT OF STRUCTURAL DAMPING, NEWLY INCORPORATED IN THE CODE, IS FINALLY DESCRIBED.

1981-0127 ZABRANSKY J, VILARDO J M, SCHAKENBACH J T, ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 6. THE SOUTHEAST REGION.
NTIS, JANUARY 1981. 175 P.
PNL-3195-WERA-6

THE SOUTHEAST ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA: ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE SOUTHEAST REGION (ALABAMA, FLORIDA, GEORGIA, MISSISSIPPI, AND SOUTH CAROLINA). AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IS PROVIDED IN THE REGIONAL DISCUSSION, AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS, OVER SEVERAL TIME SCALES, IN THE WIND RESOURCE AT SELECTED STATIONS IN EACH STATE ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED, DIRECTION AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0128 LISSAMAN P B S, ZALAY A D, HIBBS B H
ADVANCED AND INNOVATIVE WIND ENERGY CONCEPT DEVELOPMENT: DYNAMIC INDUCER SYSTEM. RESEARCH REPORT.
NTIS, MAY 1981. 77 P.
SERI/TR-8085-1-T2

THE PERFORMANCE BENEFITS OF THE DYNAMIC INDUCER TIPVANE SYSTEM HAVE BEEN EXPERIMENTALLY DEMONSTRATED FOR THE FIRST TIME. TOW-TESTS CONDUCTED ON A THREE-BLADED, 3.6-METER DIAMETER ROTOR HAVE SHOWN THAT A DYNAMIC INDUCER CAN ACHIEVE A POWER COEFFICIENT (BASED UPON POWER BLADE SWEPT AREA) OF 0.5, WHICH EXCEEDS THAT OF A PLAIN ROTOR BY ABOUT 35%. WIND TUNNEL TESTS CONDUCTED ON A ONE-THIRD SCALE MODEL OF THE DYNAMIC INDUCER ACHIEVED A POWER COEFFICIENT OF 0.62 WHICH EXCEEDED THAT OF A PLAIN ROTOR BY ABOUT 70%. THE DYNAMIC INDUCER SUBSTANTIALLY IMPROVES THE PERFORMANCE OF CONVENTIONAL ROTORS AND INDICATIONS ARE THAT HIGHER POWER COEFFICIENTS CAN BE ACHIEVED THROUGH ADDITIONAL AERODYNAMIC OPTIMIZATION. IT IS NOTED THAT THE WIND TURBINE SYSTEM USED AS A BASELINE UNIT IS THE KEDCO 1200, A CONVENTIONAL PROPELLER-TYPE WIND TURBINE WITH POWER BLADES DESIGNED FOR OPTIMUM PERFORMANCE WITHOUT TIP VANE AUGMENTATION. IN ADDITION, THE TIP VANE UTILIZED A STANDARD CONVENTIONAL NACA AIRFOIL SELECTED ON CONSERVATIVE GROUNDS TO GUARANTEE ACCEPTABLE PERFORMANCE. MORE ADVANCED HIGH LIFT-TO-DRAG AIRFOIL SECTIONS ARE EXPECTED TO IMPROVE THE TIP VANE EFFECTIVENESS. THE ANALYTICAL AND EXPERIMENTAL DEVELOPMENT EFFORTS SUMMARIZED IN THIS REPORT SUGGEST THAT THE DYNAMIC INDUCER CAN PLAY A MAJOR ROLE IN FUTURE TURBINE TECHNOLOGY. A NEW METHOD FOR CALCULATING WIND TUNNEL CORRECTIONS FOR AUGMENTED WIND TURBINES IS DEVELOPED. THIS SHOWS THAT CORRECTIONS ARE VERY SIGNIFICANT. FOR EXAMPLE, WITH A BLOCKAGE OF 16%, THE CORRECTED POWER COEFFICIENT IS ABOUT 20% LOWER THAN THAT ACTUALLY MEASURED.

1980-0001 ARTHUR COOK AND THE AGWAY CONNECTION.
WIND POWER DIG. NO. 19: 42-43, SPRING 1980.

1980-0002 CAMPBELL "CHINESE" MILL.
WIND POWER DIG. NO. 19: 40, SPRING 1980.

1980-0003 CHARLIER M
ARCHITECTURE IS PEOPLE.
ALTERN. SOURCES ENERGY NO. 44: 4-8, JULY/AUGUST 1980.

ED DOERR'S CONSULTING BUSINESS IS DESCRIBED. HE ASSISTS PEOPLE IN ARCHITECTURAL DESIGN USING ALTERNATIVE SOURCES OF ENERGY, TAKING INTO ACCOUNT BOTH THE LIMITATIONS OF THE TECHNOLOGY AS WELL AS LIMITATIONS OF THE PEOPLE. HE RECOMMENDS SYSTEMS THAT WILL SUIT THE PEOPLE, THEIR CIRCUMSTANCES, AND THEIR LIFE STYLES.

1980-0004 CHROMALLOY CONSIDERS VAWT'S.
WIND POWER DIG. NO. 19: 46, SPRING 1980.

1980-0005 DOE PROPOSING $80 MILLION FY81 BUDGET.
WIND ENERGY REP.: 3, JANUARY 1980.

1980-0006 DEPARTMENT OF ENERGY SOLAR BUDGET UP, BUT NOT AS MUCH AS RATE OF INFLATION.
SOL. ENERGY INTELL. REP. 6(1): 2, JANUARY 7, 1980.

WIND ENERGY CONVERSION IS SLATED TO GET $80-MILLION, ONE OF THE BIGGEST INCREASES IN THE SOLAR BUDGET, AND ENOUGH TO START THE COMMERCIALIZATION PROGRAM OUTLINED IN PENDING LEGISLATION.

1980-0007 DOWN-UNDER DARRIEUS.
WIND POWER DIG. NO. 19: 41, SPRING 1980.

1980-0008 DUNHAM B
PINSON; AN ALTERNATE SOLUTION.
WIND POWER DIG. NO. 19: 51-52, SPRING 1980.

1980-0009 FIGARD R L, SCHETZ J A
FLOWFIELD NEAR THE ROTOR OF A 10 KW HORIZONTAL-AXIS WINDMILL.
J. ENERGY 4(2): 64-69, MARCH-APRIL 1980.

A THREE-PRONGED STUDY OF THE FLOWFIELD IMMEDIATELY BEHIND THE ROTOR OF A 10 KW HORIZONTAL-AXIS WINDMILL IS PRESENTED. THE PREDICTIONS OF A COMPUTERIZED BLADE-ELEMENT ANALYSIS AND THE SCALED RESULTS OF WIND TUNNEL TESTS OF A 1/5TH SCALE MODEL ARE COMPARED WITH FIELD MEASUREMENTS TAKEN WITH THE FULL-SCALE UNIT. IN ADDITION, TURBULENCE MEASUREMENTS TAKEN IN THE FIELD AND IN THE WIND TUNNEL TESTS ARE GIVEN. BOTH THE ANALYTICAL PREDICTIONS AND THE SCALED WIND TUNNEL RESULTS AGREE WITH THE FIELD DATA TO WITHIN ABOUT PLUS OR MINUS 10 PERCENT FOR TOTAL POWER. THE AXIAL VELOCITY PROFILE PREDICTED IN THE ROTOR DISK BY THE ANALYSIS IS IN REASONABLE AGREEMENT WITH THAT MEASURED JUST BEHIND THE ROTOR IN THE FIELD. THE AGREEMENT WITH THE SCALED WIND TUNNEL IS NOT AS GOOD.

1980-0010 FOKKER-VFW DEVELOPES (SIC) DARRIEUS.
WIND POWER DIG. NO. 19: 39, SPRING 1980.

1980-0011 FRANCIS B
SANDIA; DARRIEUS TECHNOLOGY ADVANCES.
WIND POWER DIG. NO. 19: 27-29, SPRING 1980.

1980-0012 GIPE P
ALCOA; SOON TO DOMINATE VAWT MARKET.
WIND POWER DIG. NO. 19: 20-25, SPRING 1980.

1980-0013 GIPE P
MECHANICSBURG 1--MCLOUGHLIN O.
WIND POWER DIG. NO. 19: 54-56, SPRING 1980.

1980-0014 GIPE P
P.I. SPECIALISTS MARKET BRITISH TURBINE.
WIND POWER DIG. NO. 19: 44-45, SPRING 1980.

1980-0015 GIPE P
VAWT'S; A BRIEF INTRODUCTION.
WIND POWER DIG. NO. 19: 9-11, SPRING 1980.

1980-0016 GIROMILL READY FOR ROCKY FLATS.
WIND POWER DIG. NO. 19: 36-37, SPRING 1980.

1980-0017 GLADDEN MILL SURVIVES.
WIND POWER DIG. NO. 19: 43, SPRING 1980.

1980-0018 GLASGOW J C, MILLER D R
TEETERED, TIP-CONTROLLED ROTOR: PRELIMINARY TEST RESULTS FROM MOD-0 100-KW EXPERIMENTAL WIND TURBINE.
NTIS, 1980. 16 P.
DOE/NASA/1028-80/26, NASA-TM-81445

RESULTS OF TESTS CONDUCTED USING THE MOD-0 100 KW EXPERIMENTAL WIND TURBINE ARE EVALUATED. THE TEETERED ROTOR SIGNIFICANTLY DECREASED LOADS ON THE YAW DRIVE MECHANISM AND REDUCED BLADE CYCLIC FLAPWISE BENDING MOMENTS BY 25 PERCENT AT THE 20 PERCENT SPAN LOCATION WHEN COMPARED TO THE RIGID HUB ROTOR. THE TEETERED HUB PERFORMED WELL, BUT IMPACTED THE TEETER STOPS ON OCCASION AS WIND SPEED AND/OR DIRECTION VARIED RAPIDLY. THE TIP-CONTROLLED ROTOR PERFORMED SATISFACTORILY WITH SOME EXPECTED LOSS OF CONTROL WHEN COMPARED TO THE FULL SPAN PITCHABLE BLADE. THE PERFORMANCE RESULTS INDICATE THAT A REVIEW OF TECHNIQUES USED TO CALCULATE ROTOR POWER IS IN ORDER.

1980-0019 HAMILTON STANDARD WINS MEDICINE BOW SVU AWARD.
WIND ENERGY REP. : 1-2, JANUARY 1980.

1980-0020 KRAWIEC S
ECONOMICS OF SELECTED WECS DISPERSED APPLICATIONS.
NTIS, APRIL 1980. 38 P.
SERI/TR-431-580

THE OBJECTIVE OF THIS PAPER IS TO ANALYZE THE COST OF ELECTRICITY GENERATED BY SELECTED WIND ENERGY SYSTEMS IN RESIDENTIAL AND AGRICULTURAL APPLICATIONS, THE BREAKEVEN COST OF WIND SYSTEMS ABLE TO COMPETE ECONOMICALLY WITH CONVENTIONAL POWER SOURCES IN DISPERSED APPLICATIONS, AND THE IMPACT OF MAJOR ECONOMIC FACTORS ON THE COST PERFORMANCE INDEX. THE TWO MAJOR MEASURES OF ECONOMICS USED ARE BREAKEVEN PERIOD AND LEVELIZED COST OF ELECTRICITY (LIFE-CYCLE COST).

1980-0021 MCCONNELL R D
A SCREENING METHOD FOR WIND ENERGY CONVERSION SYSTEMS.
NTIS, MARCH 1980. 6 P.
SERI/TP-731-649

WE HAVE DEVELOPED A SCREENING METHOD FOR EVALUATING WIND ENERGY CONVERSION SYSTEMS (WECS) LOGICALLY AND CONSISTENTLY. IT IS A SET OF PROCEDURES SUPPORTED BY A DATA BASE FOR LARGE CONVENTIONAL WECS. THE PROCEDURES ARE FLEXIBLE ENOUGH TO ACCOMMODATE CONCEPTS LACKING COST AND ENGINEERING DETAIL, AS IS THE CASE WITH MANY INNOVATIVE WIND ENERGY CONVERSION SYSTEMS (IWECS). THE METHOD USES BOTH VALUE INDICATORS AND SIMPLIFIED COST ESTIMATING PROCEDURES. VALUE INDICATORS ARE SELECTED RATIOS OF ENGINEERING PARAMETERS INVOLVING ENERGY, MASS, AREA, AND POWER. COST MASS RATIOS AND COST ESTIMATING RELATIONSHIPS WERE DETERMINED FROM THE CONVENTIONAL WECS DATA BASE TO ESTIMATE OR VERIFY INSTALLATION COST ESTIMATES FOR IWECS. THESE VALUE INDICATORS AND COST ESTIMATING PROCEDURES ARE SHOWN FOR CONVENTIONAL WECS. AN APPLICATION OF THE METHOD TO A TRACKED-VEHICLE AIRFOIL CONCEPT IS PRESENTED.

1980-0022 MCGEORGE J
JOHN'S WORKSHOP.
ALTERN. SOURCES ENERGY NO. 43: 34-38, MAY/JUNE 1980.

1980-0023 ZAMBRANO T G
ASSESSING THE LOCAL WINDFIELD WITH INSTRUMENTATION.
NTIS, OCTOBER 1980. 277 P.
PNL-3622

THIS REPORT CONCERNS THE DEVELOPMENT AND TESTING OF A TECHNIQUE FOR THE INITIAL SCREENING AND EVALUATION OF POTENTIAL SITES FOR WIND ENERGY CONVERSION SYSTEMS (WECS). THE METHODOLOGY WAS DEVELOPED THROUGH A REALISTIC SITING EXERCISE. THE SITING EXERCISE INVOLVED MEASUREMENTS OF WIND ALONG THE SURFACE AND WINDS ALOFT USING A RELATIVELY NEW INSTRUMENT SYSTEM, THE TETHERED AERODYNAMIC LIFTING ANEMOMETER (TALA) KITE; NOTATION OF ECOLOGICAL FACTORS SUCH AS VEGETATION FLAGGING, SOIL EROSION AND SITE EXPOSURE, AND VERIFICATION OF AN AREA BEST SUITED FOR WIND-ENERGY DEVELOPMENT BY ESTABLISHING AND MAINTAINING A WIND MONITORING NETWORK. THE SITING EXERCISE WAS CARRIED OUT IN AN APPROXIMATELY 100-SQUARE-MILE REGION OF THE TEHACHAPI MOUNTAINS OF SOUTHERN CALIFORNIA. THE RESULTS SHOWED THAT A COMPREHENSIVE SITE SURVEY INVOLVING FIELD MEASUREMENTS, ECOLOGICAL SURVEY, AND WIND-MONITORING CAN BE AN EFFECTIVE TOOL FOR PRELIMINARY EVALUATION OF WECS SITES.

1980-0024 MCNERNEY G M
AN AUTOMATIC-CONTROL SYSTEM FOR THE 17 METRE VERTICAL-AXIS WIND TURBINE (VAWT).
NTIS, MARCH 1980. 49 P.
SAND-78-0984

THE 17-METRE DOE/SANDIA VAWT BEGAN OPERATION IN MARCH 1977. SINCE THAT TIME THE TURBINE HAS BEEN OPERATED STRICTLY BY MANUAL CONTROL FOR THE PURPOSE OF DATA ACQUISITION AND PERFORMANCE ANALYSIS; THIS PROCEDURE HAS LIMITED THE VAWT OPERATION TIME AND POWER OUTPUT. AN AUTOMATIC-CONTROL SYSTEM HAS BEEN DESIGNED AND IMPLEMENTED TO STUDY AUTOMATIC CONTROL OF A VAWT AND TO BETTER JUDGE THE FATIGUE LIFE AND RELIABILITY OF THE VAWT UNDER WHAT WILL BE NORMAL OPERATING CONDITIONS FOR POWER PRODUCTION. THIS SYSTEM, INCLUDING THE NECESSARY HARDWARE, IS DISCUSSED IN DETAIL ALONG WITH A SIMPLIFIED COST ANALYSIS.

1980-0025 KSU ROTOR EXPERIMENT.
WIND POWER DIG. NO. 19: 38-39, SPRING 1980.

1980-0026 LEVY G W, FIELD J
SOLAR ENERGY EMPLOYMENT AND REQUIREMENTS 1978-1985. SUMMARY AND HIGHLIGHTS.
NTIS, APRIL 1980. 209 P.
DOE/TIC-11154

THE PURPOSE OF THIS STUDY IS TO PROVIDE A DESCRIPTION OF THE PRESENT STATUS OF THE SOLAR ENERGY AREA IN TERMS OF MANPOWER, AND TO DEVELOP AND APPLY A METHODOLOGY FOR PROJECTING MANPOWER REQUIREMENTS IN SOLAR ENERGY. THIS INCLUDES IDENTIFICATION AND DESCRIPTION OF EMPLOYERS ENGAGED IN SOLAR AND SOLAR-RELATED ACTIVITIES; COLLECTION OF EMPLOYMENT DATA BY OCCUPATION; DEFINITION OF NEW OCCUPATIONAL SPECIALTIES AND CHANGES IN TRADITIONAL OCCUPATION; ANALYSIS OF THE EDUCATION AND EXPERIENCE OF THOSE EMPLOYED IN SOLAR AND SOLAR-RELATED AREAS; PROJECTION OF SHORT-TERM AND MID-TERM SOLAR EMPLOYMENT BY OCCUPATION, AND DEVELOPMENT OF A METHODOLOGY FOR FORMULATING FUTURE PROJECTIONS.

1980-0027 LIU M K, YOCKE M A
SITING OF WIND TURBINE GENERATORS IN COMPLEX TERRAIN.
J. ENERGY 4(1): 10-16, JANUARY-FEBRUARY 1980.

ACCURATE DETERMINATION OF WIND DISTRIBUTIONS IN THE ATMOSPHERIC SURFACE LAYER IS A PREREQUISITE FOR THE SUCCESSFUL SITING AND DESIGN OF WIND TURBINE GENERATORS. A GENERAL METHODOLOGY WHICH COMBINES A CLIMATOLOGICAL APPROACH AND A DIAGNOSTIC WIND MODEL IS PROPOSED FOR SELECTING OPTIMUM WIND POWER SITES IN COMPLEX TERRAIN. THE DEVELOPMENT OF THE DIAGNOSTIC WIND MODEL, WHICH IS BASED UPON THE NUMERICAL SOLUTION OF THE THREE-DIMENSIONAL MASS CONTINUITY EQUATION WITH THE APPROPRIATE PHYSICAL PROCESSES PARAMETERIZED, IS DELINEATED. TO DEMONSTRATE ITS UTILITY, THE PROPOSED METHODOLOGY IS APPLIED TO THE ISLAND OF MAUI IN HAWAII. THE PREDICTED WIND FIELD APPEARS TO RETRIEVE QUANTITATIVELY THE ESSENTIAL FEATURES OF THE MEASURED WIND FLOWS; ADDITIONALLY, THE AREAS IDENTIFIED AS POTENTIAL WIND POWER APPLICATION SITES CORRESPOND TO THOSE DETERMINED EARLIER VIA FIELD STUDIES.

1980-0028 LUNDE P
WINDMILLS: FROM JIDDAH TO YORKSHIRE.

ARAMCO WORLD MAG. 31(1): 32-35, JANUARY-FEBRUARY 1980.

THIS ARTICLE REVIEWS THE HISTORY OF WIND ENERGY AND MENTIONS CURRENT PROJECTS IN QUEBEC, YORKSHIRE, AND NORTH CAROLINA.

1980-0029 MIGLIORE P G, WOLFE W P, FANUCCI J B
FLOW CURVATURE EFFECTS ON DARRIEUS TURBINE BLADE AERODYNAMICS.
J. ENERGY 4(2): 49-55, MARCH-APRIL 1980.

THE EFFECTS OF CURVILINEAR FLOW ON DARRIEUS BLADE AERODYNAMICS ARE DESCRIBED. ANALYSIS SHOWS THAT THESE EFFECTS CAN HAVE A SIZEABLE IMPACT ON PERFORMANCE FOR BLADES OF LARGE CHORD. EXPERIMENTAL DATA ARE PRESENTED WHICH VERIFY THIS FORECAST. UNUSUALLY LARGE BOUNDARY-LAYER RADIAL PRESSURE GRADIENTS AND VIRTUALLY ALTERED CAMBER AND INCIDENCE ARE IDENTIFIED AS CASUAL PHENOMENA. CONFORMAL MAPPING TECHNIQUES ARE USED TO TRANSFORM GEOMETRIC AIRFOILS IN CURVED FLOW TO THEIR VIRTUAL EQUIVALENTS IN RECTILINEAR FLOW. IT IS ARGUED THAT FLOW CURVATURE IS AN IMPORTANT DETERMINANT OF DARRIEUS TURBINE BLADE AERODYNAMIC EFFICIENCY AND THAT ITS PROPER CONSIDERATION WILL YIELD PERFORMANCE IMPROVEMENTS, EVEN FOR BLADES OF SMALL CHORD.

1980-0030 MORRIS D
FROM THE GROUND UP. DEFINING SMALL SCALE.
SOLAR AGE 5(1): 8, JANUARY 1980.

HOW VARIOUS REGULATORY AGENCIES DEFINE SMALL SCALE PROJECTS (SOME WIND) IS DISCUSSED.

1980-0031 NATURE PAYS THE BILLS HERE.
HOUSE GARDEN 152(2): 106-109, FEBRUARY 1980.

DON MAYER (VICE PRESIDENT OF THE NORTH WIND POWER CO.) HAS AN ENERGY EFFICIENT HOME IN VERMONT USING A VARIETY OF ALTERNATIVE SOURCES OF ENERGY IN COMBINATION. THE HOME, USING ACTIVE SOLAR FOR HOT WATER HEATING, PASSIVE SOLAR HEATING, WINDMILL, AND OTHER IDEAS, IS DESCRIBED IN THIS ILLUSTRATED ARTICLE.

1980-0032 NESEC CALCULATES SETBACK REQUIREMENTS.
WIND POWER DIG. NO 19: 57, SPRING 1980.

1980-0033 NEW HAMPSHIRE ZONING FIGHT.
WIND POWER DIG. NO. 19: 56, SPRING 1980.

1980-0034 PG&E TO ISSUE RFP FOR LARGE WECS; BENDIX MIGHT BUY WIND ENGINEERING THIS MONTH.
SOL. ENERGY INTELL. REP. 6(11): 105, MARCH 17, 1980.

1980-0035 PUTHOFF R L, COLLINS J L, WOLF R A
INSTALLATION AND CHECKOUT OF THE DOE/NASA MOD-1 2000-KW WIND TURBINE GENERATOR.
NTIS, 1980. 25 P.
DOE/NASA/1010-80/6, NASA-TM-81444

THE MOD-1 MACHINE WAS ASSEMBLED WITHOUT THE BLADES, TESTED, AND SENT TO THE SITE AT BOONE, NORTH CAROLINA FOR ERECTION. THE BLADES WERE TRANSPORTED DIRECTLY TO THE SITE. A SERIES OF CHECKOUT TESTS WERE THEN CONDUCTED TO EVALUATE PERFORMANCE AND LOADS. THE RESULTS OF THESE TESTS COMPARED WELL WITH THE DESIGN DATA.

1980-0036 RCS PROGRAM SETTING UP SWECS STANDARDS.
WIND ENERGY REP. : 5, JANUARY 1980.

1980-0037 REMOTE AND ISOLATED AREA WIND SYSTEMS MARKET ANALYSIS.
WIND ENERGY REP. : 6-10, JANUARY 1980.

THIS IS A CONDENSED EXCERPT FROM THE DOE REPORT: "A MARKET ANALYSIS OF THE POTENTIAL FOR WIND SYSTEMS USE IN REMOTE AND ISOLATED AREA APPLICATIONS."

1980-0038 SHELDAHL R E, KLIMAS P C, FELTZ L V
AERODYNAMIC PERFORMANCE OF A 5-METRE-DIAMETER DARRIEUS TURBINE WITH EXTRUDED ALUMINUM NACA-0015 BLADES.
NTIS, MARCH 1980. 41 P.
SAND-80-0179

A 5-METRE-DIAMETER VERTICAL-AXIS WIND TURBINE HAS UNDERGONE CONTINUED TESTING SINCE 1976 AT THE SANDIA LABORATORIES WIND TURBINE SITE. THE LATEST TESTS OF THIS MACHINE HAVE BEEN WITH EXTRUDED ALUMINUM BLADES OF NACA-0015 AIRFOIL CROSS SECTION. THE RESULTS OF THESE TESTS AT SEVERAL TURBINE ROTATIONAL SPEEDS ARE PRESENTED AND COMPARED WITH EARLIER TEST RESULTS. A PERFORMANCE COMPARISON IS MADE WITH A VORTEX/LIFTING LINE COMPUTATIONAL CODE. THE PERFORMANCE OF THE TURBINE WITH THE EXTRUDED BLADES MET ALL EXPECTATIONS.

1980-0039 SHEPERDSON W
DYNERGY; ONE ENTREPRENEUR'S EXPERIENCE IN WIND.
WIND POWER DIG. NO. 19: 13-18, SPRING 1980.

1980-0040 SMEALLIE P H, WOLFF B
CAPITAL FORMATION FOR SMALL WIND ENERGY CONVERSION SYSTEM MANUFACTURERS. A GUIDE TO METHODS AND SOURCES. FINAL REPORT.
NTIS, MAY 1980. 57 P.
SERI/TR-98298-1

A WORKSHOP OF WIND MACHINE MANUFACTURERS AND FINANCIAL EXPERTS CONTRIBUTED TO THE DEVELOPMENT OF THIS GUIDE TO CAPITAL FORMATION. SOURCES OF CAPITAL ARE DESCRIBED AND THE DEVELOPMENT OF A BUSINESS PLAN EXPLAINED. THE REPORT INCLUDES CASE HISTORIES OF FOUR WIND COMPANIES' EXPERIENCES IN RAISING CAPITAL.

1980-0041 STRAIGHT BLADE DEVELOPMENT.
WIND POWER DIG. NO. 19: 41, SPRING 1980.

1980-0042 STRICKLAND J H, WEBSTER B T, NGUYEN T
A VORTEX MODEL OF THE DARRIEUS TURBINE: AN ANALYTICAL AND EXPERIMENTAL STUDY.
NTIS, FEBRUARY 1980. 155 P.
SAND-79-7058

A PRELIMINARY AERODYNAMIC PERFORMANCE PREDICTION MODEL HAS BEEN CONSTRUCTED FOR THE DARRIEUS TURBINE USING A VORTEX LATTICE METHOD OF ANALYSIS. A SERIES OF EXPERIMENTS WERE CONDUCTED FOR THE EXPRESS PURPOSE OF VALIDATING THE ANALYTICAL MODEL. THESE EXPERIMENTS WERE CONDUCTED ON A SERIES OF TWO DIMENSIONAL ROTOR CONFIGURATIONS WHICH WERE TOWED IN A LARGE TANK OF WATER. THE USE OF WATER AS A WORKING FLUID WAS INTENDED TO FACILITATE BOTH FLOW VISUALIZATION AND THE ABILITY TO MEASURE AERODYNAMIC BLADE FORCES WHILE ALLOWING OPERATION AT SUFFICIENTLY HIGH REYNOLDS NUMBERS. THE PRIMARY PURPOSE OF THIS RESEARCH WAS TO ALLOW REASONABLE PREDICTIONS OF AERODYNAMIC BLADE FORCES AND MOMENTS TO BE MADE. PREVIOUS AERODYNAMIC MODELS BASED ON SIMPLE MOMENTUM PRINCIPLES WERE INADEQUATE FOR PREDICTING BLADE LOADING. A SECONDARY MOTIVATION OF THIS RESEARCH WAS TO ALLOW PREDICTION OF THE NEAR WAKE STRUCTURE FOR THE PURPOSE OF BEING ABLE TO SPECIFY SEPARATION DISTANCES BETWEEN TURBINES PLACED IN ARRAYS.

1980-0043 SZOSTAK J
D A F.
WIND POWER DIG. NO.19: 30-32, SPRING 1980.

1980-0044 SZOSTAK J, TOLLER B, WHITEWAY D
NRC; REBIRTH OF THE DARRIEUS ROTOR.
WIND POWER DIG. NO. 19: 33-35, SPRING 1980.

1980-0045 TARP.
WIND POWER DIG. NO. 19 37-38, SPRING 1980.

1980-0046 TILTING WING.
WIND POWER DIG. NO. 19: 40, SPRING 1980.

1980-0047 TORNADO VORTEX.
WIND POWER DIG. NO. 19: 47, SPRING 1980.

1980-0048 TUMAC INDUSTRIES MARKETS VAWT.
WIND POWER DIG. NO. 19: 46, SPRING 1980.

1980-0049 VAS I E
A REVIEW OF THE CURRENT STATUS OF THE WIND ENERGY INNOVATIVE SYSTEMS PROJECTS.
NTIS, MARCH 1980. 77 P.
SERI/TP-635-469

THE RESPONSIBILITY TO PROVIDE PROGRAM MANAGEMENT OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM WAS TRANSFERRED TO THE SOLAR ENERGY RESEARCH INSTITUTE FROM THE DEPARTMENT OF ENERGY DURING THE LATTER PART OF FY78. THE MAJOR ACTIVITIES CARRIED OUT IN THIS PROGRAM ARE SUBCONTRACTED RESEARCH AND DEVELOPMENT (R&D) STUDIES AND ASSESSMENTS OF INNOVATIVE CONCEPTS. THE PRESENT PAPER REVIEWS THE EFFORTS OF EIGHT OF THE R&D SUBCONTRACTORS.

1980-0050 VINAYAGALINGAM T
PRELIMINARY WIND TUNNEL TESTS ON THE PEDAL WIND TURBINE.
J. ENERGY 4(3): 142-144, MAY-JUNE 1980.

HIGH SOLIDITY-LOW SPEED WIND TURBINES ARE RELATIVELY SIMPLE TO CONSTRUCT AND CAN BE USED ADVANTAGEOUSLY IN MANY DEVELOPING COUNTRIES FOR SUCH DIRECT APPLICATIONS AS WATER PUMPING. ESTABLISHED DESIGNS IN THIS CLASS, SUCH AS THE SAVONIUS AND THE AMERICAN MULTIBLADE ROTORS, HAVE THE DISADVANTAGE THAT THEIR MOVING SURFACES REQUIRE A RIGID CONSTRUCTION, THEREBY RENDERING LARGE UNITS UNECONOMICAL. IN THIS RESPECT, THE PEDAL WIND TURBINE RECENTLY REPORTED BY THE AUTHOR AND WHICH INCORPORATES SAIL TYPE ROTORS OFFERS A NUMBER OF ADVANTAGES. THIS NOTE REPORTS PRELIMINARY RESULTS FROM A SERIES OF WIND TUNNEL TESTS WHICH WERE CARRIED OUT TO ASSESS THE AERODYNAMIC TORQUE AND POWER CHARACTERISTICS OF THE TURBINE.

1980-0051 WATSON R A
COMPARISON WITH STRAIN GAGE DATA OF CENTRIFUGAL STRESSES PREDICTED BY FINITE ELEMENT ANALYSIS ON THE DOE/SANDIA 17-M DARRIEUS TURBINE.
NTIS, FEBRUARY 1980. 21 P.
SAND-78-1990

BY THE USE OF STRAIN GAGES, THE BLADE STRUCTURAL RESPONSE TO PURELY CENTRIFUGAL LOADING WAS MEASURED ON THE DOE/SANDIA 17-M DARRIEUS ROTOR. THE MEASUREMENTS OBTAINED ARE COMPARED IN THIS REPORT WITH MARC-H NONLINEAR FINITE ELEMENT STRESS PREDICTIONS. IT WAS NECESSARY TO INCLUDE GRAVITATIONAL EFFECTS IN THE FINITE ELEMENT MODEL TO EXPLAIN CERTAIN ASYMMETRIES IN THE DATA. THE MODEL WITH GRAVITATIONAL EFFECTS SHOWS GOOD AGREEMENT WITH THE DATA. EXAMINATION OF RESULTS SUGGESTS THAT REFINEMENT OF THE MODEL TO INCLUDE MORE STRUCTURAL DETAIL IN THE REGION WHERE THE BLADE JOINS THE TOWER WOULD PROBABLY ENHANCE THE ACCURACY OF THE MODEL.

1980-0052 WECS MARKET POTENTIAL LARGE IN REMOTE AREAS.
WIND ENERGY REP. : 6, JANUARY 1980.

1980-0053 WHOLEY J
HARNESSING THE WIND.
HOUSE GARDEN 152(2): 30,32-34, FEBRUARY 1980.

THIS GENERAL REVIEW OF THE POSSIBILITY FOR USE OF WIND ENERGY FOR DOMESTIC ELECTRICITY IS PRESENTED FOR HOME-OWNERS.

1980-0054 WIND POWER BUSINESS BRISK.
ENG. NEWS-REC. 204(7): 32, FEBRUARY 14, 1980.

TWO LARGE WIND ENERGY PROJECTS ARE DESCRIBED BRIEFLY: (1) A 4-MW TURBINE PROJECT IN MEDICINE BOW, WYOMING, WHICH COMBINES UTILITY-SIZE WIND TURBINE GENERATORS WITH LARGE HYDROELECTRIC PLANTS AND DISTRIBUTION SYSTEMS; (2) NASA'S 4-MW MOD-5 PROJECT.

1980-0055 WINDFARMS LTD. BUYING SIX ALCOA VAWTS.
WIND ENERGY REP. : 1,4, JANUARY 1980.

1980-0056 ABARIKWU O I, MERONEY R N
A STUDY OF THE D.A.F. DARRIEUS VERTICAL AXIS WIND TURBINE AT THE C.S.U. DAIRY FARM.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, DEPARTMENT OF CIVIL ENGINEERING, CIVIL ENGINEERING REPORT CER80-8101A-RNM1, JULY 1980. 35 P.

PERFORMANCE OF THE DARRIEUS TURBINE USED AT C.S.U.'S DAIRY FARM FOR THE COOLING OF MILK IS DESCRIBED. TWO FAILURES, CAUSED BY HIGH GUSTS, OR WINDY RAIN, HAVE BEEN THE ONLY PROBLEMS. SEVERAL SYSTEM DESIGN IMPROVEMENTS HAVE BEEN MADE.

1980-0057 LOYD M L
CROSSWIND KITE POWER.
J. ENERGY 4(3): 106-111, MAY-JUNE 1980.

THIS PAPER DESCRIBES A CONCEPT FOR LARGE-SCALE WIND POWER PRODUCTION BY MEANS OF AERODYNAMICALLY EFFICIENT KITES. BASED ON AIRCRAFT CONSTRUCTION, THESE KITES FLY TRANSVERSE TO THE WIND AT HIGH SPEED. THE LIFT PRODUCED AT THIS SPEED IS SUFFICIENT TO BOTH SUPPORT THE KITE AND GENERATE POWER. THE EQUATIONS OF MOTION ARE DEVELOPED, AND EXAMPLES ARE PRESENTED. ONE VERSION, BASED ON THE C-5A AIRCRAFT, RESULTS IN 6.7 MW PRODUCED BY A 10-M/S WIND. EXTRAPOLATION TO NEWER TECHNOLOGY, WHICH IS MORE COMPARABLE TO MODERN WIND TURBINES, INDICATES THE PRODUCTION OF 45 MW FROM A SINGLE MACHINE. THE DETAILED CALCULATIONS ARE VALIDATED BY COMPARISON OF THEIR RESULTS WITH SIMPLE ANALYTICAL MODELS. THE METHODOLOGY USED HERE LAYS THE FOUNDATION FOR THE SYSTEMATIC STUDY OF POWER-PRODUCING KITES.

1980-0058 AKINS R E
PERFORMANCE EVALUATION OF WIND TURBINES.
ASCE TRANSP. ENG. J. 106(1): 19-29, JANUARY 1980.

A RELATIVELY STRAIGHT FORWARD TECHNIQUE TERMED THE METHOD OF BINS HAS BEEN DEVELOPED THAT MAY BE USED IN THE DETERMINATION OF THE AVERAGE OUTPUT CHARACTERISTICS OF A PARTICULAR WIND TURBINE. THE TECHNIQUE IS APPLICABLE TO ANY SIZE OR TYPE WIND TURBINE. THE OUTPUT POWER OF A WIND TURBINE AS A FUNCTION OF WIND SPEED IS NOT AN ADEQUATE MEASURE OF THE POWER PRODUCTION OF A WIND TURBINE. HOWEVER, THE OUTPUT POWER AS A FUNCTION OF WIND SPEED CAN BE COMBINED WITH EITHER A KNOWLEDGE OR AN ESTIMATE OF THE WIND CHARACTERISTICS AT A PARTICULAR LOCATION TO PREDICT THE ANNUAL POWER PRODUCED BY THE TURBINE. THIS APPROACH OF ESTIMATING THE ANNUAL POWER PRODUCTION OF A WIND TURBINE IN SOME ASSUMED ENVIRONMENT IS A USEFUL WAY OF EVALUATING DIFFERENT MACHINES OR OF EVALUATING THE EFFECTS OF LOCATING A PARTICULAR MACHINE AT DIFFERENT SITES.

1980-0059 ALLISON W D
MOUNTING FOR WINDMILLS.
U.S. PATENT NO. 4,217,501, AUGUST 12, 1980.

THIS WINDMILL STRUCTURE IS COMPRISED OF A PAIR OF SUBSTANTIALLY HORIZONTAL, FLEXIBLE CABLE MEMBERS SUSPENDED BETWEEN SUPPORTS. FIRST AND SECOND POINTS ON THE CABLE MEMBERS, RESPECTIVELY, ARE VERTICALLY SPACED AND ALIGNED RELATIVE TO EACH OTHER. THE WINDMILL HAS CONNECTING MOUNTING STRUCTURE TO BOTH FLEXIBLE CABLE MEMBERS AT FIRST AND SECOND POINTS FOR ROTATION THROUGH AT LEAST ONE REVOLUTION OF THE MOUNTING STRUCTURE RELATIVE TO FLEXIBLE MEMBERS ABOUT A VERTICAL AXIS PASSING THROUGH POINTS AND MOUNTING STRUCTURE. THE WINDMILL IS SUPPORTED ON A MOUNTING STRUCTURE THAT IS IN ACCORDANCE WITH THE DIRECTION OF THE WIND.

1980-0060 ANKRUM G T
GOVERNMENT COMMERCIALIZATION PLANS FOR WIND ENERGY.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 343-348.
CONF-791097

THIS PAPER DISCUSSED THE ATTENTION DOE IS GIVING TO THE COMMERCIALIZATION ISSUES OF WIND ENERGY.

1980-0061 BAHRAMI K, STALLKAMP J A, WALTON A
DISPERSED STORAGE AND GENERATION CASE STUDIES.
NTIS, MARCH 15, 1980. 187 P.
N80-22782/0, JPL-PUBL-79-98

THREE INSTALLATIONS UTILIZING SEPARATE DISPERSED STORAGE AND GENERATION (DSG) TECHNOLOGIES WERE INVESTIGATED. EACH OF THE SYSTEMS IS DESCRIBED IN COSTS AND CONTROL. SELECTED INSTITUTIONAL AND ENVIRONMENTAL ISSUES ARE DISCUSSED, INCLUDING LIFE CYCLE COSTS. NO UNRESOLVED TECHNICAL, ENVIRONMENTAL, OR INSTITUTIONAL PROBLEMS WERE ENCOUNTERED IN THE INSTALLATIONS. THE WIND AND SOLAR PHOTOVOLTAIC DSG WERE INSTALLED FOR TEST PURPOSES, AND APPEAR TO BE PRESENTLY UNECONOMICAL. HOWEVER, A NUMBER OF FACTORS ARE DECREASING THE COST OF DSG RELATIVE TO CONVENTIONAL ALTERNATIVES, AND AN INCREASED DSG PENETRATION LEVEL MAY BE EXPECTED IN THE FUTURE.

1980-0062 BALOMBIN J R
AN EXPLORATORY SURVEY OF NOISE LEVELS ASSOCIATED WITH A 100KW WIND TURBINE.
NTIS, 1980. 20 P.
NASA-TM-81486, E-424

NOISE MEASUREMENTS OF A 125-FOOT DIAMETER, 100 KW WIND TURBINE ARE PRESENTED. THE DATA INCLUDE MEASUREMENTS AS FUNCTIONS OF DISTANCE FROM THE TURBINE AND DIRECTIVITY ANGLE AND COVER A FREQUENCY RANGE FROM 1 HZ TO SEVERAL KHZ. POTENTIAL COMMUNITY IMPACT IS DISCUSSED IN TERMS OF A-WEIGHTED NOISE LEVELS RELATIVE TO BACKGROUND LEVELS, AND THE INTRASONIC SPECTRAL CONTENT. FINALLY, THE CHANGE IN THE SOUND POWER SPECTRUM ASSOCIATED WITH A CHANGE IN THE ROTOR SPEED IS DESCRIBED. THE ACOUSTIC IMPACT OF THIS SIZE WIND TURBINE IS JUDGED TO BE MINIMAL.

1980-0063 BARRETT C I
BUREAU OF RECLAMATION'S WIND/HYDROELECTRIC ENERGY PROJECT.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 197-202.
CONF-791097

THE STUDY, WHICH COVERS A 600 SQUARE MILE AREA, HAS AS ITS PRINCIPAL OBJECTIVE THE EVALUATION OF INTEGRATING A WIND ENERGY FARM HAVING ABOUT 100 MEGAWATT CAPACITY WITH STORAGE AND ELECTRIC GENERATING CAPABILITIES OF THE COLORADO RIVER STORAGE PROJECT.

1980-0064 BERRIE T
THE SIGNIFICANCE OF NON-FIRM ENERGY FOR THE TRANSMISSION ENGINEER.
ELECTR. REV. 206(1): 28-30, JANUARY 4, 1980.

THE SUBJECT OF NON-FIRM (NON-CONSTANT) ENERGY PRODUCTION IS NOT NEW--IT HAS HAD TO BE DEALT WITH SINCE THE EARLIEST DAYS OF ELECTRICITY SUPPLY BY HYDRO-ELECTRIC ENGINEERS AND BY THOSE DEALING WITH TIE-LINE CONNECTIONS TO A NEIGHBOURING ELECTRICITY UTILITY. YET IT HAS BECOME NEWS AGAIN BECAUSE OF THE INTEREST IN THE "NON-CONVENTIONAL" ENERGY SOURCES SUCH AS WINDPOWER, WAVEPOWER AND SOLAR ENERGY. MANY OF THE WELL-TRIED

METHODS OF EVALUATING HYDRO ENERGY CAN BE USED TO FIND THE ECONOMIC WORTH OF NON-CONVENTIONAL ENERGY. BUT NEW METHODS ARE ALSO NEEDED AS IS A DIFFERENT ATTITUDE BY TRANSMISSION/DISTRIBUTION DESIGNERS AND BY MANUFACTURERS WHOSE CHOICE OF EQUIPMENT SOMETIMES FORCES SYSTEM DESIGNS ON PLANNERS.

1980-0065 BONDI H
INDIRECT UTILIZATION OF SOLAR ENERGY (WAVE AND WIND ENERGY).
R. SOC. LONDON PHILOS. TRANS. A 295(1414): 501-506, 1980.

THIS PAPER EXAMINES THE PROSPECTS FOR THE UTILIZATION OF WAVE AND WIND ENERGY.

1980-0066 BRAASCH R H
DARRIEUS VERTICAL AXIS WIND TURBINE PROGRAM OVERVIEW - FALL 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 39-58.
CONF-791097

SANDIA LABORATORIES IS DEVELOPING DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT) TECHNOLOGY WITH THE OBJECTIVE OF ENCOURAGING PRIVATE INDUSTRY TO PRODUCE ECONOMICALLY FEASIBLE, COMMERCIALLY MARKETABLE WIND ENERGY SYSTEMS. THE FIRST FULL CYCLE OF DEVELOPMENT IS ESSENTIALLY COMPLETE, AND RESULTING CURRENT TECHNOLOGY DESIGNS HAVE BEEN EVALUATED FOR COST-EFFECTIVENESS. AERODYNAMIC, STRUCTURAL, AND SYSTEM ANALYSES CAPABILITIES HAVE EVOLVED DURING THIS CYCLE TO SUPPORT AND EVALUATE THE SYSTEM DESIGNS. THIS REPORT PRESENTS SOME OF THE MORE SALIENT RECENT DEVELOPMENTS, FIRST GENERATION COSTS, CURRENT ACTIVITIES, AND FUTURE PLANS. POTENTIAL DESIGN IMPROVEMENTS IDENTIFIED IN THE FIRST DEVELOPMENT CYCLE ARE PRESENTED ALONG WITH THEIR COST BENEFITS.

1980-0067 BRANDELS L
THE SWEDISH WIND ENERGY PROGRAM OVERVIEW.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 457-460.
CONF-791097

THE GENERAL OBJECTIVE OF THE WIND PROGRAM IS TO PROVIDE A FACTUAL BASIS FOR A PARLIAMENTARY DECISION TO BE TAKEN IN 1985 CONCERNING LARGE-SCALE INTRODUCTION OF WIND GENERATED POWER INTO THE NATIONAL GRID.

1980-0068 BRAUN H R, BRISTOW D J, WAKE S J
EVALUATION OF THE VERTICAL AXIS WIND TURBINE AT DREO.
NTIS, JANUARY 1980. 101 P.
AD-A983961, DREO-R-822

THIS REPORT DEALS WITH AN EVALUATION STUDY OF A VERTICAL AXIS WIND TURBINE-BATTERY STORAGE SYSTEM FOR A LOW-POWER UNATTENDED POWER SOURCE. THE SYSTEM'S WIND TURBINE, ENERGY-GENERATING AND BATTERY-STORAGE SYSTEM, MECHANICAL DRIVE SYSTEM, INSTALLATION, CONTROL-CIRCUITRY AND DATA-ACQUISITION SYSTEM ARE DESCRIBED. ALSO, A PERFORMANCE-HISTORY OUTLINING THE PROBLEM AREAS ENCOUNTERED AND A DATA-SUMMARY OF TWO YEARS OF PERFORMANCE-DATA ACQUIRED DURING THIS STUDY ARE PRESENTED. THE OBJECTIVE OF THIS STUDY WAS TO ASSESS THE SYSTEM'S ABILITY TO PROVIDE SIXTY WATTS OF CONTINUOUS POWER.

1980-0069 BULLO P
ENERGY FROM WIND. PROJECTS IN PROGRESS AND THEIR PROBLEMS.
ELLETRIFICAZIONE NO. 1: 27-31, JANUARY 1980. (IN ITALIAN)

THIS PAPER DEALS WITH PROJECTS TO USE WIND AS A SOURCE OF POWER AND MENTIONS THAT 10/SUP 11/ KW OF ELECTRIC POWER COULD BE PRODUCED BY PROPERLY SITED WIND DRIVEN MOTORS IN A SPECIFIC BELT OF AMERICA. IT DETAILS ACTUAL PROJECTS IN PROGRESS IN THE USA, IN GREAT BRITAIN, DENMARK, FRANCE AND GERMANY, AND DEALS AT LENGTH WITH THE RESEARCH PROGRAMS UNDERTAKEN IN ITALY BY ENEL, FIAT AND OTHER CENTRES. IT DISCUSSES THE DESIGN PROBLEMS OF THE LOCATION OF THE TOWERS; THE DESIGN AND NUMBER OF THE PROPELLERS, VARIABLE PITCH BLADES, SYSTEMS OF POWER TRANSMISSION, AND THE TURBINE SYSTEMS TO BE ERECTED ON THE TOWERS.

1980-0070 BULLO P
AEOLIAN (WIND) ENERGY. HOW MUCH IT COSTS AND HOW IT CAN BE USED.
ELLETRIFICAZIONE NO. 2: 79-83, FEBRUARY 1980. (IN ITALIAN)

THE VARIOUS FACTORS, SUCH AS THE SITES OF INSTALLATION, THE COST OF THE PLANT AND THE VALUE OF THE POWER GENERATED, WHICH DETERMINE THE SWITCHABILITY OF WIND POWER FOR ELECTRICAL GENERATION ARE EXAMINED. THE FACTORS DETERMINING THE SIZE OF THE MARKET FOR SUCH EQUIPMENT, SUCH AS WHETHER IT IS FOR THE INDUSTRIALIZED OR THE DEVELOPING COUNTRIES ARE THEN DISCUSSED. THE SCALE OF THE UNITS NEEDED IS DIFFERENT IN THE TWO BROAD FIELDS, AND CONSIDERATIONS OF COMPATIBILITY WITH EXISTING POWER NETWORKS (OR WHETHER THESE EXIST) ARE OBVIOUSLY IMPORTANT.

1980-0071 CASE C W, CLARK H R, KAY J, LUCARELLI F B, RIZER S
PROJECTS FROM FEDERAL REGION IX: DEPARTMENT OF ENERGY APPROPRIATE ENERGY TECHNOLOGY PROGRAM. PART II.
NTIS, JANUARY 1980. 50 P.
LBL-10098

DETAILS AND PROGRESS OF APPROPRIATE ENERGY TECHNOLOGY PROGRAMS IN REGION IX ARE PRESENTED. IN ARIZONA, THE PROJECTS ARE SOLAR HOT WATER FOR THE PRESCOTT ADULT CENTER AND SOLAR PROTOTYPE HOUSE FOR A RESIDENTIAL COMMUNITY. IN CALIFORNIA, THE PROJECTS ARE SOLAR AQUADOME DEMONSTRATION PROJECT; SOLAR POWERED LIQUID CIRCULATING PUMP; APPROPRIATE ENERGY TECHNOLOGY RESOURCE CENTER; DIGESTER FOR WASTEWATER GROWN AQUATIC PLANTS; PERFORMANCE CHARACTERISTICS OF AN ANAEROBIC WASTEWATER LAGOON PRIMARY TREATMENT SYSTEM; APPROPRIATE ENERGY/ENERGY CONSERVATION DEMONSTRATION PROJECT; SOLAR ENERGY FOR COMPOSTING TOILETS; DRY CREEK RANCHERIA SOLAR DEMONSTRATION PROJECTS; DEMONSTRATION FOR ENERGY RETROFIT ANALYSIS AND IMPLEMENTATION; AND ACTIVE SOLAR SPACE HEATING SYSTEM FOR THE INTEGRAL URBAN HOUSE. IN HAWAII, THE PROJECTS ARE: JAVA PLUM ELECTRIC; LOW-COST POND DIGESTERS FOR HAWAIIAN PIG FARM ENERGY NEEDS; SOLAR BEESWAX MELTER; METHANE GAS PLANT FOR OPERATING BOILERS AND GENERATING STEAM; AND SOLAR WATER HEATING IN SUGARCANE SEED-TREATMENT PLANTS. A WIND-POWERED LIGHTED NAVIGATION BUOYS PROJECT FOR GUAM IS ALSO DESCRIBED. A REVISED DESCRIPTION OF THE BIOGAS ENERGY FOR HAWAIIAN SMALL FARMS AND HOMESTEADS IS GIVEN IN AN APPENDIX.

1980-0072 CHERRY N J
WIND ENERGY RESOURCE SURVEY METHODOLOGY.
J. IND. AERODYN. 5(3-4): 247-280, MAY 1980.

THE WIND ENERGY RESOURCE SURVEY IS AN ESSENTIAL ELEMENT IN A PROGRAMME INVOLVING THE EXTENSIVE USE OF WIND ENERGY. PREVIOUS SURVEY PROGRAMMES SERVE AS A GUIDE FOR THE PROCEDURE, STARTING WITH A REVIEW OF THE AVAILABLE INFORMATION, SURVEY METHODS AND EXISTING WIND DATA. AN OBSERVATIONAL PROGRAMME IS USUALLY NECESSARY IF THE

RESOURCE BECOMES A SERIOUS OPTION FOR DEVELOPMENT. A REGIONAL SURVEY TO OBTAIN DATA FROM LIKELY SITES CAN BE FOLLOWED BY DETAILED STUDIES AT THE MOST PROMISING LOCATIONS. INITIALLY THE SURVEY CAN BE USED TO CHOOSE THE BEST SITES FOR SUPPLYING THE CHEAPEST ENERGY. A CAREFULLY SET-OUT SYSTEM MIGHT ALSO PROVIDE CAPACITY SUBSTITUTION, WHICH IS AN IMPORTANT FACTOR IN THE ECONOMICS.

1980-0073 DOE RESEARCH ON WIND ENERGY (A BIBLIOGRAPHY).
NTIS, MARCH 1980. 59 P.
DOE/TIC/SDI-2002

THIS BIBLIOGRAPHY WITH ABSTRACTS WAS COMPILED BY THE TECHNICAL INFORMATION CENTER OF THE DEPARTMENT OF ENERGY, FROM THE ENERGY DATA BASE. THE BIBLIOGRAPHY CONTAINS 126 ABSTRACTS.

1980-0074 DEMEO E A
KEY ISSUES ASSOCIATED WITH THE ECONOMICS AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 203-209.
CONF-791097

KEY ISSUES RELATED TO ELECTRIC UTILITY ACCEPTANCE OF WIND GENERATION AND THE ULTIMATE INTEGRATION OF WIND INTO UTILITY SYSTEMS ARE PRESENTED. THESE ISSUES ARE IN SEVERAL AREAS. FIRST OF ALL ARE ISSUES RELATING TO PRIMARY IMPACTS OF WIND GENERATION ON UTILITY SYSTEMS. WE ARE TALKING HERE ABOUT LARGE SCALE UTILITY TYPE APPLICATION OF WIND. THE VALUE OF WIND SYSTEMS IS CERTAINLY OF KEY IMPORTANCE--ENERGY VALUE, CAPACITY VALUE, VALUE AS A FUEL SAVER.

1980-0075 DEMEO E A
OVERVIEW OF U.S. ELECTRIC UTILITY INDUSTRY ACTIVITIES IN WIND ENERGY CONVERSION.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 161-173.
CONF-791097

BARRING A MAJOR UNFORESEEN HARDWARE CATASTROPHE, IT IS BECOMING GENERALLY RECOGNIZED THAT WIND GENERATION WILL BE THE FIRST OF THE NEW SOLAR ELECTRIC TECHNOLOGIES TO EMERGE FOR CONSIDERATION AS A POWER GENERATION ALTERNATIVE. CONSEQUENTLY, A NUMBER OF UTILITIES ARE ATTENTIVELY FOLLOWING HARDWARE DEVELOPMENTS IN HOPES OF ESTABLISHING A LEVEL OF CONFIDENCE IN BOTH WIND TURBINE GENERATOR (WTG) PERFORMANCE AND WIND ENERGY RESOURCE AVAILABILITY SUFFICIENT TO ALLOW RESPONSIBLE CONSIDERATION OF WIND GENERATION IN FUTURE SYSTEM EXPANSION PLANS.

1980-0076 DEMEO E A
WORKSHOP SUMMARY. ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 553-561.
CONF-791097

1980-0077 DODGE D
WORKSHOP SUMMARY. SMALL WIND TURBINE SYSTEMS: A WORKSHOP ON R&D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 547-552.
CONF-791097

1980-0078 DULIKRAVICH D S
NUMERICAL CALCULATION OF STEADY INVISCID FULL POTENTIAL COMPRESSIBLE FLOW ABOUT WIND TURBINE BLADES.
NTIS, 1980. 11 P.
N80-18497/1

AN EXACT NONLINEAR MATHEMATICAL MODEL THAT ACCOUNTS FOR THREE-DIMENSIONAL CASCADE EFFECTS ABOUT THE INNER PORTIONS OF THE ROTOR BLADES AND COMPRESSIBILITY EFFECTS ABOUT THE TIP REGIONS OF THE BLADES WAS DERIVED. AN ARTIFICIALLY TIME DEPENDENT VERSION WAS INTERACTIVELY SOLVED BY A FINITE VOLUME TECHNIQUE INVOLVING AN ARTIFICIAL VISCOSITY AND A THREE-LEVEL CONSECUTIVE MESH REFINEMENT. THE EXACT BOUNDARY CONDITIONS WERE APPLIED BY GENERATING A BOUNDARY CONFORMING PERIODIC COMPUTATION MESH.

1980-0079 DYER G
LONG LIVE OLD WINCOS (RESTORING WIND TURBINES).
ALTERN. SOURCES ENERGY NO. 42: 29-31, MARCH-APRIL 1980.

1980-0080 EDWARDS P J, DAWBER K R
AN INVESTIGATION OF WIND-ENERGY PROSPECTS IN THE OTAGO REGION OF NEW ZEALAND.
J. IND. AERODYN. 5(3-4): 281-296, MAY 1980.

THE INVESTIGATION REPORTED HERE COVERS THE OTAGO REGION OF THE SOUTH ISLAND OF NEW ZEALAND EAST OF 169 DEGREES EAST LONGITUDE, AN AREA OF 2.5*10/SUP 6/ HECTARES CENTERED NEAR 45 DEGREES LATITUDE. THREE YEARS OF DATA FROM AN ANEMOMETER NETWORK INSTALLED AS PART OF A NATIONAL WIND-ENERGY RESOURCE SURVEY HAVE BEEN ANALYZED TO PROVIDE (A) AN INVENTORY OF THE WIND ENERGY AVAILABLE ANNUALLY IN THE REGION; (B) A DESCRIPTION OF THE CHARACTERISTICS OF PROSPECTIVE AEROGENERATION SITES.

1980-0081 ELFORD W G, CRAIG R L
UPPER ATMOSPHERE WIND OBSERVATIONS AT ADELAIDE 35 DEGREES, AUGUST 1974.
J. ATMOS. TERR. PHYS. 42(1): 61-67, JANUARY 1980.

THIS PAPER PRESENTS A BRIEF DESCRIPTON OF THE ADELAIDE RADIO METEOR WIND SYSTEM, AND A DISCUSSION OF WINDS OBSERVED DURING THE FIRST INTERVAL OF THE CO-OPERATIVE TIDAL OBSERVATIONS PROGRAM, 10-16 AUGUST 1974. HOURLY VALUES OF THE ZONAL AND MERIDIONAL WINDS WERE OBTAINED AT HEIGHT INTERVALS OF 2 KM BETWEEN 90 AND 100 KM THROUGHOUT THE PERIOD OF OBSERVATION. THE MAIN FEATURES OF THE WINDS ARE PREVAILING COMPONENTS, 24- AND 12-H TIDAL COMPONENTS, QUASI TWO-DAY OSCILLATIONS AND SIGNIFICANT WIND ENERGY AT LONG PERIODS.

1980-0082 EULER K-J
ALTERNATIVE ENERGY SOURCES--NO REAL ALTERNATIVE.
ELEKTRO-ANZ. 33(3): 18-20, FEBRUARY 23, 1980. (IN GERMAN)

THIS REPORT DISCUSSES THE SIX PAPERS WHICH WERE THE SUBJECT OF A COLLOQUIUM HELD IN SEPTEMBER 1979 AT THE TECHNOLOGY HQ IN ESSEN. REVIEWING THE PAST AND PRESENT ENDEAVOURS IN VARIOUS AREAS OF THE WORLD SHOWS THAT THE ALTERNATIVES USUALLY PROPOSED SUCH AS SOLAR AND GEOTHERMAL ENERGIES, TIDES, WINDS, WAVES AND NATURAL DEPRESSIONS BELOW SEA LEVEL, ARE NOT LIKELY TO BECOME EFFECTIVE COMPETITORS TO CONVENTIONAL FUELS BECAUSE OF THEIR COST. CONTROLLED NUCLEAR FUSION IS SEEN AS A MORE LIKELY ALTERNATIVE. THE PAPER OUTLINES THE LINES OF RESEARCH BEING PURSUED IN VARIOUS COUNTRIES INCLUDING THE MORE RECENT EXPERIMENTS WITH LASER BEAMS. ENERGY

BALANCES FOR EACH ALTERNATIVE ARE GIVEN. SOLAR CELLS AND ENERGY FROM PLANTS WERE NOT INCLUDED IN THE DISCUSSIONS.

1980-0083 FEGAN G R, PERCIVAL C D
PROBLEMS IN THE INTEGRATION OF INTERMITTENT SOURCES INTO UTILITY PRODUCTION COSTING MODELS.
NTIS, JANUARY 1980. 5 P.
SERI/TP-351-546

THE INTERMITTENT GENERATION SOURCE, A SOURCE OVER WHICH THE UTILITY DISPATCHER HAS MINIMAL CONTROL WITH REGARD TO POWER AVAILABILITY, PRESENTS SERIOUS PROBLEMS TO THE UTILITY PLANNER IN TERMS OF RELIABILITY, DETERMINATION OF WORTH, AND INCLUSION IN EXPANSION PLANS. THE PROBLEMS INVOLVED WITH THE INTEGRATION OF PHOTOVOLTAIC CELLS, WIND MACHINES, AND OTHER RENEWABLE SOURCES WITH LIMITED STORAGE INTO UTILITY PRODUCTION COST MODELS ARE UNFORTUNATELY A FUNCTION OF THE DIFFERENT RESOURCES. THE PROBLEMS ARE DIFFERENTIATED INTO THOSE DEALING WITH RENEWABLE RESOURCES WHICH ARE CORRELATED TO THE DEMAND AND THOSE DEALING WITH RENEWABLE RESOURCES WHICH APPEAR TO ACT INDEPENDENTLY OF DEMAND.

1980-0084 FEGAN G R, PERCIVAL C D
INTEGRATION OF INTERMITTENT SOURCES INTO BALERIAUX-BOOTH PRODUCTION COST MODELS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, NEW YORK, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH1523-4/80, 1980. 6 P.

AN INTERMITTENT GENERATION SOURCE IS ONE OVER WHICH A UTILITY DISPATCHER HAS MINIMAL CONTROL WITH REGARD TO THE AMOUNT OF POWER AVAILABLE AT ANY INSTANT. THE POWER MAY FLUCTUATE FREELY OVER THE RANGE FROM ZERO TO SOME MAXIMUM. EXAMPLES OF SUCH SOURCES ARE WIND MACHINES, PHOTOVOLTAIC CELLS AND, IN SOME CASES, RUN-OF-RIVER HYDRO. FOR A UTILITY PLANNER THIS FORM OF RESOURCE PRESENTS PROBLEMS IN THE DETERMINATION OF RELIABILITY AND WORTH. A METHOD OF INTEGRATING THESE RESOURCES INTO A UTILITY PRODUCTION COST MODEL IS PRESENTED: THE METHOD SHOULD IMPROVE APPROXIMATIONS IN PRODUCTION COSTING AND IN THE LOSS-OF-LOAD CALCULATION.

1980-0085 FINNEGAN P M
WORKSHOP SUMMARY. LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 561-568.
CONF-791097

A WORKSHOP ON LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS WAS HELD IN CLEVELAND IN 1979. THE WORKSHOP SCOPE INCLUDED BOTH HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE WORKSHOP CONSISTED PRIMARILY OF DETAILED TECHNICAL PRESENTATIONS ON LARGE WIND TURBINE R&D ACTIVITIES SPONSORED BY DOE. INFORMATION ON LARGE WIND TURBINES BEING DEVELOPED BY SEVERAL PRIVATE ORGANIZATIONS WAS ALSO PRESENTED AND DENMARK, SWEDEN AND GERMANY REVIEWED THEIR LARGE WIND TURBINE PROJECTS. PANEL DISCUSSSIONS AFTER EACH MAJOR SESSION PROVIDED AN OPPORTUNITY TO DISCUSS ISSUES AND PROBLEMS.

1980-0086 FINNEGAN P M
SUMMARY OF APRIL 1979 WORKSHOP ON LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 119-136.
CONF-791097

THE DOE OBJECTIVES FOR THE SERIES OF WORKSHOPS WERE (1) PRESENT THE PROGRESS AND SIGNIFICANT RESULTS OF ONGOING PROJECTS SPONSORED BY DOE, (2) PROVIDE A FORUM TO FACILITATE THE EXCHANGE OF NEW IDEAS AND INFORMATION, AND (3) PROVIDE AN OPPORTUNITY FOR IN-DEPTH DISCUSSION OF SPECIFIC ISSUES CONFRONTING WIND TURBINE DEVELOPERS AS THE TECHNOLOGY MOVES CLOSER TO THE GOAL OF COMMERCIALIZATION.

1980-0087 FORDHAM J W, PECK M K, MCMULLEN R, CUNNINGHAM A B
HYBRID ENERGY SYSTEM: WIND AND WATER.
NTIS, FEBRUARY 1980. 78 P.
PUB-41062, PB80-171218

THE POTENTIAL FOR USING WIND TOGETHER WITH HYDRO GENERATION TO MEET SMALL AREA ENERGY DEMANDS WAS EXAMINED AND A PROTOTYPE WIND-HYDRO SYSTEM WAS MODELED FOR A NEVADA SITE TO DETERMINE OPTIMUM COMPONENT SIZES AND OPERATION. THE WIND-HYDRO SYSTEM IS DESIGNED AS AN ALTERNATIVE TO CONVENTIONAL POWER GENERATION METHODS EXPECIALLY IN REMOTE AREAS WHERE THE CONSTRUCTION OF TRANSMISSION LINES IS NOT ECONOMICALLY PRACTICAL. THE SYSTEM INCLUDES A RESERVOIR TO CATCH AS MUCH RUNOFF AS POSSIBLE, A HYDROELECTRIC GENERATION PLANT, A WIND TURBINE, AND A GENERATOR. TO OFFSET THE VARIABILITY OF ENERGY SUPPLY FROM THE WIND, ENERGY CONVERSION SYSTEMS(WECS) DRIVE RECHARGE PUMPS TO THE UPSTREAM RESERVOIR WHERE WATER IS STORED TO BE RELEASED TO DRIVE THE HYDROELECTRIC GENERATORS WHEN NEEDED FOR A STEADY ENERGY SUPPLY. COSTS AND BENEFITS ARE EXAMINED IN A GENERALIZED MANNER FOR SIX PRELIMINARY DESIGNS; THEN IN DETAIL FOR A WIND-HYDRO SYSTEM LOCATED ON SLIDE MOUNTAIN IN NEVADA.

1980-0088 FRAGA E, CRESPO A
SPANISH WIND ENERGY PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 471-482.
CONF-791097

THIS IS A FIVE YEAR PROGRAM THAT INCLUDES AS ITS MAIN PART THE FABRICATION, INSTALLATION AND OPERATION OF A 100 KW POWER PLANT; THIS PART WOULD SERVE AS A BASIS FOR THE STUDY AND DESIGN OF LARGER TURBINES, AND FOR A GENERAL STUDY OF WIND ENERGY UTILIZATION IN SPAIN.

1980-0089 GOETHALS R
WIND ENERGY.
RECHERCHE 11(109): 262-271, MARCH 1980. (IN FRENCH)

WIND ENERGY SEEMS TODAY TO BE ONE OF THE MOST PROMISING SOURCES FOR THE PRODUCTION OF ELECTRICITY. THE ORIGIN AND NATURE OF WIND ENERGY ARE EXPLAINED AND THE WORK WHICH HAS BEEN DONE IN HARNESSING IT, TOGETHER WITH THE PRINCIPLES AND DISADVANTAGES OF ITS USE, IS OUTLINED. THE DIFFERENT TYPES OF WINDMILLS WHICH HAVE BEEN DEVELOPED IN FRANCE BETWEEN 1930 AND 1970 ARE DESCRIBED. THE AMERICAN PROGRAMME SINCE 1970 IS DEALT WITH. THIS HAS USED AEROSPACE TECHNIQUES IN THE CONSTRUCTION OF LARGE WINDMILLS CAPABLE OF PRODUCING SEVERAL MEGAWATTS OF ELECTRICAL POWER. THE APPLICATION OF SUCH A PROGRAMME TO THE PRODUCTION OF ELECTRICITY IN FRANCE IS DISCUSSED.

1980-0090 GOODMAN F R
WORKING GROUP REPORT ON LARGE SCALE SYSTEMS: ECONOMICS & OPERATIONS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 507-512.
CONF-791097

1980-0091 GRASTRUP H
DESIGN AND CONSTRUCTION OF TWO 630 KW WIND TURBINES.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 419-436.
CONF-791097

THIS PAPER DESCRIBES THE MAIN EFFORTS OF A DEVELOPMENT PROGRAMME FOR LARGE, ELECTRICITY PRODUCING WIND TURBINES, UNDERTAKEN BY THE DANISH ELECTRICAL UTILITIES IN COOPERATION WITH THE GOVERNMENT.

1980-0092 GREENE G C, HUBBARD H H
SOME CALCULATED EFFECTS OF NON-UNIFORM INFLOW ON THE RADIATED NOISE OF A LARGE WIND TURBINE.
NTIS, MAY 1980. 14 P.
NASA-TM-81813, N80-25104/4

FAR FIELD COMPUTATIONS WERE PERFORMED FOR A LARGE WIND TURBINE TO EVALUATE THE EFFECTS OF NON-UNIFORM AERODYNAMIC LOADING OVER THE ROTOR DISK. A MODIFIED VERSION OF THE FARASSAT/NYSTROM PROPELLER NOISE PREDICTION PROGRAM WAS APPLIED TO ACCOUNT FOR THE VARIATIONS IN LOADING DUE TO INFLOW INTERRUPTION BY THE UPSTREAM SUPPORT TOWER. THE COMPUTATIONS INDICATE THAT FOR THE UNIFORM INFLOW CASE, RELATIVELY LOW NOISE LEVELS ARE GENERATED AND THE FIRST ROTATIONAL HARMONIC DOMINATED THE SPECTRUM. FOR CASES REPRESENTING WAKE FLOW DEFICIENCIES DUE TO THE TOWER STRUCTURE, SUBSTANTIALLY INCREASED NOISE LEVELS FOR ALL HARMONICS ARE INDICATED, THE GREATEST INCREASES BEING ASSOCIATED WITH THE HIGHER ORDER HARMONICS.

1980-0093 HUGOSSON S
SWEDISH LARGE-SCALE PROTOTYPES--DESIGN AND SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 461-470.
CONF-791097

THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT (NE) WANTS TO STUDY DIFFERENT LARGE-SCALE DESIGN CONCEPTS TO ACHIEVE--IF POSSIBLE--AN EVALUATION OF THE PROTOTYPES THAT COVERS A WIDE TECHNOLOGICAL SPAN OF POSSIBLE (REASONABLE) DESIGN CONCEPTS. WE ARE CONFIDENT THAT WE HAVE FOUND VERY WINDY SITES, AND THE GEOTECHNICAL CONDITIONS HAVE PROVED TO BE VERY GOOD, EVEN THOUGH WE ARE NOT FOUNDING THE UNITS ON GRANITE BEDROCK.

1980-0094 HUNDEMANN A S
WIND POWER. 1978-MAY, 1980. (CITATIONS FROM THE ENGINEERING INDEX DATA BASE.)
NTIS, JUNE 1980. 305 P.
PB80-811441

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR. WINDMILL AND WIND POWER FEASIBILITY, USE, AND ENGINEERING ARE DISCUSSED IN THESE CITATIONS OF WORLDWIDE RESEARCH. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH THE USE OF WIND POWER IN DEVELOPING COUNTRIES AND COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE STUDIES ON ENERGY STORAGE SYSTEMS.

1980-0095 HUNDEMANN A S
WIND POWER. 1977-1978. (CITATIONS FROM THE NTIS DATA BASE.)
NTIS, JUNE 1980. 263 P.
PB80-811433

THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

1980-0096 HUNDEMANN A S
WIND POWER. 1979-MAY, 1980. (CITATIONS FROM THE NTIS DATA BASE.)
NTIS, JUNE 1980. 145 P.
PB80-811458

THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

1980-0097 IMAIZUMI S
A BRIEF SURVEY OF THE PAST AND FUTURE PROGRAM OF WECS R&D IN JAPAN.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 451-456.
CONF-791097

SINCE THE PRODUCTION FROM DOMESTIC ENERGY SOURCES HAS BEEN VERY LIMITED, THE PERCENTILE FRACTION OF IMPORTED ENERGY REACHED ABOUT 89% IN 1974. THE DEMAND GROWTH OF THE CONVENTIONAL ENERGY HAS ALSO BROUGHT ENVIRONMENTAL PROBLEMS. THEREFORE, IT IS VITALLY IMPORTANT FOR JAPAN TO INSURE THE DEVELOPMENT OF DEPENDABLE ENERGY RESOURCES AND USE THEM IN AN ENVIRONMENTALLY ACCEPTABLE MANNER. IN THIS CONTEXT, THE R & D FOR NEW ENERGY SOURCES SUCH AS SOLAR ENERGY, GEOTHERMAL ENERGY IS CONSIDERED TO BE ESSENTIAL TO MEET THE INCREASING DEMANDS.

1980-0098 ANDERSEN T S, BODENSCHATZ C A, EGGERS A G, HUGHES P S, LAMPE R F
MOD-0A 200 KW WIND TURBINE GENERATOR ENGINEERING.
NTIS, AUGUST 1980. 246 P.
N81-23598, NASA-CR-165129, DOE/NASA/0163-3

ENGINEERING DRAWINGS AND THE DETAILED MECHANICAL AND ELECTRICAL DESIGN OF A HORIZONTAL-AXIS WIND TURBINE DESIGNED FOR DOE AT THE NASA LEWIS RESEARCH CENTER AND INSTALLED IN CLAYTON, NEW MEXICO ARE DISCUSSED. THE DRAWINGS SHOW THE HUB, PITCH CHANGE MECHANISM, DRIVE TRAIN, NACELLE EQUIPMENT, YAW DRIVE SYSTEM, TOWER, FOUNDATION, ELECTRICAL POWER SYSTEMS, AND THE CONTROL AND SAFETY SYSTEMS.

1980-0099 JOHANSON E E
SYNTHESIS OF WECS/UTILITY INTEGRATION STUDIES: CENTRALIZED AND DISPERSED.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 173-196.

CONF-791097

THIS PAPER PRESENTS THE RESULTS OF A SYNTHESIS OF WIND ENERGY SYSTEMS' VALUE TO UTILITIES, BASED UPON SEVERAL STUDIES THAT HAVE BEEN CONDUCTED IN THE PAST THREE YEARS. THE STUDIES, FUNDED BY DOE AND EPRI, WERE CONDUCTED BY SEVERAL DIFFERENT COMPANIES, EACH USING DIFFERENT ANALYTICAL MODELS. THE VALUES ASSUMED FOR MODEL INPUTS ALSO VARIED FROM STUDY TO STUDY, AS DID THE YEAR IN WHICH THE ANALYSES WERE DONE AND THE WIND SYSTEM CHARACTERISTICS.

1980-0100 KLEIN W E
MODIFIED AEROSPACE SR&QA METHOD FOR WIND TURBINES.
ANNUAL RELIABILITY MAINTAINABILITY SYMPOSIUM, SAN FRANCISCO, CALIFORNIA, JANUARY 22-24, 1980. PROCEEDINGS.
NEW YORK, IEEE, NO. 80CH1513-IR, 1980. P. 254-258. ALSO: NTIS, 1980. 6 P.
DOE/NASA/20370-79/18, NASA-TM-79284

THIS PAPER DESCRIBES THE SAFETY, RELIABILTIY AND QUALITY ASSURANCE (SR&QA) APPROACH DEVELOPED FOR THE FIRST LARGE WIND TURBINE GENERATOR PROJECT, MOD-OA.

1980-0101 AUER F
FULL ELECTRICAL SUPPLY OF SMALL LOADS AT REMOTE SITES WITH WIND AND SOLAR ENERGY.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 481-490.

THE COMBINED USE OF WIND AND SOLAR ENERGY TO SUPPLY SMALL ELECTRICAL LOADS AT REMOTE SITES WILL BECOME OF INCREASING IMPORTANCE IN THE NEAR FUTURE. THE MINIMIZATION OF COSTS OF SUCH A PLANT IS OF WHICH CAN CALCULATE FOR EVERY SITE AND FOR ARBITRARILY GIVEN LOADS A COST MINIMUM FOR THE WIND ENERGY CONVERTER AND THE SOLAR CELLS IN CONNECTION WITH BATTERIES. A PLANT THUS OPTIMIZED CAN PROVIDE A FULL ELECTRICAL SUPPLY, FOR EXAMPLE TO TELEVISION TRANSMITTERS OR WEEKEND HOUSES. THREE EXAMPLES ARE GIVEN.

1980-0102 DRAKE W, CLEWS H, CORDES J, JOHNSON B, MURPHY P
DEVELOPMENT OF A 2 KILOWATT HIGH RELIABILITY WIND MACHINE. PHASE I. DESIGN AND ANALYSIS. VOLUME I. EXECUTIVE SUMMARY.
NTIS, JANUARY 1980. 24 P.
RFP-3025/64410/3533/79/16-1

A HIGH RELIABILITY WIND MACHINE RATED FOR 2 KW AT 9 M/S HAS BEEN DESIGNED TO BE COST-EFFECTIVE FOR REMOTE SITE USE. TO MEET OR EXCEED ENVIRONMENTAL CONDITIONS AS SPECIFIED IN THE CONTRACT, THE RESULTING DESIGN DEFINES A RUGGED, RELATIVELY SIMPLE WIND MACHINE. RIGOROUS FATIGUE ANALYSIS FOR STRUCTURAL COMPONENTS AND DEVELOPMENT OF REDUNDANT SYSTEMS FOR ELECTRICAL COMPONENTS LED TO AN EXPECTED MEAN TIME BETWEEN FAILURES OF 12.35 YEARS. THE DESIGN IS FOR A HORIZONTAL AXIS, DOWN-WIND MACHINE WITH TWO WOODEN BLADES SPANNING 5 METERS DIAMETER. POSITIVE ROTOR CONTROL IS ACCOMPLISHED THROUGH A CENTRIFUGALLY GOVERNED VARIABLE PITCH, STALLING ROTOR.

1980-0103 DRAKE W, CLEWS H, CORDES J, JOHNSON B, MURPHY P
DEVELOPMENT OF A 2 KILOWATT HIGH RELIABILITY WIND MACHINE. PHASE I. DESIGN AND ANALYSIS. VOLUME II. TECHNICAL REPORT.
NTIS, JANUARY 1980. 89 P.
RFP-3025/64410/3533/79/16-2

SEE ABSTRACT FOR VOLUME I.

1980-0104 HIESTER T R
PRELIMINARY EVALUATION OF WIND ENERGY POTENTIAL: COOK INLET AREA, ALASKA.
NTIS, JUNE 1980. 103 P.
PNL-3408

THIS REPORT SUMMARIZES WORK ON A PROJECT PERFORMED UNDER CONTRACT TO THE ALASKA POWER ADMINISTRATION (APA). THE OBJECTIVE OF THIS RESEARCH WAS TO MAKE A PRELIMINARY ASSESSMENT OF THE WIND ENERGY POTENTIAL FOR INTERCONNECTION WITH THE COOK INLET AREA ELECTRIC POWER TRANSMISSION AND DISTRIBUTION SYSTEMS, TO IDENTIFY THE MOST LIKELY CANDIDATE REGIONS (25 TO 100 SQUARE MILES EACH) FOR ENERGY POTENTIAL, AND TO RECOMMEND A MONITORING PROGRAM SUFFICIENT TO QUANTIFY THE POTENTIAL.

1980-0105 MUKHOPADHYAY V
A LOW COST TILTING BLADE VERTICAL AXIS WINDMILL FOR RURAL IRRIGATION.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1891-1900.

A LOW COST VERTICAL AXIS TILTING BLADE TYPE WINDMILL SUITABLE FOR RURAL IRRIGATION IS DEVELOPED ALONG WITH A WORKING MODEL TO DEMONSTRATE THE FEASIBILITY OF THE WORKING CONCEPT. THE POWER COEFFICIENT VARIATION WITH TIP SPEED RATIO IS CALCULATED BASED ON A SIMPLE ANALYTICAL MODEL AND COMPARED WITH OTHER TYPES OF WINDMILLS. THIS TYPE OF WINDMILL IS THOUGHT TO BE SUITABLE AND COST EFFECTIVE FOR USE IN SMALL IRRIGATION, LIFTING WATER FROM WELL, AND TUBEWELLS ETC., IN RURAL AREAS BECAUSE OF ITS INHERENT SIMPLICITY AND ABILITY TO RESPOND TO GUSTY WINDS WITHOUT A STEERING MECHANISM.

1980-0106 TONKS P E
WIND ELECTRIC SYSTEMS FOR REMOTE POWER REQUIREMENTS.
TELECOMMUNICATIONS 14(7): 22, 24, 72, JULY 1980.

THIS PAPER DESCRIBES THE HR2, A HIGH RELIABILITY 2-KW WIND ELECTRIC SYSTEM FOR BATTERY CHARGING APPLICATIONS. THIS SYSTEM WAS DESIGNED AND ENGINEERED TO SUPPLY POWER AT REMOTE SITES UNDER HARSH ENVIRONMENTAL CONDITIONS.

1980-0107 ADLER F M, ANGELOFF L G, HENTON P, KING P W
DEVELOPMENT OF AN 8 KILOWATT WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I. DESIGN AND ANALYSIS. VOLUME 1 - EXECUTIVE SUMMARY.
NTIS, MARCH 1980. 15 P.
RFP-3007(VOL.1)

1980-0108 ADLER F M, ANGELOFF L G, HENTON P, KING P W
DEVELOPMENT OF AN 8 KILOWATT WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I. DESIGN AND ANALYSIS. VOLUME II - TECHNICAL REPORT.
NTIS, MARCH 1980. 92 P.
RFP-3007(VOL.2)

1980-0109 AERODYNAMIC CHARACTERISTICS OF THE TOROIDAL ACCELERATOR PLATFORM (TARP) WIND ENERGY CONVERSION SYSTEM.
ALBANY, NEW YORK, NYSERDA, FEBRUARY 1980. 69 P.
NYSERDA-80-7

THIS REPORT DESCRIBES AN ANALYTICAL AND EXPERIMENTAL RESEARCH PROGRAM THAT HAS BEEN CONDUCTED AT RENSSELAER POLYTECHNIC INSTITUTE FOR THE PURPOSE OF EVALUATING THE AERODYNAMIC CHARACTERISTICS OF THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) WIND ENERGY CONVERSION SYSTEM. THE TARP IS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR WHICH CONVERTS AMBIENT WINDS INTO LOW PRESSURE, HIGH KINETIC ENERGY ZONES IN THE IMMEDIATE PROXIMITY OF A WIND ENERGY CONVERSION UNIT. A TARP MAY BE DESCRIBED AS BEING SUBSTANTIALLY THE SHAPE OF AN INNER SECTION OF A HOLLOW TOROID. A TWIN ROTOR SYSTEM OF ANY KIND MAY BE MOUNTED WITHIN THE PERIPHERAL FLOW CHANNEL ABOUT A TARP STRUCTURE SUCH THAT EACH ROTOR IS SITUATED IN THE OPTIMUM ACCELERATED FLOW VELOCITY REGION FOR BEST ENERGY RECOVERY.

1980-0110 AHMADI G
PERFORMANCE OF A LOW COST CROSS-WIND-AXIS SAIL-WIND TURBINE.
ENERGY 5(10): 1045-1052, OCTOBER 1980.

THE PERFORMANCE OF A MODEL OF A CROSS-WIND AXIS SAIL ROTOR IS INVESTIGATED. SEVERAL DIFFERENT TYPES OF SAIL BLADES ARE EMPLOYED AND THE EFFECTS OF WIND VELOCITY, BLADE PITCH ANGLES, AND EXTERNAL LOAD ON THE EFFICIENCY OF THE ROTOR ARE STUDIED.

1980-0111 ALBARRAN J F, CHAVEZ C, LEZAMA J A
PORTABLE, SELF-CONTAINED WIND-GENERATOR STATISTICAL ANALYZER.
INTERNATIONAL IECI CONFERENCE, PHILADELPHIA, MARCH 17, 1980. PROCEEDINGS. N.Y. IEEE, CAT. NO. 80CH1551-1, 1980. P. 264-269.

BASED ON A SINGLE CHIP MICROPROCESSOR--(MCS 8748), A PORTABLE WIND GENERATOR-ANALYZER WAS BUILT. IT CONTAINS THREE INPUTS: WIND-SPEED, GENERATOR SPEED AND GENERATOR OUTPUT. THE INPUTS ARE CORRELATED WITH THE WIND-SPEED EVENT INTO STATISTICAL BINS. AT THE END OF A TEST (TYPICALLY OF THE ORDER OF 10 HOURS), THE ANALYZER WILL DISPLAY THE AVERAGE AND CORRELATED BINS CORRESPONDING TO ITS THREE INPUTS.

1980-0112 ALBRIGHT S, LECHNER M, SENTER R, SPANOS E
PUBLIC SERVICE COMPANY OF NEW MEXICO: VEST AN INTEREST IN ALTERNATE ENERGY.
SOUTHWEST BULL. N.M. SOL. ENERGY ASSOC. 5(2): 9-12, FEBRUARY 1980.

A MODIFIED RATE CHARGE DESIGN FOR ELECTRICAL POWER USAGE HAS BEEN PROPOSED BY THE PUBLIC SERVICE COMPANY OF NEW MEXICO (PNM) TO ACCOMMODATE THE USE OF ELECTRICITY FOR BACKUP HEATING BY SOLAR ENERGY USERS. OTHER PROJECTS OF THE COMPANY, INCLUDING WIND POWER, ARE REVIEWED.

1980-0113 ALEXANDER J H
FIELD EVALUATION PROGRAM FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, 1980. 2 P.
CONF-800406-6, RFP-3086

THE FIELD EVALUATION PROGRAM (FEP) SOLICITS THE COOPERATION OF STATE ENERGY OFFICES (SEO) TO UNDERTAKE THE SELECTION OF USERS AND THE SITING OF APPROXIMATELY 120 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS), IN COOPERATION WITH ELECTRIC UTILITIES, THROUGHOUT MOST OF THE FIFTY STATES AND SIX TERRITORIES OF THE U.S. SWECS RATED WITHIN THE TWO TO FORTY KW RANGE WILL BE PURCHASED FROM ABOUT TWELVE MANUFACTURERS. THESE SWECS WILL BE INTERCONNECTED TO A UTILITY LINE. DATA WILL BE COLLECTED AT EACH SITE ON THE LOAD PROFILE, ENERGY OUTPUT OF SWECS, THE TECHNICAL AND INSTITUTIONAL PROCEDURES FOR SITING AND INSTALLATION, AVAILABLE WIND ENERGY, AND PERFORMANCE AND FAILURE MODES OF THE SWECS. THE PROGRAM STATUS AS OF MID-FEBRUARY 1980 IS REVIEWED.

1980-0114 ALFREDSSON P H, DAHLBERG J A, BARK F H
SOME PROPERTIES OF THE WAKE BEHIND HORIZONTAL AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J5, P. 469-484.

THE DEVELOPMENT OF THE NEAR WAKE BEHIND A MODEL OF A WIND TURBINE WITH A HORIZONTAL AXIS OF ROTATION HAS BEEN STUDIED IN A WIND TUNNEL. TO ISOLATE THE EFFECT ON THE INCREASED DOWNSTREAM GROWTH OF THE WIDTH OF THE WAKE CAUSED BY AMBIENT TURBULENCE, THE MODEL WAS PLACED IN A CONSTANT VELOCITY FIELD WITH AND WITHOUT GRID GENERATED TURBULENCE. MEASUREMENTS WERE ALSO MADE IN A SIMULATED ATMOSPHERIC BOUNDARY LAYER. BOTH THE AXIAL MEAN VELOCITY FIELD AND THE RMS VALUE OF THE FLUCTUATING AXIAL VELOCITY WERE MEASURED. THE BREAK-DOWN OF THE TIP VORTICES WAS STUDIED VISUALLY BY USING SMOKE INJECTION UPSTREAM OF THE TURBINE. FOR THE CASES WHEN THE MEAN VELOCITY UPSTREAM OF THE ROTOR IS CONSTANT, THE EXPERIMENTAL RESULTS FOR THE MEAN VELOCITY IN THE WAKE ARE COMPARED WITH THEORETICAL PREDICTIONS FROM A SLIGHTLY MODIFIED VERSION OF A COMPUTATIONAL MODEL PROPOSED BY P.B.S. LISSAMAN. IF AMBIENT TURBULENCE IS PRESENT IN THE UPSTREAM FLOW, THE THEORETICAL RESULTS ARE IN GOOD AGREEMENT WITH THE EXPERIMENTAL RESULTS IN THE FAR WAKE. IN THE REMAINING CASES, THE AGREEMENT IS NOT SATISFACTORY.

1980-0115 ANDERSON M B
A VORTEX-WAKE ANALYSIS OF A HORIZONTAL-AXIS WIND TURBINE AND A COMPARISON WITH A MODIFIED BLADE-ELEMENT THEORY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H1, P. 357-374.

A THEORETICAL METHOD IS DEVELOPED FOR DETERMINING THE GEOMETRY AND STRENGTH DISTRIBUTION OF THE VORTEX-WAKE GENERATED BY A HORIZONTAL-AXIS WIND TURBINE. THE ANGLE OF RELATIVE FLOW AND INDUCED VELOCITIES ARE COMPARED WITH THOSE FROM A MODIFIED BLADE-ELEMENT THEORY. THE BLADE-ELEMENT THEORY INCLUDES TIP LOSSES WHICH ARE EVALUATED FROM EITHER THE GOLDSTEIN OR PRANDTL SOLUTION OF THE POTENTIAL FLOW ABOUT A HELICAL VORTEX SHEET.

1980-0116 ANKRUM T
WIND ENERGY CONVERSION.
ALTERNATE SOURCES OF ENERGY. ALTERNATE SOURCES OF ENERGY CONFERENCE, NEW YORK, SEPTEMBER 29, 1980. NTIS, 1980. P. 81-91.
CONF-8009108

THE ECONOMICS AND MARKET POTENTIAL IN THE U.S. FOR LARGE AND SMALL WIND TURBINES ARE ANALYZED.

1980-0117 ARE E
WIND ENERGY CONVERSION DEVICE.

U.S. PATENT NO. 4,213,057, JULY 15, 1980.

THIS REPORT DESCRIBES A WIND ENERGY CONVERSION DEVICE THAT CONVERTS THE WIND ENERGY TO ELECTRICAL ENERGY COMPRISED OF A MAIN ELONGATED GENERALLY HORIZONTALLY DISPOSED HOUSING, A GENERATOR, INCLUDING INNER AND OUTER ROTORS; AND A FRONT END MULTI-BLADED PROPELLER, JOURNALED THROUGH A FRONT END PORTION, DIRECTLY COUPLED TO THE INNER AND OUTER ROTORS. BLADES OF THE FRONT END PROPELLER ARE PITCHED TO ROTATE THE ROTOR IN A DIRECTION WHEN THE FRONT PROPELLER IS EXPOSED TO AND ROTATED BY WIND PRESSURES. THE REAR END MULTI-BLADED PROPELLER IS JOURNALED THROUGH THE REAR OF THE HOUSING AND IS DIRECTLY COUPLED TO INNER AND OUTER ROTORS IN TURN, WHEN EXPOSED TO AND ROTATED BY THE WIND, WILL TRANSMIT ELECTRICAL ENERGY GENERATED BY THE ROTATION OF THE FIRST AND SECOND ROTORS. THE HOUSING IS SET AT A PREDETERMINED ELEVATION ABOVE GROUND FOR PROPER EXPOSURE TO PREVAILING WIND FORCES.

1980-0118 ARGO W H
SOLAR THERMAL AND WIND ENERGY POWER SOURCE.
U.S. PATENT NO. 4,224,528, SEPTEMBER 23, 1980.

THIS THERMAL AIR AND WIND POWERED ELECTRIC CURRENT GENERATING SYSTEM IS COMPRISED OF A TOWER HAVING A PLURALITY OF UPWARDLY CONVERGING LEGS AND A CENTRALLY OPEN PLATFORM SECURED TO THE UPPER END PORTION OF THE LEGS AND A PLURALITY OF LIGHT ADMITTING WALL FORMING PANELS ENCLOSING THE TOWER FOR FORMING A THERMAL AIR PASSAGEWAY. THE LOWERMOST EDGE OF THE PANELS ARE SPACED ABOVE THE SURFACE OF THE EARTH. A THERMAL AIR AND WIND DRIVEN TURBINE IS MOUNTED ON THE PLATFORM IN COMMUNICATION WITH THE INTERIOR OF THE TOWER, AND THE DRIVE SHAFT PROJECTS DOWNWARDLY THROUGH THE PLATFORM COEXTENSIVE WITH THE TOWER. A SECTION OF HELICALLY WOUND SHEET MATERIAL EXTENDS RADIALLY INWARD FROM THE TOWER WALLS COEXTENSIVE WITH THE TOWER FOR INDUCING A CYCLONIC ACTION ON THERMAL AIR MOVING TOWARD THE TURBINE. THE GENERATOR IS OPERATIVELY CONNECTED WITH THE DRIVE SHAFT.

1980-0119 ATTITUDES OF THE VDEW.
ELEKTRIZITAETSWIRTSCHAFT 79(20): 760-765, SEPTEMBER 29, 1980. (IN GERMAN)

THE VDEW HAS GIVEN INFORMATION ON THE ADVANTAGES AND DISADVANTAGES, AND THE EXPECTED USE OF DECENTRALISED ELECTRICITY-GENERATING INSTALLATIONS. THE AUTHORS GIVE AN ASSESSMENT OF "COAL-FIRED MINIATURE POWER STATIONS--AN ALTERNATIVE TO LARGE POWER-STATION UNITS?" AND "THE USE OF DOMESTIC ELECTRICITY GENERATION INSTALLATIONS (ENERGY BOXES)". FOR THE FIRST INVESTIGATION THERE IS ALSO AVAILABLE A MORE COMPREHENSIVE VERSION. ALSO PREPARED WERE COMMENTARIES ON BLOCK-UNIT POWER STATIONS AND ON THE POSSIBILITIES OF UTILISING WIND ENERGY.

1980-0120 AXELL R A, HELMS P W
THE MOD-2 WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1159-1163.

THIS PAPER PRESENTS A DESCRIPTION OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM, CURRENT STATUS OF THE PROGRAM, ITS PLANS FOR PERFORMANCE EVALUATION, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION.

1980-0121 BAIN D
HOOKING UP ALA PURPA.
ALTERN. SOURCES ENERGY NO. 46: 12-13, NOVEMBER/DECEMBER 1980.

1980-0122 BAKER T L
TURBINE-TYPE WINDMILLS OF THE GREAT PLAINS AND MIDWEST.
AGRIC. HIST. 54(1): 38-61, JANUARY 1980.

1980-0123 BALCERAK J C
CONTROLLED VELOCITY TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS. AN EVALUATION OF A TECHNIQUE.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, NOVEMBER 1980. 50 P.
RFP-3189

TESTS OF A SMALL WIND ENERGY CONVERSION SYSTEM (SWECS) WERE CONDUCTED AT THE DEPARTMENT OF TRANSPORTATION TEST CENTER IN PUEBLO, COLORADO. THE TEST MACHINE WAS MOUNTED ON A RAIL FLATCAR WHICH WAS PUSHED BY A LOCOMOTIVE. THE PRIMARY OBJECTIVE OF THE TEST WAS TO DETERMINE THE USEFULNESS OF SWECS CONTROLLED VELOCITY TESTING (CVT) USING THIS METHOD. WIND VELOCITY PROFILES, ACCELERATION/DECELERATION FORCES, ROTOR YAW, POWER OUTPUT, ROTOR RPM, POWER COEFFICIENT, WAKE MEASUREMENTS, AND FLOW VISUALIZATION WERE EXAMINED IN THESE TESTS. THE RESULTS CONFIRM THE POTENTIAL BENEFIT OF THIS METHOD AS AN ADDITION TO THE NATURAL ATMOSPHERIC TESTING DONE AT ROCKY FLATS WIND SYSTEMS TEST CENTER.

1980-0124 BARCHET W R, WENDELL L L, HIESTER T R, ELLIOTT D L, PENNELL W T
WIND RESOURCE ASSESSMENT AND SITING.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 165-170.

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE), MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY, HAS THE SPECIFIC RESPONSIBILITY FOR PROVIDING THE APPROPRIATE INFORMATION ON WIND CHARACTERISTICS. APPLIED RESEARCH AND DEVELOPMENT ACTIVITIES WITHIN THE WCPE ARE DISCUSSED WITH REGARD TO: (1) DEFINING THE WIND ENERGY RESOURCE; AND (2) DEVELOPING EFFECTIVE SITING TECHNOLOGIES.

1980-0125 BARCHET W R
WIND RESOURCE ASSESSMENT IN THE NORTHWEST UNITED STATES.
NATIONAL CONFERENCE ON RENEWABLE ENERGY TECHNOLOGIES, HONOLULU, DECEMBER 7, 1980. NTIS, AUGUST 1980. 3 P.
PNL-SA-8875

THE NORTHWEST UNITED STATES INCLUDES THREE OF THE WIND RESOURCE ASSESSMENT REGIONS DELINEATED BY THE PACIFIC NORTHWEST LABORATORY (PNL): THE NORTHWEST REGION (IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING), THE ALASKA REGION, AND THE HAWAII REGION (HAWAII AND THE TRUST TERRITORIES OF THE PACIFIC). DETAILED WIND ENERGY RESOURCE ASSESSMENT ATLASES HAVE BEEN PREPARED FOR EACH OF THESE REGIONS (ELLIOTT AND BARCHET 1980, WISE, ET AL., 1980, SCHROEDER AND HORI, 1980); ONLY THE HIGHLIGHTS ARE PRESENTED HERE.

1980-0126 BARDSLEY W E
NOTE ON THE USE OF THE INVERSE GAUSSIAN DISTRIBUTION FOR WIND ENERGY APPLICATIONS.
J. APPL. METEOROL. 19(9): 1126-1130, SEPTEMBER 1980.

THE INVERSE GAUSSIAN DISTRIBUTION IS SUGGESTED AS AN ALTERNATIVE TO THE THREE-PARAMETER WEIBULL DISTRIBUTION

FOR THE DESCRIPTION OF WIND SPEED DATA WITH LOW FREQUENCIES OF LOW SPEEDS. MAXIMUM LIKELIHOOD ESTIMATION OF THE INVERSE GAUSSIAN PARAMETERS IS MUCH SIMPLER THAN THE ITERATIVE TECHNIQUE REQUIRED FOR THE THREE-PARAMETER WEIBULL DISTRIBUTION. IN ADDITION, THE INVERSE GAUSSIAN DISTRIBUTION FEATURES THE MEAN WIND SPEED AS A PARAMETER, A DESIRABLE PROPERTY FOR WIND ENERGY INVESTIGATIONS. A SUMMATION-REPRODUCTIVE PROPERTY OF THE DISTRIBUTION PERMITS ESTIMATION OF THE MEAN WIND ENERGY FLUX FROM A SEQUENCE OF SPEED AVERAGES.

1980-0127 BARLOW T M, CROTHERS W T, KING D M, RINDE J A, CHIAO T T, KULKARNI S V, FRANK D N
MECHANICAL ENERGY STORAGE TECHNOLOGY PROJECT. ANNUAL REPORT FOR CALENDAR YEAR 1979.
NTIS, MAY 1, 1980. 153 P.
UCRL-50056-79

THE AIM OF THE MECHANICAL ENERGY STORAGE TECHNOLOGY (MEST) PROJECT AT LLL IS TO DEMONSTRATE ITS POTENTIAL FOR ENERGY SAVINGS IN VEHICULAR AND STATIONARY SYSTEMS. PRIMARY EMPHASIS IS ON FLYWHEEL ENERGY STORAGE SYSTEMS. IN-HOUSE RESEARCH AND DEVELOPMENT WORK INCLUDES DEVELOPMENT AND EVALUATION OF THE TAPERED-THICKNESS FLYWHEEL ROTOR CONCEPT AND CHARACTERIZATION OF FIBER-COMPOSITE MATERIALS FOR APPLICATION TO FLYWHEEL SYSTEMS. THE PROJECT'S CY 1979 ACTIVITIES WERE ORGANIZED INTO THE FOLLOWING TASKS: TRANSPORTATION APPLICATIONS; PHOTOVOLTAIC AND WIND APPLICATIONS; FIBER-COMPOSITE MATERIALS TECHNOLOGY; FLYWHEEL ROTOR AND CONTAINMENT TECHNOLOGY; ADVANCED COMPONENT TECHNOLOGY; AND PROJECT MANAGEMENT AND DOE SUPPORT. STATUS OF THE PROJECTS IS SUMMARIZED.

1980-0128 BASS L, WYNHOLDS H, BLOEDORN J, HODGSON F, HERZOG F
STUDY OF PRODUCT LIABILITY INSURANCE ISSUES RELATED TO SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, NOVEMBER 1980. 163 P.
RFP-3178-80/21

PRODUCTS LIABILITY INSURANCE IS AVAILABLE FOR ALL BUT THE SMALLEST AND NEWEST SWECS MANUFACTURERS. LARGE COMPANIES SIMPLY INSURE SWECS AS PART OF THEIR TOTAL RISK MANAGEMENT (INSURANCE) PROGRAM. FOR OTHER COMPANIES, HOWEVER, PURCHASE OF PRODUCTS LIABILITY INSURANCE USUALLY REQUIRES A KNOWLEDGEABLE AND AGGRESSIVE INSURANCE BROKER, AND AN EFFECTIVE PRODUCT LIABILITY PREVENTION PROGRAM. COSTS OF PRODUCTS LIABILITY INSURANCE VARIES CONSIDERABLY, DEPENDING ON BOTH THE MANUFACTURER'S PERFORMANCE AND THE INSURER'S PERCEPTION OF EXPOSURE. THIS STUDY WAS SPONSORED BY THE DOE TO ANALYZE THE PARTICULAR PRODUCTS SAFETY AND LIABILITY STATUS OF THE SWECS INDUSTRY AND TO PROPOSE STRATEGIES FOR ADDRESSING THEIR NEEDS. EIGHT STRATEGIES WERE IDENTIFIED WHICH WOULD REDUCE THE MANUFACTURERS' RISK, REDISTRIBUTE THE ECONOMIC BURDEN OF PRODUCTS LIABILITY, AND REDEFINE THE CONCEPT OF ACCEPTABLE RISK.

1980-0129 BASTIANON R A
WIND ENERGY IN ARGENTINA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER X1, P. 565-570.

THIS PAPER SHOWS THE HIGH LEVELS OF WIND SPEED IN SOUTHERN ARGENTINA TOGETHER WITH THE POSSIBILITY OF AN ADVANTAGEOUS USE OF THE WIND ENERGY. THE AVAILABILITY OF THIS RESOURCE AND THE TOTAL CONSUMPTION OF OUR OIL IN THE NEAR FUTURE, HAVE CAUSED THE SCIENCE AND TECHNOLOGY SECRETARIAT OF STATE TO INCLUDE WIND ENERGY IN THE NON-CONVENTIONAL ENERGY NATIONAL PROGRAM. THIS PROGRAM IS DESCRIBED TOGETHER WITH THE WORKS WHICH IT SUPPORTS. THE SOUTHERN REGION OF ARGENTINA, KNOWN AS PATAGONIA, IS CONSIDERED POTENTIALLY GOOD FOR THE INSTALLATION OF LARGE AND SMALL WIND TURBINES. THE HIGH POWERED TURBINES CONNECTED TO THE NATIONAL GRID CAN PROVIDE ENERGY AT A VERY LOW COST DUE TO THE EXISTING HIGH WINDS WHILE NUMEROUS LOW POWERED WIND GENERATORS, BETWEEN 10 AND 20 KW, CAN BE INSTALLED TO PROVIDE ENERGY TO SMALL COMMUNITIES IN ISOLATED AREAS, WITH NO POSSIBILITIES OF BEING CONNECTED TO THE DISTRIBUTION GRID. FINALLY, THIS PAPER DESCRIBES THE FIRST ATTEMPT MADE IN 1961, TO CONSTRUCT A HIGH PERFORMANCE TURBINE.

1980-0130 BAUMAN B, FIMREITE D
PARALLEL GENERATION IN SOUTHERN WISCONSIN.
ASAE PAPER 80-3041, 1980. 10 P.

THE PAPER DESCRIBES EXPERIENCES IN DEVELOPING A PARALLEL GENERATION RATE TO ACCOMMODATE FOR INTERFACING OF WIND ENERGY SYSTEMS IN SOUTHERN WISCONSIN. IT DISCUSSES SAFETY CONSIDERATIONS, SERVICE AGREEMENTS, THE PARALLEL GENERATION RATE, METERING, AND ALTERNATE ENERGY CREDITS.

1980-0131 BAWN W E, GUERRERO J V
UTILITY CONCERNS ABOUT INTERCONNECTED SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, NOVEMBER 1980. 43 P.
TM-IP-81-2

1980-0132 BERGER G J, ROYCE R, FARLEY R C
A HANDBOOK ON THE SALE OF EXCESS ELECTRICITY BY INDUSTRIAL AND INDIVIDUAL POWER PRODUCERS UNDER THE PUBLIC UTILITY REGULATORY POLICIES ACT. FINAL REPORT.
NTIS, MAY 1980. 31 P.
SERI/TR-98125-1

THIS HANDBOOK IS INTENDED TO HELP INDUSTRIAL FIRMS OR INDIVIDUALS CONSIDERING A DECISION TO GENERATE THEIR OWN ELECTRICITY. A DESCRIPTION OF FEDERAL REGULATION OF PUBLIC UTILITIES AND THE PROCEDURE FOR OBTAINING CONTRACTS FOR THE PURCHASE AND SALE OF ELECTRICITY ARE INCLUDED. THE APPLICABLE SECTIONS OF THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978 (PURPA) ARE EXAMINED AS THEY AFFECT THE ABILITY OF A FIRM TO SELL AND DELIVER EXCESS ELECTRICITY TO A CUSTOMER.

1980-0133 BERRY E X
WIND RESOURCE ASSESSMENT IN CALIFORNIA.
NTIS, MAY 1980. 77 P. ALSO: SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, MAY 1980. 74 P.
PB80-195167

THIS REPORT PROVIDES A STRATEGY FOR WIND-ENERGY PROSPECTING, A DESIGN FOR A WIND PROSPECTING INSTRUMENT, AND A METHOD OF ANALYSIS OF WIND-ENERGY DATA. THE FORMULATION ALSO PRODUCES AN IMPROVED BASIS FOR THE CALCULATION OF WIND MACHINE PERFORMANCE USING ONLY A FEW WIND PARAMETER MEASUREMENTS.

1980-0134 BEURSKENS H J M, HAGEMAN A J F K, HOSPERS G D, KRAGTEN A, LYSEN E A
LOW SPEED WATER PUMPING WINDMILLS: ROTOR TESTS AND OVERALL PERFORMANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K2, P. 501-520.

IN THE PROCESS OF DEVELOPING LOW SPEED WATER PUMPING WINDMILLS THE AERODYNAMIC PROPERTIES OF FOUR DIFFERENT ROTORS OF 1.5 M DIAMETER WERE TESTED IN AN OPEN WIND-TUNNEL. THE INFLUENCE OF A NUMBER OF DESIGN PARAMETERS ON THE POWER OUTPUT HAS BEEN STUDIED. THESE INCLUDE LINEARIZATION OF THE BLADE SETTING ANGLE AND BLADE CHORD, BLADE TIP GEOMETRY, THE EFFECT OF GUY RODS AND OTHER STRUCTURAL ELEMENTS TO STRENGTHEN THE BLADES, AND THE EFFECTS OF OBSTACLES IN THE ROTOR WAKE. OTHER EXPERIMENTS INCLUDE THE EFFECT OF CHANGING THE GEOMETRY OF THE LEADING EDGE TO INCREASE THE STARTING TORQUE OF THE ROTOR. THE RESULTS OF THESE EXPERIMENTS ARE REPORTED AND COMPARED WITH THEORETICAL PREDICTIONS. THE FIELD PERFORMANCE OF A WATER PUMPING WINDMILL HAS BEEN MEASURED AT A TEST FIELD. THE THEORETICAL PERFORMANCE OF THE WINDMILL COULD BE PREDICTED BY MEASURING THE CHARACTERISTICS OF THE PUMP AND COUPLING THIS TO THE MEASURED PERFORMANCE OF THE ROTOR. THE DISCREPANCIES BETWEEN FIELD DATA AND THEORETICAL PREDICTIONS WILL BE DISCUSSED.

1980-0135 BHUMRALKAR C M, MANCUSO R L, LUDWIG F L
A PRACTICAL AND ECONOMIC METHOD FOR ESTIMATING WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
SOL. ENERGY 25(1): 55-65, 1980.

IN ORDER TO ASSESS THE ECONOMIC VIABILITY OF INSTALLING A WIND ENERGY CONVERSION SYSTEM (WECS) AT A SITE, IT IS NECESSARY TO KNOW THE WIND CHARACTERISTICS AT THAT SITE. A PHYSICALLY BASED, THREE-DIMENSIONAL MODEL HAS BEEN DEVELOPED THAT INCORPORATES THE EFFECT OF UNDERLYING TERRAIN AND USES AVAILABLE, CONVENTIONAL WIND INFORMATION FROM SELECTED NEARBY WEATHER STATIONS. THIS MODEL--CALLED COMPLEX--IS ESSENTIALLY AN OBJECTIVE ANALYSIS COMPUTER PROGRAM THAT INTERPOLATES VALUES OF WIND FROM OBSERVATIONS AT IRREGULARLY SPACED STATIONS. THE REQUIRED STATISTICAL WIND CHARACTERISTICS ARE ESTIMATED FROM THE SYNTHESIZED HOURLY WINDS, WHICH ARE OBTAINED BY USING THE COMPLEX MODEL. THE LINEAR CHARACTERISTICS OF THE COMPLEX MODEL HAVE BEEN USED TO OBTAIN SOLUTIONS DIRECTLY FOR ONLY THE FEW EIGENVECTORS OF THE INPUT FOR ANY ARBITRARY SET OF OBSERVATIONS FROM LINEAR COMBINATIONS OF THOSE SOLUTIONS.

1980-0136 BLACK T
PUTTING THE WIND TO WORK.
DES. ENG. 51(1): 48-51, JANUARY 1980.

AN ASSESSMENT IS MADE OF THE WORLD'S LARGEST WIND TURBINE GENERATOR EMPLOYING HORIZONTAL AXIS AND 100-FT LONG BLADES WITH VARIABLE PITCH. THE NACELLE IS MOUNTED ON A 140-FT-HIGH TOWER. PITCH OF THE BLADES IS AUTOMATICALLY VARIED TO MAINTAIN A CONSTANT 35 RPM AT WIND SPEEDS BETWEEN 11 MPH (CUT-IN-SPEED) AND 35 MPH (CUT-OUT SPEED). THE ROTOR DRIVES AN ALTERNATOR THROUGH A STEP-UP GEAR.

1980-0137 BOEHMAN L I, ANDERSON L A, CRISP J N, PINSON J D, BISHOP W S
ANALYSIS OF SMALL, NONCONVENTIONAL ELECTRIC POWER SYSTEMS FOR REMOTE SITE APPLICATIONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 828-834.

ELECTRIC POWER SYSTEMS WITH ENERGY CONVERSION BY WIND, SOLAR, AND HYBRID WIND-SOLAR CONFIGURATIONS AND ENERGY STORAGE IN FLYWHEELS, HYDROGEN, BATTERIES AND THERMAL DEVICES ARE CONSIDERED. RELATIVE PERFORMANCE, COST, AVAILABILITY, AND RELIABILITY ARE COMPARED FOR THE CONCEPTUAL SYSTEMS. A MODULAR CONFIGURATION WITH TWO 8 KW WIND ENERGY CONVERTERS AND SEALED LEAD ACID BATTERIES IS ANALYZED IN DETAIL FOR A REMOTE SITE MILITARY APPLICATION IN NORTHERN ALASKA. THE SYSTEM ANALYZED CAN PROVIDE 5 KW ON A CONTINUOUS BASIS WITH 5.6 METERS PER SEC AVERAGE WIND VELOCITY AND HAVE 12 HOURS OF RESERVE CAPACITY STORED IN THE BATTERY ENERGY STORAGE SYSTEM.

1980-0138 BOLAND J F
COR-TEN STEEL--ITS APPLICATION AND LIMITATIONS IN WIND SYSTEMS STRUCTURES.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, AUGUST 1980.
TM-TD/80-4

THE PROPERTIES OF COR-TEN STEELS ARE DISCUSSED IN LIGHT OF THEIR POSSIBLE APPLICATION IN SMALL WIND SYSTEMS. THE PRECAUTIONS AND LIMITATIONS TO BE CONSIDERED BY DESIGNERS IN USING THESE ALLOYS ARE ALSO DISCUSSED.

1980-0139 BOLLMEIER W S, BUTTERFIELD C P, CINGO R P, DODGE D M, HANSEN A C, SHEPHERD D C, TANGLER J L
SMALL WIND SYSTEMS TECHNOLOGY ASSESSMENT. STATE OF THE ART AND NEAR TERM GOALS.
NTIS, FEBRUARY 1980. 97 P.
RFP-3136/3533/80/18

COMMERCIALLY AVAILABLE SMALL WIND CONVERSION SYSTEMS (SWECS), DOE-FUNDED PROTOTYPE SWECS, AND POSSIBLE SECOND GENERATION ADVANCED CONCEPTS ARE ASSESSED FROM THE STANDPOINT OF SEVERAL KEY FIGURES-OF-MERIT INCLUDING COST OF ENERGY, DOLLARS PER POUND, KILOWATT HOURS PER YEAR PER POUND, AND KILOWATT HOURS PER YEAR PER SQUARE METER OF ROTOR AREA. THE RELIABILITY, PERFORMANCE, AND INSTALLATION AND MAINTENANCE COSTS OF THESE SYSTEMS ARE ALSO ASSESSED. IT IS CONCLUDED THAT CURRENT SWECS, WHILE NEARING THE THRESHOLD OF COMPETITIVENESS WITH CONVENTIONAL ENERGY SOURCES, ARE INHIBITED FROM REACHING THEIR LOWEST COST POTENTIAL BY THE USE OF OFF-THE-SHELF COMPONENTS, LESS THAN OPTIMUM ROTOR DESIGNS, AND (IN SOME CASES) OVERLY COMPLICATED CONTROL SYSTEMS. THE COMPARISON OF IMPROVED DOE PROTOTYPES AND POSSIBLE ADVANCED CONCEPT SWECS SHOWS THAT, IN MANY SIZE RANGES, CONSIDERABLE REDUCTIONS IN ENERGY COST CAN BE ACHIEVED.

1980-0140 BONTIUS G H, KOENRAADS A J T M, OFFRINGA L J J, VALTER G P, DE ZEEUW W J
WIND TURBINES FOR POWER GENERATION.
ENERGIESPECTRUM 4(11): 264-269, NOVEMBER 1980. (IN DUTCH)

THIS PAPER DISCUSSES THE SUITABILITY OF THE ASYNCHRONOUS GENERATORS NORMALLY COUPLED TO WIND TURBINES, WHERE THEY RUN IN OVERSYNCHRONOUS OPERATION. IT RECOMMENDS A SYSTEM COMPRISING A SYNCHRONOUS GENERATOR, RECTIFIER, INVERTER, AND A SECOND SYNCHRONOUS GENERATOR (OF LOW RATED OUTPUT) FOR REACTIVE CURRENT COMPENSATION. THIS SYSTEM SUPPLIES POWER AT A BETTER POWER FACTOR THAN THE ASYNCHRONOUS GENERATOR AND CAN OPERATE WITHIN A WIDER RANGE OF SPEEDS. FOR GREAT DISTANCES BETWEEN THE WIND TURBINE PARK AND THE NATIONAL GRID DC TRANSMISSION IS MOST CONVENIENT.

1980-0141 BOSSANYI E A, MACLEAN C, WHITTLE G E, DUNN P D
THE EFFICIENCY OF WIND TURBINE CLUSTERS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J1, P. 401-416.

A NUMBER OF AUTHORS HAVE DEVELOPED THEORETICAL MODELS TO DESCRIBE THE WIND DEPLETION EFFECTS IN WIND TURBINE CLUSTERS. THIS PAPER COMPARES THE ASSUMPTIONS, SOME OF WHICH ARE QUITE ARBITRARY, MADE IN THE DIFFERENT MODELS AND DEMONSTRATES THE WIDE RANGE OF ANSWERS THAT CAN BE OBTAINED BY CHOOSING DIFFERENT SETS OF ASSUMPTIONS. SOME NEW MODIFICATIONS ARE ALSO SUGGESTED, INCLUDING A PHYSICALLY MORE REALISTIC WAY OF ESTIMATING THE RATE AT WHICH MOMENTUM IS REPLENISHED FROM ABOVE. THEORETICAL RESULTS ARE COMPARED WITH THE LIMITED EXPERIMENTAL DATA

THAT IS AVAILABLE, BUT THERE IS OBVIOUSLY A NEED FOR MORE PRACTICAL EXPERIMENTS, BOTH IN WIND TUNNELS AND IN THE FIELD. A FLEXIBLE COMPUTER PROGRAM HAS BEEN WRITTEN WHICH ENABLES SOME OF THE DIFFERENT OPTIONS TO BE COMPARED, AND ALLOWS ONE TO DISCOVER THE SENSITIVITY OF THE RESULTS TO THE DIFFERENT ASSUMPTIONS WHICH CAN BE MADE. THE PROGRAM CAN ALSO ACCEPT ANY REAL WIND TURBINE CHARACTERISTICS, SO THAT POWER AND DRAG COEFFICIENTS MAY VARY WITH WIND SPEED AND HENCE WITH POSITION IN THE CLUSTER. FURTHERMORE, CLUSTER EFFICIENCY WILL VARY WITH THE INCIDENT WIND SPEED. THE AVERAGE CLUSTER EFFICIENCY OVER A WHOLE YEAR IS CALCULATED, FOR PARTICULAR WIND SPEED DISTRIBUTION, AND FROM THIS IT CAN BE SHOWN THAT, FOR EXAMPLE, THE OPTIMUM RATED WIND SPEED OF A WIND TURBINE CLUSTER IS LOWER THAN FOR AN ISOLATED MACHINE, AND THIS EFFECT BECOMES MORE SIGNIFICANT FOR LARGER CLUSTERS.

1980-0142 BOTTRELL G, SULLIVAN L J
DEVELOPMENT OF A 4 KW WIND TURBINE GENERATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 810-814.

STRUCTURAL COMPOSITES INDUSTRIES HAS BEEN AWARDED A ROCKWELL INTERNATIONAL ENERGY SYSTEMS GROUP CONTRACT (PF 07420C), FUNDED BY THE U.S. DEPARTMENT OF ENERGY, TO DEVELOP A SMALL WIND ENERGY CONVERSION SYSTEM (SWECS). THE SYSTEM IS TO BE RATED AT 4 KW AND OPERATED IN A 10 MILE PER HOUR MEAN WIND SPEED. IT WILL BE USED FOR REMOTE RESIDENTIAL APPLICATIONS. VENTUS ENERGY CORP. IS ASSISTING SCI WITH THE SWECS DEVELOPMENT. RESULTS TO DATE ARE PRESENTED IN THIS PAPER.

1980-0143 BOTTRELL G W
TORQUE CONTROL SYSTEM FOR WIND ENERGY CONVERSION DEVICES.
U.S. PATENT NO. 4,219,308, AUGUST 26, 1980.

AUTOMATIC TORQUE CONTROL OF WIND ENERGY CONVERSION DEVICES IS PROVIDED THROUGH THE UTILIZATION OF TURBINE REACTION TORQUE. IN THE PREFERRED EMBODIMENT, THE FRAME OF THE DRIVEN MACHINE IS ARRANGED TO BE ROTATABLE THROUGH A LIMITED ANGLE. AS RATED TORQUE OF THE SYSTEM IS EXCEEDED, A FORCE PROPORTIONAL TO THE TURBINE REACTION TORQUE IS EXERTED BY SAID FRAME TO ADJUST THE TURBINE AERODYNAMIC CONFIGURATION IN SUCH A MANNER AS TO REDUCE THE TORQUE ERROR TO SUBSTANTIALLY ZERO.

1980-0144 BRAY R E
SITE INSOLATION AND WIND POWER CHARACTERISTICS. SUMMARY REPORT.
NTIS, AUGUST 1980. 155 P.
DOE/CS/20160-1(VOL.1)

DESIGN AND OPERATION OF EITHER LARGE OR SMALL SCALE SOLAR AND WIND ENERGY CONVERSION SYSTEMS SHOULD BE BASED, IN PART, ON KNOWLEDGE OF EXPECTED SOLAR AND WIND POWER TRENDS. FOR THIS PURPOSE, HISTORIC SOLAR AND WIND DATA AVAILABLE AT 101 NATIONAL WEATHER SERVICE STATIONS WERE PROCESSED STATISTICALLY. PRELIMINARY PLANNING DATA ARE PROVIDED FOR SELECTED DAILY AVERAGE SOLAR AND WIND POWER CONDITIONS OCCURRING AND PERSISTING FOR TIME PERIODS OF INTEREST. SOLAR DATA ARE GLOBAL RADIATION INCIDENT ON A HORIZONTAL SURFACE, AND WIND DATA REPRESENT WIND POWER NORMAL TO THE AIR FLOW. EMPIRICAL PROBABILITIES WERE CONSTRUCTED FROM THE HISTORIC DATA TO PROVIDE A REASONABLE INFERENCE OF THE CHANCE OF SIMILAR CLIMATOLOGICAL CONDITIONS OCCURRING AT ANY GIVEN TIME IN THE FUTURE. (DIURNAL WIND POWER VARIATIONS WERE ALSO CONSIDERED.) RATIOS WERE ALSO GENERATED AT EACH STATION TO RELATE THE GLOBAL RADIATION DATA TO INSOLATION ON A SOUTH-FACING SURFACE INCLINED AT VARIOUS ANGLES. IN ADDITION, JOINT PROBABILITY DISTRIBUTIONS WERE DERIVED TO SHOW THE PROPORTION OF DAYS WITH SOLAR AND WIND POWER WITHIN SELECTED INTERVALS.

1980-0145 BRENNECKE P, EWE H, JUSTI E
STATUS AND NEAR TERM DEVELOPMENT GOALS OF A HYDROGEN ECONOMY.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 4: WASSERSTOFFTECHNOLOGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 297-306.

"HYDROGEN ENERGY" IS DEFINED AS AN ENERGY REGIME, IN WHICH ALL AVAILABLE SOURCES OF PRIMARY ENERGY ARE USED TO PRODUCE HYDROGEN. THEREAFTER THE INEXHAUSTIBLE MULTIPURPOSE CARRIER OF SECONDARY ENERGY MAY BE STORED, TRANSPORTED, AND DISTRIBUTED SIMPLY AND INEXPENSIVELY AND THE OXIDATION PRODUCT (PURE WATER VAPOUR) WILL BE RECYCLED AUTOMATICALLY BY THE BIOSPHERE TO RIVERS AND OCEANS. DEPENDING ON WHETHER SOLAR OR NUCLEAR ENERGY IS PREFERRED AS THE SOURCE OF PRIMARY INEXHAUSTIBLE ENERGY, THE SYSTEM IS CALLED "SOLAR HYDROGEN ECONOMY" OR "NUCLEAR HYDROGEN ECONOMY". IT IS SHOWN HOW ONE CAN CONSTRUCT A STABLE LONG TERM SOLUTION OF THE PRESENT ENERGY PROBLEMS. SOME FIRST PRACTICAL STEPS ARE PROPOSED.

1980-0146 BRIDSEN D W, WORTHINGTON P J
STRUCTURAL DESIGN AND MAINTENANCE POLICIES FOR LARGE WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F4, P. 307-321.

MAJOR STRUCTURAL FAILURES OF LARGE WIND TURBINE (WT) BLADES CAN HAVE VERY SERIOUS ECONOMIC AND PUBLIC SAFETY CONSEQUENCES: ASSURANCE OF STRUCTURAL INTEGRITY WILL BE REQUIRED THROUGHOUT THEIR WORKING LIVES. MAINTENANCE COSTS WILL ALSO HAVE TO BE GIVEN GREAT CONSIDERATION IF WT ARE TO BE ECONOMICALLY VIABLE. STRUCTURAL MAINTENANCE WILL BE VERY EXPENSIVE BECAUSE OF SITING OF WT IN REMOTE AREAS AND THE DIFFICULTY OF GAINING ACCESS TO THE MAIN ROTATING STRUCTURAL COMPONENTS WHEN THEY ARE MOUNTED ON HIGH TOWERS. ACCEPTABLE ASSURANCE OF STRUCTURAL INTEGRITY MUST BE PROVIDED AT MINIMUM COST. THE DESIGN OF LARGE WT BLADES MAY DRAW ON AEROSPACE EXPERIENCE BOTH IN METHODS OF CONSTRUCTION AND IN CHOICE OF MATERIALS, AND THEY WILL SHARE COMMON HAZARDS SUCH AS METAL FATIGUE AND CORROSION. AIRCRAFT STRUCTURAL DESIGN AND INSPECTION POLICIES, WHICH ARE NOW INSEPARABLY LINKED, HAVE BEEN DEVELOPED OVER MANY YEARS OF EXPERIENCE. DESIGN PRINCIPLES WHICH GIVE GOOD FATIGUE LIFE AND CORROSION PROTECTION, AND THUS LOW FAILURE RATES AND LOW INSPECTION COSTS, ARE NOW WIDELY ACCEPTED. INTEGRITY MONITORING USING VISUAL AND NON-DESTRUCTIVE INSPECTION IS IN WIDESPREAD USE. THIS DISCUSSION PAPER WILL DRAW ON THIS EXPERIENCE TO COMPARE POSSIBLE STRUCTURAL DESIGN AND INSPECTION POLICIES FOR LARGE WT BLADES. A BRIEF DISCUSSION OF INSPECTION METHODS, SUCH AS NON-DESTRUCTIVE INSPECTION AND INTEGRITY MONITORING, AND THEIR COST-EFFECTIVENESS IS INCLUDED. TO BE EFFECTIVE AND ECONOMICAL THESE TECHNIQUES MUST BE CONSIDERED IN THE DESIGN PROCESS.

1980-0147 BRIGGS W R
SWECS COST OF ENERGY BASED ON LIFE CYCLE COSTING.
NTIS, MAY 1980. 57 P.
RFP-3120/3533/80-13

VARIOUS SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BEING DEVELOPED UNDER CONTRACT TO ROCKY FLATS WERE SUBJECTED TO A LIFE CYCLE COSTING (LCC) ANALYSIS TO PROJECT THE COST OF ENERGY AVAILABLE FROM THESE SYSTEMS. SWECS SIZES CONSIDERED WERE 1-2 KW, 8 KW, AND 40 KW UNITS. SYSTEMS COSTS WERE BASED ON AN ASSUMED SALES VOLUME

OF 1,000 UNITS OF EACH SWECS PER YEAR. THE RESULTS OF THE LCC ANALYSIS SHOW SWECS COST OF ENERGY TO BE COMPETITIVE WITH GRID ELECTRICITY COSTS OF ENERGY OVER THE PROJECTED LIFETIMES OF THE SWECS DEPENDING ON COMPETING ENERGY COST AT THE SWECS LOCATION, AVERAGE WIND VELOCITY, AND EFFICIENCY OF UTILIZATION OF SWECS-GENERATED ENERGY.

1980-0148 BRODE R, STONER R, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 5: THE EAST CENTRAL REGION.
NTIS, 1980. 214 P.
PNL-3195(WERA-5)

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH STATE OF THE REGION. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED AS SEPARATE CHAPTERS THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE STATE CHAPTERS. STATES INCLUDE DELAWARE, MARYLAND, KENTUCKY, NORTH CAROLINA, TENNESSEE, VIRGINIA, AND WEST VIRGINIA.

1980-0149 BUCH A
THE WIND IS BLOWING. SEA WATER DESALINATION BY WAY OF WIND POWER.
ENERGY DEV. NO. 2: 49-51, JUNE 1980.

1980-0150 BUEHRING I K, FRERIS L L
SOME ASPECTS OF SMALL AEROGENERATOR DESIGN AND TESTING.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F3, P. 297-305.

AT IMPERIAL COLLEGE A SYSTEM IS UNDER STUDY IN WHICH AN AEROGENERATOR FEEDS ELECTRIC ENERGY TO RESISTIVE LOADS FOR SPACE AND WATER HEATING. FOR THIS PURPOSE, A FAMILY OF PERMANENT MAGNET ALTERNATORS WERE DEVELOPED FOR EITHER DIRECT OR THROUGH GEARBOX COUPLING TO THE WINDROTOR. THESE MACHINES HAVE EXCEPTIONALLY HIGH "ALL YEAR" EFFICIENCY. THE OUTPUT FROM THE ALTERNATOR CAN BE FED DIRECTLY TO A RESISTIVE LOAD OR CAN BE MODULATED ON THE BASIS OF A CONTROL STRATEGY THE PURPOSE OF WHICH IS MAXIMUM ENERGY EXTRACTION. A THYRISTOR RECTIFIER HAS BEEN USED FOR POWER CONDITIONING AS THIS GIVES CONSIDERABLE FLEXIBILITY IN IMPLEMENTING CONTROL STRATEGIES. TO COMPARE THE PERFORMANCE OF THREE ROTORS UNDER DEVELOPMENT, NAMELY A 2.5 DIAMETER CAMBERED PLATE BLADE, 3 M DIAMETER SAILWING AND 3.5 M DIAMETER VARIABLE PITCH SINGLE BLADE ROTOR, A TEST PROCEDURE WAS DEVELOPED IN WHICH THE ROTATIONAL SPEED OF THE ROTOR WAS KEPT CONSTANT. THIS PREVENTS CONTINUOUS TRANSFER OF KINETIC ENERGY TO AND FROM THE ROTOR. CONSTANT SPEED OPERATION WAS ENFORCED THROUGH A FEEDBACK LOOP ROUND THE THYRISTOR RECTIFIER. TEST RESULTS FOR THE CAMBERED PLATE ROTOR ARE SHOWN. FINALLY, A STUDY TO COMPARE THE EFFECTIVENESS OF A NUMBER OF CONTROL POLICIES IS DESCRIBED. THE AEROGENERATOR PLUS CONTROL SYSTEM DYNAMICS WERE SIMULATED ON AN ANALOGUE COMPUTER, THE INPUT TO WHICH WAS A PRERECORDED SAMPLE OF WIND SPEED. THE SIMULATION PROVIDED AN OUTPUT, IN TERMS OF ENERGY, PRODUCED BY THE SYSTEM FOR EACH OF THE CONTROL POLICIES. THE RESULTS INDICATE THAT THERE IS LITTLE DIFFERENCE IN PERFORMANCE AMONGST THE POLICIES TESTED.

1980-0151 BUILTJES P J H, MILBORROW D J
MODELLING OF WIND TURBINE ARRAYS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J2, P. 417-430.

THE FEASIBILITY OF CONSTRUCTING ARRAYS, OR CLUSTERS, OF WIND TURBINES FOR POWER GENERATION IS BEING STUDIED IN DENMARK, THE NETHERLANDS, SWEDEN, THE UNITED STATES AND THE UNITED KINGDOM. THE CONCEPT IS ATTRACTIVE SINCE THE CONCENTRATION OF A NUMBER OF MACHINES ON ONE SITE OFFERS ECONOMIES DURING CONSTRUCTION AND OPERATION AND IN POWER MARSHALLING AND CONTROL. STUDIES OF THE INTERACTIVE EFFECTS WHICH REDUCE THE OUTPUT OF WIND TURBINES IN AN ARRAY DEPEND HEAVILY ON WIND TUNNEL TESTS. THE RESULTS DERIVED FROM TWO SETS--AT THE NETHERLANDS ORGANISATION FOR INDUSTRIAL RESEARCH (T.N.O.) AND AT CENTRAL ELECTRICITY RESEARCH LABORATORIES, ENGLAND (C.E.R.L.) ARE REVIEWED AND COMPARED, WITH PARTICULAR EMPHASIS ON THE ACCURACY OF THE MODELLING TECHNIQUES AND THE EFFECTS OF SCALE.

1980-0152 BULLO P
WIND ENERGY: CURRENT SITUATION AND FUTURE PROSPECTS.
ELETTRIFICAZIONE NO. 10: 461-469, OCTOBER 1980. (IN ITALIAN)

THE ARTICLE BEGINS WITH THE PRESENT MARKET SITUATION OF WIND MACHINES AND THEN REVIEWS THE PROJECTS IN HAND IN DIFFERENT COUNTRIES. THE PROSPECTS FOR THE PENETRATION OF WIND ENERGY INTO THE WORLD ENERGY CONSUMPTION FRAMEWORK ARE EXAMINED; THESE ARE DERIVED FROM PREDICTIONS FROM THE U.S., JAPAN AND THE EEC.

1980-0153 BULLO P
WIND-POWER GENERATING UNITS AND THEIR IMPACT ON THE ENVIRONMENT.
ELETTRIFICAZIONE NO. 5: 220-223, MAY 1980. (IN ITALIAN)

THE SITING OF WIND POWER GENERATING UNITS TO OVERCOME PROBLEMS OF ACCEPTABILITY, VISUAL EFFECTS ON THE LANDSCAPE AND POSSIBLE ECOLOGICAL DIFFICULTIES IS BRIEFLY DISCUSSED. THE TECHNICAL PROBLEMS OF MECHANICAL IMBALANCE DUE TO ICE FORMATION, ICE DISLODGMENT AND POSSIBLE DANGER, NOISE AND ELECTROMAGNETIC INTERFERENCE ARE DETAILED AND THEIR SIGNIFICANCE ASSESSED. IN THE CONTEXT OF GOVERNMENT MEASURES ADOPTED IN ITALY TO ENCOURAGE THE RATIONAL USE OF RENEWABLE ENERGY SOURCES REFERENCE IS MADE TO CERTIFICATION OF PROTOTYPE EQUIPMENT AND THE SIMPLIFICATION OF PLANNING PERMISSION PROCEDURES FOR SMALL UNITS.

1980-0154 BULLO P
WIND ENERGY--SYSTEMS OF CONVERSION AND RELATED PROBLEMS.
ELETTRIFICAZIONE NO. 6: 266-272, JUNE 1980. (IN ITALIAN)

THREE SYSTEMS OF WIND GENERATED POWER ARE CONSIDERED. FIRSTLY FOR STAND ALONE INSTALLATIONS THE PROVISION OF STORAGE BATTERIES IS UNAVOIDABLE. ON A LARGER SCALE PARALLEL RUNNING WITH A LARGE INTERCONNECTED SYSTEM IS POSSIBLE. FINALLY, FOR VERY LARGE SCALE WIND POWER THE USE OF PUMPED STORAGE OR THE GENERATION OF HYDROGEN MAY BE CONSIDERED. THE USE OF ALTERNATORS IS CONSIDERED, AND THE ALTERNATIVE OF DC GENERATORS WITH INVERTORS DISCUSSED.

1980-0155 BULLO P

WIND-DRIVEN GENERATORS--ANALYSIS OF SITES FAVOURABLE TO THEIR INSTALLATION.
ELETTRIFICAZIONE NO. 4: 171-178, APRIL 1980. (IN ITALIAN)

THIS ARTICLE EXAMINES THE VARIOUS PARAMETERS TO BE EVALUATED IN RESPECT TO A RATIONAL AND ECONOMIC INSTALLATION OF A WINDMILL GENERATOR, AND PRESENTS A NUMBER OF MEAN WIND "ISOWIND" MAPS FOR MANY AREAS OF THE WORLD, INCLUDING BRITAIN, BASED UPON MEASURED WIND VELOCITIES AT GROUND LEVEL.

1980-0156 BULLO P
CONVERSION OF WIND ENERGY INTO ELECTRICITY.
ELETTRIFICAZIONE NO. 8: 349-355, AUGUST 1980. (IN ITALIAN)

THE GENERATOR IS AN IMPORTANT PART OF THIS FORM OF ENERGY CONVERSION. FOR ECONOMY, THE GENERATOR CHARACTERISTICS SHOULD MATCH PROPERLY THE WINDMILL (OR OTHER CHARACTERISTICS). A TABLE IS GIVEN OF THE VARIOUS POSSIBLE COMBINATIONS OF "WINDMILL" ROTOR, TRANSMISSION AND ELECTRICIAL GENERATOR. A BAR DIAGRAM SHOWS THE RELATIVE CAPITAL AND ENERGY COSTS OF THESE COMBINATIONS. THERE IS A DESCRIPTION OF THE CONTROL OF MODERN WINDMILLS. A BLOCK DIAGRAM OF SUCH A SCHEME IS GIVEN, TOGETHER WITH SOME RESULTING PERFORMANCE CURVES OF A NASA 230, 1500 KW EQUIPMENT. PRIMARY ROTOR CONTROL IS DISCUSSED IN FAIR DETAIL. THIS INCLUDES ORIENTATION AND STABILITY AND VIBRATION PROBLEMS. A SPEED/POWER CURVE IS GIVEN FOR A 500 KW UNIT. THE LAST SECTION GIVES A GOOD DESCRIPTION OF A WTG ENERGY SYSTEMS "AEROMOTOR" CONTROL SYSTEM, WITH SEVERAL DIAGRAMS.

1980-0157 BUTTERFIELD C P, PYKKONEN K R, SEXTON J H
EFFECTS OF GUY-WIRES ON SWECS TOWER DYNAMICS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JULY 1980. 17 P.
TM-TD-81-1

THE ROCKY FLATS (RF) SUPPORTING RESEARCH AND TECHNOLOGY (SRT) STUDY FOR TOWER TESTING/ANALYSIS HAS LED TO SOME USEFUL INFORMATION CONCERNING THE EFFECT OF TOWER GUY PRETENSION ON SMALL WIND SYSTEM TOWER DYNAMICS. THE EFFECT OF GUY-WIRE PRETENSION ON TOWER NATURAL FREQUENCIES IS USUALLY CONSIDERED NEGLIGIBLE IF THE GUY: 1) HAS NO SAG CAUSED BY GRAVITY, AND 2) THE TENSION IS NOT APPROACHING THE TOWER BUCKLING LOAD. AT THE RF TEST CENTER IT WAS FOUND THAT, FOR THE TEST TOWER EVEN WHEN THESE CONDITIONS WERE AVOIDED, THE GUY FUNDAMENTAL FREQUENCY MUST BE 30% GREATER THAN THE TOWER FUNDAMENTAL FREQUENCY TO MAINTAIN THE FUNDAMENTAL'S CHARACTERISTICS.

1980-0158 BYGGETH N G, HALLSTEN K-E, THORESON L
DRIVE TRAIN ASSEMBLY OF THE SWEDISH WTS 3.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E3, P. 253-267.

THE PAPER GIVES IN A SHORT INTRODUCTION A GENERAL OVERVIEW OF THE SWEDISH WTS 3 (WIND TURBINE SYSTEM 3 MW). AN ELABORATED DESCRIPTION OF THE COMPLETE DRIVE TRAIN ASSEMBLY OF THE WTS 3 IS THEN GIVEN.

1980-0159 CANDIDATE WIND TURBINE GENERATOR SITE, CULEBRA, PUERTO RICO. ANNUAL DATA SUMMARY, JANUARY - DECEMBER 1979.
NTIS, JUNE 1980. 13 P.
DOE/RL/01830-T1

THIS REPORT SUMMARIZES WIND SPEED AND DIRECTION DATA COLLECTED ON METEOROLOGICAL TOWERS AT 14 CANDIDATE AND WIND TURBINE GENERATOR INSTALLATION SITES FROM JANUARY 1979 THROUGH DECEMBER 1979. THE BASIC METHOD OF DATA COLLECTION IS BY DIGITAL DATA CASSETTE RECORDING SYSTEMS. FOR THE DIGITAL DATA REPORTED, AN INSTANTANEOUS SAMPLE IS RECORDED EVERY 2 MINUTES. AN EXPLANATION IS INCLUDED FOR EACH DATA SUMMARY TABLE AS WELL AS INFORMATION ON HOW SPECIFIC VALUES WERE COMPUTED. THE REST OF THE REPORT PRESENTS THE ANNUAL SUMMARIZED DATA FOR EACH SITE.

1980-0160 CANDIDATE WIND TURBINE GENERATOR SITE, CULEBRA, PUERTO RICO. ANNUAL DATA SUMMARY, OCTOBER 1978 - SEPTEMBER 1979.
NTIS, JULY 1980. 12 P.
DOE/RL/01830-T2

THIS REPORT SUMMARIZES WIND SPEED AND DIRECTION DATA COLLECTED ON METEOROLOGICAL TOWERS AT 14 CANDIDATE AND WIND TURBINE GENERATOR INSTALLATION SITES FROM OCTOBER 1978 THROUGH SEPTEMBER 1979. THE BASIC METHOD OF DATA COLLECTION IS BY DIGITAL DATA CASSETTE RECORDING SYSTEMS. FOR THE DIGITAL DATA REPORTED, AN INSTANTANEOUS SAMPLE IS RECORDED EVERY 2 MINUTES. AN EXPLANATION IS PROVIDED FOR EACH DATA SUMMARY TABLE AS WELL AS INFORMATION ON HOW SPECIFIC VALUES WERE COMPUTED. THE REST OF THE REPORT PRESENTS THE ANNUAL SUMMARIZED DATA FOR EACH SITE.

1980-0161 CARPENTER R D
WIND TURBINE.
U.S. PATENT NO. 4,218,175, AUGUST 19, 1980.

THIS PATENT DESCRIBES A WIND TURBINE CONSISTING OF A CONE WITH A PLURALITY OF VANES EXTENDING OUTWARDLY MORE OR LESS PERPENDICULAR TO THE SURFACE OF THE CONE AND WINDING IN A HELICAL FASHION FROM A SMALLER DIAMETER OF THE CONE, BUT WITH A CHANGING PITCH ANGLE AND TERMINATING ON OR NEAR THE LARGE DIAMETER. THE SHAFT COMMUNICATES WITH THE CONE AT THE CENTER LINE AND A WIND TUNNEL SURROUNDS THE CONE COMPRISED OF A CONVERGING INLET, A DIVERGING OUTLET AND A THROAT AREA. THE TIP OF THE CONE IS LOCATED AT APPROXIMATELY THROAT AREA AND THE LARGER DIAMETER OF THE CONE IS LOCATED AT OR NEAR THE OUTLET OF THE TUNNEL.

1980-0162 CARR M J, GROTZKY V K, SEXTON J H
PINSON C2E WIND TURBINE GENERATOR FAILURE ANALYSIS AND CORRECTIVE DESIGN MODIFICATION.
NTIS, MARCH 1980. 27 P.
RFP-3128/3533/80-16

ON DECEMBER 4, 1978 WIND SPEEDS AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER REACHED 42 M/S (94 MPH). DURING A ROUTINE INSPECTION OF ALL WIND MACHINES FOLLOWING THIS WINDSTORM, TWO FAILURES WERE OBSERVED ON THE PINSON C2E WIND TURBINE GENERATOR. ONE FAILURE WAS FATIGUE CRACKS WHICH FORMED ON PLATES WELDED TO THE ROTOR SHAFT. THE SECOND FAILURE WAS A NUMBER OF CRACKS IN THE SKIN OF ALL THREE BLADES. ALTHOUGH THE POSSIBILITY EXISTS THAT THE HIGH WINDS OF DECEMBER 4, 1978 CONTRIBUTED TO THESE FAILURES, NO CONCLUSIVE DATA EXIST SUBSTANTIATING THIS THEORY. IN FACT, THE C2E'S FEATHERING MECHANISM FUNCTIONED NORMALLY DURING THE WINDSTORM; THEREBY, CONTROLLING ROTOR OVERSPEED, A POTENTIAL CAUSE OF DAMAGE.

1980-0163 CARROLL D P, KRAUSE P C
SECURITY ASSESSMENT OF POWER SYSTEMS INCLUDING ENERGY STORAGE AND WITH THE INTEGRATION OF WIND ENERGY.
PROGRESS REPORT, OCTOBER 1, 1979-DECEMBER 31, 1979.

NTIS, JANUARY 1980. 23 P.
DOE/ET/29100-11

PROGRESS IN WIND ENERGY STUDIES IS REPORTED. DURING THIS QUARTER TWO AREAS WERE PURSUED: WIND TURBULENCE MODELS AND THEIR EFFECT ON UNSTEADY SHAFT TORQUE OF HORIZONTAL MACHINES, AND REDUCED ORDER AERODYNAMIC MODELS OF WIND MACHINES.

1980-0164 CASKEY B C, SCHILDKNECHT H E
MECHANICAL ENERGY STORAGE FOR PHOTOVOLTAIC/WIND PROJECT. FINAL REPORT.
NTIS, JUNE 1980. 66 P.
SAND-79-2259

THIS REPORT DESCRIBES THE SOLAR MECHANICAL ENERGY STORAGE PROGRAM AT THE TIME THAT LAWRENCE LIVERMORE LABORATORY ASSUMED THE RESPONSIBILITY FOR IT. IT ALSO PRESENTS CONTRACTOR AND SYSTEMS ANALYSES RESULTS FOR RESIDENTIAL FLYWHEEL ENERGY-STORAGE SYSTEMS (FESS). VARIOUS PHASES OF THE PROGRAM HAVE ADDRESSED SMALL-TO-INTERMEDIATE APPLICATIONS OF PHOTOVOLTAIC/WIND-ENERGY STORAGE USING FLYWHEELS, COMPRESSED AIR, AND LOW-HEAD, UNDERGROUND PUMPED-HYDRO TECHNOLOGIES. SANDIA NATIONAL LABORATORIES' RECOMMENDATIONS FOR CONTINUED WORK IN SPECIFIC AREAS ARE INCLUDED.

1980-0165 CHENEY M C
UTRC 8 KW WIND TURBINE TESTS.
NTIS, 1980. 9 P.
CONF-800406-5, RFP-3085

THE UNITED TECHNOLOGIES RESEARCH CENTER (UTRC) 8 KW PROTOTYPE WIND TURBINE BECAME OPERATIONAL IN JULY 1979 AND UNDERWENT TESTING IN EAST HARTFORD, CT UNTIL DELIVERY TO ROCKWELL INTERNATIONAL, THE PRIME CONTRACTOR, IN FEBRUARY 1980. THE PROGRAM WILL CONTINUE WITH THE FIELD EVALUATION BY ROCKWELL AT THEIR ROCKY FLATS SITE DURING 1980. THE PROTOTYPE TESTING DEMONSTRATED THE BASIC OPERATION OF THE UNIQUE CONTROL CONCEPT OF THE UTRC COMPOSITE BEARINGLESS WIND TURBINE WHICH UTILIZES A HUB-MOUNTED PENDULUM EMPLOYED TO TWIST THE GRAPHITE COMPOSITE INBOARD REGION OF THE BLADE PRODUCING BLADE PITCH VARIATIONS. THE TESTS ALSO DEMONSTRATED THE PREDICTED PERFORMANCE OF 9 KW AT 20 MPH, AND THE HIGH SPEED STALL CONTROL FEATURE

1980-0166 CHIEH C F, FROST W
TETHER ANALYSIS FOR A KITE ANEMOMETER.
WIND ENG. 4(2): 80-86, 1980.

AN ANALYSIS TO DETERMINE THE EFFECT OF VERTICALLY VARYING WIND ON KITE ANEMOMETER MEASUREMENTS IS PROVIDED. THE RESULTS OF THE ANALYSIS DEMONSTRATE THAT THE INFLUENCE OF WIND SHEAR HAS A SMALL EFFECT ON CALIBRATION CURVES WHICH WERE ESTABLISHED IN A UNIFORM FLOW FIELD. IF AN EMPIRICALLY DETERMINED CONSTANT OF 0.9 IS CHANGED TO 0.995, THE CORRECTION FOR HEIGHT IS ONE PERCENT OR LESS. THIS FINDING IS OF SIGNIFICANCE IN THAT IT DEMONSTRATES THE KITE ANEMOMETER CAN BE EMPLOYED AT SITES OF VARYING TERRAIN SURFACE ROUGHNESS WITHOUT SPECIFIC CALIBRATION FOR THAT SITE.

1980-0167 CHIEN H C, MERONEY R N, SANDBORN V A
SITES FOR WIND-POWER INSTALLATIONS: PHYSICAL MODELLING OF THE WIND FIELD OVER KAHUKU POINT, OAHU, HAWAII.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B1, P. 75-90.

OAHU ISLAND, HAWAII, U.S.A., IS KNOWN TO POSSESS A RICH WIND POWER RESOURCE DUE TO THE PREVAILING TRADE WIND BOUNDARY LAYER. A CONTOURED MODEL OF THE KAHUKU POINT AREA WAS PREPARED TO AN UNDISTORTED SCALE OF 1:3840. MEASUREMENTS OF WIND SPEED AND TURBULENCE WERE MADE OVER THE KAHUKU POINT MODEL IN A METEOROLOGICAL WIND TUNNEL. MEASUREMENTS HAVE BEEN COMPARED WITH THE RESULTS OF A FIELD PROGRAM. THE LINEAR CORRELATION BETWEEN FIELD AND LABORATORY MEASUREMENTS WAS FOUND TO BE 0.80. A CORRELATION BY RANK OF RELATIVE WIND SPEEDS FOR THESE DATA PAIRS REVEALED A SIMULATION AT A LEVEL OF 0.97. LABORATORY DATA WERE ALSO USED TO EVALUATE PROPOSED ANALYTIC METHODS TO ESTIMATE SPEED-UP OF FLOW OVER HILLS. METHODS EXAMINED PREDICT VALUES WHICH BRACKET MEASURED MAGNITUDES.

1980-0168 CHRISTIANSON M M
ALTERNATIVE TECHNOLOGY IN LOW INCOME NEW YORK: ENERGY TASK FORCE'S FIRST FOUR YEARS.
COMMUNITY ENERGY SELF-RELIANCE. PROCEEDINGS OF THE FIRST CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS, BOULDER, COLORADO, AUGUST 20-21, 1979. NTIS, JULY 1980. P. 80-90. ALSO: WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1980. P. 80-90.

AN APARTMENT BUILDING IN NEW YORK CITY, WITH SOLAR, WIND, AND ENERGY CONSERVATION SYSTEMS, IS DESCRIBED, ALONG WITH OTHER PROJECTS AND PLANS OF THE ENERGY TASK FORCE.

1980-0169 CINGO R P
WIND ENERGY CONVERSION, IS IT ENVIRONMENTALLY ACCEPTABLE?
NTIS, 1980. 10 P.
CONF-800517-6, RFP-3072

THE WIDESPREAD IMPLEMENTATION OF WIND ENERGY CONVERSION SYSTEMS PRESENTS A NUMBER OF ENVIRONMENTAL CONCERNS THAT MUST BE ASSESSED AND, IF FOUND TO BE SIGNIFICANT, MUST BE SOLVED BEFORE COMMERCIALIZATION OF THESE SYSTEMS CAN BE ACCOMPLISHED. THIS PAPER PROVIDES AN OVERVIEW OF THE CURRENT STATE OF KNOWLEDGE RELATING TO THE ASSESSMENT OF THE ENVIRONMENTAL IMPACTS OF WIND ENERGY CONVERSION SYSTEMS. THE TEXT IDENTIFIES FIVE GENERIC AREAS THAT HAVE BEEN INVESTIGATED AND SUMMARIZES THE CONLUSION OF STUDIES CONDUCTED IN EACH AREA.

1980-0170 CINGO R P, BUTTERFIELD C P, HANSEN A C
STATE-OF-THE-ART OF SMALL WIND SYSTEMS.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 160-164.

WIND ENERGY CONVERSION SYSTEMS (WECS) OFFER SEVERAL ADVANTAGES IN THE PRESENT WORLD ENERGY, ECONOMIC AND SOCIAL CLIMATE. THE NEED IS FOR DECREASED DEPENDENCE UPON NON-RENEWABLE ENERGY SOURCES, AND WIND ENERGY IS SUGGESTED AS A COST-EFFECTIVE FORM OF SOLAR/ELECTRIC CONVERSION. IN THE PAST, SWECS HAVE BEEN USED PRIMARILY FOR WATER PUMPING AND GENERATING DIRECT CURRENT ELECTRICAL POWER FOR BATTERY CHARGING. MORE RECENTLY, THERE HAS BEEN INCREASED EFFORT TO DEVELOP AND MARKET SYSTEMS FOR GENERATION OF 60 HERTZ ALTERNATING CURRENT POWER EITHER INTERTIED WITH A CENTRAL UTILITY OR IN A STAND-ALONE MODE.

1980-0171 CINGO R P

WIND ENERGY CONVERSION: IS IT ENVIRONMENTALLY ACCEPTABLE?
J. ENVIRON. SCI. 23(6): 11-15, NOVEMBER 1980.

AN OVERVIEW OF THE CURRENT STATUS OF THE KNOWLEDGE REGARDING POTENTIAL ENVIRONMENTAL IMPEDIMENTS TO THE COMMERCIALIZATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) IS PRESENTED. THE TEXT ALSO IDENTIFIES PERTINENT STUDIES CONDUCTED IN EACH AREA AND SUMMARIZES THE CONCLUSIONS OF THE STUDIES.

1980-0172 COMMUNITY ENERGY SELF-RELIANCE. PROCEEDINGS OF THE FIRST CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS.
NTIS, JULY 1980. 598 P. ALSO: WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1980. 598 P.
CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS, BOULDER, COLORADO, AUGUST 20-21, 1979.
SERI/CP-354-421

THE PROCEEDINGS OF A WORKSHOP/CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS ARE PRESENTED. THIS MEETING WAS SPONSORED BY DOE AND SERI TO ENCOURAGE DECENTRALIZATION IN ATTACKING ENERGY PROBLEMS, TO SHOW HOW RENEWABLE ENERGY CAN MEET COMMUNITY GOALS, TO PRESENT EXAMPLES OF SUCCESSFUL PROJECTS, TO DISCUSS THE PLANNING AND MANAGEMENT OF RENEWABLE ENERGY SYSTEMS, TO IDENTIFY SOURCES OF FINANCIAL SUPPORT, TO SHARE LEGAL STRATEGIES, AND TO EXAMINE UTILITY ROLES. PRESENTED PAPERS AND WORKSHOP SUMMARIES ARE INCLUDED.

1980-0173 COMPARATIVE EVALUATION OF NONTRADITIONAL ENERGY RESOURCES.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, FEBRUARY 1980. 131 P.
P-500-80-006

THIS REPORT DISCUSSES A METHOD FOR EXPANDING ENERGY-SUPPLY PLANNING TO CONSIDER ENERGY RESOURCES NOT TRADITIONALLY INCLUDED, SUCH AS GEOTHERMAL, SOLAR, AND WIND ENERGY, BIOMASS, SMALL HYDROELECTRIC PROJECTS, AND COGENERATION. TO ILLUMINATE THEIR COMPARATIVE CHARACTERISTICS, THE STAFF EMPLOYED A RATHER SIMPLE METHOD APPLICABLE TO ALL THE TECHNOLOGIES. A COMPOSITE PROFILE OF COSTS, RELATIVE PROBABILITY OF IMPLEMENTATION, POTENTIAL FOR USE, TIMING OF IMPLEMENTATION, AND IMPEDIMENTS TO USE WAS COMPILED. THE ANALYSIS IS DIVIDED INTO TIME HORIZONS OF 1979, 1985, 1991, AND 2000. THE ANALYSIS OF IMPLEMENTATION PROBABILITY IS BASED ON AN EXPLICIT SET OF CRITERIA. THE SCORING SYSTEM IS PRESENTED IN A FORMAT THAT ALLOWS REVIEWERS BOTH TO UNDERSTAND THE BASIS OF THE RATINGS, AND TO TEST THE SENSITIVITY OF CONCLUSIONS TO ALTERNATIVE ASSUMPTIONS. THE REPORT IS NOT INTENDED TO SERVE THE PURPOSES OF A UTILITY-SUPPLY-PLANNING EXERCISE, BUT RATHER SEEKS TO ILLUMINATE POLICY OPTIONS AND FACILITATE CHOICES AMONG THEM. INSIGHTS FROM THIS ANALYSIS DO, HOWEVER, CONTRIBUTE TO THE ABILITY TO COMPARE NONTRADITIONAL OPTIONS TO CONVENTIONAL UTILITY RESOURCES FOR MEETING ENERGY-DEMAND GROWTH. A FIRST APPLICATION OF THE METHOD HAS SHOWN THAT ALTERNATIVE ENERGY SOURCES CAN MAKE A MAJOR CONTRIBUTION TO MEETING CALIFORNIA'S ENERGY NEEDS BY THE YEAR 2000. TO REALIZE THE ACHIEVABLE POTENTIAL OF THESE NEW ENERGY SOURCES, HOWEVER, ADDITIONAL ACTIONS ARE REQUIRED FROM MANY GROUPS PROCEEDING ON MULTIPLE FRONTS. KEY ACTIONS REQUIRED TO ACCELERATE USE OF THE TECHNOLOGIES OF GREATEST NEAR-TERM INTEREST ARE DESCRIBED.

1980-0174 CONNELL J R
TURBULENCE AS EXPERIENCED BY A MOVING ROTOR OF A WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1149-1153.

THIS PAPER REPORTS SOME OF THE EARLY RESULTS FROM PACIFIC NORTHWEST LABORATORY STUDIES THAT ARE AIMED AT CHARACTERIZING THE WIND AS IT WOULD BE SEEN BY ROTATING BLADES OF LARGE WIND TURBINES. THE FIRST PART OF THE PAPER DISCUSSES TRANSFER FUNCTIONS BETWEEN WIND INPUT AND MACHINE RESPONSE. THE SHAPE OF A TRANSFER FUNCTION MAY BE DISTINCTLY DIFFERENT DEPENDING UPON WHETHER THE MACHINE IS LARGE OR SMALL; OR IF LARGE, WHETHER THE INPUT WIND USED TO DERIVE IT IS MEASURED AT A STATIONARY POINT OR AT A POINT FOLLOWING THE ROTATION OF A WIND TURBINE BLADE. THE SECOND PART OF THE PAPER DESCRIBES SPECTRA OF TURBULENCE FROM WINDS MEASURED BY PNL IN SUCH A WAY THAT THEY CORRESPOND TO WIND SEEN BY A ROTATING BLADE. IN PART THREE SOME IMPLICATIONS FOR POWER EXTRACTION AND FOR FATIGUE ARE DESCRIBED. THE FOURTH PART PRESENTS SEVERAL EXAMPLES OF THE RESPONSE SPECTRA OF LARGE WIND TURBINES TAKEN FROM RESEARCH REPORTS. THE MACHINE RESPONSE SPECTRA ARE COMPARED TO THE PNL SPECTRUM OF ROTATIONALLY SAMPLED WIND SPEED.

1980-0175 CONNELL J R
TURBULENCE SPECTRUM OBSERVED BY A FAST-ROTATING WIND-TURBINE BLADE.
NTIS, JUNE 1980. 35 P.
PNL-3426

THE SPECTRUM OF TURBULENCE ENCOUNTERED BY A POINT ON A FAST-ROTATING WIND TURBINE BLADE IS SHOWN TO BE POSSIBLY QUITE DIFFERENT FROM THAT MEASURED BY A STATIONARY ANEMOMETER. THE PHYSICALLY REASONABLE EXPECTATIONS ARE SUPPORTED QUANTITATIVELY BY EXPERIMENTS USING PACIFIC NORTHWEST LABORATORY'S VERTICAL-PLANE ANEMOMETER ARRAY. THE MEASUREMENTS INDICATE THAT THE BLADE ENCOUNTERS ENERGY DENSITIES IN TWO REGIONS OF THE TURBULENCE SPECTRUM MUCH DIFFERENT THAN THOSE SEEN BY STATIONARY ANEMOMETERS. FOR TYPICAL TURBINE TYPES AND WIND CONDITIONS, THE SPECTRAL ENERGY REDISTRIBUTION PHENOMENON MAY BE SIGNIFICANT ONLY FOR TURBINE BLADE DIAMETERS LARGER THAN 10 M. THE SPECTRAL SHIFT SHOULD ALSO AFFECT GUST STATISTICS FOR ROTATING BLADES; THE DURATION OF GUSTS THAT ARE SMALLER THAN THE DIAMETER OF THE DISK OF BLADE ROTATION WILL DECREASE. CORRESPONDINGLY, THE RISE RATE WILL INCREASE BY A FACTOR OF ABOUT TEN.

1980-0176 CONSERVATION AND SOLAR ENERGY PROGRAMS OF THE DEPARTMENT OF ENERGY: A CRITIQUE.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1980. 88 P.
OTA-E-120

THIS STUDY EVALUATES THE PROGRESS AND DIRECTION OF A NUMBER OF CONSERVATION AND SOLAR ENERGY PROGRAMS IN ORDER (1) TO PROVIDE AN OVERVIEW OF THE BALANCE AND LONG-RANGE CONTRIBUTION OF THESE EFFORTS, AND (2) TO DISCOVER IF THE PROGRAMS ARE COHERENTLY LINKED TO GOALS SET BY CONGRESS AND THE ADMINISTRATION. THE BASIS OF THE WORK WAS GENERATED BY TWO ADVISORY PANELS, WHOSE MEMBERS IDENTIFIED AND DISCUSSED CRITICAL ISSUES. THE STUDY IS QUITE CRITICAL OF C AND SE, ESPECIALLY ITS OBJECTIVES AND THE LACK OF CLEAR DIRECTION FROM DOE MANAGEMENT. SOME OF THE ISSUES IDENTIFIED SUGGEST HOW CONGRESS AND THE SECRETARY OF ENERGY CAN SET THE STAGE FOR C AND SE TO BECOME MORE EFFECTIVE. IT IS POINTED OUT WHERE PROGRAMS THEMSELVES ARE FUNCTIONING INEFFICIENTLY, AND WHAT MIGHT BE DONE TO IMPROVE THEM. A SERIES OF ISSUES RELATED TO SPECIFIC PROGRAMS ARE IDENTIFIED FOR: WIND, PHOTOVOLTAICS, SOLAR THERMAL, OCEAN SYSTEMS, BIOMASS, TRANSPORTATION CONSERVATION, SOLAR ACTIVE AND PASSIVE, AND BUILDINGS AND COMMUNITY SYSTEMS.

1980-0177 COOPER N
NEW GEAR, INCENTIVES SPIN WIND ENERGY INTO FAVOR.
ENERGY USER NEWS 5(3): 12, JANUARY 21, 1980.

A COMBINATION OF ECONOMIC INCENTIVES AND IMPROVED TECHNOLOGY MAY SPEED THE COMMERCIALIZATION OF WIND ENERGY TO A SIGNIFICANT MARKET SHARE DURING THE NEXT TEN YEARS. UNTIL PENDING LEGISLATION THAT WILL INCREASE TAX CREDITS

FOR COMMERCIAL INVESTORS IN ALTERNATIVE ENERGY SOURCES IS PASSED, THE PER-KILOWATT-HOUR COST BARRIER REMAINS TOO HIGH IN SOME AREAS. GUARANTEES TO PURCHASE SURPLUS POWER FROM WIND MACHINES WERE INCLUDED IN THE PUBLIC UTILITY REGULATORY ACT OF 1978, TO IMPROVE THE ECONOMICS. OTHER COST FACTORS ARE WIND SPEED, THE NEED TO FIND FAVORABLE INSTALLATION SITES, AND PUBLIC RELUCTANCE TO RISK UNPROVEN TECHNOLOGIES. EXPERIMENTS WITH VERTICAL-AXIS WIND TURBINES, WHICH CAN ACCEPT WIND FROM ANY DIRECTION AND ARE SELF-REGULATING, ARE EXPECTED TO PROVIDE A PERSUASIVE DEMONSTRATION. OTHER COMPANIES ARE DEVELOPING HORIZONTAL DOWNWIND MACHINES AND SYNCHRONOUS INVERTERS TO TIE IN WITH A UTILITY GRID. MODELS OF SEVERAL MANUFACTURERS ARE DESCRIBED, AND NAMES AND ADDRESSES OF MANUFACTURERS ARE LISTED BY WINDMILL TYPE.

1980-0178 COROTIS R B
APPLICATION OF STATISTICAL TECHNIQUES TO WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT FOR THE PERIOD OCTOBER 1, 1978--SEPTEMBER 30, 1979.
NTIS, MAY 1980. 171 P.
DOE/ET/20283-2

IN THIS REPORT A NUMBER OF NEW STATISTICAL TECHNIQUES AND MATHEMATICAL MODELS ARE DEVELOPED TO ANALYZE WIND DATA COLLECTED AT A POTENTIAL WIND ENERGY CONVERSION SITE.

1980-0179 COROTIS R B
CONFIDENCE INTERVAL PROCEDURES FOR WIND TURBINE CANDIDATE SITES.
SOL. ENERGY 24(5): 427-433, 1980.

THREE DIFFERENT ASPECTS OF CONFIDENCE INTERVALS FOR SEASONAL MEAN WIND SPEEDS ARE INVESTIGATED. VARIOUS TECHNIQUES OF ESTABLISHING CONFIDENCE INTERVALS AT A CANDIDATE SITE ARE DISCUSSED FIRST AND THE CONSISTENCY OF RESULTS DEMONSTRATED FOR 20 SITES. NEXT, A PROCEDURE IS DERIVED FOR THE ENHANCEMENT OF CANDIDATE SITE CONFIDENCE INTERVALS THROUGH THE USE OF A NEARBY REFERENCE SITE WITH LONG-TERM DATA. PROPER INCORPORATION OF THE SPATIAL CORRELATION BETWEEN SITES AND THE UNCERTAINTY IN THE CORRELATION ARE ESSENTIAL TO EFFECTIVE USE OF THE REFERENCE SITE DATA. FINALLY, A TECHNIQUE IS PRESENTED THAT PERMITS THE USE OF LONG-TERM REGIONAL DATA PLUS SINGLE-SEASON DATA AT A CANDIDATE SITE TO ESTABLISH CONFIDENCE INTERVALS FOR DIFFERENT SEASONS OF THE YEAR.

1980-0180 COROTIS R B
HANDBOOK FOR THE APPLICATION OF STATISTICAL TECHNIQUES TO WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT FOR THE PERIOD OCTOBER 1, 1978--SEPTEMBER 30, 1979.
NTIS, MAY 1980. 26 P.
DOE/ET/20283-3

PROCEDURES ARE PRESENTED FOR THE USE OF STATISTICAL TECHNIQUES TO ANALYZE WIND DATA COLLECTED AT CANDIDATE SITES FOR WIND TURBINE INSTALLATIONS. EFFECTIVE UTILIZATION OF DATA IN DETERMINING THE WIND REGIME IS IMPORTANT IN GAINING THE MOST RELIABLE INFORMATION NECESSARY TO ASSESS TURBINE PERFORMANCE AND GENERATED POWER IN A RELATIVELY SHORT PERIOD OF ON-SITE COLLECTION. THIS HANDBOOK SPECIFICALLY DISCUSSES ADJUSTMENT PROCEDURES AND RELIABILITY MEASURES FOR THE MEAN WIND SPEED AT A SITE; SELECTION OF A PROBABILITY DISTRIBUTION FOR THE HOURLY WIND SPEED AND CALIBRATION FROM OBSERVED DATA; EMPLOYMENT OF A PROBABILITY MODEL FOR WIND SPEED PERSISTENCE; AND SIMPLIFIED TECHNIQUES FOR THE TIME SERIES SIMULATION OF HOURLY WIND SPEED AT A SITE AND ARRAY POWER FROM A REGION. A BRIEF DISCUSSION OF THE LIMITATIONS IMPLICIT IN NATIONAL WEATHER SERVICE DATA IS ALSO INCLUDED.

1980-0181 CRAMER G, DREWS P, HEIER S, KLEINKAUF W, WETTLAUFER R
DIFFERENCES IN THE CONTROL OF WIND POWER CONVERTERS IN GRID AND ISOLATED OPERATION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 416-428.

FOR HORIZONTAL AXIS CONVERTERS WITH ADJUSTABLE ROTOR BLADES THE DIFFERENT REQUIREMENTS ON THE CONTROL SYSTEM ARE SHOWN FOR VARIOUS MODES OF OPERATION. THE APPROPRIATE REGULATION STRUCTURES ARE DEVELOPED AND THE DYNAMIC BEHAVIOR OF COMPLETE PLANTS IS EXPLAINED USING THE RESULTS OF DIGITAL SIMULATIONS.

1980-0182 CRIMI P
PERFORMANCE ASSESSMENT OF A FLETTNER WIND TURBINE.
J. ENERGY 4(6): 281-283, NOVEMBER-DECEMBER 1980.

1980-0183 CROMACK D E, MCGOWAN J G, HERONEMUS W E
THE STATUS OF WIND POWER RESEARCH AND DEVELOPMENT FOR SPACE AND WATER HEATING IN THE UNITED STATES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K1, P. 485-498.

THE PAPER SUMMARIZES THE LATEST DEVELOPMENTS IN WIND POWERED HEATING SYSTEMS FOR RESIDENTIAL AND RURAL APPLICATIONS IN THE UNITED STATES. INCLUDED ARE DETAILS OF THE PIONEERING WORK DONE AT THE UNIVERSITY OF MASSACHUSETTS AS WELL AS THE WORK DONE BY OTHER ORGANISATIONS. IN ADDITION TO A DESCRIPTION OF THE VARIOUS TYPES OF HEATING SYSTEMS AND COMPONENTS DEVELOPED FOR SUCH SYSTEMS, DETAILS OF CURRENTLY AVAILABLE COMPONENTS ARE DISCUSSED. DESIGNS COVERED UNDER THIS TOPIC INCLUDE ELECTRIC RESISTANCE HOT WATER HEATING SYSTEMS AND THE SO CALLED MECHANICAL CHURN SYSTEMS. ALSO DISCUSSED ARE CONCEPTUAL DESIGNS THAT PROVIDE BOTH THERMAL AND ELECTRICAL POWER. A SUMMARY OF EXPERIMENTAL DATA FOR A FULL SCALE RESIDENTIAL FACILITY, THE UNIVERSITY OF MASSACHUSETTS SOLAR HABITAT-I IS PRESENTED ALONG WITH OTHER AVAILABLE EXPERIMENTAL DATA ON KEY SYSTEM COMPONENTS. CURRENT ANALYTICAL MODELLING TECHNIQUES ARE DISCUSSED WHICH INLCUDE DETAILED HOUR-BY-HOUR DIGITAL COMPUTER MODELS AND SIMPLIFIED MODELS THAT CAN BE READILY USED BY DESIGN ENGINEERS. BASED ON THE RESULTS OF ANALYTICAL MODELLING AND EXPERIMENTAL TESTING OF SUCH SYSTEMS, THE ECONOMIC FEASIBILITY OF WIND HEATING SYSTEMS IS PRESENTED. THIS WORK IS BASED ON LIFE-CYCLE COSTING TECHNIQUES, AND THE RESULTS ARE COMPARED TO CONVENTIONAL AND FLAT-PLATE SOLAR HEATING SYSTEMS. THIS PAPER GIVES THE LATEST RESULTS OF THESE STUDIES WHICH POINT OUT THE SIZE OF THE POTENTIAL MARKET FOR WIND HEATING SYSTEMS.

1980-0184 CROMIE W J
WHICH IS RISKIER: WINDMILLS OR REACTORS?
SCIQUEST 53(3): 6-10, MARCH 1980.

IN 1978, DR. HERBERT INHABER, A SCIENTIST EMPLOYED BY THE ATOMIC ENERGY BOARD OF CANADA, PUBLISHED AN EVALUATION OF THE HEALTH HAZARDS OF DIFFERENT ENERGY SYSTEMS ENTITLED "RISK OF ENERGY PRODUCTION". HE CONCLUDED THAT NATURAL GAS AND NUCLEAR SYSTEMS ARE SAFER THAN COAL- AND OIL-FIRED POWER PLANTS, HYDROELECTRICITY, VARIOUS FORMS OF SOLAR ENERGY, WINDMILLS, METHANOL (WOOD ALCOHOL), AND OTHER NONCONVENTIONAL ENERGY SOURCES. THE REPORT AND ITS CONCLUSIONS DREW WIDESPREAD CRITICISM, PARTICULARLY FROM DR. JONH P. HOLDREN, PROFESSOR OF ENERGY AND RESOURCES, UNIVERSITY OF CALIFORNIA AT BERKELEY. HOLDREN AND FIVE COLLEAGUES

WRITE A STINGING 232-PAGE CRITIQUE OF THE INHABER REPORT. THE COUNCIL FOR THE ADVANCEMENT OF SCIENCE WRITING, A NONPROFIT EDUCATIONAL ORGANIZATION OF WRITERS AND SCIENTISTS, INVITED THE TWO TO DEBATE THE ISSUE IN FRONT OF AN AUDIENCE OF SCIENCE REPORTERS. THE CONFRONTATION TOOK PLACE AT CASW'S 17TH ANNUAL NEW HORIZONS IN SCIENCE BRIEFING IN PALO ALTO, CALIF., ON NOV. 5, 1979. AN EDITED TRANSCRIPT OF THE DEBATE IS PRESENTED HERE.

1980-0185 CURTICE D, PATTON J, BOHN J, SECHAN N
STUDY OF DISPERSED SMALL WIND SYSTEMS INTERCONNECTED WITH A UTILITY DISTRIBUTION SYSTEM. INTERIM REPORT: PRELIMINARY HARDWARE ASSESSMENT.
NTIS, MARCH 1980. 111 P.
RFP-3093/94445/3533/80/7

OPERATING PROBLEMS FOR VARIOUS PENETRATIONS OF SMALL WIND SYSTEMS CONNECTED TO THE DISTRIBUTION SYSTEM OF A UTILITY ARE DEFINED. PROTECTION EQUIPMENT, SAFETY HAZARDS, FEEDER VOLTAGE, REGULATION, LINE LOSSES, AND VOLTAGE FLICKER PROBLEMS ARE STUDIED, ASSUMING DIFFERENT SMALL WIND SYSTEMS CONNECTED TO AN EXISTING DISTRIBUTION SYSTEM. TO IDENTIFY HARDWARE DEFICIENCIES, POSSIBLE SOLUTIONS PROVIDED BY OFF-THE-SHELF HARDWARE AND EQUIPMENT ARE ASSESSED. RESULTS OF THE STUDY INDICATE THAT EXISTING TECHNIQUES ARE INADEQUATE FOR DETECTING ISOLATED OPERATION OF A SMALL WIND SYSTEM. POTENTIAL SAFETY HAZARDS POSED BY SMALL WIND SYSTEMS ARE ADEQUATELY HANDLED BY PRESENT WORK PROCEDURES ALTHOUGH THESE PROCEDURES REQUIRE A DISCONNECT DEVICE AT SYNCHRONOUS GENERATOR AND SELF-COMMUTATED INVERTER SMALL WIND SYSTEMS.

1980-0186 CURTIS E H
NATIONAL WIND ENERGY CONSTRUCTION PROGRAM: ITS ENERGY AND ECONOMIC IMPACT.
AMERICAN PUBLIC POWER ASSOCIATION ANNUAL ENGINEERING AND OPERATIONS WORKSHOP, 24TH, PHOENIX, FEBRUARY 25, 1980. WASHINGTON, D.C., U.S. DEPARTMENT OF THE INTERIOR, 1980. P. 25.

DEVELOPING THE 1.7 QUAD WIND ENERGY PORTION OF THE 18.5 QUAD (20 PERCENT) NATIONAL RENEWABLE ENERGY GOAL TRANSLATES INTO 500,000 MILLION KWH/YEAR OF ELECTRICAL POWER GENERATION. IF, FOR EXAMPLE, WIND DYNAMOS THAT PRODUCED 10 MILLION KWH/YEAR WERE USED, 50,000 LARGE WIND MACHINES WOULD BE REQUIRED. A NEAR-TERM GOAL OF 5000 MW BY 1989 IS NEEDED TO DEVELOP THE MANUFACTURING INDUSTRY AND IS APPROPRIATE AS A START TOWARD 500,000 KWH/YEAR BY THE YEAR 2000. ANALYSES OF WIND ENERGY DEVELOPMENT AT THIS LEVEL WERE FOUND TO BE FEASIBLE. A 20 YEAR CONSTRUCTION SCHEDULE FOR 24,000 WIND DYNAMOS WHICH WOULD HAVE A 60,000 MW CAPACITY AND PRODUCE ABOUT 200,000 MILLION KWH/YEAR IS PRESENTED AND ECONOMIC ANALYSES WERE PERFORMED. THE ANALYSES SHOWED THAT DEVELOPMENT WAS COST EFFECTIVE AND WOULD SHOW A PROFIT, WITHOUT INCLUDING THE VALUE OF DISPLACED ENERGY COSTS.

1980-0187 CURTO P A, BJUSTROM R C, COLUZZI M E, MANLEY R N, CHERDAK A S, ELDRIDGE F R, JACOBSEN W E
PERFORMANCE OF DISTRIBUTED ACTIVE SOLAR POWER SYSTEMS.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 221-228.
SERI/TP-351-431

THE PERFORMANCE OF AN ACTIVE SOLAR POWER SYSTEM DEPENDS UPON THE AVAILABLE SOLAR RESOURCE, EQUIPMENT CHARACTERISTICS AND LOAD PROFILE. A DISTRIBUTED SOLAR POWER SYSTEMS PERFORMANCE SIMULATION MODEL IS DEVELOPED THAT CAN HANDLE ALL CLASSES OF WINDPOWER, SOLAR THERMAL PROCESS HEAT AND ELECTRICITY, AND PHOTOVOLTAICS SYSTEMS. THIS MODEL UTILIZES HOURLY INSOLATION, WINDSPEED. TEMPERATURE AND PRESSURE DATA (DERIVED FROM SOLMET TAPES, AVAILABLE FROM THE NATIONAL CLIMATIC CENTER), CHARACTERIZATIONS OF OVER 200 CLASSES OF SOLAR EQUIPMENT COMPONENTS AND SUBSYSTEMS, AND HOURLY ELECTRICAL AND THERMAL LOAD DATA FOR SELECTED INDUSTRIAL, COMMERCIAL, INSTITUTIONAL, AGRICULTURAL AND RESIDENTIAL APPLICATIONS (INCLUDING SEASONAL VARIATIONS). MODEL OUTPUTS INCLUDE PEAK ARRAY POWER, ANNUAL COLLECTED ENERGY, SOLAR FRACTION, BACKUP ENERGY REQUIREMENTS, PEAK BACKUP LOAD POWER, EXCESS GENERATED ENERGY AVAILABLE FOR SALE OR WASTE, AVERAGE HOURLY GENERATION PROFILES, AND OTHER RELATED DATA. SYSTEM PERFORMANCE CAN BE DETERMINED FOR UP TO 72 DIFFERENT APPLICATIONS AND 26 LOCATIONS FOR VARIOUS ARRAY SIZES AND STORAGE CAPACITIES.

1980-0188 DALL-WINTHER D P
WINDMILL.
U.S. PATENT NO. 4,218,183, AUGUST 19, 1980.

A MULTI-VANE WINDMILL ROTATING IN A HORIZONTAL PLANE ON A VERTICAL SHAFT INCLUDES FRAME SUPPORTED FABRIC TYPE VANES WITH THE FRAME HINGEDLY ATTACHED AT ONE END TO SUPPORT ARMS TO SWING CLOSED AND CATCH THE WIND IN ONE POSITION AND TO SWING OPEN UNDER CENTRIFUGAL AND WIND FORCES IN ANOTHER POSITION WHEN COMING INTO THE WIND TO REDUCE AIR RESISTANCE. VANES ARE RELEASABLY ATTACHED IN PART TO THE FRAME FOR SUPPORT IN OPERATING POSITION AND OTHERWISE SLIDABLY SECURED THERETO SO AS TO RELEASE AND COLLAPSE ON THE FRAME UNDER EXTREME WIND PRESSURES WHEN THE FRAME IS CLOSED AND THUS SPILL THE WIND. STOPS ON THE SUPPORT ARMS PROVIDE A LIMIT OF MOVEMENT OF THE VANE FRAMES. A SECOND EMBODIMENT OF THE VANES INCLUDES TWO OVERLAPPING SECTIONS NORMALLY HELD IN OVERLAPPED OR CLOSED POSITION BY YIELDING MEANS THAT PERMIT THE SECTIONS TO SEPARATE UNDER HIGH WINDS TO PROVIDE AN AIR PASSAGEWAY THROUGH THE VANE.

1980-0189 DEBONTRIDDER J, VANDENPUT A, GEYSEN W
VERTICAL WIND TURBINE.
REV. E. 9(9): 181-188, 1980. (IN DUTCH)

THIS PAPER DESCRIBES A VERTICAL WIND TURBINE DEVELOPED AT THE K.U. LEUVEN. AS COMPARED WITH THE CLASSIC WIND TURBINES, THE VERTICAL WIND TURBINE HAS SOME REAL ADVANTAGES: THE MOST SIGNIFICANT ONE IS ITS GOOD ECONOMICAL EFFICIENCY. THE CHARACTERISTICS OF THE SYSTEM CONSISTING OF A VERTICAL WIND TURBINE WITH A DIAMETER OF 5 M AND A DC GENERATOR ARE DISCUSSED.

1980-0190 DE MAY G
CHARACTERISTICS OF ELECTRO-GAS-DYNAMIC WIND ENERGY DEVICES.
ENERGY CONVERS. MANAGE. 20(3): 201-203, 1980.

RECENTLY, A NEW PRINCIPLE HAS BEEN PRESENTED TO CONVERT WIND ENERGY DIRECTLY INTO ELECTRICAL POWER. THE BASIC IDEA IS THAT THE WIND CARRIES CHARGED PARTICLES AND HENCE BEARS AN ELECTRIC CURRENT. IN THIS CONTRIBUTION THE IV CHARACTERISTICS OF SUCH A DEVICE WILL BE CALCULATED STARTING FROM A CONDUCTION MODEL FOR THE CHARGED PARTICLES. FROM THE IV CHARACTERISTICS, THE MAXIMUM ATTAINABLE POWER AND THE INFLUENCE OF SEVERAL DEVICE PARAMETERS WILL BE INVESTIGATED.

1980-0191 DEIBERT D D
NEW WECS DESIGN: THE UNIFIED WIND DYNAMO.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 35-46.
SERI/CP-635-938

A RADICALLY NEW WIND ENERGY CONVERSION SYSTEM HAS BEEN DESIGNED, MANUFACTURED AND SUCCESSFULLY TESTED. THE SYSTEM, CALLED THE UNIFIED WIND DYNAMO, IS THE PRODUCT OF UNIVERSAL ENERGY TECHNOLOGIES CORPORATION AND JOHN G. REUTTER ASSOCIATES. EMPLOYING A SPECIFICALLY DESIGNED, ULTRA LOW RPM ALTERNATOR, THE UWD ATTAINS EFFICIENCIES OF BETWEEN .66 AND .80 OF THE BETZ THEORETICAL LIMIT, WHILE OPERATING ATOP THE EIGHT STORY REUTTER ASSOCIATES' BUILDING IN CAMDEN, NEW JERSEY. THE NEW SYSTEM IS ABLE TO ADAPT TO VARIED BLADE STRUCTURAL CONSTRAINTS. AS A RESULT, THE UWD CAN BE COMPLETELY INSURED WITH REASONABLE PREMIUMS FOR DAMAGE AND LIABILITY, IF SO DESIRED. OTHER FEATURES OF THE UWD INCLUDE THE SIMPLICITY INHERENT IN THE ONE MOVING PART DESIGN, AND ADAPTABILITY IN BEING ABLE TO ECONOMICALLY INCORPORATE AUGMENTER TECHNOLOGIES.

1980-0192 DE LAGARDE J M
EVOLUTION OF THE FLEXIBLE BLADE CONCEPT (VERTICAL AXIS WINDMILLS).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C3, P. 159-168.

STARTING FROM THE "FLEXIBLE BLADE CONCEPT" A TWO YEAR DEVELOPMENT WORK, SPONSORED BY A FRENCH UNIVERSITY AND GOVERNMENT, HAS EVOLVED INTO A VERTICAL AXIS SOLUTION UNDER THE NAME OF WREB (WIND ROTOR ELASTICALLY BLADED). ELASTIC FITTING OF BLADES PERMITS "LINEARIZATION" OF LIFT CURVE UP TO ANGLES OF ATTACK OF 30 DEGREES BOTH SIDES, THUS BRINGING WREB FORMULA NEARER THEORETICAL "INVISCID" MODELS GOVERNED BY VERY SIMPLE LAWS. SUCH A FEATURE, COUPLED WITH BLADE OSCILLATION PHASING EFFECTS, GIVES TO WREB MILLS VERY ORIGINAL PROPERTIES OF EASY SELF START AND SELF SPEED LIMITATION IN STRONG WINDS. WITH SOLIDITIES (NC/D) OF 0.3 TO 0.5 WREB WOULD ROTATE AT A SPEED COMPRISED BETWEEN HALF AND TWO THIRDS OF DARRIEUS ROTORS AND GIVE COMPARABLE CP MAX (ALREADY DEMONSTRATED BY TUNNEL TESTS) AND A VERY FLAT CP CURVE. ITS ADAPTATION TO REQUIRED POWER IS VERY EASY BY VARYING EITHER THE NUMBER OF BLADES OR THE LENGTH OF THEM. FROM SIMPLE TWO OR THREE BLADED MILLS, WELL ADAPTED FOR SMALL SIZES, ONE CAN DERIVE BY MODULAR CONSTRUCTION MULTIBLADED VERTICAL AXIS MACHINES OF THE SAME SOLIDITY. WREB FORMULA COULD PROVE TO BE ONE OF THE CHAPEST TO BUILD.

1980-0193 DELIONBACK L M, WILHOLD G A
EXTRACTING ENERGY FROM NATURAL FLOW.
NASA TECH. BRIEFS 5(1): 37, SPRING 1980.

THREE CONCEPTS ARE PROPOSED FOR EXTRACTING THE ENERGY FROM WIND, WATERFLOW AND TIDES. THE FLOW-ENERGY-CONVERTOR GEOMETRIES UTILIZE FLOW INSTABILITY TO GENERATE USABLE ENERGY. THEY WOULD RESPOND TO ONE OF THREE INSTABILITY MODES: VORTEX EXCITATION MOTION, GALLOPING OR PLUNGING MOTION, AND FLUTTER. THE FIRST CONVERTOR IS A SPRING-MOUNTED CYLINDER THAT WOULD OSCILLATE AT EXTREMELY HIGH AMPLITUDES IN RESPONSE TO VORTEX EXCITATION. A SIMILAR SYSTEM HAVING A D-SHAPED CYLINDRICAL BODY WOULD RESPOND TO GALLOPING INSTABILITY. A THIRD CONVERTOR RESPONDING TO FLUTTER WOULD BE MORE COMPLEX TO DESIGN, AND IT WOULD BE DIFFICULT TO MAINTAIN THE UNSTABLE CONDITIONS.

1980-0194 DEPARTMENT OF ENERGY SOLAR ENERGY OBJECTIVES, CALENDAR YEAR 1980.
NTIS, APRIL 1980. 33 P.
DOE/CS/0155

THIS PAPER SETS OUT THE GOALS OF THE DEPARTMENT OF ENERGY FOR CALENDAR YEAR 1980 WITH RESPECT TO THE OUTPUT OF EACH OF THE SOLAR ENERGY PROGRAMS AUTHORIZED BY CONGRESS. THE PAPER COVERS FIVE CATEGORIES OF SOLAR ENERGY SOURCES: (1) BIOMASS; (2) SOLAR THERMAL SYSTEMS, INCLUDING ACTIVE AND PASSIVE SYSTEMS USED FOR HEATING OR COOLING; (3) PHOTOVOLTAIC SYSTEMS; (4) WIND-POWERED SYSTEMS; AND (5) OCEAN SYSTEMS.

1980-0195 DESSERT R
ENERGY EFFICIENT PASSENGER VEHICLE.
U.S. PATENT NO. 4,181,188, JANUARY 1, 1980. 6 P.

AN ENERGY EFFICIENT PASSENGER CARRYING VEHICLE FOR ROAD USE COMPRISED OF A LONG, NARROW BODY CARRYING TWO PASSENGERS IN A BACK-TO-BACK RELATIONSHIP IS DESCRIBED. THE VEHICLE IS BASICALLY A BATTERY POWERED ELECTRIC VEHICLE THAT CAN BE CHARGED BY ALL FREE ENERGY SOURCES; NAMELY, THE SUN, THE WIND, HUMAN MUSCLES AND MOMENTUM. THE VEHICLE COMPRISES FOUR MODULES: BODY, SOLAR, AND TWO POWER MODULES. AN ELECTRIC POWER MODULE IS LOCATED WITHIN EACH END OF THE BODY MODULE. THIS MODULE INCLUDES ELECTRIC MOTORS DRIVING THE VEHICLE, SUPPORTING WHEELS AND RECHARGEABLE BATTERIES TO POWER THE MOTORS. PEDALS, SIMILAR TO THOSE ON A BICYCLE, LOCATED AT EACH POWER MODULE, DRIVE GENERATORS TO HELP RECHARGE THE BATTERIES DURING OPERATION OF THE VEHICLE, OR DIRECTLY HELP THE VEHICLE WHEELS. A SOLAR MODULE COMPRISING A LARGE ELECTRICITY GENERATING SOLAR CELL PANEL COVERS MOST OF THE VEHICLE ROOF TO AID IN CHARGING THE BATTERIES. MEANS ARE PROVIDED TO TILT THE SOLAR CELL PANEL TOWARD THE SUN ABOUT A LONGITUDINAL AXIS. A UNIQUE FLEXIBLE DUCT BELOW THE SOLAR PANEL SERVES TO COOL THE CELLS AND, IF DESIRED, HEAT THE PASSENGER COMPARTMENT. FURTHER ENERGY SAVINGS ARE OBTAINED BY CANTING THE REAR WHEELS WHILE STEERING WITH THE FRONT WHEELS, SO THAT THE VEHICLE MOVES DOWN THE ROAD AT A CRAB ANGLE WHICH PROVIDES A SAIL EFFECT WHEN WIND IS FROM THE VEHICLE BEAM OR AFT OF THE BEAM. REGENERATIVE BRAKING MEANS CAN BE USED WHEN SLOWING DOWN, ON A LONG DOWN GRADE, WHEN SAILING SPEED IS GREATER THAN REQUIRED, OR ANY OTHER TIME WHEN VEHICLE MOMENTUM IS GREATER THAN NECESSARY FOR VEHICLE OPERATION, TO USE EXCESS FORWARD MOMENTUM TO DRIVE GENERATORS TO CHARGE THE BATTERIES. THUS, A SINGLE BATTERY CHARGE WILL BE CONSERVED AND VEHICLE OPERATION WILL BE ASSISTED IN A MANNER GIVING MAXIMUM VEHICLE RANGE AND SPEED.

1980-0196 DIRECTORY OF SOLAR ENERGY RESEARCH ACTIVITIES IN THE UNITED STATES: FIRST EDITION, MAY 1980.
NTIS, MAY 1980. 243 P.
SERI/SP-644-690

INFORMATION COVERING 1220, FY 1978 AND FY 1979 SOLAR ENERGY RESEARCH PROJECTS IS INCLUDED. IN ADDITION TO THE TITLE AND TEXT OF PROJECT SUMMARIES, THE DIRECTORY CONTAINS THE FOLLOWING INDEXES: SUBJECT INDEX, INVESTIGATOR INDEX, PERFORMING ORGANIZATION INDEX, AND SUPPORTING ORGANIZATION INDEX. THIS INFORMATION WAS REGISTERED WITH THE SMITHSONIAN SCIENCE INFORMATION EXCHANGE BY FEDERAL, STATE, AND OTHER SUPPORTING ORGANIZATIONS. THE PROJECT SUMMARIES ARE CATEGORIZED IN THE FOLLOWING AREAS: BIOMASS, OCEAN ENERGY, WIND ENERGY, PHOTOVOLTAICS, PHOTOCHEMICAL ENERGY CONVERSION, PHOTOBIOLOGICAL ENERGY CONVERSION, SOLAR HEATING AND COOLING, SOLAR PROCESS HEAT, SOLAR COLLECTORS AND CONCENTRATORS, SOLAR THERMAL ELECTRIC GENERATION, AND OTHER SOLAR ENERGY CONVERSION.

1980-0197 DIVONE L V
THE CURRENT PERSPECTIVE ON WIND POWER BASED ON RECENT U.S. RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A1, P. 1-16.

A BRIEF OVERVIEW OF THE FEDERAL WIND ENERGY PROGRAM WILL BE PRESENTED. TEST RESULTS OF BOTH LARGE AND SMALL WIND SYSTEMS THAT HAVE BEEN OPERATING ON AN EXPERIMENTAL BASIS AT RESIDENCES, FARMS AND UTILITIES WILL BE DISCUSSED. PLANS FOR IMPLEMENTATION OF MORE ADVANCED WIND SYSTEMS WILL BE HIGHLIGHTED. COMMERCIALIZATION

STRATEGIES WILL BE OUTLINED. WHILE THE INDUSTRY AND THE MACHINES ARE STILL IN THE DEVELOPMENTAL STAGE, WE ARE BEGINNING TO SEE THE TREND TOWARD COMMERCIALIZATION. BY 1983, THE TECHNOLOGY AND THE INDUSTRY SHOULD HAVE REACHED THE POINT WHERE WIND POWER WILL BE COST-EFFECTIVE OVER THE WINDIER REGIONS OF THE UNITED STATES. WE ANTICIPATE THAT WITHIN A FEW YEARS, RELIABLE, PRACTICAL WIND SYSTEMS, BOTH LARGE AND SMALL, WILL BECOME AVAILABLE AND WILL RAPIDLY APPROACH COST-EFFECTIVENESS FOR WINDIER LOCATIONS, WITH ONLY MODERATE FINANCIAL INCENTIVES NEEDED TO ASSIST THEIR EARLY UTILIZATION.

1980-0198 DONOHUE K
NEW BRUNSWICK UTILITY BUILDS FOR ENERGY EFFICIENCY.
ELECTR. COMF. COND. NEWS 7(1): 14-15, JANUARY 1980.

THE NEW BRUNSWICK ELECTRIC POWER COMMISSION HAS COMBINED AN ENERGY-SAVING BUILDING DESIGN AND A SOLAR-HEAT PUMP SYSTEM IN ONE OF ITS DISTRICT OFFICES AS PART OF ITS CONTINUING STUDY OF ENERGY CONSERVATION. HEAT PUMPS INTEGRATED WITH SOLAR COLLECTORS USE 25% LESS ELECTRICITY THAN THE TARGET CONSUMPTION RATE SET BY THE POWER COMMISSION. THE ENERGY-SAVING DESIGN FEATURES HIGH VOLUME TO SURFACE RATIO, MINIMAL WINDOW AREA, AND EARTHEN WINDBREAKS. A WIND-POWERED GENERATING SYSTEM IS USED FOR WATER HEATING AND CHARGING BATTERIES USED FOR EMERGENCY COMMUNICATION.

1980-0199 DORAN J C, POWELL D C
GUST CHARACTERISTICS FOR WECS DESIGN AND PERFORMANCE ANALYSIS.
NTIS, MAY 1980. 76 P.
PNL-3421

THIS DOCUMENT PROVIDES A DESCRIPTION OF SOME GUST CHARACTERISTICS WHICH ARE USEFUL IN THE STUDY OF WIND TURBINE FATIGUE CAUSED BY A FLUCTUATING WIND ENVIRONMENT. THE PARTICULAR GUST FORM CHOSEN CAN ALSO BE USED IN THE ANALYSIS OF THE DYNAMIC RESPONSE OF A TURBINE. THE STATISTICAL BEHAVIOR OF SUCH GUST CHARACTERISTICS IS NOT IDENTICAL TO THAT DETERMINED SIMPLY FROM THE WIND RECORDED BY AN ANEMOMETER. THESE MODES OF BEHAVIOR MAY BE RELATED, HOWEVER, BY THE APPLICATION OF APPROPRIATE DIGITAL FILTERS TO THE ANEMOMETER DATA. THIS PROCEDURE HAS BEEN CARRIED OUT FOR A NUMBER OF SAMPLE CASES, AND THE VARIATIONS OF THE RESULTANT GUST FEATURES ARE PRESENTED. A NUMBER OF SUGGESTIONS ON SPECIFIC APPLICATIONS AND INTERPRETATIONS OF THE DATA ARE INCLUDED.

1980-0200 DRAKE R L, HUANG C H
MASS-CONSISTENT, INTERPOLATED WIND FIELDS FOR COMPLEX TERRAIN.
SYMPOSIUM ON INTERMEDIATE RANGE ATMOSPHERIC TRANSPORT PROCESSES AND TECHNOLOGY ASSESSMENT, GATLINBURG, TENNESSEE, OCTOBER 1, 1980. NTIS, SEPTEMBER 1980. 8 P.
PNL-SA-8678

MASS-CONSISTENT MODELING IS AN ATTEMPT TO DERIVE SNAPSHOTS OF THE MEAN WIND FIELD OVER A SECTION OF TERRAIN FROM GIVEN SETS OF MEASURED WIND FIELDS. THE MODELING SCHEME PRESENTED IS BASED ON THE ASSUMPTION THAT THE BEST MASS-CONSERVING WIND FIELD IS A STRONG FUNCTION OF THE INTERPOLATION TECHNIQUE FOR THE MEASURED WINDS AND A WEAK FUNCTION OF THE MASS CONSERVATION SCHEME. THE PROPOSED SCHEME INCLUDES THE FOLLOWING SPECIAL FEATURES: A TERRAIN-FOLLOWING COORDINATE SYSTEM, AN ARBITRARILY DEFINED UPPER BOUNDARY, AND A PROVISION FOR DENSITY STRATIFICATION. THE ACCURACY AND UTILITY OF THE SCHEME WAS TESTED AGAINST AN ANALYTICALLY DERIVED WIND FIELD FLOWING OVER AN ANALYTICALLY DEFINED TERRAIN.

1980-0201 DUBEY M, COTY U, BAIN D, DONHAM R, VAUGHN L, DICKINSON R
IMPACT OF LARGE WIND ENERGY SYSTEMS IN CALIFORNIA. FINAL REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, JUNE 1980. 200 P.
P-500-80-031

THE GOAL OF THIS CONTRACT IS TO EVALUATE THE POTENTIAL IMPACT OF LARGE WIND ENERGY SYSTEMS IN CALIFORNIA. TO ACCOMPLISH THIS A NUMBER OF ISSUES ARE ADDRESSED TO GIVE AN OVERVIEW OF WIND ENERGY AS IT MIGHT DEVELOP IN CALIFORNIA. THESE ISSUES INCLUDE: CALIFORNIA WIND RESOURCES; UTILITY APPLICATIONS; ENVIRONMENTAL IMPACTS; ECONOMIC IMPACTS; INSTITUTIONAL FACTORS; AND EQUIPMENT AVAILABILITY.

1980-0202 DUENSING G
WINDS PREVAILING IN GERMAN COASTAL REGIONS.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 441-449.

THE DATA AVAILABLE AT THE DEUTSCHER WETTERDIENST PERMIT THE WIND ENERGY POTENTIAL OF THE GERMAN COAST TO BE EVALUATED. FROM THE MEDIUM WIND VELOCITY CHART MARKED REDUCTION OF THE STRONG WINDS PREVAILING OVER THE SEA IS OBVIOUS AS THEY MOVE INLAND. THIS FOLLOWS THAT THE IMMEDIATE COASTAL AREAS OF THE NORTH SEA AND THE ISLE OF FEHMARN ONLY WILL ALLOW AN OPTIMAL UTILIZATION OF WIND FORCES. THE DIRECT CORRELATION BETWEEN WIND VALUE AND AREA SUGGESTS THAT AN EFFICIENT COMPOUND SYSTEM OF WIND CONVERTERS SHOULD BE INSTALLED, WIDELY SPACED, IN THAT PARTICULAR AREA. CONSTRUCTIONS SHOULD BE ABLE TO TAKE GUSTY WIND LOADS OF AT LEAST 50 M/S IN COASTAL AREAS.

1980-0203 DUFFY R E, JARAN C, UNGERMANN C
AERODYNAMIC CHARACTERISTICS OF THE TARP (TOROIDAL ACCELERATOR ROTOR PLATFORM) WIND ENERGY CONVERSION SYSTEM. FINAL REPORT 1978-1979.
NTIS, FEBRUARY 1980. 72 P.
PB81-140675

AUGMENTED WIND ENERGY CONVERSION SYSTEMS ARE DESIGNED TO INCREASE THE AMBIENT WIND VELOCITY AT THE TURBINE BLADES. THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) IS AN INNOVATIVE, AUGMENTING STRUCTURE FOR USE WITH HORIZONTAL AXIS WECS. ITS SHAPE RESEMBLES THAT OF A HORIZONTALLY-ORIENTED WHEEL RIM AND IS INTENDED TO BE BUILT INTO OR RETROFITTED ONTO STRUCTURES BUILT FOR OTHER PURPOSES, WHICH COULD INCREASE THE USE OF WECS IN URBAN AREAS. THIS REPORT DETAILS HOW VARIATIONS OF THE BASIC TARP STRUCTURE, ABOUT THREE FEET IN DIAMETER, WERE TESTED IN A WIND TUNNEL TO DETERMINE THE OPTIMUM DESIGN. THE MODEL SYSTEM PRODUCED UP TO 4.5 TIMES THE POWER WHICH THE ROTOR AND GENERATOR EXTRACTED WITHOUT THE TARP.

1980-0204 DULIKRAVICH D S
WIND: COMPUTER PROGRAM FOR CALCULATION OF THREE DIMENSIONAL POTENTIAL COMPRESSIBLE FLOW ABOUT WIND TURBINE ROTOR BLADES.
NTIS, OCTOBER 1980. 20 P.
NASA-TP-1729, N80-33357

A COMPUTER PROGRAM IS PRESENTED WHICH NUMERICALLY SOLVES AN EXACT, FULL POTENTIAL EQUATION (FPE) FOR THREE DIMENSIONAL, STEADY, INVISCID FLOW THROUGH AN ISOLATED WIND TURBINE ROTOR. THE PROGRAM AUTOMATICALLY GENERATES A THREE DIMENSIONAL, BOUNDARY CONFORMING GRID AND ITERATIVELY SOLVES THE FPE WHILE FULLY ACCOUNTING FOR BOTH

THE ROTATING CASCADE AND CORIOLIS EFFECTS. THE PROGRAM IS CAPABLE OF ACCURATELY ANALYZING INCOMPRESSIBLE AND COMPRESSIBLE FLOWS, INCLUDING THOSE THAT ARE LOCALLY TRANSONIC AND TERMINATED BY WEAK SHOCKS.

1980-0205 ECONOMIC ANALYSIS OF OCEAN THERMAL AND WIND POWER PLANTS AND POWER GENERATION. JANUARY, 1972-DECEMBER, 1980.
NTIS, DECEMBER 1980. 70 P.
PB81-856478, NERACIAANT2679

THIS RETROSPECTIVE BIBLIOGRAPHY CONTAINS CITATIONS CONCERNING ECONOMIC ANALYSIS AND EVALUATION OF THE TECHNIQUES AND TECHNOLOGY FOR OCEAN THERMAL ENERGY CONVERSION SYSTEMS AND SMALL AND LARGE WIND ENERGY CONVERSION SYSTEMS. GOVERNMENT POLICIES AND ECONOMIC INCENTIVES TO COMMERCIALIZATION WORLDWIDE ARE INCLUDED ALONG WITH CONSIDERATIONS OF ECONOMIC PROSPECTS AND FEASIBILITY.

1980-0206 EDESESS M
ECONOMICS OF ON-SITE WIND POWER.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 156-159.

WIND-ELECTRIC POWER RAPIDLY IS BECOMING ECONOMICAL FOR ON-SITE APPLICATIONS. IT WILL SOON BE HIGHLY COMPETITIVE WITH GRID ELECTRICITY OR ON-SITE DIESEL-ELECTRIC POWER. THE ECONOMIC COMPARISONS PRESENTED HERE ARE BASED ON CONVENTIONAL, CONSERVATIVE ASSUMPTIONS ABOUT FUTURE INCREASES IN MATERIALS AND ENERGY COSTS. THESE COMPARISONS INDICATE THAT WIND POWER IS WORTH SERIOUS CONSIDERATION FOR ON-SITE POWER GENERATION.

1980-0207 EDRIS A-A
DYNAMIC CHARACTERISTICS OF A WIND DRIVEN INDUCTION GENERATOR EQUIPPED WITH THYRISTOR CONTROLLED INDUCTANCES ON THE STATOR SIDE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F2, P. 279-296.

THE PAPER PRESENTS AN APPROACH TO STUDY THE INFLUENCE OF THYRISTOR CONTROLLED INDUCTANCES IN SERIES WITH THE STATOR WINDING OF AN INDUCTION GENERATOR ON ITS DYNAMIC CHARACTERISTICS IN WIND POWER PLANTS. A MATHEMATICAL MODEL FOR DIGITAL COMPUTER SIMULATION IS DEVELOPED. THE MODEL IS FORMULATED IN A STATE-SPACE FORM IN WHICH THE GENERATOR IS REPRESENTED BY A PHASE CO-ORDINATE MODEL (THREE-AXIS MODEL). THE RESULTS OF THE COMPUTER SIMULATION OF THE MODEL HAVE SHOWN THAT CONTROLLED INDUCTANCES IN SERIES WITH THE GENERATOR STATOR WINDING CAN BE USED TO PARRY THE GENERATOR TRANSIENTS CAUSED BY IMPACTS IN ITS DRIVING TORQUE. THE IMPACT TORQUE CONSIDERED IN THIS ANALYSIS HAS AN IMPULSE FORM, WHICH IS A TYPICAL REPRESENTATION FOR WIND GUSTS.

1980-0208 EGGWERTZ S
STUDY OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN A FARM AREA AND WECS SAFETY LIMIT REQUIREMENTS. MINUTES FROM EXPERT MEETING IEA, RESEARCH AND DEVELOPMENT WECS, ANNEX ONE, SUBTASK A1.
NTIS, JUNE 1980. 114 P. (IN DUTCH)
IEA WECS SUB-TASK A1 MEETING, STOCKHOLM, FEBRUARY 25, 1980.
N81-19636

THE PROCEEDINGS INCLUDE THE DESCRIPTION OF TWO 2500 KW WINDMILL PROTOTYPES, SAFETY STUDIES PERFORMED IN SEVERAL COUNTRIES, AND A CONTRIBUTION CONCERNING FAULT TREE ANALYSIS AND LOAD CASE RECOMMENDATIONS. THE INTRODUCTION OF SAFE ZONE, THE CRACK DETECTION SYSTEM, AND OPERATION DURING ICING CONDITIONS ARE DISCUSSED.

1980-0209 EGUCHI N, OGASAWARA M
WIND TURBINE GENERATORS FOR TELECOMMUNICATIONS.
JPN. TELECOMMUN. REV. 22(3): 275-281, JULY 1980.

TWO GENERATING SYSTEMS, ONE USING A PROPELLER AND THE OTHER A DARRIEUS UNIT, WERE MANUFACTURED AND HAVE BEEN UNDER FIELD TESTS IN ORDER TO DETERMINE THEIR DURABILITY, WEATHERABILITY AND OTHER CHARACTERISTICS UNDER NATURAL OPERATING CONDITIONS.

1980-0210 ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 1. NORTHWEST REGION.
NTIS, APRIL 1980. 192 P.
PNL-3195-WERA-1

INFORMATION IS PRESENTED CONCERNING REGIONAL WIND ENERGY RESOURCE ASSESSMENT; REGIONAL FEATURES; AND STATE FEATURES FOR IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING.

1980-0211 EMERSON G
A HISTORY OF INNOVATION IN WIND POWER.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 1-8.
SERI/CP-635-938

HISTORICALLY, THE NEED FOR CHEAP, SIMPLE MOTIVE POWER HAS BROUGHT ABOUT INNOVATIONS IN THE USE OF WIND AS A SOURCE OF ENERGY. THESE INNOVATIONS TEND TO COME IN DISCRETE ERAS AND NOT AS A CONTINUOUS PROGRESSION. AN ERA USUALLY DRAWS TO A CLOSE WITH A CHEAPER, MORE CONVENIENT SOURCE OF ENERGY BEING MADE READILY AVAILABLE. THUS, THE PRESENT ERA MAY END IF A MAJOR BREAKTHROUGH IN ENERGY TECHNOLOGY SHOULD OCCUR SUCH AS DEVELOPMENT OF A WORKABLE NUCLEAR FUSION POWER PLANT. THE NUMBER OF INNOVATIONS PER ERA HAS INCREASED EXPONENTIALLY; THEREFORE, WITH THE CURRENT RESURGENCE WE FIND THE GREATEST NUMBER OF INNOVATIONS IN THE USE OF WIND ENERGY IN HISTORY.

1980-0212 ESCHER W J D, FOSTER R W, TISON R R, HANSON J A
SOLAR/HYDROGEN SYSTEMS TECHNOLOGIES. VOLUME II. SOLAR/HYDROGEN SYSTEMS ASSESSMENT. FINAL REPORT.
NTIS, JUNE 2, 1980. 2 PARTS: PART 1, 279 P.; PART 2, 237 P.
DOE/JPL-955492(VOL.2)(PTS. 1 AND 2)

SEE ENTRY FOR VOLUME 1, 1980-0225.

1980-0213 ETHELFELD J, JENSEN F, KJOLLER J, LYSTRUP A
ARBEJDSRAPPORT OG VEJLEDNING VEDRORENDE REPARATION AF TRE STK. VINGER TIL 30 KW RIISAGERMOLLE. (WORKING REPORT AND INSTRUCTION FOR REPAIRING OF THRE E PIECES OF WINGS FROM A 30 KW RIISAGERMILL).
RISO NATL. LAB. REP. NO. 2207: JANUARY 1980. 21 P. (IN DUTCH) ALSO: NTIS, JANUARY 1980. 21 P.
PB81-174021, RISO-M-2207

THIS REPORT IS MADE TO GIVE THE OWNERS OF RIISAGER WINDMILLS INSTRUCTIONS TO SERVICE AND REPAIR THE FIBERGLASS

BLADES.

1980-0214 ETHELFELD J
STATUSRAPPORT VEDRORENDE BREMSEAKTIVERINGSSYSTEM--CENTRIFUGALUDLOSER--AF 30 KW RIISAGERMOLLE. (STATUS REPORT ON ACTIVATIONS SYSTEM, CENTRIFUGAL SWITCH, OF A 30 KW RIISAGER MOLLE WITH 10 M WING SPAN).
RISO NATL. LAB. REP. NO. 2220: APRIL 1980. 21 P. (IN DUTCH) ALSO: NTIS, APRIL 1980. 21 P.
PB81-174039, RISO-M-2220

THE REPORT IS MADE TO HELP THE OWNERS AND THE TECHNICAL PERSONNEL OF OLD WINDMILLS: TO MAKE A NEW INDUCTION SENSOR WHICH GIVES A QUICK ACTIVATION OF THE ORIGINAL BRAKE ACTIVATION SYSTEM; TO BUILD A NEW BRAKE ACTIVATION SYSTEM, WITH ITS OWN NEW INDEPENDENT INDUCTION SENSOR SYSTEM; AND TO CHANGE THE (ORIGINAL) CENTRIFUGAL SWITCH FOR THE BRAKE SO THAT A QUICKER ACTIVATION IS OBTAINED.

1980-0215 EXPERIMENTAL WIND TURBINE TO START UP IN JANUARY, 1981.
INGENIEUR 92(47): 20-21, NOVEMBER 20, 1980. (IN DUTCH)

THE PAPER DESCRIBES THE FIRST LARGE DUTCH EXPERIMENTAL WIND TURBINE, WHICH WILL COME INTO SERVICE IN MID-JANUARY 1981. THE 25 M DIAMETER HORIZONTAL SHAFT TURBINE IS ABOUT 22 M ABOVE GROUND LEVEL AND PRODUCES 300 KW AT 13 M/S WIND SPEED. THE ROTOR IS CARBON FIBRE REINFORCED PLASTIC. THE INSTRUMENTATION OF THIS EXPERIMENTAL TURBINE INCLUDES INSTRUMENTS FOR MEASURING VIBRATION OF VARIOUS PARTS. THE TURBINE OPERATES BETWEEN 6 AND 17 M/S WIND SPEED (12-23 KNOTS), UTILIZING 13 % OF THE TOTAL WIND ENERGY AT THE SITE. THE TURBINE IS DESIGNED FOR 120 RPM BUT RUNS NORMALLY AT 30-80 RPM. AT THE MAXIMUM OUTPUT SETTING THE TURBINE WILL GENERATE 500,000 KWH PER YEAR. COMMERCIAL WIND TURBINES COULD BE AVAILABLE IN 1983 (FROM 10 TO 50 M ROTOR DIAMETER).

1980-0216 EXTRACTING ENERGY FROM WIND.
NYSERDA REV.: 1-6, JANUARY 1980.

SUCCESSFUL IMPLEMENTATION OF WIND POWER WILL REQUIRE RESOLUTION OF A NUMBER OF INSTITUTIONAL AND TECHNICAL PROBLEMS. THIS PAPER OUTLINES SOME OF THE MAJOR BARRIERS TO WIND USE. THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA) IS SUPPORTING RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS AIMED AT IMPROVING THE EFFICIENCY OF WIND SYSTEMS. THE ARTICLE HIGHLIGHTS SOME OLD WIND MACHINES AS WELL AS MODERN WIND PROJECTS. WIND-USE STUDIES AND PROJECTS UNDERTAKEN BY THE NYSERDA INCLUDE AUGMENTATION WIND ENERGY SYSTEMS, WIND TURBINES WITHOUT TOWERS, CONVERSION OF WIND ENERGY TO HEAT OR ELECTRICITY, AND STUDIES OF LAWS AND CODES THAT ARE BARRIERS TO WIND USE. STUDIES ARE ALSO BEING CORRELATED TO IDENTIFY AREAS THAT HAVE HIGH WIND ENERGY AVAILABLE.

1980-0217 FANSTEN M
FINANCING OF RENEWABLE ENERGY SOURCES (SOLAR, WIND AND BIOMASS ENERGY SOURCES).
REV. ENERG. 31(327): 32-43, AUGUST-SEPTEMBER, 1980.

THIS PAPER CONSIDERS THE UTILISATION OF RENEWABLE ENERGY SOURCES AS ALTERNATIVES TO THE CONVENTIONALLY USED FOSSIL AND NUCLEAR ENERGY SOURCES. PROBLEMS OF INVESTMENT INTO RESEARCH AND EXPERIMENTATION ARE DISCUSSED QUITE EXHAUSTIVELY AND THE ATTITUDES PREVAILING KEEPING THIS PROGRAMME ON A LOW BUDGET ARE POINTED OUT.

1980-0218 FARMER E D, NEWMAN V G, ASHMOLE P H
ECONOMIC AND OPERATIONAL IMPLICATIONS OF A COMPLEX OF WIND DRIVEN GENERATORS ON A POWER SYSTEM.
INST. ELECTR. ENG. PROC. PT. A 127(5): 289-295, JUNE 1980.

AN ASSESSMENT IS PRESENTED OF THE TECHNICAL AND ECONOMIC IMPLICATIONS OF INTEGRATING A SIZEABLE COMPLEX OF AEROGENERATORS INTO A POWER SYSTEM. AN IMPORTANT ECONOMIC AND OPERATIONAL FACTOR IS THE VARIABLE AND UNCERTAIN NATURE OF THE WIND. HOWEVER, IT IS SHOWN THAT THE EFFECTS OF THE MORE RAPID FLUCTUATIONS ARE LARGELY MITIGATED BY THE INCOHERENCY OF DIFFERENT MACHINE OUTPUTS; A DIVERSITY FACTOR IS DEFINED IN TERMS OF THE SPACING OF AN ARRAY OF MACHINES AND THE TURBULENCE LENGTH SCALE. IN CONTRAST, THE SLOWER VARIATIONS ARE SHOWN TO REQUIRE A SIGNIFICANT ENHANCEMENT OF THE OPERATIONAL RESERVE CAPACITY BUT NOT TO NECESSITATE THE ADDITION OF DEDICATED STORAGE, TO ACCOMODATE WIND-POWER PENETRATION UP TO ABOUT 20 PERCENT OF MAXIMUM DEMAND. THE INCREASED UNCERTAINTY OF THE RESIDUAL GENERATION, OVER THE SCHEDULING PERIOD, SIGNIFICANTLY AFFECTS THE ECONOMICS OF UTILISATION OF PUMPED-STORAGE AND GAS-TURBINES AS STANDBY PLANT. THE RESULTS OF AN ANALYSIS OF A YEAR'S DATA, PERTAINING TO DEMAND AND WIND SPEED AT 4 WELL SEPARATED SITES, ARE PRESENTED. FINALLY, THOSE PRINCIPAL SYSTEM ASPECTS, THAT REQUIRE DETAILED EVALUATION, ARE IDENTIFIED AND DISCUSSED.

1980-0219 FEGAN G R, PERCIVAL C D
PLANNING FOR ELECTRIC UTILITY SOLAR APPLICATIONS: THE EFFECTS ON RELIABILITY AND PRODUCTION COST ESTIMATES OF THE VARIABILITY IN DEMAND.
ASME CENTURY 2 EMERGING TECHNOLOGY CONFERENCE, SAN FRANCISCO, CALIFORNIA, AUGUST 10, 1980. NTIS, JANUARY 1980. 14 P.
CONF-800804-18, SERI/TP-351-545

PREVIOUS STUDIES HAVE SHOWN THE NECESSITY OF THE CONSIDERATION OF HOURLY VARIABILITY IN THE OUTPUT FROM THE INTERMITTENT GENERATION SOURCE. HOWEVER, THE STUDIES DID NOT TAKE INTO ACCOUNT THE VARIABILITY IN THE DEMAND. A RESULT IS PRESENTED WHICH SHOWS THAT UNDER GENERAL CONDITIONS THE VARIABILITY DUE TO RANDOMNESS CAN BE IGNORED EXCEPT IN THE NEIGHBORHOOD OF THE PEAK AND MINIMUM DEMANDS.

1980-0220 FEUSTEL J E, HELM S, KOERBER F
LARGE WIND ENERGY CONVERTER: GROWIAN 3 MW.
GROSSE WINDENERGIEANLAGE GROWIAN 3 MW. BAUREIFE UNTERLAGER FUER GROSSE WINDENERGIEANLAGE, REPT. ET 40884, NUREMBERG, MASCHINENFABRIK AUGSBURG-NUERNBERG A.G., 1979. 92 P. TRANSL.: NTIS, NOVEMBER 1980. 90 P.
N81-20543/7, NASA-TM-75404

THE FINAL REPORT ON THE PROJECTED APPLICATION OF LARGE-SCALE WIND TURBINE ON THE NORTHERN GERMAN COAST IS SUMMARIZED. THE DESIGNS OF THE TOWER, MACHINERY HOUSING, ROTOR, AND ROTOR BLADES ARE DESCRIBED. ROTOR BLADE ADJUSTMENT DEVICES, AUXILIARY AND ACCESSORY EQUIPMENT ARE EXAMINED.

1980-0221 FEUSTEL J E, STOY B
SOLAR ENERGY AND WIND ENERGY--A CONTRIBUTION TO COVERING FUTURE ENERGY DEMAND.
BRENNST.-WAERME-KRAFT 32(9): 360-366, SEPTEMBER 1980. (IN GERMAN)

THE VARIOUS FORMS AND CHARACTERISTIC FEATURES OF SOLAR ENERGY ARE SHOWN. AN OVERVIEW IS GIVEN FOR THE DIRECT POSSIBILITIES OF USING IT. SOLAR COLLECTORS AND THEIR MOST IMPORTANT DEVELOPMENTS IN THE LOWER, MEDIUM AND HIGH TEMPERATURE RANGE ARE DESCRIBED, AS WELL AS DEVELOPMENT ACTIVITIES IN THE FIELD OF THE PHOTOELECTRIC

TRANSFORMATION OF LIGHT INTO ELECTRIC CURRENT, WITH THE HELP OF SOLAR CELLS. THE INDIRECT UTILISATION OF SOLAR ENERGY BY USING HEAT PUMPS IS ALSO PRESENTED. THE AUTHORS DEAL WITH APPLICATIONS OF WIND AS A FURTHER FORM OF INDIRECT SOLAR ENERGY UTILISATION. THE PRESENT INTERNATIONAL STATE OF WIND ENERGY CONVERTORS, FUTURE POSSIBILITIES AS WELL AS LIMITS OF THE ENERGY UTILISATION ARE CONSIDERED.

1980-0222 MAHRT L, HEALD R C
ANALYSIS OF STRONG NOCTURNAL SHEARS FOR WIND MACHINE DESIGN.
NTIS, NOVEMBER 1980. 77 P.
DOE/ET/23116-80/1, PNL-3781

WIND SHEAR DATA AT WIND TURBINE HEIGHTS FROM SEVERAL SITES IS REVIEWED AND NEW DATA IS DOCUMENTED IN TERMS OF TOTAL AND COMPONENT SHEAR. A VARIETY OF ATMOSPHERIC SCENARIOS MAY COMBINE TO GIVE LARGE PERSISTENT SHEAR. AMONG THESE, STRONG BOUNDARY LAYER STABILITY IS FOREMOST. IT OCCURS WITH STRONG NOCTURNAL SURFACE COOLING, IN LOW LEVEL FRONTAL AND SUBSIDENCE INVERSIONS, AND IN THUNDERSTORM OUTFLOWS. STRONG SHEARS RESULTING FROM SURFACE RADIATION INVERSIONS ARE PARTICULARLY EVIDENT OVER THE HIGH PLAINS WHERE DRY AIR AND HIGH ALTITUDE COMBINE TO RESULT IN STRONG RADIATIONAL COOLING. TERRAIN IS ALSO AN IMPORTANT INFLUENCE ON SHEAR BUT IT IS NOT WELL UNDERSTOOD AND IS VERY SITE SPECIFIC.

1980-0223 FINAL ENVIRONMENTAL IMPACT REPORT FOR THE CALIFORNIA ENERGY COMMISSION SOLAR ENERGY COMMISSION SOLAR PROGRAM AND WIND PROGRAM.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, MAY 1980. 195 P.
P-700-80-005

THIS FINAL ENVIRONMENTAL IMPACT REPORT ANALYZES THE CALIFORNIA ENERGY COMMISSION'S SOLAR PROGRAM AND WIND PROGRAM. THE WIND PROGRAM HAS A NEAR-TERM GOAL OF 500 MEGAWATTS OF WIND GENERATED ELECTRICITY ON LINE IN CALIFORNIA BY 1985. POTENTIAL SITES FOR WIND DEVELOPMENT FROM A WIND RESOURCE STANDPOINT OCCUR IN THE DESERT AND MOUNTAINS WHERE STRONG, PERSISTENT WINDS OCCUR. THE SITING OF A SPECIFIED NUMBER OF WIND TURBINES MAY POSE POTENTIAL ENVIRONMENTAL IMPACTS, BUT THESE EFFECTS ARE MITIGABLE. THE MOST SUBSTANTIAL CONCERN IS THE NEED FOR SCATTERED WIND TURBINES OVER A GIVEN AREA. CONSTRUCTION IMPACTS FROM TURBINE PAD LEVELING, ACCESS ROADS AND TRANSMISSION CORRIDORS COULD BE CONSIDERABLE. CONFLICTS WITH EXISTING AND FUTURE LAND USE MAY ALSO OCCUR. OPERATIONAL EFFECTS INCLUDE MINOR CHANGES IN MICROCLIMATE, BIRD COLLISIONS WITH THE TURBINE BLADES, NOISE, INCREASED OFF-ROAD VEHICLE USE, AESTHETICS AND RADIO AND TELEVISION WAVE INTERFERENCE.

1980-0224 FLOWERDEW HUNDRED.
WIND POWER DIG. NO. 20: 32-33, SUMMER 1980.

1980-0225 FOSTER R W, TISON R R, ESCHER W J D, HANSON J A
SOLAR/HYDROGEN SYSTEMS FOR THE 1985 TO 2000 TIME FRAME. VOLUME I. SOLAR/HYDROGEN SYSTEMS ASSESSMENT. FINAL REPORT.
NTIS, JUNE 1, 1980. 147 P.
DOE/JPL-955492(VOL.1)

THE FINDINGS OF A STUDY OF OPPORTUNITIES FOR COMMERCIALIZATION OF SYSTEMS CAPABLE OF PRODUCING HYDROGEN FROM SOLAR ENERGY ARE PRESENTED IN TWO VOLUMES. VOLUME I FIRST REVIEWS THE BACKGROUND OF THE WORK AND THE METHODS USED. THEN AN EVALUATION OF THE HYDROGEN PRODUCT COSTS THAT MIGHT BE ACHIEVED BY THE FOUR SELECTED CANDIDATE SYSTEMS (PHOTOVOLTAIC/WATER ELECTROLYSIS, THERMAL-HEAT ENGINE/WATER ELECTROLYSIS, WIND ENERGY/WATER ELECTROLYSIS, SMALL HYDROGEN/WATER ELECTROLYSIS) IS COMPARED WITH THE PRICING STRUCTURE AND PRACTICES OF THE COMMODITY GAS MARKET. SUBSEQUENTLY, PRODUCT COST AND MARKET PRICE MATCH IS NOTED TO EXIST IN THE SMALL USER SECTOR OF THE HYDROGEN MARKETPLACE. BARRIERS TO AND HISTORICAL TIME LAGS IN COMMERCIALIZATION OF NEW TECHNOLOGIES ARE THEN REVIEWED. FINALLY, RECOMMENDATIONS FOR DEVELOPMENT AND DEMONSTRATION PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THE CANDIDATE SYSTEMS ARE PRESENTED.

1980-0226 FRANDSEN S, CHRISTENSEN C J
ON WIND TURBINE POWER MEASUREMENTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D4, P. 207-222.

A STATISTICAL TREATMENT OF THE WIND TURBINE POWER CURVE IS PRESENTED. IT IS SHOWN THAT VARIATIONS IN U AND P CAN BE HANDLED MORE CONVENTIONALLY BY MEANS OF TWO PARAMETERS: THE COHERENT VARIATION ALONG THE POWER CURVE AND THE INCOHERENT ACROSS THE CURVE THE AVERAGING TIME PROBLEM IS DISCUSSED. THE RESPONSE OF THE POWER TRAIN TO TURBULENCE IN THE WIND AND TO GRID FREQUENCY VARIATIONS IS DISCUSSED IN A SPECTRAL LANGUAGE. A SPECTRAL RESPONSE FUNCTION FOR THE POWER TRAIN IS DERIVED.

1980-0227 FREEMAN P A
HARNESS THE WIND FOR AERATION.
WATER WASTES ENG. 17(9): 25-26, 29, 56, SEPTEMBER 1980.

THE NEW WASTEWATER AERATION SYSTEM DESCRIBED PUSHES OXYGEN-RICH SURFACE WATER TO THE LAGOON BOTTOM--AN APPROACH THAT IS REPORTED TO REQUIRE LESS ENERGY THAN CONVENTIONAL AERATION. THE AUTHOR SHOWS THAT WINDS AS LOW AS 1 MPH CAN TURN THE TURBINES THAT POWER THIS NEW, ENERGY-EFFICIENT AERATION SYSTEM.

1980-0228 FREER R
WIND POWER GENERATION FOR NATIONAL AND REGIONAL GRID SYSTEMS; DESIGN PROPOSALS FOR GENERATION AND TRANSMISSION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A3, P. 43-60.

ONE PROBLEM WITH ALL RENEWABLE ENERGY SOURCES IS TO CONVERT THE ENERGY INTO A COMMERCIALLY USEFUL FORM. THIS PAPER DEMONSTRATES HOW WIND ENERGY CAN BE CONVERTED INTO ELECTRICITY AT CONSTANT VOLTAGE AND CONSTANT FREQUENCY ON A COMMERCIAL SCALE BY USING A HYDRAULIC POWER CONVERSION SYSTEM, AND CONNECTED TO NATIONAL AND REGIONAL GRID SYSTEMS. FOR AN OFFSHORE ARRAY OF TOWERS IN SHALLOW WATER UP TO ABOUT 12 M DEEP THE MOST ECONOMICAL FOUNDATION APPEARS TO BE AN ARTIFICIAL ISLAND WHICH COULD BE BUILT UP PARTLY FROM DREDGED MATERIAL. WE BELIEVE THE CORRECT METHOD OF EVALUATING THE FINANCIAL BENEFIT FROM A WIND ENERGY SOURCE IS TO ASSESS IT IN TERMS OF THE SAVING OF CONVENTIONAL FUELS, INSTEAD OF IN TERMS OF HYPOTHETICAL UNIT GENERATION COST. THE FUEL SAVING WOULD START AS SOON AS THE FIRST MACHINES WERE COMMISSIONED WHICH WOULD MINIMISE THE PERIOD OF TIME FOR WHICH CAPITAL WOULD BE REQUIRED FOR THE CONSTRUCTION OF A LARGE ARRAY. THE EQUIPMENT DESCRIBED IN THIS DESIGN IS WITHIN THE PRESENT AND PROPOSED RANGE OF DEVELOPMENT OF COMMERCIAL MACHINERY AND PROTOTYPE DESIGN COULD BE STARTED AS SOON AS FINANCE WAS AVAILABLE.

1980-0229 FRIEDMANN P P
AEROELASTIC STABILITY AND RESPONSE ANALYSIS OF LARGE HORIZONTAL-AXIS WIND TURBINES.

J. IND. AERODYN. 5(3-4): 373-401, MAY 1980.

THE PAPER PRESENTS A REVIEW OF RECENT RESEARCH ON AEROELASTIC AND STRUCTURAL DYNAMIC ASPECTS OF LARGE HORIZONTAL-AXIS WIND TURBINES. THE LITERATURE AVAILABLE IN THE FIELD IS REVIEWED WITH CONSIDERABLE DETAIL AND THE FUNDAMENTAL DIFFERENCES BETWEEN HELICOPTER ROTOR AEROELASTIC PROBLEMS AND THE WIND TURBINE AEROELASTIC PROBLEM ARE CAREFULLY OUTLINED. FORMULATION OF THE ISOLATED BLADE AEROELASTIC PROBLEM AS WELL AS THE COUPLED ROTOR/TOWER SYSTEM, ARE TREATED IN CONSIDERABLE DETAIL. RESULTS ILLUSTRATING THE CHARACTERISTICS OF THE ISOLATED BLADE BEHAVIOR ARE PRESENTED. COUPLED ROTOR/TOWER BEHAVIOR IS ALSO ILLUSTRATED WITH AN EMPHASIS ON ROTOR-TOWER-YAW DRIVE INTERACTION AND ROTOR/TOWER INTERACTION. VARIOUS OTHER STRUCTURAL DYNAMIC AND AEROELASTIC PROBLEMS OCCURRING IN WIND TURBINES ARE ALSO BRIEFLY DISCUSSED.

1980-0230 FRIEDMAN P A
SOLAR AND WIND ENERGY TAX INCENTIVES: STATE STATUTES.
ENERGY LAW SERVICE. VOLUME 3. MONOGRAPHS. WILMETTE, ILLINOIS, CALLAGHAN AND COMPANY, 1980. P. 1-59.

FORTY STATES PROVIDE TAX INCENTIVES FOR THE PURCHASE AND INSTALLATION OF SOLAR OR WIND EQUIPMENT. THIS MONOGRAPH PROVIDES A CONCISE REFERENCE TO STATE TAX INCENTIVES AVAILABLE TO RESIDENTIAL AND COMMERCIAL INVESTORS IN SOLAR AND WIND EQUIPMENT. WHILE FEDERAL INCENTIVES CONSIST STRICTLY OF INCOME TAX CREDITS, THE STATE INCENTIVES REFLECT VARIOUS FORMS OF REVENUE-RAISING AVAILABLE TO STATES AND LOCALITIES. DEPENDING UPON THE STATE, QUALIFYING EXPENDITURES CAN EARN INDIVIDUAL AND CORPORATE INCOME TAX CREDITS, DEDUCTIONS AND RAPID DEPRECIATION, SALES AND USE TAX EXEMPTIONS, PROPERTY-TAX EXEMPTIONS AS WELL AS LIMITED ASSESSMENT, AND REDUCED CORPORATE FRANCHISE TAXES. CERTAIN STATES HAVE EXPRESSLY GRANTED LOCAL GOVERNMENTS POWER TO ENACT THEIR OWN TAX INCENTIVES.

1980-0231 FROST W
STANDARD DEVIATIONS AND CONFIDENCE INTERVALS FOR ATMOSPHERIC DESIGN CRITERIA USED IN WECS DEVELOPMENT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B3, P. 107-131.

AN ENGINEERING HANDBOOK ENTITLED "ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT" WAS PREPARED UNDER A NASA CONTRACT TO PROVIDE DESIGN CRITERIA RECOMMENDED FOR USE IN BOTH SMALL AND LARGE-SCALE WECS. THIS PAPER SUPPLEMENTS THE DESIGN CRITERIA BY CARRYING OUT A DETAILED COMPARISON OF THE RECOMMENDED DESIGN CURVES WITH EXPERIMENTAL DATA FOR 1) VERTICAL SHEAR HORIZONTAL WIND AND 2) ATMOSPHERIC WIND SPEED TURBULENCE SPECTRA AND INTENSITIES. THESE DATA ARE DIRECTLY USED IN ANALYSIS OF THE VIBRATION AND FATIGUE LOADING OF WIND TURBINE ROTOR BLADES.

1980-0232 FROST W, KAUFMAN J W
WIND WHEEL TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 131-156.
SERI/CP-635-938

AN ANALYTICAL AND EXPERIMENTAL STUDY OF AN INNOVATIVE WIND WHEEL TURBINE (WWT) IS REPORTED. EVALUATION OF THE PROBABLE PERFORMANCE, POSSIBLE PRACTICAL APPLICATIONS, AND ECONOMIC VIABILITY AS COMPARED TO OTHER CONVENTIONAL WIND ENERGY SYSTEMS IS DISCUSSED. THE WWT APPARATUS IS ESSENTIALLY A BLADED WHEEL WHICH IS DIRECTLY EXPOSED TO THE WIND ON THE UPPER HALF AND EXPOSED TO WIND THROUGH MULTIPLE DUCTING ON THE LOWER HALF. THE MULTIPLE DUCTS CONSIST OF A FORWARD DUCT (FRONT CONCENTRATOR) AND TWO SIDE DUCTS (SIDE CONCENTRATORS). THE FORCED ROTATION OF THE WHEEL IS THEN CONVERTED TO POWER THROUGH APPROPRIATE SUBSYSTEMS. RESULTS OF A SERIES OF PRELIMINARY TESTS ON TWO SIMPLE MODELS, A PAPER MODEL (MODEL NO. 1) AND A STAINLESS STEEL MODEL (MODEL NO. 2) ARE REPORTED. MEASURED VALUES OF POWER COEFFICIENTS OVER WIND SPEEDS RANGING FROM 4 TO 16 M/S ARE GIVEN. A SIMPLE ANALYTICAL MODEL OF A FOUR-BLADED WHEEL IS ALSO DEVELOPED.

1980-0233 FUNG T K, SCHEFFLER R L, STOLPE J
WIND ENERGY--A UTILITY PERSPECTIVE.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, MINNEAPOLIS, MINNESOTA, JULY 13-18, 1980. PAPERS. PISCATAWAY, N.J., IEEE POWER ENGINEERING SOCIETY, 1980. PAPER NO. 80 SM 564-5, 7 P.

OF ALL THE RENEWABLE ENERGY SYSTEMS, WIND TURBINE GENERATORS (WTG'S) ARE LIKELY TO MAKE THE EARLIEST SIGNIFICANT COST-EFFECTIVE CONTRIBUTION TO THE UTILITY GRID. IN ORDER TO ACCELERATE THE COMMERCIAL DEPLOYMENT OF WTG'S, SEVERAL ISSUES MUST BE ADDRESSED IN A TIMELY MANNER. THIS PAPER PRESENTS SOME OF THE ISSUES FACING THE UTILITY INDUSTRY AS THEY RELATE TO IMPLEMENTATION OF AN EFFECTIVE WIND ENERGY PROGRAM. IN ADDITION, THE SOUTHERN CALIFORNIA EDISON COMPANY'S WIND ENERGY PROGRAM IS PRESENTED, WHICH IS DESIGNED TO PROVIDE PERTINENT ANSWERS TO THE TECHNICAL, ECONOMIC AND ENVIRONMENTAL ISSUES CONCERNING WTG INSTALLATIONS AND THEIR COMMERCIAL VIABILITY AS A FUTURE GENERATION RESOURCE.

1980-0234 GARG H P, SHISHODIA K A, RANI U
REVIEW ON RENEWABLE ENERGIES IN INDIA.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 5: SOLARENERGIE IN SUEDLAENDERN. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 343-353.

THE ENERGY CRISIS IS A MAJOR TOPIC OF THE WHOLE WORLD. THE RENEWABLE ENERGY SOURCES LIKE SOCIAL FORESTRY, BIO-GAS, WIND-POWER, AND SOLAR ENERGY CAN BE EFFECTIVELY USED FOR MEETING THE ENERGY REQUIREMENT OF INDIA. THE POTENTIAL OF THESE ENERGY SOURCES, THE WORK DONE IN THESE AREAS IN INDIA, AND THEIR LIMITATIONS ARE DESCRIBED IN THIS PAPER. PER CAPITA ENERGY CONSUMPTION IN INDIAN VILLAGES IS VERY LOW. SINCE MOST OF THE VILLAGES ARE REMOTELY LOCATED, CONNECTING THEM WITH ELECTRIC POWER GRID IS VERY UNECONOMICAL DUE TO HEAVY COST OF LAYING TRANSMISSION LINES AND ASSOCIATED HEAVY POWER LOSS. FOSSIL FUELS ARE ALREADY IN SHORT SUPPLY. UNDER THESE CONDITIONS MORE ENERGY CAN BE SUPPLIED BY TAPPING RENEWABLE SOURCES OF ENERGY.

1980-0235 GARSTANG M, NNAJI S, PIELKE R A, GUSDORF J, LINDSEY C, SNOW J W
COASTAL ZONE WIND ENERGY. PART 1. SYNOPTIC AND MESOSCALE CONTROLS AND DISTRIBUTIONS OF COASTAL WIND WIND ENERGY. FINAL REPORT.
NTIS, MARCH 1980. 190 P.
DOE/ET/20274-7

THIS REPORT DESCRIBES A METHOD OF DETERMINING COASTAL WIND ENERGY RESOURCES. CLIMATOLOGICAL DATA AND A MESOSCALE NUMERICAL MODEL ARE USED TO DELINEATE THE AVAILABLE WIND ENERGY ALONG THE ATLANTIC AND GULF COASTS OF THE UNITED STATES. IT IS FOUND THAT THE SPATIAL DISTRIBUTION OF THIS ENERGY IS DEPENDENT ON THE LOCATIONS OF THE OBSERVING SITES IN RELATION TO THE MAJOR SYNOPTIC WEATHER FEATURES AS WELL AS THE PARTICULAR ORIENTATION OF THE COASTLINE WITH RESPECT TO THE LARGE-SCALE WIND.

1980-0236 GARTON J E, GHERMAZIEN T, ROBINSON K
WINTER ICE REMOVAL FROM STOCK PONDS.
NTIS, 1980. 42 P.
PB81-167207

THE PURPOSE OF THIS STUDY WAS TO FIND A PRACTICAL, RELIABLE, AND INEXPENSIVE METHOD FOR MELTING ICE ON FARM PONDS DURING THE WINTER TO ALLOW LIVESTOCK ACCESSIBILITY TO WATER. AN ALTERNATIVE MEANS OF REMOVING ICE FROM THE NEAR-SHORE SURFACE OF PONDS WAS FOUND, RATHER THAN REQUIRING THAT FARMERS/RANCHERS ROUTINELY CHIP HOLES IN THE ICE. THE PERFORMANCES OF TWO METHODS WERE TESTED: (1) USE OF AN ELECTRICALLY-OPERATED SUBMERSIBLE PUMP; AND (2) A WIND ELECTRIC GENERATOR DIRECTLY CONNECTED TO AN ELECTRIC TROLLING MOTOR, TO STIMULATE CONDITIONS IN REMOTE LOCATIONS LACKING ELECTRICITY. BY EITHER TECHNIQUE, WARMER WATER FROM GREATER DEPTHS WAS CIRCULATED TO THE SURFACE OF THE POND.

1980-0237 GERHARDT K
WIND ENGINE.
U.S. PATENT NO. 4,213,737, JULY 22, 1980. 5 P.

WINDMILL APPARATUS FOR USE IN CAPTURING THE ENERGY OF THE WIND AND CONVERTING IT TO POWER COMPRISING A PLURALITY OF RELATIVELY NARROW RING-LIKE BANDS JOINED TOGETHER IN A GENERALLY CONCENTRIC RADIALLY SPACED RELATION TO FORM A WHEEL ADAPTED TO ROTATE ABOUT MEANS DEFINING THEREFOR A CENTRAL AXIS, SAID WHEEL IN USE NORMALLY ORIENTING GENERALLY PERPENDICULAR TO A GROUND SURFACE, A PLURALITY OF AIR FOILS POSITIONED BETWEEN SUCCESSIVELY ADJACENT BANDS, IN A CIRCULARLY SPACED RELATION, EACH SAID AIR FOIL HAVING MEANS PIVOTALLY MOUNTING IT FOR ADJUSTMENT ABOUT AN AXIS WHICH IS RADIAL TO THE WHEEL AXIS, THE SURFACES OF SAID FOILS AT THEIR RADIAL EXTREMITIES BEING SUBSTANTIALLY FLAT, EACH SAID FOIL BETWEEN ITS RADIAL EXTREMITIES BEING PROVIDED WITH AN OUTER PERIPHERAL SURFACE A SUBSTANTIAL PORTION OF WHICH IS FLATTENED TO DEFINE ITS OPERATING FACE WHICH IN USE OF THE FOIL IS GENERALLY FACED INTO THE PREVAILING WINDS, THE BALANCE OF THE SAID PERIPHERAL SURFACE BEING GENERALLY ACCURATE AND DEPARTING SHARPLY FROM SAID FLATTED PORTION TO GIVE THE FOIL A GENERALLY BULBOUS CONFIGURATION AT ITS SIDE OPPOSITE THAT DEFINED BY SAID FLATTED PORTION THE PEAK OF WHICH HAS A SUBSTANTIAL DEPARTURE FROM SAID FLATTED PORTION AND THERE BEING RELATIVELY LOW RATIO OF THE LENGTH OF SAID FLATTED PORTION TO THE DEPTH OF SAID FOIL AT THE LOCATION OF SAID PEAK IN A SENSE TRANSVERSE TO THE PIVOT AXIS OF THE FOIL IS DESCRIBED.

1980-0238 GEWEHR H W
DEVELOPMENT OF COMPOSITE BLADES FOR LARGE WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C1, P. 133-140.

THE FIRST PORTION OF THIS PAPER DESCRIBES A NASA/DOE-FUNDED RESEARCH PROGRAM INVOLVING THE DESIGN, CONSTRUCTION, AND TESTING OF A LARGE, LOW COST, COMPOSITE WIND TURBINE BLADE. THE ALL-FIBREGLASS BLADE IS 150 FEET (47.5 M) LONG, REPRESENTATIVE OF A BLADE FOR A 300 FOOT (91 M) DIAMETER WIND TURBINE ROTOR. THE PRIMARY OBJECTIVE OF THE PROGRAM WAS TO DEVELOP THE ENGINEERING AND FABRICATION TECHNOLOGY FOR LARGE COMPOSITE BLADES HAVING THE POTENTIAL FOR LOW COST MANUFACTURE IN PRODUCTION QUANTITIES. A KEY ELEMENT IN DESIGN AND CONSTRUCTION OF THE BLADE WAS THE USE OF TRANSVERSE FILAMENT TAPE (TFT), WHICH IS A COMMERCIAL WOVEN ROVING HAVING ALL STRUCTURAL FIBRES TRANSVERSE TO THE LENGTHWISE DIMENSION OF THE TAPE. DEVELOPMENT OF MECHANICAL PROPERTIES OF TFT USEFUL FOR DESIGN WAS ONE OF THE PRIMARY PROGRAM TASKS. THE FABRICATION COST OF THE COMPLETE PROTOTYPE BLADE WAS $22/KG; PRODUCTION COSTS PROJECT TO LESS THAN $9/KG. SUCCESSFUL COMPLETION OF THE 150 FT (45.7 M) BLADE PROGRAM LED TO A FOLLOW-ON PROGRAM, ALSO DESCRIBED IN THIS PAPER, TO DESIGN AND BUILD TWO 100 FOOT (30.5 M) COMPOSITE BLADES FOR THE NASA/DOE MOD-1 WIND TURBINE IN BOONE, NORTH CAROLINA, USING THE TACHNOLOGY BASE DEVELOPED UNDER THE 150 FOOT (47.5 M) BLADE PROGRAM. IN VIEW OF THE PLANNED OPERATIONAL EMPLOYMENT OF THE MOD-1 COMPOSITE BLADES, A LIGHTNING TEST WAS CONDUCTED ON A SECTION OF THE PROTOTYPE BLADE WHICH DEMONSTRATED THAT A LIMITED NUMBER OF ELECTRICAL CONDUCTORS MUST BE ADDED TO COMPOSITE BLADES FOR PROTECTION AGAINST DAMAGE BY LIGHTNING STROKES.

1980-0239 GILHAUS A
STATIONAERE SCHWUNGRAD-ENERGIESPEICHER. (STATIONARY FLYWHEEL ENERGY ACCUMULATORS).
NEW WAYS TO SAVE ENERGY. PROCEEDINGS OF THE INTERNATIONAL SEMINAR, BRUSSELS, OCTOBER 23-25, 1979. DORDRECHT, HOLLAND, BOSTON, MASSACHUSETTS, REIDEL PUBL. CO., 1980. P. 546-554. (IN GERMAN)

THE AIM OF THE SYSTEM STUDY IS TO EXAMINE INDUSTRIAL APPLICATIONS OF STATIONARY FLYWHEEL ENERGY ACCUMULATORS. THE ECONOMIC VALUE FOR THE CONSUMER AND THE EFFECTS ON THE POWER SUPPLY GRID ARE INVESTIGATED. THE BENEFITS OF USING STATIONARY FLYWHEEL ENERGY ACCUMULATORS TO LOWER THE DEMANDED MAXIMUM OUTPUT OF A POWER SUPPLY TO RECOVER INVESTMENT COSTS. COMPENSATION OF SHORT-TIME MAXIMUM POWER OUTPUT SEEMS TO BE MORE FAVORABLE AT POWER PLANTS. APPLICATIONS, SUCH AS BRAKING ENERGY STORAGE IN VEHICLES, AND THE USE OF FLYWHEELS IN WIND POWER PLANTS, SEEM TO BE PROMISING. ATTRACTIVE SAVINGS OF ENERGY CAN BE OBTAINED BY INTRODUCING MODERN FLYWHEEL TECHNOLOGY FOR EMERGENCY POWER SUPPLY UNITS WHICH ARE EMPLOYED FOR INSTANCE IN TELECOMMUNICATION SYSTEMS.

1980-0240 GILLI P V
NEW TECHNOLOGIES FOR COVERING THE FUTURE ENERGY DEMAND OF AUSTRIA.
OESTERR. Z. ELEKTRIZITAETSWIRTSCH. 33(5): 141-148, MAY 1980. (IN GERMAN)

AUSTRIA DEPENDS TO A HIGH DEGREE ON PRIMARY ENERGY IMPORTS. NEW TECHNOLOGIES WILL THEREFORE PLAY AN INCREASING ROLE IN THE FUTURE ENERGY SUPPLY AND DEMAND PATTERN. IN ELECTRICITY GENERATION, NEW TECHNOLOGIES WILL BE IN THE FIELD OF COAL COMBUSTION, COMBINED PROCESSES, SOLAR AND WIND POWER--FOR WHICH THE CONDITIONS IN AUSTRIA ARE NOT VERY FAVOURABLE--AND IMPROVED SYSTEMS OF COMBINED HEAT AND POWER GENERATION. ALSO FOR STORAGE, TRANSMISSION AND UTILISATION OF ELECTRIC ENERGY, NEW TECHNOLOGIES WILL BE IMPORTANT. IN OIL SUBSTITUTION--WHICH PROVES TO BE THE CRITICAL ITEM IN THE ENERGY PROBLEM--ELECTRIC ENERGY WILL PLAY AN IMPORTANT ROLE, E.G., BY MEANS OF THE HEAT PUMP AND THE ELECTRIC CAR.

1980-0241 GINOSAR M
PROPOSED LARGE-SCALE WIND ENERGY PROGRAM FOR CALIFORNIA.
ENERGY SOURCES 5(2): 141-169, 1980.

THE GOAL OF THIS PROPOSED PROGRAM IS THE GENERATION OF AT LEAST 10 PERCENT (30 BILLION KWH/YEAR) OF THE STATE'S ELECTRICITY BY WIND-ELECTRIC SYSTEMS BY THE YEAR 2000. THIS COULD BE GENERATED BY APPROXIMATELY 3300 THREE-MEGAWATT WIND-ELECTRIC CONVERSION SYSTEMS (WECS) LOCATED ON 100 UTILITY-OWNED, WIND-ELECTRIC FARMS. THE AUTHOR PROPOSES THAT A $105 MILLION, SIX-YEAR PROGRAM BE INITIATED TO BRING WIND ENERGY TO THE POINT OF COMMERCIAL OPERATION IN CALIFORNIA.

1980-0242 GIPE P

CLOCKING THE WIND.
SOLAR AGE 5(10): 30-34, OCTOBER 1980.

THIS ARTICLE REVIEWS WIND MEASUREMENT TECHNIQUES AND CONCLUDES WITH A LIST OF ANEMOMETER/WIND DATA COLLECTION · SYSTEM SUPPLIERS.

1980-0243 GIPE P
WIND AND THE GRID.
ALTERN. SOURCES ENERGY NO. 46: 11-15, NOVEMBER/DECEMBER 1980.

1980-0244 WISE J L, WENTINK T, BECKER R, COMISKEY A L, ELLIOTT D L
WIND ENERGY RESOURCE ATLAS. VOLUME 10. ALASKA REGION.
NTIS, DECEMBER 1980. 181 P.
PNL-3195-WERA-10

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH SUBREGION OF ALASKA. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A STATE SCALE IS GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH SUBREGION ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE ALASKA WIND ENERGY RESOURCE. AN OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH SUBREGION IS INCLUDED. ASSESSMENTS FOR INDIVIDUAL SUBREGIONS ARE PRESENTED AS SEPARATE CHAPTERS. THE SUBREGION WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE ALASKA WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE SUBREGION CHAPTERS.

1980-0245 GOEDKOOP J A
A STROLL THROUGH ECN MARKET (ENERGY R AND D WORK).
ENERGIESPECTRUM 4(10): 238-249, OCTOBER, 1980. (IN DUTCH)

THIS PAPER BRIEFLY DESCRIBES INDUSTRY ORIENTED RESEARCH AND DEVELOPMENT WORK IN PROGRESS AT THE ECN (NETHERLANDS ENERGY CENTER): NUCLEAR FISSION AND FUSION, SUPERCONDUCTIVITY, ENERGY CONVERSION, RADIOBIOLOGY, WITH SPECIAL REFERENCE TO THE HIGH FLUX REACTOR AT PETTEN, NEUTRON ACTIVATION ANALYSIS, FLUIDISED BED CONBUSTION, WIND TURBINES (EXPERIMENTAL UNIT, HORIZONTAL AXIS, 25 M DIAMETER).

1980-0246 ZAININGER H W, BELL D J
WIND POWER GENERATION DYNAMIC IMPACTS ON ELECTRIC UTILITY SYSTEMS. FINAL REPORT.
NTIS, NOVEMBER 1980. 88 P.
EPRI-AP-1614

A PRIMARY APPLICATION OF WIND POWER GENERATION ON UTILITY SYSTEMS IS EXPECTED TO BE LARGE CLUSTERS OF MEGAWATT-SCALE WIND TURBINE (WT) UNITS, CONNECTED TO THE UTILITY TRANSMISSION NETWORK AND OPERATED AS PART OF THE OVERALL UTILITY GENERATION MIX. WIND FLUCTUATIONS WILL RESULT IN MINUTE-TO-MINUTE WT OUTPUT VARIATIONS. LARGE PENETRATIONS OF WIND TURBINES MAY CAUSE DYNAMIC IMPACTS SUCH AS SEVERE SYSTEM SWINGS, EXCESSIVE FREQUENCY EXCURSIONS, OR SYSTEM INSTABILITY. THESE POTENTIAL DYNAMIC IMPACTS, CONSIDERING THE INTEGRATED WIND POWER PLANTS, UTILITY CONVENTIONAL GENERATION, AND TRANSMISSION SYSTEM, MAY LIMIT THE POTENTIAL WT PENETRATION AND/OR CAUSE SIGNIFICANT SYSTEM OPERATING RESTRICTIONS. AN INITIAL ASSESSMENT OF POTENTIAL WIND POWER GENERATION DYNAMIC IMPACTS ON UTILITY SYSTEMS FROM A GLOBAL UTILITY PERSPECTIVE WAS MADE. DYNAMIC STUDY OF MINUTE-TO-MINUTE RAMPING, FREQUENCY EXCURSION, AND SHORT-TERM TRANSIENT STABILITY WAS PERFORMED USING THE HAWAIIAN ELECTRIC COMPANY SYSTEM AS AN ILLUSTRATIVE EXAMPLE.

1980-0247 GOLDBERG T, BJERGBAEK B
CO-GENERATIVE ENERGY SYSTEM FOR AGRICULTURE AND FARMING AND AN ANAEROBIC DIGESTOR FOR HIGH SOLID LOADING: (THE EXPANDING RADIAL-OVERFLOW DIGESTOR).
BIO-ENERGY WORLD CONGRESS AND EXPOSITION, ATLANTA, GEORGIA, APRIL 21, 1980. PROCEEDINGS. NTIS, 1980. P. 455-456.
CONF-800482

A DEMONSTRATION PROJECT TO SHOW THAT THE ENERGY POTENTIAL FROM FARM AND AGRICULTURAL WASTE PRODUCTS COMBINED WITH SOLAR AND WIND ENERGY SOURCES CAN GENERATE A SURPLUS OF ENERGY ADAPTABLE TO RURAL COMMUNITIES IS UNDER CONSTRUCTION IN DENMARK. A NEW TYPE OF ANAEROBIC DIGESTOR WAS DEVELOPED TO HANDLE SOLID MANURE WITH STRAW BEDDING CONTINOUSLY, AT 20 TO 30% D.S.

1980-0248 GOSLICH H D, VALETT J, KUNSTMANN W H
DEVELOPMENT OF FAST ROTORS WITH FLAPPING HINGE AND GEOMETRICAL PITCH ANGLE SETTING IN EXTREME LENGTH CONSTRUCTION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 429-440.

THEORETICAL EXAMINATION LED TO REDUCTIONS IN FORCE AND WEIGHT OF ALREADY CONSTRUCTED FLAPPING HINGE ROTORS. BEING A VERY SIMPLE CONSTRUCTION, AND THUS EASY TO MAINTAIN, THE HINGE GEOMETRY ENABLES THE ROTOR TO OPERATE AT ANY POSSIBLE MODE WHILE COST- AND WEIGHT-/POWER RATIO IS EXCELLENT. MAXIMUM POWER-SUPPLY AT ALMOST UNLIMITED HIGH WIND-SPEEDS (THEORETICALLY 55 M/S) AS WELL AS IDLING UNDER THE SAME CONDITIONS. THE THEORY OF GEOMETRY IS EXPLAINED AND PRACTICAL COMPARISON IS SHOWN. FIELD OF OPERATION IS UP TO VERY LARGE ROTOR DIMENSIONS.

1980-0249 GRANNEMANN W W, YANG C E, SEO P H
VARIABLE SPEED CONSTANT FREQUENCY CONSTANT VOLTAGE ALTERNATOR.
NTIS, JULY 1980. 41 P.
DOE/ET/29246-T1

A TEST ALTERNATOR IS OPERATED WITH DIGITAL CONTROL OF ITS OUTPUT FREQUENCY FOR VARIABLE SHAFT SPEED. THE MACHINE IS A TWO-POLE ALTERNATOR WITH POWER REMOVED THROUGH SLIP RINGS. THE OUTPUT FREQUENCY OF THE ALTERNATOR IS CONTROLLED BY ROTATING THE FIELD BY STEPPING THROUGH SIXTEEN COILS AROUND THE ROTOR. USUALLY FOUR COILS ARE ACTIVE AT ONE TIME. THE ROTATING FIELD IN THE STATIONARY COILS OF THE STATOR IS CONTROLLED BY MICROCIRCUITS. THE CONTROL CIRCUITS ARE CONSTRUCTED WITH AVAILABLE LOW-COST, LOW-POWER INTEGRATED CIRCUITS (ICS). THE TEST RESULTS FROM THE FIRST TEST ALTERNATOR INDICATE THE FEASIBILITY OF USING THIS TYPE OF ALTERNATOR TO CONVERT AVAILABLE WIND POWER DIRECTLY TO USABLE 60 HERTZ POWER.

1980-0250 GREAVER V W, FARRINGTON R B, LEBOEUF C M
APPLICATIONS OF SOLAR ENERGY IN INDUSTRIAL PARKS.

NTIS, MAY 1980. 8 P.
CONF-800706-2, SERI/TP-733-693

THE FOUR PHASES OF ONGOING WORK AT SERI THAT EXAMINES MANY UNRESOLVED QUESTIONS REGARDING THE PURPOSE, SOLAR APPLICABILITY, ECONOMICS, AND ENERGY MODELING OF INDUSTRIAL PARKS ARE PRESENTED. THE FIRST PHASE INVOLVED SITE VISITS TO APPROXIMATELY 300 PARKS IN 12 MAJOR METROPOLITAN AREAS OF 9 STATES. PHASE 2 ENTAILS AN ANALYSIS OF FOUR PARKS SELECTED FROM THOSE PARKS SURVEYED. PHASE 3 NARROWS THE FOCUS TO TWO PARKS TO BE EXAMINED FOR DETAILED TECHNICAL AND ENGINEERING ANALYSIS. PHASE 4 INCORPORATES ALL OF THE WORK OF THE EARLIER PHASES WITH ECONOMIC CRITERIA TO PRODUCE AN ENERGY ALLOCATION MODEL DESCRIBING ENERGY DELIVERY AND CONSUMPTION WITHIN THE PARK.

1980-0251 GREET R J
MAXIMUM WINDMILL EFFICIENCY.
J. APPL. PHYS. 51(9): 4680-4681, SEPTEMBER 1980.

A RESULT FREQUENTLY QUOTED IN ENGINEERING HANDBOOKS IS THAT ONE-DIMENSIONAL FLUID FLOW THEORY PLACES AN UPPER LIMIT ON WINDMILL EFFICIENCY AT 16/27 OR 59.3 PERCENT. AN ERROR IN THE DEVELOPMENT INVALIDATES THIS CONCLUSION. ONE-DIMENSIONAL FLOW ANALYSIS PLACES NO RESTRICTIONS ON REALIZABLE WINDMILL OUTPUT.

1980-0252 GROSS G E
QUALITY-ASSURANCE NEEDS AND GOALS IN SOLAR ENERGY CONVERSION.
NTIS, JULY 1980. 9 P.
SERI/TP-641-773, CONF-800927-2

A DISCUSSION OF THE STATUS OF QUALITY ASSURANCE ACTIVITIES IN SOLAR ENERGY CONVERSION TECHNOLOGIES AND OF THE NEEDS FOR FURTHER EFFORTS IN THIS AREA IS PRESENTED. THE IMPORTANCE OF RELIABILITY AND QUALITY ASSURANCE ACTIVITIES TO VARIOUS END USERS IS BRIEFLY DISCUSSED. SOME DETAILS OF SUCH ACTIVITIES IN WIND, ACTIVE HEATING AND COOLING, AND PHOTOVOLTAIC TECHNOLOGIES ARE GIVEN. SUGGESTIONS FOR AN INTEGRATED RELIABILITY, QUALITY ASSURANCE PROGRAM ARE PRESENTED AND THEIR IMPORTANCE TO THE GROWTH OF SOLAR ENERGY APPLICATION IS DISCUSSED.

1980-0253 GROSS G
RELIABILITY ENGINEERING IN SOLAR ENERGY: WORKSHOP PROCEEDINGS.
NTIS, MARCH 1980. 46 P.
SERI/TP-334-489

A WORKSHOP TO REVEAL THE SCOPE OF RELIABILITY-RELATED ACTIVITIES IN SOLAR ENERGY CONVERSION PROJECTS AND IN NONSOLAR SEGMENTS OF INDUSTRY IS DESCRIBED. TWO RELIABILITY PROGRAMS, ONE IN HEATING AND COOLING AND ONE IN PHOTOVOLTAICS, ARE EXPLICATED. THIS DOCUMENT ALSO PRESENTS GENERAL SUGGESTIONS FOR THE ESTABLISHMENT OF A UNIFIED PROGRAM FOR RELIABILITY, DURABILITY, MAINTAINABILITY, AND SAFETY (RDM AND S) IN PRESENT AND FUTURE SOLAR PROJECTS.

1980-0254 GROWIAN WIND POWER PLANT SERVES RESEARCH PURPOSES.
ELEKTRIZITAETSWIRTSCHAFT 79(7): 255-256, MARCH 1980. (IN GERMAN)

1980-0255 GUERRERO J V, ALFORD C
SWECS QUALIFICATIONS CRITERIA FOR STATE TAX INCENTIVE PROGRAM.
WIND ENERGY CONFERENCE, BOULDER, COLORADO, APRIL 9, 1980. NTIS, 1980. 9 P.
RFP-3087, CONF-800406-7

ALTERNATIVE ENERGY SYSTEMS WILL PLAY A SIGNIFICANT ROLE IN PROVIDING ENERGY SUPPLIES TO THE UNITED STATES; ESTIMATES RANGE FROM 7 TO 23 PERCENT OF THE NATION'S NEEDS BY 2000. SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TOGETHER WITH LARGE WIND TURBINE GENERATORS WILL SUPPLY A PORTION OF THESE ENERGY SUPPLIES. THE LEVEL OF DISBURSED SWECS CONTRIBUTION WILL DEPEND NOT ONLY ON RESOLVING TECHNICAL PROBLEMS BUT THE RESOLUTION OF INSTITUTIONAL ISSUES AS WELL. ONE OF THE MAJOR INSTITUTIONAL BARRIERS IS THE HIGH INITIAL COST OF SWECS COMPARED TO CONVENTIONAL ENERGY COSTS. STATE AND FEDERAL FINANCIAL INCENTIVE PROGRAMS SUCH AS INCOME TAX DEDUCTIONS AND CREDITS CAN PROMOTE PUBLIC ACCEPTANCE OF SWECS. SEVERAL PROTOTYPE QUALIFICATION DOCUMENTS ARE BEING PREPARED BY THE ROCKWELL INTERNATIONAL WIND SYSTEMS PROGRAM AT ROCKY FLATS, COLORADO (UNDER CONTRACT TO THE DEPARTMENT OF ENERGY) TO GUIDE THE STATES IN FORMULATING THEIR OWN SPECIFIC SET OF CRITERIA THAT WOULD BE MOST APPROPRIATE FOR THEIR OWN SITUATION.

1980-0256 GUPTA Y, KNOWLES R, MERRILL O, YOUNG S
ECONOMIC WORTH OF ON-SITE SOLAR ELECTRIC GENERATION IN A UTILITY GRID.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 193-198.
SERI/TP-351-431

WIDESPREAD UTILIZATION OF SOLAR ELECTRIC TECHNOLOGIES IN PARALLEL, OR AS SUPPLEMENTS TO THE EXISTING UTILITY NECESSITATE A DETAILED EVALUATION OF THEIR ECONOMIC WORTH AND UTILITY IMPACTS. SUCH AN ASSESSMENT MUST BE PERFORMED WITHIN THE CONTEXT OF THE OVERALL UTILITY/SOLAR ELECTRIC SYSTEM INTERACTION SYSTEM DESIGN-COST RELATIONS, FUTURE ELECTRIC ENERGY COSTS, RATE STRUCTURES, AND OWNERSHIP OPTIONS. SAI HAS DEVELOPED A METHODOLOGY TO EVALUATE IN DETAIL THE UTILITY IMPACTS AND ECONOMICS OF GRID-CONNECTED SOLAR ELECTRIC TECHNOLOGIES. THE VALUE OF UTILITY INTEGRATED SOLAR PLANTS CONSISTS OF BOTH ELECTRIC GENERATION COSTS AND CAPACITY COSTS TO MEET A SPECIFIED RELIABILITY LEVEL AND DEPENDS ON A NUMBER OF COMPLEX VARIABLES. THE METHODOLOGY AND RESULTS PRESENTED INCORPORATE THESE COMPLEX VARIABLES THROUGH INTEGRATION OF DIVERSE SIMULATION TECHNIQUES, INCLUDING HOURLY SOLAR ELECTRIC SYSTEM PERFORMANCE EVALUATION, PROBABILISTIC SOLAR-SUBTRACTED LOAD DETERMINATION BASED ON SOLAR PLANT OUTAGE PROBABILITIES, MIXED-INTEGER LINEAR PROGRAMMING FORMULATION OF THE CAPACITY EXPANSION AND PROBABILISTIC DETERMINATION OF GENERATION COST AND LOSS OF LOAD PROBABILITIES.

1980-0257 GUSTAFSSON A L, LUNDGREN S, FRISK B
APPLICATION OF A METHOD FOR AERODYNAMIC ANALYSIS AND DESIGN OF HORIZONTAL AXIS WIND TURBINES, PART 1.
NTIS, FEBRUARY 26, 1980. 74 P.
N81-12633,FFA-TN-AU-1499-PT.1

THE APPLICATION OF A MOMENTUM THEORY METHOD IS PRESENTED FOR STATIC PERFORMANCE ANALYSIS AND FOR DESIGN OF BLADES FOR HORIZONTAL AXIS WIND TURBINES. THE METHOD IS BASED ON A COMBINATION OF BLADE ELEMENT AND MOMENTUM THEORY. THE PERFORMANCE RESULTS ARE PRESENTED AS POWER COEFFICIENT OR SHAFT POWER VERSUS WINDSPEED AND STATIC BLADE AND TURBINE LOADS TO BE USED FOR STRUCTURAL DESIGN. THE COMBINATION OF TURBINE PERFORMANCE AND WIND CHARACTERISTICS TO OBTAIN ANNUAL ENERGY PRODUCTION IS TREATED. THE PROCEDURE TO OBTAIN THE CHORD AND TWIST DISTRIBUTION THAT MAXIMIZES BLADE PERFORMANCE AT A SPECIFIED WIND IS DESCRIBED. NUMERICAL RESULTS FOR THE SWEDISH WIND POWER TEST UNIT KALKUGNEN ARE PRESENTED.

1980-0258 HAACK B N
SIMULATION MODEL FOR WIND ELECTRIC SYSTEMS.
WIND ENG. 4(2): 64-75, 1980.

A COMPUTER OPERATED SIMULATION MODEL FOR THE EXAMINATION OF WIND ELECTRIC SYSTEMS IS DESCRIBED. COMPONENTS INCLUDED IN THIS MODEL ARE WIND SPEED OBSERVATIONS COLLECTED AT FIRST ORDER METEOROLOGICAL STATIONS, RESIDENTIAL ELECTRICAL CONSUMPTION DATA FROM SAMPLED HOUSEHOLDS, AND CHARACTERISTICS OF WIND ELECTRIC EQUIPMENT. THE MODEL SIMULATES WIND ELECTRIC SYSTEM PERFORMANCE FOR ONE YEAR USING WIND SPEED AND RESIDENTIAL DEMAND OBSERVATIONS AT THREE HOUR INTERVALS. PRIMARY OUTPUTS FROM THE MODEL INCLUDE AVAILABLE WIND ENERGY, GENERATOR OUTPUT, BACK-UP UTILIZATION, ENERGY LOSS DUE TO THE INEFFICIENCIES OF THE BATTERY AND INVERTER, AND PERCENT OF CONSUMER DEMAND SATISFIED BY THE WIND.

1980-0259 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. SEPTEMBER, 1978-OCTOBER, 1980 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, NOVEMBER 1980. 173 P.
PB81-800476

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES AND INERTIA OR FRICTION WELDING ARE REVIEWED.

1980-0260 HACKLEMAN M
AT HOME WITH ALTERNATIVE ENERGY: A COMPREHENSIVE GUIDE TO CREATING YOUR OWN SYSTEMS.
CULVER CITY, CALIFORNIA. PEACE PRESS, 1980. 150 P.

THIS BOOK TAKES A COMPREHENSIVE LOOK AT THE FIVE MAJOR ALTERNATIVE SOURCES: SUN, WIND, WATER, WOOD, AND METHANE, AND THE CHOICES TO BE MADE IN BUILDING SYSTEMS TO UTILIZE THEM. HACKLEMAN HAS IMPLEMENTED THE DESIGNS HIMSELF. WHILE OTHER BOOKS WALK THE READER THROUGH PLANS, THIS ONE TAKES THE READER THROUGH THE REASONING TO DETERMINE WHICH FACTORS ARE ESSENTIAL TO AN ALTERNATIVE ENERGY SYSTEM, AND WHICH ARE A MATTER OF CHOICE. HE PRESENTS EACH SYSTEM IN TERMS OF A MULTITUDE OF CONTINGENCIES, IN LIGHT OF THE OVERALL ECOLOGY OF THE PLANET.

1980-0261 HACKLEMAN M
LOW VOLTAGE ENERGY SYSTEMS.
WIND POWER DIG. NO. 20: 6-10, 12-14, SUMMER 1980.

1980-0262 HAGEDORN N H, THALLER L H
REDOX STORAGE SYSTEMS FOR SOLAR APPLICATIONS.
POWER SOURCES CONFERENCE, 12TH, BRIGHTON, U.K., SEPTEMBER 15, 1980. NTIS, 1980. 30 P.
DOE/NASA/1002-80-5

THE WORLD-WIDE DEVELOPMENT OF SOLAR PHOTOVOLTAIC AND WIND TURBINE SYSTEMS TO MEET A RANGE OF TERRESTRIAL ELECTRICAL ENERGY REQUIREMENTS HAS UNDERSCORED THE NEED FOR INEXPENSIVE AND RELIABLE ELECTRICAL ENERGY STORAGE. THE NASA REDOX ENERGY STORAGE SYSTEM BASED ON SOLUBLE AQUEOUS IRON AND CHROMIUM CHLORIDE REDOX COUPLES HAS DISPLAYED MANY SYSTEM-RELATED FEATURES WHICH FOR THE MOST PART ARE UNIQUE TO THIS STORAGE SYSTEM. THE NEEDED TECHNOLOGY ADVANCES IN THE TWO ELEMENTS (ELECTRODES AND MEMBRANES) THAT ARE THE KEY TO ITS TECHNOLOGICAL FEASIBILITY HAVE BEEN ACHIEVED AND SYSTEM DEVELOPMENT HAS BEGUN. THE DESIGN, CONSTRUCTION, AND TEST OF A ONE-KILOWATT SYSTEM INTEGRATED WITH A SOLAR PHOTOVOLTAIC ARRAY IS UNDERWAY TO PROVIDE EARLY DEMONSTRATION OF THE ATTRACTIVE SYSTEM-RELATED FEATURES OF THE NASA REDOX STORAGE SYSTEM, ITS VERSATILITY AND ITS COMPATIBILITY WITH A TERRESTRIAL SOLAR PHOTOVOLTAIC ELECTRIC POWER SYSTEM.

1980-0263 HAHN M, WACKERLE P
DEVELOPMENT AND DESIGN OF A LARGE "WIND-TURBINE BLADE".
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C2, P. 141-158.

A SHORT SCHEDULE OF THE DEVELOPMENT GROUP AND THE DESIGN-BASIS DEVELOPED IN THE PAST WILL BE GIVEN. THE MOULD-CONCEPT IS THE KEY FOR DESIGN AND MANUFACTURING OF LARGE BLADE-STRUCTURES, WHICH NEEDS A SPECIAL SURFACE-DEFINITION AND STRUCTURAL DESIGN. THE BLADES DESIGN AND THE ASSEMBLY WILL BE DESCRIBED WITH ALL CONSEQUENCES FOR SURFACE DEFINITION, MATERIAL SELECTION, LAMINATE DESIGN, CURING PROCEDURE AND TOOL DESIGN. A COMPLETE SURVEY ABOUT THE TOOLING WILL BE GIVEN, INCLUDING MOULD AND HEATING SYSTEM, CUTTING AND MILLING DEVICES. A SHORT REPORT ABOUT THE MANUFACTURING OF AN 11 METRE-TEST SECTION COMPLETES THE PRESENTATION.

1980-0264 HALACY D S
SOLAR ENERGY AND THE BIOSPHERE.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. NEW YORK, MARCEL DEKKER, INC., 1980. P. 3-13.

THE INTERACTION OF THE SUN WITH THE EARTH'S BIOSPHERE IS DISCUSSED. THE RELATION OF SOLAR RADIATION TO PHOTOBIOLOGICAL PROCESSES IS CONSIDERED. SPECIFIC PROCESSES DESCRIBED INCLUDE THE ENERGETICS OF PHOTOCHEMISTRY, VISION, PHOTOTROPISM AND PHOTOSYNTHESIS. THE VARIOUS FORMS IN WHICH ENERGY APPEARS AND IS STORED IN THE BIOSPHERE ARE REVIEWED, INCLUDING SOLAR, OCEAN THERMAL, WIND, HYDROPOWER, FOSSIL FUELS, INTERNAL HEAT IN THE EARTH, TIDAL POWER, NUCLEAR AND FUSION ENERGY.

1980-0265 HAMILTON L D
COMPARATIVE RISKS FROM DIFFERENT ENERGY SYSTEMS: EVOLUTION OF THE METHODS OF STUDIES.
INT. AT. ENERGY AGENCY BULL. 22(5/6): 35-71, OCTOBER 1980.

THE RISKS OF DEATH, DISEASE AND INJURY FROM THE COAL FUEL CYCLE, THE NUCLEAR FUEL CYCLE, AND WIND ENERGY ARE ESTIMATED.

1980-0266 HANSEN A C
ADJUSTMENT OF SWECS POWER CURVES FOR AIR DENSITY VARIATIONS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, MARCH 1980. 8 P.
TM-TO/80-2

PAST METHODS FOR CORRECTING SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) POWER CURVES TO STANDARD SEA LEVEL CONDITIONS HAVE CONSISTED SIMPLY OF MULTIPLYING THE POWER BY THE DENSITY RATIO. THESE METHODS ARE LIMITED IN THEIR ACCURACY IN THAT THEY IGNORE TWO FACTS: 1) CUT-IN SPEED IS A FUNCTION OF DENSITY, AND 2) THE MAXIMUM OUTPUT OF MANY SWECS IS LIMITED BY CONTROLS OR GENERATOR CAPACITY RATHER THAN AERODYNAMIC LIMITS. THIS MEMO

DESCRIBES A NEW METHOD WHICH CONSISTS OF ADJUSTMENT TO WIND SPEED NEAR CUT-IN AND ADJUSTMENT TO POWER OUTPUT AT ALL OTHER WIND SPEEDS. REYNOLDS NUMBER AND ROTOR/LOAD MATCHING EFFECTS, THOUGH POSSIBLY OF SIGNIFICANCE IN SPECIAL LIMITED SITUATIONS, ARE NOT TREATED IN THIS METHOD.

1980-0267 HANSEN A C
EARLY RESULTS FROM THE SWECS ROTOR WAKE MEASUREMENT PROJECT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, SEPTEMBER 1980. 21 P.
TM-TD/81-4

MEASUREMENTS WERE TAKEN IN AUGUST, 1980 AT THE DEPARTMENT OF TRANSPORTATION RAIL TEST FACILITY IN PUEBLO, COLORADO USING CONTROLLED VELOCITY TESTS TO QUANTITATIVELY MEASURE THE NATURE AND EXTENT OF THE WAKE AROUND A HORIZONTAL-AXIS WIND MACHINE AND TO PROVIDE DATA NECESSARY TO VALIDATE ROTOR WAKE MODELS. EARLY RESULTS ARE PRESENTED IN THIS TECHNICAL MEMO AND SHOW THAT THE MEAN VELOCITY WAKE AT THE CENTER LINE IS DETECTABLE 14 DIAMETERS FROM THE ROTOR. THE INTERDEPENDENCE OF THE WAKE STRENGTH AND SWECS POWER COEFFICIENT WAS ALSO MEASURED. COMPLETE RESULTS WILL BE REPORTED IN A LATER FINAL REPORT.

1980-0268 HANSEN A C
NOISE MEASUREMENTS OF TWO SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1980. 6 P.
TM-II-80-1

NOISE MEASUREMENTS PRESENTED IN THIS MEMO INDICATE THAT NOISE LEVELS NEAR THE DUNLITE AND GRUMMAN SWECS ARE COMPLETELY ACCEPTABLE AND SHOULD CAUSE NO DISTURBANCE TO PERSONS NEAR THE SYSTEMS. THE SOUND PRESSURE LEVELS OF THE TWO WIND MACHINES WERE CONSISTENTLY IN THE 40 TO 60 DBA RANGE. BY USING CHARTS DEPICTING TYPICAL SOUND LEVELS OF DIFFERENT SOURCES, IT CAN BE CONCLUDED THAT THE NOISE LEVELS OF THE TWO SWECS AS MEASURED AT THE ROCKY FLATS WIND SYSTEMS TEST CENTER ARE LESS THAN OR EQUIVALENT TO THE LEVELS ENCOUNTERED IN AN OFFICE ENVIRONMENT. IT SHOULD BE NOTED THAT BACKGROUND WIND NOISE COULD MASK SWECS NOISE AT HIGHER WIND SPEEDS. IT SHOULD ALSO BE NOTED THAT CONCLUSIONS IN THIS MEMO ARE PRELIMINARY IN NATURE AND CANNOT BE CONSIDERED DEFINITIVE.

1980-0269 HANSEN A C
TURBULENCE AND WIND-TURBINE PERFORMANCE.
ASCE TRANSP. ENG. J. 106(6): 675-683, NOVEMBER 1980.

ACTIVITIES MANAGED BY ROCKWELL INTERNATIONAL FOR THE DEPARTMENT OF ENERGY HAVE BEGUN TO DETERMINE THE QUANTITATIVE SIGNIFICANCE OF TURBULENCE TO WIND TURBINE UTILIZATION. AT THE WIND SYSTEMS TEST CENTER THREE METHODS ARE AVAILABLE FOR ANALYSIS OF PERFORMANCE DATA TAKEN IN TURBULENT WINDS. FREQUENCY-MATCHING, THE METHOD-OF-BINS AND MOST-PROBABLE-POWER METHODS ARE DESCRIBED AND IT IS SHOWN THAT THE METHOD-OF-BINS IS THE MOST ACCURATE METHOD FOR CALCULATING A SYSTEM POWER CURVE FOR USE IN ENERGY YIELD PREDICTIONS. LIMITATIONS AND ADVANTAGES OF THE ANALYSIS METHODS ARE HIGHLIGHTED. WIND ENERGY CONVERSION SYSTEM DEVELOPMENT SUBCONTRACTS HAVE RESULTED IN IMPROVED UNDERSTANDING OF THE IMPORTANCE OF TURBULENCE IN SYSTEM DESIGN. IN NINE DESIGNS, TURBULENCE (GUST) CONSIDERATIONS HAVE BEEN SECOND ONLY TO MAXIMUM SURVIVAL WIND SPEED, IN IMPORTANCE TO STRUCTURAL DESIGN. THE EXPERIENCES TO DATE OF THE NINE DESIGN EFFORTS ARE SUMMARIZED.

1980-0270 HANSEN A C, BUTTERFIELD C P
CURRENT DEVELOPMENTS IN SMALL WIND ENERGY CONVERSION SYSTEMS.
J. IND. AERODYN. 5(3-4): 337-356, MAY 1980.

A SURVEY AND REVIEW OF THE CURRENT STATE-OF-THE-ART RESEARCH AND DEVELOPMENT IS PRESENTED FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). CURRENT TECHNICAL AND ECONOMIC STATUS OF SWECS IS GIVEN INCLUDING SOME ADVANTAGES AND DISADVANTAGES OF VARIOUS TECHNICAL APPROACHES TO WIND ENERGY CONVERSION. PROGRAMS ARE DESCRIBED WHICH ARE DESIGNED TO ADVANCE THE COMMERCIALIZATION OF SWECS.

1980-0271 HIGASHI K K
DUNLITE MODEL 81/002550 WIND TURBINE GENERATOR. FINAL TEST REPORT.
NTIS, FEBRUARY 1980. 25 P.
RFP-3149/3533/80-17

THE DUNLITE MODEL 81/002550 WIND TURBINE GENERATOR HAS MET ALL MANUFACTURER CLAIMS OF PERFORMANCE AND RELIABILITY. THE MACHINE OPERATED SATISFACTORILY IN WINDS UP TO THE MANUFACTURER RATED SURVIVAL SPEED OF 36 M/S (80 MPH). IN ADDITION, THE DUNLITE OPERATED IN WINDS EXCEEDING 22.5 M/S (50 MPH) FOR EIGHT HOURS WITHOUT INCURRING DAMAGE. MAJOR DAMAGE TO THIS MACHINE OCCURRED WHEN WIND SPEEDS EXCEEDED 40.3 M/S (90 MPH). IF WINDS OF THIS VELOCITY ARE EXPECTED, THE MANUFACTURER OFFERS A HIGH SPEED MODEL OF THIS WIND TURBINE DESIGNED TO WITHSTAND WINDS OF 49.5 M/S (110 MPH). TESTING OF THE DUNLITE INDICATED THAT THE MACHINE IS CAPABLE OF PRODUCING ITS RATED OUTPUT OF 2 KW AT 11 M/S (25 MPH).

1980-0272 HIMMELMAN W A
POWER FROM THE WIND.
SOLAR ENGINEERING FOR DOMESTIC BUILDINGS. NEW YORK, MARCEL DEKKER, 1980. P. 242-262.

INFORMATION IS PRESENTED CONCERNING DOMESTIC POWER SYSTEMS; AVAILABLE WIND ENERGY; TYPES OF WIND TURBINES; ESTIMATION OF SHAFT POWER; SYSTEM EFFICIENCY; DOMESTIC POWER REQUIREMENTS; WIND SYSTEM COMPONENTS; WIND TURBINE MANUFACTURERS; AND ENERGY STORAGE BY WATER RESERVOIRS AND COMPRESSED AIR.

1980-0273 HINRICHSEN E N, NOLAN P J
MOD-2 WIND TURBINE FARM STABILITY STUDY.
NTIS, JUNE 1980. 171 P.
DOE/NASA/0134-1, NASA-CR-165156, N80-33862

THE DEVELOPMENT OF LARGE WIND TURBINE GENERATORS (WTGS) FOR OPERATION IN UTILITY POWER SYSTEMS IS ACCELERATING. THIS REPORT CONTAINS THE RESULTS OF AN INVESTIGATION OF THE DYNAMICS OF SINGLE AND MULTIPLE 2.5 MW, BOEING MOD-2 WTGS CONNECTED TO UTILITY POWER SYSTEMS, INCLUDING THE FIRST THREE-MACHINE CLUSTER CONNECTED TO THE GRID OF THE BONNEVILLE POWER ADMINISTRATION. THE ANALYSIS IS BASED ON DIGITAL SIMULATION OF THE COMPLETE ELECTROMECHANICAL SYSTEM OF SINGLE AND MULTIPLE WTGS, INCLUDING WIND TURBINE, WIND TURBINE CONTROL, DRIVE TRAIN, GENERATOR, GENERATOR EXCITATION CONTROL, ELECTRICAL NETWORK AND EQUIVALENT UTILITY SOURCE. BOTH TIME RESPONSE AND FREQUENCY RESPONSE METHODS WERE USED. THE RESULTS SHOW THAT THE DYNAMICS OF WTGS ARE CHARACTERIZED BY TWO TORSIONAL MODES, THE LIGHTLY DAMPED SHAFT MODE AT FREQUENCIES WELL BELOW 1 HZ, AND THE ELECTRICAL MODE AT 3-5 HZ. THE FORMER IS PRIMARILY EXCITED BY WIND SPEED DISTURBANCES, THE LATTER BY ELECTRICAL DISTURBANCES. SINCE THE SHAFT MODE FALLS WITHIN THE BANDWIDTH OF BLADE PITCH CONTROL, ADDITIONAL DAMPING FOR THIS MODE IS A PREREQUISITE FOR GOOD TURBINE CONTROL.

1980-0274 HIRSCHBEIN M S, YOUNG M I
STABILITY OF LARGE HORIZONTAL-AXIS AXISYMMETRIC WIND TURBINES.
NTIS, 1980. 37 P.
NASA-TM-81623, E-633, N81-12446

THE STABILITY OF LARGE HORIZONTAL AXIS, AXI-SYMMETRIC, POWER PRODUCING WIND TURBINES WAS EXAMINED. THE ANALYTICAL MODEL USED INCLUDED THE DYNAMIC COUPLING OF THE ROTOR, TOWER AND POWER GENERATING SYSTEM. THE AERODYNAMIC LOADING WAS DERIVED FROM BLADE ELEMENT THEORY. EACH ROTOR BLADE WAS PERMITTED TWO PRINCIPAL ELASTIC BENDING DEGREES OF FREEDOM, ONE DEGREE OF FREEDOM IN TORSION AND CONTROLLED PITCH AS A RIGID BODY. THE ROTOR HUB WAS MOUNTED IN A RIGID NACELLE WHICH MAY YAW FREELY OR IN A CONTROLLED MANNER. THE TOWER CAN BEND IN TWO PRINCIPAL DIRECTIONS AND MAY TWIST. ALSO, THE ROTOR SPEED CAN VARY AND MAY INDUCE PERTURBATION REACTIONS WITHIN THE POWER GENERATING EQUIPMENT. STABILITY WAS DETERMINED BY THE EIGENVALUES OF A SET OF LINEARIZED CONSTANT COEFFICIENT DIFFERENTIAL EQUATIONS. ALL RESULTS PRESENTED ARE BASED ON A 3-BLADED, 300 FT. DIAMETER, 2.5 MEGAWATT WIND TURBINE. SOME OF THE PARAMETERS VARIED WERE: WIND SPEED, ROTOR SPEED, STRUCTURAL STIFFNESS AND DAMPING, THE EFFECTIVE STIFFNESS AND DAMPING OF THE POWER GENERATING SYSTEM AND THE PRINCIPAL BENDING DIRECTIONS OF THE ROTOR BLADES. UNSTABLE OR WEAKLY STABLE BEHAVIOR CAN BE CAUSED BY AERODYNAMIC FORCES DUE TO MOTION OF THE ROTOR BLADES AND TOWER IN THE PLANE OF ROTATION OR BY MECHANICAL COUPLING BETWEEN THE ROTOR SYSTEM AND THE TOWER.

1980-0275 HOHENEMSER K H, SWIFT A H P
THE YAWING OF WIND TURBINES WITH BLADE CYCLIC PITCH VARIATION.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 207-224.
SERI/CP-635-938

A NEW TYPE OF HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, ANALYZED, BUILT AND BRIEFLY TESTED IN THE ATMOSPHERE. THE 7.6 METER DIAMETER UPWIND ROTOR IS TAIL VANE STABILIZED. IT HAS PASSIVE CYCLIC PITCH VARIATION OBTAINED BY A SMALL BUILT-IN BLADE PRELAG ANGLE IN RELATION TO THE CYCLIC PITCH AXIS. THE USUAL COMPLEX BLADE FEATHERING MECHANISM IS OMITTED. INSTEAD, THE ROTOR FURL ANGLE CAN BE VARIED BY A HIGH SPEED ACTUATOR. THE TWO-BLADED ROTOR STARTS EASILY, IT RUNS SMOOTHLY, IT CAN BE RAPIDLY YAWED WITHOUT PRODUCING GYROSCOPIC HUB MOMENTS OR NOTICEABLE OUT-OF-PLANE BLADE EXCURSIONS, AND IT IS OF VERY SIMPLE DESIGN.

1980-0276 HOLDREN J P, MORRIS G, MINTZER I
ENVIRONMENTAL ASPECTS OF RENEWABLE ENERGY SOURCES.
NTIS, FEBRUARY 1980. 102 P.
UCB/ERG-80-1

THE LITERATURE TREATING ENVIRONMENTAL CHARACTERISTICS OF RENEWABLE ENERGY SOURCES IS SURVEYED AND REVIEWED. THE INFORMATION REQUIRED FOR COMPREHENSIVE, COMPARATIVE ASSESSMENT OF THE ENVIRONMENTAL EFFECTS OF ENERGY ALTERNATIVES IS DETERMINED, AND THE COVERAGE OF THE EXTANT LITERATURE IS EVALUATED AGAINST THIS STANDARD. THE TECHNICAL CHARACTERISTICS OF RELEVANT ENERGY TECHNOLOGIES ARE SUMMARIZED, EMPHASIZING ENVIRONMENTAL ASPECTS. THE MOST PROMISING RENEWABLES ARE COMPARED TO EACH OTHER AND TO NONRENEWABLE ENERGY TECHNOLOGIES. SUGGESTIONS CONCERNING IMPLICATIONS FOR ENERGY CHOICES ARE MADE.

1980-0277 HOLUB G
WIND POWER STATIONS.
ELEKTROTECHNIK 35(10): 297-299, NOVEMBER 1980. (IN CZECHOSLOVAKIAN)

THE PAPER SURVEYS THE 1980 STATE AND DEVELOPMENT TRENDS OF HIGH-POWER WIND STATIONS (ABOVE 100 KW) TAKING INTO ACCOUNT BOTH THE TECHNICAL AND ECONOMIC FACTORS. THE CONSTRUCTION OF TURBINES, TRANSMISSION GEAR AND GENERATORS IS DISCUSSED.

1980-0278 HOOVER L J, SANTINI D J, SMELTZER K K, STENEHJEM E J
CONCENTRATED VS. DISTRIBUTED ENERGY: EMPLOYMENT BASED COMMUNITY LEVEL DIFFERENCES.
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, ANNUAL CONFERENCE, SAN FRANCISCO, CALIFORNIA, JANUARY 4, 1980. NTIS, 1980. 14 P.
CONF-800111-4

CONSIDERATION IS GIVEN TO THE DIFFERENCES BETWEEN CONCENTRATED OPTIONS (CENTRAL STATION ELECTRIC, SYNFUELS) AND DISTRIBUTED OPTIONS (SHACOB) FOR RESIDENTIAL SPACE CONDITIONING. EMPLOYMENT, GEOGRAPHIC LOCATION, COMMUNITY STABILITY, AND LOCATIONAL EQUITY ARE THE FACTORS DISCUSSED.

1980-0279 HUGOSSON S
SWEDEN TO BUILD LARGE-SCALE WIND TURBINE PROTOTYPES.
INT. POWER GENERATION 3(8): 37, 39, NOVEMBER 1980.

THIS ARTICLE DISCUSSES THE CONSTRUCTION OF TWO MEDIUM SIZE WIND TURBINES WHICH WILL BE USED TO OBTAIN DATA AND EXPERIENCE TO FORM THE BASIS FOR A MORE EXTENSIVE WIND POWER PROGRAMME TO BE IMPLEMENTED IN THE MID 1980S.

1980-0280 HUGOSSON S
SWEDISH WIND ENERGY PROGRAM.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 399-405.

THE SWEDISH GOVERNMENTAL PROGRAM FOR WIND ENERGY RESEARCH AND DEVELOPMENT IS PLANNED AND IMPLEMENTED BY THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT (NE), ESTABLISHED IN 1975. THE BOARD'S PURPOSE AND RESPONSIBILITIES INVOLVE SETTING UP PROGRAMS, DISTRIBUTING GRANTS AND LOANS FOR RESEARCH AND DEVELOPMENT IN ENERGY MATTERS. THE WIND ENERGY PROGRAM IS ONE OF 15 PROGRAMS.

1980-0281 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. 1964-1978 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, JULY 1980. 290 P.
PB80-812886

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR.

1980-0282 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. 1979-JUNE, 1980 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, JULY 1980. 117 P.

INVOLVED IN WIND DESIGN ARE COVERED.

1980-0284 HUSAIN S A
COMFORTABLE HEATING AND COOLING BY SOLAR REFLECTORS AND WIND.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1850-1861.

THIS PAPER EXAMINES THE USE OF SOLAR AND WIND ENERGY FOR DOMESTIC SPACE HEATING AND COOLING, WATER HEATING AND COOKING.

1980-0285 HUSS G, PERNPEITNER R
AERODYNAMIC ROTOR DESIGN OF THE "GROWIAN" LARGE-SCALE WIND ENERGY CONVERTER.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 406-415.

THE AERODYNAMIC DESIGN OF THE ROTOR ESTABLISHES TO A LARGE EXTENT THE PERFORMANCE CHARACTERISTICS AND ENERGY DELIVERY OF WIND ENERGY CONVERTERS. WITHIN THIS FRAMEWORK, THERE ARISE THE QUESTIONS AS TO ROTOR BLADE GEOMETRY, NUMBER OF ROTOR BLADES, DESIGN TOP-SPEED RATIO, NOMINAL ROTOR SPEED, HUB HEIGHT AND INSTALLED GENERATOR RATING PER ROTOR CIRCLE. TAKING REPRESENTATIVE WIND DATA FROM THE NORTH-GERMAN COASTAL AREA (LIST ON THE ISLAND OF SYLT) AS A BASIS, THE SELECTION AND OPTIMIZATION OF THESE PARAMETERS FOR THE GROWIAN LARGE-SCALE WIND ENERGY CONVERTER IS DISCUSSED. MORE DETAIL IS GIVEN IN PARTICULAR ON THE RELATIONSHIP WITH THE EXPECTED ANNUAL ENERGY PRODUCTION OF THE SYSTEM.

1980-0286 IGRA O
PRELIMINARY RESULTS FROM THE SHROUDED WIND-TURBINE PILOT PLANT.
J. ENERGY 4(4): 190-192, JULY-AUGUST 1980.

THIS ARTICLE PRESENTS SOME PRELIMINARY RESULTS OF WORK BEING DONE ON THE DEVELOPMENT OF A SHROUDED WIND-TURBINE PILOT PLANT IN ISRAEL.

1980-0287 INALL E K
LOW-SPEED VERTICAL-AIROFOIL, VERTICAL-AXIS WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 195-201.
SERI/CP-635-938

MOST DESIGNS FOR WIND DRIVEN TURBINES BUILT TO PRODUCE ELECTRIC POWER OPERATE, FOR HIGH EFFICIENCY, WITH BETA > 4 (BETA = ROTOR TIP SPEED/WIND SPEED). CONSEQUENTLY THE CENTRIFUGAL FORCES ON THE ROTORS ARE HIGH AND COMBINED WITH OTHER FLUCTUATING FORCES IN EXPENSIVE ROTORS OF SOPHISTICATED DESIGN MADE FROM SPECIAL MATERIALS. AN ALTERNATIVE IS TO USE A LESS EFFICIENT, SLOW MOVING, LARGE ROTOR WITH LOWER STRESS IN CHEAPER MATERIAL. SUCH ROTORS ALSO HAVE MUCH HIGHER STARTING TORQUE, WHICH IS MAINTAINED OVER A RANGE OF SPEED, PROVIDING ADEQUATE OUTPUT AND SIMPLE LOAD CONTROL WITHOUT SPECIAL PROVISION TO PREVENT STALLING. TESTS ARE REPORTED ON A MODEL WITH BLADES WHICH AUTOMATICALLY ASSUME TWO SET POSITIONS DURING ROTATION AND ONE POSITION GOVERNED BY CENTRIFUGAL FORCES ON THE BLADE. EFFICIENCIES UP TO 15% HAVE BEEN OBTAINED.

1980-0288 JACOB A, RAJAGOPALAN V, VEILLETTE D
STRATEGIE DE COMMANDE POUR UN SYSTEME DE CONVERSION DE L'ENERGIE EOLIENNE A VITESSE VARIABLE. (CONTROL STRATEGY OF A SYSTEM FOR THE CONVERSION OF VARIABLE SPEED WINDMILL POWER.)
CAN. ELECTR. ENG. J. 5(1): 16-20, JANUARY 1980. (IN FRENCH)

A METHOD OF CALCULATING AN OPTIMAL CONTROL STRATEGY FOR A VARIABLE SPEED WIND POWER GENERATION SCHEME, INCORPORATING A SQUIRREL CAGE INDUCTION MACHINE, OPERATING IN A SELF EXCITED INDUCTION GENERATOR MODEL IS PRESENTED. THE SYSTEM INCORPORATES A CONVENTIONAL THREE-PHASE THYRISTOR RECTIFIER, A LINE COMMUTATED INVERTER AND AN ECONOMICAL AUXILIARY COMMUTATED VOLTAGE SOURCE INVERTER. THE THREE REGULATED VARIABLES ARE: DRIVE SPEED AS A FUNCTION OF AVAILABLE MECHANICAL ENERGY BY MANIPULATING THE RESISTIVE TORQUE DEVELOPED BY AN INDUCTION GENERATOR; INDUCTION MOTOR POWER CONSUMPTION DURING START-UP OF THE WINDMILL WHICH IS OF VERTICAL AXIS TYPE; OPERATING SLIP OF THE INDUCTION MACHINES, THEREBY LIMITING START-UP AND BRAKING CURRENTS. THE STRATEGY IS SUITABLE FOR ANY OTHER VARIABLE SPEED DRIVE SYSTEM INCORPORATING AN INDUCTION MACHINE.

1980-0289 JAGADISH B S
WIND ENERGY.
NONCONVENTIONAL SOURCES OF ENERGY: NOTES ON SHORT-TERM COURSE. NTIS, 1980. PAPER 11, 19 P.
NP-25005

INFORMATION IS PRESENTED CONCERNING WIND POWER KINETICS; WIND POWER AVAILABILITY IN INDIA; AND DESIGN CHARACTERISTICS OF VARIOUS TYPES OF WIND TURBINES.

1980-0290 JAIN B C
RESEARCH IN THE AREA OF RENEWABLE SOURCES OF ENERGY AT JYOTI.
NONCONVENTIONAL SOURCES OF ENERGY: NOTES ON SHORT-TERM COURSE. NTIS, 1980. PAPER 8, 5 P.
NP-25005

RESEARCH ACTIVITIES IN THE FOLLOWING AREAS ARE DESCRIBED BRIEFLY: SOLAR HOT WATER SYSTEMS, SOLAR HOT AIR SYSTEMS, SOLAR LOW PRESSURE STEAM SYSTEMS, SOLAR-POWERED COLD STORAGE, SOLAR THERMAL POWER GENERATION, WIND POWER, BIO-GAS PLANTS, RURAL ENERGY CENTERS, AND PHOTOVOLTAIC SYSTEMS. THE FACILITIES AT JYOTI ARE LISTED.

1980-0291 JANCZEWSKI J

THE USE OF WIND ENERGY IN ELECTRICAL ENERGY PRODUCTION.
ENERGETYKA 34(5): 171-175, MAY 1980. (IN POLISH)

THE PAPER PRESENTS A REVIEW OF RESEARCH WORKS IN THE FIELD OF WIND ENERGY USE FOR POWER GENERATION. IT ALSO PRESENTS A SCHEME OF TECHNICAL AND ECONOMIC CALCULATIONS FOR THE CHOICE OF A PARTICULAR TYPE OF WINDPOWER TURBINE SET. POSSIBILITIES FOR BUILDING WIND-POWER STATIONS ARE CONSIDERED.

1980-0292 JENSEN S A, BJERREGAARD E T D
TESTS PERFORMED ON THE 2 MW TVIND WECS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H3, P. 391-400.

MEASUREMENTS ON THE 2 MW WECS, BUILT BY THE TVIND SCHOOLS IN JUTLAND, HAVE BEEN CARRIED OUT IN CONNECTION WITH THE DEVELOPMENT OF GENERAL TEST METHODS AND MEASURING OF EQUIPMENT FOR LARGE WECS. A BRIEF DESCRIPTION IS GIVEN OF THE INSTRUMENTATION. MEASUREMENTS WERE MADE WITH STRAIN GAUGES MOUNTED AT VARIOUS POSITIONS ALONG THE ROTOR BLADES. THE ROTOR SHAFT TORQUE AND RPM WERE MEASURED, ENABLING THE MECHANICAL POWER EFFICIENCY TO BE INVESTIGATED. THE REPORTED RESULTS COVER THE WIND VELOCITY RANGE 5-12 M/S, WHICH CORRESPONDS ROUGHLY TO THE POWER RANGE THAT, AT THE TIME OF TESTING, COULD BE ABSORBED BY THE ELECTRICAL GRID. THE SIGNALS FROM THE ROTATING PARTS WERE TRANSMITTED TO A TAPERECORDER VIA A 16 CHANNEL TELEMETRI SYSTEM DESIGNED AND BUILT FOR THE PURPOSE. THE RESULTS PRESENTED DEAL MAINLY WITH THE INFLUENCE FROM THE TOWER SHADOW ON THE ROTOR WHICH IS LOCATED ON THE DOWN-WIND SIDE OF THE TOWER.

1980-0293 JESCH L F
LINEARISED BLADE DESIGN FOR HORIZONTAL AXIS WIND TURBINES.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FURUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY DGS-SONNENENERGIE VERL., 1980. P. 491.

1980-0294 JESCH L F, CROSSLAND R T
DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINE BLADES.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 450-457.

ANGLE OF ATTACK, THRUST COEFFICIENT AND REYNOLDS NUMBER VARIATIONS FOR EACH ELEMENT OF THE BLADE IN EVERY ROTATIONAL POSITION OF THE VERTICAL AXIS ROTOR IS ANALYSED BY A COMPUTER MODEL, USING FINITE ELEMENT TECHNIQUE. THE THRUST COEFFICIENT IS FOUND TO HAVE FOUR DISTINCT PEAKS WHEN PLOTTED AGAINST THE ANGULAR POSITION OF THE SHAFT. IN A COMPLETE CYCLE THESE VALUES OSCILLATE RAPIDLY BETWEEN POSITIVE MAXIMA AND NEGATIVE MINIMA. THE AMPLITUDE AND FREQUENCY OF THESE VARIATIONS IN THRUST, CAUSED BY THE CHANGES IN AERODYNAMIC LIFT OF THE ROTATING BLADE, IS DIFFERENT FOR ENERGY ELEMENTAL POSITION AND IT IS DEPENDENT ON OPERATING CONDITIONS. AT HIGH SPEEDS POSITIVE TORQUE IS PRODUCED EVEN AT STALL CONDITIONS.

1980-0295 JESCH L F, WALTON D
REYNOLDS NUMBER EFFECTS ON THE AERODYNAMIC PERFORMANCE OF A VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER G1, P. 323-332.

THE IMPORTANCE OF REYNOLDS NUMBER ON THE DARRIEUS TYPE VERTICAL AXIS WIND TURBINES (VAWT) HAS BEEN RECOGNISED BEFORE BUT HAS NOT BEEN INVESTIGATED IN DETAIL. ROTOR PERFORMANCE HAS USUALLY BEEN CALCULATED ON THE BASIS OF A SINGLE REYNOLDS NUMBER OPERATING OVER THE ENTIRE LENGTH OF THE BLADE. A NEW COMPUTER MODEL CALCULATES THE LOCAL REYNOLDS NUMBER FOR EACH ELEMENT ALONG THE BLADE AND AS IT ROTATES. THE ACTUAL LOCAL LIFT AND DRAG COEFFICIENTS ARE THEN OBTAINED THROUGH DATA DERIVED FROM NACA TESTS. COMPARISON OF THE OVERALL TURBINE PERFORMANCE, OBTAINED BY USING THIS MODEL, WITH PREVIOUS THEORIES AND WITH WIND TUNNEL TEST RESULTS SHOWS A CONSIDERABLE IMPROVEMENT IN PREDICTION ACCURACY. USING THIS IMPROVED MODEL AN AERODYNAMIC ANALYSIS OF THE VAWT WAS PERFORMED. THE EFFECTS OF BLADE NUMBERS, BLADE GEOMETRY, CHORD LENGTH AND ROTOR SOLIDITY ARE INVESTIGATED SINGLY AND IN COMBINATIONS. THE RESULTS SHOW THAT WHEN A VARIABLE RE IS INCLUDED AND FOR A GIVEN SOLIDITY, IT IS NECESSARY TO CALCULATE THE EFFECT OF BLADE CHORD AND ROTOR RADIUS INDEPENDENTLY.

1980-0296 JOHANSSON B C A
THE VELOCITY INDUCED BY THE WAKE OF A WIND TURBINE IN A SHEAR LAYER, INCLUDING GROUND EFFECT.
NTIS, JUNE 1980. 42 P.
N81-20037, FFA-133, PB81-142184, N81-13471

A THEORY FOR THE CALCULATION OF THE VELOCITY FIELD INDUCED BY THE WAKE OF A HORIZONTAL AXIS WIND TURBINE IN A WIND SHEAR LAYER AND IN THE VICINITY OF PLANE GROUND SURFACE, WHEN THE FORCE DISTRIBUTION OF THE TURBINE IS KNOWN, IS DEVELOPED. THE TURBINE IS APPROXIMATED BY A DISK AREA OF CONTINUOUS DISTRIBUTIONS OF THRUST AND FORCE PARALLEL TO THE CYLINDER OF DISTRIBUTED VORTICITY. A NUMERICAL EXAMPLE IS CALCULATED AND DISTRIBUTIONS OF VELOCITY NORMAL TO THE DISK PLANE AND GROUND EFFECT INFLUENCES ARE SHOWN. THE THEORY IS BASED ON ASSUMPTIONS STRICTLY VALID ONLY FOR SMALL PERTURBATIONS OF THE UNDISTURBED FLOW.

1980-0297 JOHANSSON B C A
THE VELOCITY INDUCED BY THE WAKE OF A WIND TURBINE IN A SHEAR LAYER, INCLUDING GROUND EFFECT.
NTIS, SEPTEMBER 17, 1980. 51 P.
N81-14985, FFA-TN-HU-2198-PT.3

THE TURBINE WAS APPROXIMATED BY A DISK AREA OF CONTINUOUS DISTRIBUTIONS OF THRUST AND FORCE PARALLEL TO THE DISK PLANE. ITS WAKE WAS REPRESENTED BY A SEMI-INFINITE CYLINDER OF DISTRIBUTED VORTICITY. A NUMERICAL EXAMPLE WAS CALCULATED. THE THEORY IS BASED UPON ASSUMPTIONS STRICTLY VALID ONLY FOR SMALL PERTURBATIONS OF THE UNDISTURBED FLOW. HOWEVER, THE RESULTS MAY HAVE A WIDER RANGE OF APPLICABILITY.

1980-0298 JOHANSSON T B, STEEN P
SOLAR SWEDEN: AN OUTLINE TO A RENEWABLE ENERGY SYSTEM.
BIO-ENERGY WORLD CONGRESS AND EXPOSITION, ATLANTA, GEORGIA, APRIL 21, 1980. PROCEEDINGS. NTIS, 1980. P. 336-338.
CONF-800482

SOLAR SWEDEN IS AN OUTLINE OF A RENEWABLE ENERGY SYSTEM FOR SWEDEN IN THE YEAR 2015 USING BIOMASS, SOLAR HEATING, HYDROPOWER, WINDPOWER AND SOLAR CELLS. IT IS TAKEN AS AN ASSUMPTION THAT THE PRODUCTION OF GOODS AND SERVICES IS DOUBLED IN THE YEAR 2015 AS COMPARED WITH TODAY, WHICH MEANS THAT THE STANDARD OF LIVING IS DOUBLED. THE TOTAL ENERGY DEMAND IS ASSUMED TO BE ABOUT 25% ABOVE TODAY'S LEVEL DUE TO MODERATELY INCREASED ENERGY EFFICIENCY. THE AIM OF THE STUDY IS TO GIVE A BASIS FOR DISCUSSIONS OF THE ADVANTAGES AND DISADVANTAGES OF A RENEWABLE ENERGY SYSTEM. IT ALSO GIVES A BASIS FOR DIRECTING NEAR TERM DECISIONS IN ORDER TO MAKE SUCH AN

ENERGY SYSTEM A REALITY. THE TOTAL COST OF THE SYSTEM IS CALCULATED BASED ON FORECASTS OF COSTS TO BE ACHIEVED WITHIN TEN YEARS. IT IS FOUND THAT THE COSTS OF THE ENERGY SYSTEM ARE NOT IN CONFLICT WITH THE INCREASED PRODUCTION LEVELS ASSUMED IN THE WHOLE ECONOMY.

1980-0299 KAUFMAN J W
WIND WHEEL ELECTRIC POWER GENERATOR.
U.S. PATENT NO. 4,191,505, MARCH 4, 1980. 8 P.

THIS WIND WHEEL ELECTRIC POWER GENERATOR APPARATUS INCLUDES A HOUSING ROTATABLY MOUNTED UPON A VERTICAL SUPPORT COLUMN. PRIMARY AND AUXILIARY FUNNEL-TYPE, VENTURI DUCTS ARE FIXED ONTO THE HOUSING FOR CAPTURING WIND CURRENTS AND CONDUCTING TO A BLADED WHEEL ADAPTED TO BE OPERATIVELY CONNECTED WITH THE GENERATOR APPARATUS. ADDITIONAL AIR FLOWS ARE ALSO CONDUCTED ONTO THE BLADED WHEEL; ALL OF THE AIR FLOWS POSITIVELY EFFECTING ROTATION OF THE WHEEL IN A CUMULATIVE MANNER. THE AUXILIARY DUCTS ARE DISPOSED AT AN ACUTE ANGLE WITH RESPECT TO THE LONGITUDINAL AXIS OF THE HOUSING, AND THIS FEATURE, TOGETHER WITH THE ROTATABILITY OF THE HOUSING AND THE DUCTS, PERMITS CAPTURE OF WIND CURRENTS WITHIN A VARIBLE DIRECTIONAL RANGE.

1980-0300 KAZA K R V
NONLINEAR AEROELASTIC EQUATIONS OF MOTION OF TWISTED, NONUNIFORM, FLEXIBLE HORIZONTAL-AXIS TURBINE BLADES.
NTIS, JULY 1980. 70 P.
NASA-CR-159502, DOE/NASA/3139-1, N80-26774/3

THE SECOND-DEGREE NONLINEAR EQUATIONS OF MOTION FOR A FLEXIBLE, TWISTED, NONUNIFORM, HORIZONTAL AXIS WIND TURBINE BLADE WERE DEVELOPED USING HAMILTON'S PRINCIPLE. A MATHEMATICAL ORDERING SCHEME WHICH WAS CONSISTENT WITH THE ASSUMPTION OF A SLENDER BEAM WAS USED TO DISCARD SOME HIGHER-ORDER ELASTIC AND INERTIAL TERMS IN THE SECOND-DEGREE NONLINEAR EQUATIONS. THE BLADE AERODYNAMIC LOADING WHICH WAS EMPLOYED ACCOUNTED FOR BOTH WIND SHEAR AND TOWER SHADOW AND WAS OBTAINED FROM STRIP THEORY BASED ON A QUASI-STEADY APPROXIMATION OF TWO-DIMENSIONAL, INCOMPRESSIBLE, UNSTEADY, AIRFOIL THEORY. THE RESULTING EQUATIONS HAD PERIODIC COEFFICIENTS AND WERE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY AND RESPONSE OF LARGE HORIZONTAL-AXIS WIND TURBINE BLADES.

1980-0301 KAZA K R V, JANETZKE D C
MOSTAS COMPUTER CODE EVALUATION FOR DYNAMIC ANALYSIS OF TWO-BLADED WIND TURBINES.
J. ENERGY 4(4): 162-169, JULY-AUGUST 1980.

CALCULATED DYNAMIC BLADE LOADS ARE COMPARED WITH MEASURED LOADS OVER A RANGE OF YAW STIFFNESSES OF THE DOE/NASA MOD-0 WIND TURBINE TO EVALUATE THE PERFORMANCE OF TWO VERSIONS OF THE MOSTAS COMPUTER CODE. THE RESULTS OF THE FIRST VERSION DO NOT AGREE WITH DYNAMIC BLADE LOAD AMPLIFICATIONS AT OR CLOSE TO RESONANCE CONDITIONS. THE RESULTS OF THE SECOND VERSION COMPARE WELL WITH THE MEASURED DATA. TO EXPLAIN THE DEFICIENCIES OF THE FIRST VERSION, AN INVESTIGATION WAS MADE WITH THE AID OF A HYPOTHETICAL THREE-DEGREE-OF-FREEDOM DYNAMIC MODEL. THE EXACT EQUATIONS OF MOTION OF THIS MODEL WERE SOLVED USING THE FLOQUET-LIAPUNOV METHOD.

1980-0302 KEAST D N, POTTER R C
PRELIMINARY ANALYSIS OF THE AUDIBLE NOISE OF CONSTANT-SPEED, HORIZONTAL-AXIS WIND-TURBINE GENERATORS.
NTIS, JULY 1980. 72 P.
DOE/EV-0089

AN ANALYTICAL PROCEDURE HAS BEEN DEVELOPED FOR CALCULATING CERTAIN AERODYNAMIC SOUND LEVELS PRODUCED BY LARGE, HORIZONTAL-AXIS WIND-TURBINE GENERATORS (WTG'S) SUCH AS THE DOE/NASA MODS-0, -0A, -1, AND -2. THIS PRELIMINARY PROCEDURE IS BASED UPON VERY LIMITED FIELD DATA FROM THE MOD-0. IT POSTULATES A NOISE COMPONENT DUE TO THE (CONSTANT) ROTATION OF THE BLADES OF THE WTG, PLUS A WAKE-NOISE COMPONENT THAT INCREASES WITH THE SQUARE OF THE POWER PRODUCED BY THE WTG. MECHANICAL SOUND FROM MACHINERY, AND LOW-FREQUENCY IMPULSIVE SOUNDS PRODUCED BY BLADE INTERACTION WITH THE WAKE OF THE SUPPORT TOWER ARE NOT CONSIDERED.

1980-0303 KEITH T G
PERFORMANCE OF A STEEL SPAR WIND TURBINE BLADE ON THE MOD-0 100 KW EXPERIMENTAL TURBINE.
NTIS, SEPTEMBER 1980. 25 P.
DOE/NASA/1028-27, NASA-TM-81588, N81-11448

THE PERFORMANCE AND LOADING OF A LARGE WIND TURBINE ROTOR, 38.4 M IN DIAMETER AND COMPOSED OF TWO-COST STEEL SPAR BLADES HAS BEEN EXAMINED. TWO BLADES WERE FABRICATED AT LEWIS RESEARCH CENTER AND SUCCESSFULLY OPERATED ON THE MOD-0 WIND TURBINE AT PLUM BROOK. THE BLADES WERE OPERATED ON A TOWER ON WHICH THE NATURAL BENDING FREQUENCY HAD BEEN ALTERED BY PLACING THE TOWER ON A LEAF-SPRING APPARATUS. IT WAS FOUND THAT NEITHER BLADE PERFORMANCE NOR LOADING WERE AFFECTED SIGNIFICANTLY BY THIS TOWER SOFTENING TECHNIQUE. ROTOR PERFORMANCE EXCEEDED PREDICTION WHILE BLADE LOADS WERE FOUND TO BE IN REASONABLE AGREEMENT WITH THOSE PREDICTED. SEVENTY-FIVE HOURS OF OPERATION OVER A FIVE MONTH PERIOD RESULTED IN NO DETERIORATION IN THE BLADE.

1980-0304 KELLY D A
WIND CONVERSION LATTICE ARRAY, WITH MULTIPLE MINI-TURBO-GENERATOR MODULES.
U.S. PATENT NO. 4,220,870, SPETEMBER 2, 1980.

THIS REPORT DESCRIBES AN ARRAY OF IDENTICAL MINIATURE WIND TURBINE/GENERATOR MODULES. THE COMBINATION IS COMPRISED OF AN OPEN FRAMEWORK LATTICE SUPPORT STRUCTURE; A PLURALITY OF MINIATURE VANED TURBINE IMPELLERS OF CONCAVE LINEAR VANES VERTICALLY DISPOSED AND SECURED TO AN UPPER AND LOWER DISC ADJACENT TO THE OUTER PERIPHERY OF DISCS; A CENTRALLY DISPOSED SHAFT FIXED TO EACH OF THE DISCS PROTRUDING FROM AN END OF ONE OF THE DISCS; A COUPLING HALF SECURED TO THE SHAFT END WITH PROTECTIVE HOUSINGS DISPOSED OVER THE GENERATORS AND MOUNTED TO THEM; A CONNECTION OF ALL ELECTRICAL WIRES FROM THE GENERATORS INTO USEFUL SERIES AND PARALLEL CIRCUITRY FOR CONNECTION TO THE HOUSEHOLD LOAD; AND A HINGE AT THE BASE OF THE FRAMEWORK STRUCTURE, DIAGONAL PIVOTING SUPPORT STRUTS FOR MAINTAINING IT IN AN UPRIGHT POSITION.

1980-0305 KENDALL H W, NADIS S J
ENERGY STRATEGIES: TOWARD A SOLAR FUTURE.
CAMBRIDGE, MASSACHUSETTS, BALLINGER PUBLISHING CO., 1980. 320 P.

THE RESULTS OF A RESEARCH PROJECT CONDUCTED BY A TEAM FROM THE UNION OF CONCERNED SCIENTISTS ARE PRESENTED, IN WHICH IT IS SHOWN HOW A BLEND OF ALREADY DEMONSTRATED SOLAR ENERGY TECHNOLOGIES COULD, BY THE YEAR 2050, PROVIDE ALL OF THE U.S. ENERGY NEEDS.

1980-0306 KENTFIELD J A C
BENEFITS ARISING FROM THE USE OF PNEUMATIC ENERGY TRANSMITTAL IN WIND-POWER SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.

PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 821-827.

A BRIEF DESCRIPTION IS GIVEN OF A NEW FORM OF SIMPLE, FIXED PITCH, HORIZONTAL AXIS WIND TURBINE SUITABLE FOR THE DIRECT DRIVE OF MECHANICAL DEVICES SUCH AS PUMPS, COMPRESSORS, ETC. EXPERIMENTALLY OBTAINED PERFORMANCE CHARACTERISTICS OF THE TURBINE ARE PRESENTED WHICH SHOW THAT A RELATIVELY GOOD PERFORMANCE IS ACHIEVABLE. A PNEUMATIC TRANSMISSION SYSTEM SUITABLE FOR USE IN CONJUNCTION WITH THE NEW TURBINE IS ALSO DESCRIBED. PREDICTIONS OF THE PERFORMANCE OF THE PNEUMATIC TRANSMISSION SHOW THAT IT HAS PARTICULAR ADVANTAGES WHEN USED IN COMBINED WIND AND SOLAR-ENERGY CONVERSION SYSTEMS FOR ELECTRICAL POWER GENERATION. THE ENERGY CONVERSION EFFECTIVENESS OF AN OPTIMIZED CONFIGURATION IS 54% WHEN INTERNAL LOSSES ARE TAKEN INTO ACCOUNT AND APPROXIMATELY 60% OF THE TOTAL ENERGY INPUT IS THERMAL, THE REMAINDER BEING SHAFT-POWER PROVIDED BY THE WIND-TURBINES INCORPORATED IN THE SYSTEM. ADVANTAGES OF PNEUMATIC TRANSMISSIONS ARE DISCUSSED. THESE INCLUDE, APART FROM OVERALL SYSTEM SIMPLICITY, THE USE OF A NON-TOXIC WORKING FLUID AND THE COMPARATIVE EASE WITH WHICH ENERGY STORAGE CAN BE PROVIDED BOTH IN THE FORM OF STORED COMPRESSED AIR AND, WITH SOLAR ASSISTED SYSTEMS, THERMALLY.

1980-0307 KESSLER D L
WIND: A LOOK TO THE FUTURE.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 185-190.
CONF-800995

INFORMATION ON WIND TURBINES IS PRESENTED CONCERNING WIND POWER AVAILABILITY, SITE SELECTION, TURBINE CHARACTERISTICS, AND COST.

1980-0308 KILICKAYA M S
EFFECT OF AN EMBANKMENT ON THE WIND STRUCTURE.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 493.

1980-0309 KINLOCH D H, WICKS F E, BECKER M, YERAZUNIS S, PARMELEE J M
POTENTIAL AND IMPACTS OF WIND ELECTRIC GENERATORS UPON ELECTRIC POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY MEETING. NEW YORK, NY, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH1523-4/80, 1980. 10 P.

WIND GENERATION RESEARCH MUST BE INTERFACED WITH THE CAPABILITY OF ANALYZING GENERATION EXPANSION AND ELECTRIC DEMAND OVER A REALISTIC PLANNING PERIOD. METHODS OF INCORPORATING WIND ELECTRIC GENERATION INTO GENERATION PLANNING RESEARCH HAVE BEEN DEVELOPED AT RENSSELAER POLYTECHNIC INSTITUTE. THE GENERATION OUTPUT FROM AN HOUR-BY-HOUR SIMULATION OF WIND TURBINES USING ACTUAL WIND DATA IS COUPLED WITH HOURLY DATA FROM THE NEW YORK STATE ELECTRIC POWER LOAD FOR CORRESPONDING HOURS. THIS INFORMATION IS THEN PROCESSED WITH A GENERATION PLANNING MODEL THAT UTILIZES LINEAR PROGRAMMING TO CALCULATE THE CORRESPONDING OPTIMUM GENERATION AND OPERATING STRATEGY. THESE DATA ARE THEN POST-PROCESSED TO DETERMINE THE POTENTIAL AND IMPACTS OF WIND GENERATION ON POWER GENERATION AND PRIMARY FUEL REQUIREMENTS. BY COMBINING ACTUAL WIND AND ELECTRIC DEMAND DATA WITH FORECASTS OF FUTURE ELECTRIC DEMANDS, A REALISTIC PROJECTION OF WIND GENERATION'S IMPACT ON THE NEW YORK STATE UTILITIES IS EVALUATED OVER THE 1985 TO 2005 PLANNING PERIOD.

1980-0310 KLIMAS P C, FRENCH R E
USER'S MANUAL FOR THE VERTICAL AXIS WIND TURBINE PERFORMANCE COMPUTER CODE DARTER.
NTIS, MAY 1980. 48 P.
SAND-80-1155

THE COMPUTER CODE DARTER (DARRIEUS, TURBINE, ELEMENTAL REYNOLDS NUMBER) IS AN AERODYNAMIC PERFORMANCE/LOADS PREDICTION SCHEME BASED UPON THE CONSERVATION OF MOMENTUM PRINCIPLE. IT IS THE LATEST EVOLUTION IN A SEQUENCE WHICH BEGAN WITH A MODEL DEVELOPED BY TEMPLIN OF NRC, CANADA AND PROGRESSED THROUGH THE SANDIA NATIONAL LABORATORIES-DEVELOPED SIMOSS (SIMPLE MOMENTUM, SINGLE STREAMTUBE) AND DART (DARRIEUS TURBINE) TO DARTER.

1980-0311 KLUETER H
WORKING GROUP ON APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 519-522.
CONF-791097

1980-0312 KLUETER H H
WORKSHOP SUMMARY. WIND ENERGY APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 569-576.
CONF-791097

1980-0313 KNOX J B
WIND RESOURCE AND SITING REQUIREMENTS.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. NEW YORK, MARCEL DEKKER, INC., 1980. P. 617-664.

INFORMATION IS PRESENTED CONCERNING WIND ENERGY RESOURCE; THE U.S. WIND ENERGY CONVERSION PROGRAM; SITING REQUIREMENTS; METHODOLOGIES FOR SITE REQUIREMENTS; AND FUTURE RESEARCH DIRECTIONS.

1980-0314 KORNREICH T R, DEVINE D
CURRENT STATE INCENTIVE PROGRAMS FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, JULY 1980. 81 P.
RFP-3128/05480/3533/80-0

THE OBJECTIVE OF THIS STUDY IS TO PREPARE A SUMMARY REPORT DESCRIBING THE STATE INCENTIVE PROGRAMS FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) AS OF DECEMBER 31, 1979. WRITTEN PRIMARILY FOR THE USE OF STATE GOVERNMENTS, THIS REPORT FOCUSES ON THE CURRENT STATUS OF STATE INCENTIVE PROGRAMS AND REGULATIONS THROUGHOUT THE UNITED STATES. TO MAXIMIZE THE UTILITY OF THIS DOCUMENT TO THE STATES, AN UP-TO-DATE DESCRIPTION OF CURRENT PROGRAMS IS PROVIDED. BASED ON THE EXAMINATION OF ALL STATE INCENTIVE PROGRAMS IN EFFECT DURING THIS REPORTING PERIOD, THE PROGRAMS ARE DIVIDED INTO SIX CATEGORIES: 1) INCOME TAXES, 2) PROPERTY TAXES, 3) SALES AND USE TAXES, 4) LOANS, 5) GRANTS, 6) OTHER. THE EFFECT OF THE STATE PROGRAMS ON SWECS USAGE IS ALSO EXAMINED.

1980-0315 KORNREICH T R, DEVINE D
SWECS QUALIFICATIONS FOR STATE PROGRAMS. FINAL REPORT.
NTIS, JULY 1980. 35 P.

THIS REPORT IS INTENDED TO ASSIST IN ESTABLISHING THE NEEDED BASIS TO BE USED BY STATES TO EVALUATE SWECS INCLUSION IN TAX INCENTIVE PROGRAMS TO ENCOURAGE THE USE OF RENEWABLE ENERGY SYSTEMS. THREE PROTOTYPICAL QUALIFICATIONS DOCUMENTS ARE INCLUDED IN THIS REPORT REFLECTING THREE LEVELS OF STRINGENCY: VERY DEMANDING, MODERATELY DEMANDING, AND RELATIVELY RELAXED SETS OF REQUIREMENTS THAT MAY BE PLACED UPON SWECS BY THE STATES. QUALIFICATIONS REQUIREMENTS ALREADY IN EFFECT IN CERTAIN STATES AS WELL AS INFORMATION OBTAINED FROM INTERVIEWS WITH RESPONSIBLE OFFICIALS IN A SAMPLE OF TEN STATES WERE USED IN THIS STUDY. THIS INFORMATION WAS ANALYZED AND A RANGE OF OPTIONS FOR DEFINING SWECS QUALIFICATIONS WAS ESTABLISHED. IT IS ANTICIPATED THAT THE THREE QUALIFICATIONS DOCUMENTS DEVELOPED IN THIS REPORT WILL SERVE AS MODELS FOR STATES TO FOLLOW IN STRUCTURING THEIR OWN QUALIFICATIONS REQUIREMENTS FOR INCORPORATING RESIDENTIAL SWECS IN TAX INCENTIVE PROGRAMS.

1980-0316 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES. SUMMARY REPORT.
NTIS, APRIL 1980. 29 P.
SERI/TR-8003-2

THE ROTOR SUBSYSTEM REPRESENTS ONE OF THE MAJOR COST DRIVERS IN CONVENTIONAL WIND ENERGY SYSTEMS. DESPITE THE FACT THAT THE TWO VORTEX EXTRACTION SYSTEMS EVALUATED HAVE THE POTENTIAL FOR SUBSTANTIALLY REDUCING ROTOR COSTS, THESE COST SAVINGS ARE MORE THAN OFFSET BY THE ADDITIONAL COSTS REQUIRED FOR THE AUGMENTATION DEVICES. BASED ON A PRELIMINARY ANALYSIS OF THE PRESENTLY ENVISIONED CONCEPTUAL DESIGNS OF THE TORNADO WIND ENERGY SYSTEM AND THE VORTEX AUGMENTOR SYSTEM, IT DOES NOT APPEAR THAT EITHER SYSTEM COULD ACHIEVE ECONOMIC PARITY WITH CONVENTIONAL HORIZONTAL AXIS WIND SYSTEMS EVEN IF ALL OF THE TECHNICAL UNCERTAINTIES SURROUNDING THESE INNOVATIVE CONCEPTS ARE FAVORABLY RESOLVED.

1980-0317 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES. FINAL REPORT.
NTIS, APRIL 1980. 90 P.
SERI/TR-8003-1

TWO INNOVATIVE VORTEX EXTRACTION DEVICES--THE TORNADO WIND ENERGY SYSTEM (TWES) AND THE VORTEX AUGMENTOR CONCEPT (VAC)--ARE CRITICALLY EVALUATED TO PROVIDE A PRELIMINARY ASSESSMENT OF THEIR TECHNICAL AND ECONOMIC VIABILITY AS COMPARED TO CONVENTIONAL HORIZONTAL AXIS WIND ENERGY SYSTEMS. THIS ASSESSMENT WAS CARRIED OUT OVER A WIDE RANGE OF POWER OUTPUT LEVELS AND AUGMENTATION RATIOS APPROPRIATE TO EACH OF THE CONCEPTS.

1980-0318 KOTTLER R J
PROCEEDINGS OF THE FOURTH BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
ARLINGTON, VIRGINIA, JFB SCIENTIFIC CORPORATION, JUNE 1980. 639 P.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH, WASHINGTON, D.C., OCTOBER 28, 1979.
CONF-791097

1980-0319 KOVARIK T, PIPHER C, HURST J
WIND ENERGY. THE GENERATION, STORAGE AND CONVERSION OF WIND POWER FOR PRACTICAL USE TODAY.
DORCHESTER, U.K., PRISM PRESS, 1980. 150 P.

THE HISTORY OF WIND POWER UTILISATION IS DESCRIBED BRIEFLY, CONCENTRATING ON RECENT PROJECTS IN THE USA. THE PARAMETERS OF THE WIND ARE DISCUSSED, AND THE CONSTRUCTION OF AEROGENERATORS EXPLAINED. ENERGY STORAGE BY WATER PUMPING, COMPRESSED AIR, INERTIAL ENERGY AND BATTERIES IS REVIEWED. A LIST OF WIND EQUIPMENT SUPPLIERS AND A BIBLIOGRAPHY ARE INCLUDED.

1980-0320 KRAWIEC S
ECONOMICS OF SELECTED WECS DISPERSED APPLICATIONS.
NTIS, FEBRUARY 1980. 7 P.
CONF-800406-1, SERI/TP-431-580

AN ECONOMIC ANALYSIS FOR DISTRIBUTED WIND ENERGY CONVERSION SYSTEMS (WECS) WAS CONDUCTED FOR THE DEPARTMENT OF ENERGY (DOE) AS PART OF THE SOLAR COMMERCIAL READINESS ASSESSMENT TASK AT THE SOLAR ENERGY RESEARCH INSTITUTE (SERI). THE MAJOR OBJECTIVE OF THE STUDY IS TO ANALYZE: THE COST OF ELECTRICITY GENERATED BY SELECTED WIND ENERGY SYSTEMS IN RESIDENTIAL AND AGRICULTURAL APPLICATIONS; THE BREAKEVEN COST OF WIND SYSTEMS ABLE TO COMPETE ECONOMICALLY WITH CONVENTIONAL POWER SOURCES IN DISPERSED APPLICATIONS; AND THE IMPACT OF MAJOR ECONOMIC FACTORS ON THE COST PERFORMANCE INDEX.

1980-0321 KRISTOFERSON L
SOLAR ENERGY RESEARCH IN SWEDEN.
AMBIO 9(1): 40-43, 1980.

1980-0322 LACOSTE J
ENERGY: WHAT RESTRICTIONS?
REV. FR. ELECTR. 53(268): 16-23, 72, MARCH 1980. (IN FRENCH)

THE PRESENT RESTRICTED SUPPLY OF OIL AND ITS INCREASE IN PRICE IS DISCUSSED. THE FUTURE DEVELOPMENT, AVAILABILITY, RENEWABILITY, AND STORAGE POSSIBILITIES OF ENERGY RESOURCES INCLUDING GEOTHERMAL, BIOMASS, WAVE ENERGY, SOLAR ENERGY, WIND POWER, AND THERMAL ENERGY FROM THE SEA, ARE OUTLINED.

1980-0323 LAITNER S
MIDWEST: LOCKED IN A HOLDING PATTERN.
SOL. AGE 5(1): 36, JANUARY 1980.

THE POTENTIAL APPLICATIONS OF SOLAR ENERGY AND THE DEVELOPMENT OF OTHER ENERGY SOURCES IN THE MIDWEST ARE DISCUSSED. SOLAR HEATING APPLICATIONS ARE CONSIDERED ECONOMICAL IN THE MIDWEST BECAUSE OF THE LONG AND COLD WINTERS. WIND POWER AND BIOMASS CONVERSION ARE ALSO CONSIDERED FEASIBLE SOURCES OF ENERGY. THE DOE HAS FUNDED THE MID-AMERICAN SOLAR ENERGY COMPLEX TO SERVE THE 12 STATE REGION. SO FAR, THE AGENCY HAS NOT BEEN CONSIDERED A SUCCESS. APPLICATIONS OF SOLAR ENERGY AND OTHER TECHNOLOGIES IN THE MIDWEST ARE CITED AND INCLUDE A SALT-GRADIENT SOLAR POND, SOLAR SPACE HEATING IN A ZOO, SWIMMING POOL HEATING, PASSIVE SOLAR HEATED HOUSES, THE BUSINESS DISTRICT OF A TOWN, A SUMMER CAMP, AGRICULTURAL APPLICATIONS OF SOLAR ENERGY, AND BIOMASS SYSTEMS.

1980-0324 LAWRENCE K, STROJAN C, O'DONNELL D
ENVIRONMENTAL ASSESSMENT OF SMALL WIND SYSTEMS. PROGRESS REPORT.
NTIS, FEBRUARY 1980. 37 P.
SERI/PR-354-420

THIS PROGRESS REPORT IS THE FIRST FORMAL PRODUCT OF THE ENVIRONMENTAL ASSESSMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) STUDY. IT PRESENTS AN OVERVIEW OF THE STUDY'S STRUCTURE, PLANNED ACTIVITIES, AND A SYNOPSIS OF TASK PROGRESS TO DATE. THIS REPORT WAS PREPARED AS PART OF TASK NO. 5322 IN THE INSTITUTIONAL AND ENVIRONMENTAL ASSESSMENT BRANCH OF THE SOLAR ENERGY RESEARCH INSTITUTE.

1980-0325 LAWRENCE K A, STROJAN C L
ENVIRONMENTAL EFFECTS OF SMALL WIND ENERGY CONVERSION SYSTEMS.
DOE ENVIRONMENTAL CONTROL SYMPOSIUM, 2ND, RESTON, VIRGINIA, MARCH 17, 1980. PROCEEDINGS. NTIS, JUNE 1980. VOLUME 2. P. 228-241.
CONF-800334-(VOL.2)

AS PART OF THE ENVIRONMENTAL RESEARCH PROGRAM, THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) ASSESSED THE POTENTIAL ENVIRONMENTAL EFFECTS OF SWECS. THE ENVIRONMENTAL ASSESSMENT FOCUSED ON SWECS IN THREE POWER RATING CATEGORIES: 1, 8, AND 40 KW. ENVIRONMENTAL EFFECTS CAN OCCUR THROUGHOUT A TECHNOLOGY'S LIFE CYCLE. FOR THE PURPOSES OF THIS ANALYSIS, THE LIFE CYCLE OF SWECS WAS DIVIDED INTO THREE PHASES: SYSTEM MANUFACTURE AND INSTALLATION; OPERATION AND MAINTENANCE; AND DECOMMISSION. POTENTIAL ENVIRONMENTAL EFFECTS ASSOCIATED WITH EACH PHASE ARE REVIEWED.

1980-0326 LEE S T, YAMAYEE Z A
LOAD-FOLLOWING AND SPINNING-RESERVE PENALTIES FOR INTERMITTENT GENERATION.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, MINNEAPOLIS, MINNESOTA, JULY 13-18, 1980. PAPERS. PISCATAWAY, N.J., IEEE POWER ENGINEERING SOCIETY, 1980. PAPER NO. 80 SM 582-7, 9 P.

THERE HAS BEEN INCREASING INTEREST IN INTERMITTENT GENERATION SUCH AS SOLAR AND WIND POWER INTERCONNECTED WITH UTILITY SYSTEMS. THIS PAPER PRESENTS A SIMPLE METHOD FOR ESTIMATING THE SPINNING-RESERVE AND LOAD-FOLLOWING REQUIREMENTS FOR A POWER SYSTEM CONTAINING INTERMITTENT GENERATION. IT IS INCORPORATED IN AN OPTIMAL GENERATION EXPANSION PLANNING MODEL WHICH CAN EVALUATE THE EFFECT OF SUCH REQUIREMENTS ON THE GENERATION MIX AND THE PRODUCTION COST. A CASE STUDY DEMONSTRATES THAT UNDER SOME ASSUMPTIONS, THESE PENALTIES CAN COMPLETELY ELIMINATE THE USUAL ENERGY AND CAPACITY CREDITS FOR THE INTERMITTENT GENERATION.

1980-0327 LEGOURIERES D
WIND ENERGY IN SENEGAL: GEOGRAPHIC REPARTITION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER X2, P. 571-579.

1980-0328 LIEBST B S
OPTIMIZED PITCH CONTROLLER FOR LOAD ALLEVIATION ON WIND TURBINES.
NTIS, AUGUST 19, 1980. 195 P.
FFA-TN-HU-2189-PT.1, N81-12634

AN OPTIMUM FEEDBACK CONTROL LAW FOR LOAD ALLEVIATION UTILIZING A PITCHING BLADE SEGMENT ON A WIND TURBINE IS DEVELOPED. THE ANALYSIS IS MADE FOR AN ISOLATED BLADE ON A COMPLETELY RIGID TOWER. THE BLADE IS ASSUMED TO BE COMPLETELY RIGID AND CONSTRAINED BY THREE FLEXIBLE SPRINGS. PITCH, FLAP, AND LAG BLADE DEGREES OF FREEDOM ARE INCLUDED AS WELL AS SHAFT TORSION AND GENERATOR DYNAMICS. A QUASI-STEADY ANALYSIS IS USED IN PREDICTING AERODYNAMIC LOADS. GRAVITY LOADS ARE INCLUDED, AS WELL AS WIND SHEAR AND TOWER SHADOW EFFECTS. THE NONLINEAR EQUATIONS OF MOTION ARE LINEARIZED BY PERTURBATION METHODS. THE CONTROLLER DETERMINED MINIMIZES A PENALTY INTEGRAL THAT IS THE SUM OF A QUADRATIC IN STATE PERTURBATIONS AND A QUADRATIC IN THE CONTROL. A FORTRAN PROGRAM IS PRESENTED WHICH SOLVES THE RESULTING RICCATI EQUATIONS FOR THE FEEDBACK GAINS. THE PROGRAM DEVELOPED IS USED TO DETERMINE THE CONTROL LAW FOR THE NASA ERDA 100 KW WIND TURBINE CONSIDERING ONLY THE FLAPPING DEGREES OF FREEDOM.

1980-0329 LILJEDAHL L A
KEY ISSUES ASSOCIATED WITH WIND ENERGY APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 335-338.
CONF-791097

AS THE OTHER WIND WORKSHOPS, OUR WORKSHOP ON AGRICULTURAL USE OF WIND POWER HELD SOME SPIRITED DISCUSSIONS ON VARIOUS ASPECTS OF THE AGRICULTURAL USE OF WIND POWER. THESE WERE ADDRESSED TO: (1) THE FARMERS' INTEREST; (2) THE UTILITIES' INTEREST; AND (3) THE MANUFACTURERS' INTEREST.

1980-0330 LILJEDAHL L A
OVERVIEW OF THE USDA WIND PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 321-334.
CONF-791097

ANY RESEARCH AND DEVELOPMENT PLANNING MUST BE BASED UPON SOME VISION OF FUTURE PRACTICES AND THE EQUIPMENT AND INFORMATION NEEDED TO UNDERTAKE THESE PRACTICES. THE PROGRAM OF RESEARCH ON AGRICULTURAL USE OF WIND POWER IS BASED UPON TWO MAJOR SCENARIOS. THESE ARE: (1) GENERAL PURPOSE FARMSTEAD POWER AND (2) DEDICATED OR SEMI-DEDICATED SPECIAL PURPOSE APPLICATIONS, I.E. IRRIGATION PUMPING, BUILDING HEATING, AND PRODUCT PROCESSING AND STORAGE.

1980-0331 LINDLEY D
THE ADOLESCENCE OF TWENTIETH CENTURY WIND ENERGY SYSTEMS TECHNOLOGY.
J. IND. AERODYN. 5(3-4): 207-221, MAY 1980.

THIS PAPER REVIEWS WIND ENERGY RESEARCH AND DEVELOPMENT WITH PARTICULAR EMPHASIS ON OPTIMUM SPACING, RELIABILITY, ELECTRICAL GRID INTERFACE, MACHINE RATING AND MACHINE CHARACTERISTICS. R AND D PROGRAMS OF THE U.K., GERMANY, SWEDEN AND THE USA ARE DESCRIBED.

1980-0332 LINDLEY D, SIMPSON P B, HASSAN U, MILBORROW D
ASSESSMENT OF OFFSHORE SITING OF WIND TURBINE GENERATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A2, P. 17-42.

A TECHNICAL AND ECONOMIC ASSESSMENT HAS BEEN MADE OF THE GENERATION OF ELECTRICITY USING WIND TURBINE GENERATORS LOCATED IN SHALLOW WATERS OFF THE COAST OF THE UNITED KINGDOM. THIS ASSESSMENT ENTAILED STUDIES OF SITING CRITERIA, METEOROLOGY, SEA SURFACE CONDITIONS, ENGINEERING GEOLOGY, CONSTRUCTION MATERIALS, SUPPORT STRUCTURES, MARINISATION OF COMPLETE WTG INSTALLATIONS, EFFECT OF CLUSTER CONFIGURATION ON PERFORMANCE, ELECTRICAL TRANSMISSION AND CONTROL, AVAILABILITY AND ENVIRONMENTAL ISSUES. ON THE BASIS OF THESE STUDIES, AN

WITH LARGE DIAMETER TURBINES AND AVERAGE WIND SPEEDS EXCEEDING THE CENTRAL VALUE THIS FACTOR IS REDUCED TO ABOUT 2.

1980-0333 LIPMAN N H, BOSSANYI E A, DUNN P D, MUSGROVE P J, WHITTLE G E, MACLEAN C
FLUCTUATIONS IN OUTPUT FROM WIND TURBINE CLUSTERS.
WIND ENG. 4(1): 1-7, 1980.

THIS PAPER INVESTIGATES THE EFFECT ON THE POWER OUTPUT OF WIND TURBINE CLUSTERS OF WIND SPEED FLUCTUATIONS OF SHORT PERIOD (I.E., LESS THAN AN HOUR). THE AUTHORS ARE DEALING WITH RAPID, UNPREDICTABLE VARIATIONS, AND THIS PROBLEM IS TREATED STATISTICALLY. THE CALCULATIONS DEPEND ON THE ASSUMPTION OF A PROBABILITY DISTRIBUTION FUNCTION FOR THE WIND SPEED FLUCTUATIONS. THE AUTHORS ASSUME THAT ALL THE WIND TURBINES IN THE CLUSTER ARE EXPERIENCING THE SAME WIND REGIME, AND ARE CONSIDERING A PERIOD OF TIME SHORT ENOUGH FOR THE GAUSSIAN DISTRIBUTION TO BE A REASONABLE APPROXIMATION, I.E., NO WEATHER FRONTS OR OTHER METEOROLOGICAL CHANGES.

1980-0334 LIPPERT S
ENERGY BECOMES A CLASSROOM SUBJECT.
MECH. ILLUS. 76(624): 50-51, 127, MAY 1980.

OVER 700 SCHOOLS IN THE U.S. ARE NOW OFFERING COURSES AND PROGRAMS IN SOLAR, WIND AND GEOTHERMAL ENERGY, BIOMASS CONVERSION, AND THE BASICS OF METHANE AND HYDROGEN POWER. SOME SPECIFIC COURSES BEING TAUGHT AT COLLEGES AND ADULT EDUCATION FACILITIES ARE IDENTIFIED.

1980-0335 LISSAMAN P B S, ZAMBRANO T G, WALKER S N
WIND ENERGY ASSESSMENT OF THE PALM SPRINGS-WHITEWATER REGION, CALIFORNIA, U.S.A.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B2, P. 91-106.

IN 1978 AND 1979, SPONSORED BY THE CALIFORNIA STATE ENERGY COMMISSION AND THE SOUTHERN CALIFORNIAN EDISON COMPANY, AEROVIRONMENT INC. CONDUCTED A MAJOR SURVEY OF THE WIND ENERGY IN THE PALM SPRINGS-WHITEWATER REGION, AN AREA DOMINATED BY THE SAN GORGONIO PASS. THE METHODOLOGY DESCRIBED REPRESENTS A RELIABLE AND COST-EFFECTIVE METHOD OF ASSESSING THE WIND POTENTIAL OF A REGION. FROM INSIGHTS DEVELOPED IN PALM SPRINGS-WHITEWATER STUDY, NEW TECHNIQUES FOR RAPID INITIAL SCREENING USING READILY AVAILABLE SHORT-TERM DATA WERE DEVELOPED.

1980-0336 SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE.
NTIS, 1980. 225 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, 2ND, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980.
SERI/CP-635-938

FOR VOLUME II SEE 1980-0459.

1980-0337 LJUNGSTROM O
"L-180 POSEIDON"--A NEW SYSTEM CONCEPT IN VERTICAL AXIS WIND TURBINE TECHNOLOGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER G3, P. 333-355.

RECENT STUDIES FOR THE SWEDISH GOVERNMENT ON POTENTIAL ALTERNATIVE WIND ENERGY CONVERSION SYSTEMS (ALTERNATIVES TO CONVENTIONAL HORIZONTAL AXIS TURBINES), INCLUDING OFF-SHORE SYSTEMS, HAVE FOCUSSED ON NEW AND INNOVATIVE VERTICAL AXIS WIND SYSTEMS (VAWT). THIS WORK HAS RESULTED IN A PROMISING COMBINATION OF NEW, SUBSYSTEMS CONCEPTS, THREE OF WHICH HAVE BEEN INTEGRATED IN A PROPOSED DESIGN OF A MULTI-MW TURBINE, TYPE "L-180 POSEIDON", MAX RATED POWER 20 MW IN OFF-SHORE VERSION, ROTOR DIAMETER 180 M, WHICH IS PRESENTED IN THIS PAPER.

1980-0338 LOAD RESEARCH MANUAL. VOLUME 3. LOAD RESEARCH FOR ADVANCED TECHNOLOGIES.
NTIS, NOVEMBER 1980. 75 P.
ANL/SPG-13(VOL.3)

THIS THREE-VOLUME MANUAL PRESENTS TECHNICAL GUIDELINES FOR ELECTRIC UTILITY LOAD RESEARCH. SPECIAL ATTENTION IS GIVEN TO ISSUES RAISED BY THE LOAD DATA REPORTING REQUIREMENTS OF THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978 AND TO PROBLEMS FACED BY SMALLER UTILITIES THAT ARE INITIATING LOAD RESEARCH PROGRAMS. THE MANUAL INCLUDES GUIDES TO LOAD RESEARCH LITERATURE AND GLOSSARIES OF LOAD RESEARCH AND STATISTICAL TERMS. IN VOLUME 3, SPECIAL LOAD RESEARCH PROCEDURES ARE PRESENTED FOR SOLAR, WIND, AND COGENERATION TECHNOLOGIES.

1980-0339 LOBITZ D W, SULLIVAN W N
VAWTDYN--A NUMERICAL PACKAGE FOR THE DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
ASME PAPER 80-WA/SOL-18, 1980. 7 P.

THE DYNAMIC BEHAVIOR OF WIND TURBINES IS A MAJOR FACTOR GOVERNING THEIR OVERALL FATIGUE LIFE AND RELIABILITY. THIS PAPER DESCRIBES A PACKAGE DEVELOPED FOR THE DYNAMIC ANALYSIS OF THE DARRIEUS VERTICAL AXIS WIND TURBINE. THE MODEL ON WHICH THE PACKAGE IS BASED INCLUDES THE MAJOR ROTOR ELASTIC DEGREES OF FREEDOM, GYROSCOPIC EFFECTS, AND STRUCTURAL DAMPING. THE EQUATIONS OF MOTION ARE DISCUSSED AND SEVERAL EXAMPLE SOLUTIONS ARE PRESENTED. COMPARISONS ARE MADE BETWEEN MODEL PREDICTIONS AND DATA FROM OPERATIONAL ROTORS.

1980-0340 LOBITZ D W, SULLIVAN W N
VAWTDYN--A NUMERICAL PACKAGE FOR THE DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, JULY 1980. 62 P.
SAND-80-0085

IN ORDER TO DESIGN WIND TURBINES WHICH POSSESS LONG LIFE AND AT THE SAME TIME USE A MINIMUM QUANTITY OF LOW-COST MATERIALS, IT IS ESSENTIAL THAT DYNAMIC, IN ADDITION TO STATIC, STRUCTURAL ANALYSES BE PERFORMED TO ELIMINATE UNNECESSARY MARGINS OF SAFETY RESULTING FROM UNDETERMINED DYNAMIC AMPLIFICATIONS. THE VAWTDYN PACKAGE PROVIDES A TOOL FOR ASSESSING THESE AMPLIFICATIONS IN TWO-BLADED VERTICAL AXIS WIND TURBINES. THE DYNAMIC MODEL ON WHICH THE PACKAGE IS BASED CONTAINS TURBINE MOTIONS MOST COMMONLY OBSERVED IN EXISTING RESEARCH SYSTEMS. GYROSCOPIC EFFECTS, STRUCTURAL DAMPING, AERODYNAMIC WIND LOADING, AND POWER GENERATION THROUGH EITHER AN INDUCTION OR SYNCHRONOUS GENERATOR ARE ALSO INCLUDED IN THE MODEL. IN ADDITION TO A COMPREHENSIVE DESCRIPTION OF THE MODEL, THIS REPORT DOCUMENTS THE EFFORTS THAT HAVE GONE INTO THE VERIFICATION, QUALIFICATION, AND DEMONSTRATION OF THE PACKAGE.

1980-0341 LOWE R

EXPECTED ELECTRICITY COSTS FOR THE US MOD 2 WINDMILL.
ENERGY POLICY 8(4): 347-348, DECEMBER 1980.

THIS PAPER PRESENTS AN ANALYSIS OF THE EXPECTED COST OF ELECTRICITY PRODUCTION FROM THE US MOD 2 WINDMILL, USING ACCOUNTING CRITERIA CURRENTLY RECOMMENDED FOR ENERGY TECHNOLOGIES IN THE UK. THE RESULTS SHOW THAT IF EXPECTED COST TARGETS ARE MET, THE MOD 2 DESIGN WILL BE A HIGHLY ECONOMIC MEANS OF GENERATING ELECTRICITY.

1980-0342 LUDDE P F
VERTICAL AXIS WIND TURBINE FOUNDATION PARAMETER STUDY.
NTIS, JULY 1980. 38 P.
SAND-80-7015

THE DYNAMIC FAILURE CRITERION GOVERNING THE DIMENSIONS OF PROTOTYPE VERTICAL AXIS WIND TURBINE FOUNDATIONS IS TREATED AS A VARIABLE PARAMETER. THE RESULTING CHANGE IN FOUNDATION DIMENSIONS AND COSTS IS EXAMINED.

1980-0343 LUDWIG D
ALLGEMEINE LOESUNGSMETHODE ZUR ERMITTLUNG DER DYNAMISCHEN ANTWORT AUF EINE DISKRETE EINZELBOE AM BEISPIEL DES ROTORBLATTES EINES WINDENERGIEKONVERTERS. (GENERAL CALCULATION METHOD FOR THE DYNAMIC RESPONSE TO DISCRETE GUST DISTRIBUTIONS AS EXEMPLIFIED BY THE ROTOR BLADE OF A WIND ENERGY CONVERTER.)
FORSCHUNGSBER. DTSCH FORSCH. VERSUCHSANST. LUFT RAUMFAHRT NO. 80, APRIL 12, 1980. 62 P. (IN GERMAN) ALSO:
NTIS, MARCH 1980. 63 P. (IN GERMAN)

AN ANALYTICAL METHOD IS PRESENTED TO CALCULATE THE DYNAMIC RESPONSE OF ELASTIC STRUCTURES TO DISCRETE GUST DISTRIBUTIONS. THE FORMULATION IS BASED ON THE ASSUMPTION THAT THE MODEL PARAMETERS OF THE STRUCTURE ARE KNOWN AND WHICH CAN BE RECEIVED BY EIGENANALYSIS OR GROUND VIBRATION TEST.

1980-0344 LUDWIG F L, BYRD G
EFFICIENT METHOD FOR DERIVING MASS-CONSISTENT FLOW FIELDS FROM WIND OBSERVATIONS IN ROUGH TERRAIN.
ATMOS. ENVIRON. 14(5): 585-587, 1980.

THIS PAPER DESCRIBES HOW LINEAR COMBINATIONS OF A LIMITED NUMBER OF SOLUTIONS OBTAINED BY THE CONVENTIONAL ITERATIVE RELAXATION METHODS CAN BE USED TO ACHIEVE THE SAME RESULTS WITH GREATLY REDUCED COMPUTATIONAL REQUIREMENTS. THE SOLUTIONS MUST ONLY BE OBTAINED FOR LINEARLY INDEPENDENT DATA SETS. THE APPLICATION DESCRIBED USES EIGENVECTORS OF THE COVARIANCE MATRIX OF THE INPUT WIND COMPONENT DATA AS THE LINEARLY-INDEPENDENT DATA SETS. THE MODEL WITH WHICH THIS TECHNIQUE IS APPLIED USES A RELAXATION SCHEME TO ACHIEVE MASS-CONSERVATIVE FLOW WITH MINIMUM DIFFERENCE BETWEEN THE INITIAL TRIAL WIND FIELD OBTAINED BY INTERPOLATION AND THE RESULTING MASS-CONSERVING FLOW.

1980-0345 LUNDSAGER P, FRANDSEN S, CHRISTENSEN C J
ANALYSIS OF DATA FROM THE GEDSER WIND TURBINE 1977-1979.
RISO NATL. LAB. REP. NO. 2242, AUGUST 1980. 137 P. ALSO: NTIS, AUGUST 1980. 137 P.
RISOE-M-2242, N81-19637

IN THIS REPORT A NUMBER OF TOPICS HAVE BEEN CHOSEN FOR FURTHER ANALYSIS, BASED ON THE DATA FROM THE GEDSER WIND TURBINE MEASUREMENTS, MADE DURING 1977 TO 1979. THE REPORT CONTAINS CHAPTERS DEALING WITH POWER CHARACTERISTICS BASED ON 10 MINUTE AVERAGES, COHERENCE BETWEEN MEASUREMENTS OF WIND AND ELECTRIC POWER BASED ON HIGH SPEED SCANNING, DRIVE TRAIN OSCILLATIONS AND STRUCTURAL RESPONSE OF THE ROTOR.

1980-0346 LUNDSAGER P, GUNNESKOV O
STATIC DEFLECTION AND EIGENFREQUENCY ANALYSIS OF THE NIBE WIND TURBINE ROTORS. THEORETICAL BACKGROUND.
RISO NATL. LAB. REP. NO. 2199, FEBRUARY 1980. 31 P. ALSO: NTIS, FEBRUARY 1980. 31 P.
RISOE-M-2199, N81-19497

THE THEORY OF THIN-WALLED MULTICELL STRUCTURES IS USED TO CALCULATE THE CROSS-SECTIONAL PROPERTIES OF ROTOR BLADES. THE THEORY IS DEVELOPED FOR BEAMS OF INHOMOGENEOUS MATERIALS. THE BLADE IS THEN MODELED USING THE FINITE ELEMENT METHOD. A STAYED AND A CANTILEVERED BLADE, EACH CONSISTING OF A STEEL PART AND A GLASS FIBER PART, WERE ANALYZED. STATIC DEFLECTION CAUSED BY EXTREME WIND LOADING ALONG WITH THE FIVE TO TEN LOWEST EIGENFREQUENCIES WERE CALCULATED. RESULTS DEVIATED LESS THAN 15 PERCENT FROM THEORETICAL PREDICTIONS.

1980-0347 MCCUTCHEON S
WIND POWER. AN INVENTION MATURES.
SCI. DIMENSION 12(1): 10-12, 1980.

EGG-BEATER SHAPED WIND TURBINES, DESIGNED BY DARRIEUS, AT A NUMBER OF SITES ACROSS CANADA ARE BEING USED TO INVESTIGATE WHETHER OR NOT WIND ENERGY CAN ECONOMICALLY SUPPLEMENT CONVENTIONAL ENERGY SOURCES IN REMOTE AND WINDY LOCATIONS. THE LARGEST AND MOST POWERFUL OF THIS TYPE OF WINDMILL, WHICH IS ON THE MAGDALEN ISLANDS, FAILED WHEN ITS MAIN BRAKE WAS DISCONNECTED FOR MAINTENANCE. TECHNICAL DETAILS WERE IMPROVED AND THE MACHINE IS NOW WORKING AGAIN. THE PRESENT UNCERTAINTIES ABOUT WIND ENERGY ARE CONCERNED WITH ECONOMICS RATHER THAN TECHNOLOGY.

1980-0348 MCDERMOTT J
HOW TO MAKE A WIND-SITE ANALYSIS.
POP. SCI. 217(1): 100-102, JULY 1980.

PROCEDURES FOR ACCURATELY MONITORING THE WIND POWER AVAILABILITY AT ANY SITE ARE PRESENTED. EVALUATION GUIDES FOR SELECTING CANDIDATE SITES ARE OUTLINED.

1980-0349 MCEWEN L B, SWAIN J W
INDUSTRIAL COMPRESSED AIR APPLICATIONS FOR SOLAR ENERGY CONVERSION/STORAGE DEVICES. FINAL REPORT.
NTIS, JANUARY 1980. 162 P.
SAND-79-7077

A SURVEY WAS MADE OF INDUSTRIAL COMPRESSED AIR INSTALLATIONS IN THIS COUNTRY WITH EMPHASIS ON AIR USAGE PATTERNS, TYPES OF EQUIPMENT, AND ENERGY/POWER REQUIREMENTS. THIS WAS FOLLOWED BY AN INVESTIGATION INTO THE TECHNICAL FEASIBILITY OF UTILIZING SOLAR ENERGY CONVERSION SYSTEMS TO POWER REPRESENTATIVE INDUSTRIAL COMPRESSED AIR SYSTEMS. THE FINAL TASK WAS TO EVALUATE THE ECONOMIC MERITS OF THREE DIVERSE SCENARIOS OF CONCEPTUAL INDUSTRIAL COMPRESSED-AIR INSTALLATIONS. NONE OF THE THREE WERE FOUND TO BE ECONOMICALLY ATTRACTIVE UNTIL APPROXIMATELY 10 YEARS AFTER COMPLETION OF CONSTRUCTION WITH ONE OF THE PRIMARY REASONS BEING THE HIGH COMPRESSION SYSTEMS. A PROPER COMBINATION OF TECHNOLOGICAL IMPROVEMENTS IN SOLAR ENERGY CONVERSION SYSTEMS, REDUCED CAPITAL COSTS, ACCELERATED RISES IN UTILITY RATES, AND CONTINUED UNCERTAINTY IN FOSSIL FUEL

AVAILABILITY IS REGARDED AS NECESSARY BEFORE FURTHER PURSUIT OF THIS CONCEPT IS WARRANTED.

1980-0350 MCNERNEY G M
FOURIER COEFFICIENTS OF AERODYNAMIC TORQUE FUNCTIONS FOR THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1980. 28 P.
SAND-79-1508

THE SPECTRAL CHARACTERISTICS OF THE AERODYNAMIC TORQUE ON WIND TURBINES ARE IMPORTANT IN ASSESSING DRIVETRAIN PERFORMANCE. THIS PAPER DESCRIBES A FAST FOURIER TRANSFORM METHOD TO DEDUCE FOURIER COEFFICIENTS FOR THE PERIODIC TORQUE FUNCTIONS PREDICTED BY AERODYNAMIC THEORIES FOR DARRIEUS-TYPE ROTORS. THE METHOD IS APPLIED TO SHOW SPECTRAL CHARACTERISTICS OF THE TORQUE ON THE DOE/SANDIA 17-M DARRIEUS ROTOR PREDICTED BY THE SINGLE AND MULTIPLE STREAMTUBE AERODYNAMIC MODELS.

1980-0351 MCPHERSON W E, ROWE D W
WINDMILL CONSTRUCTION.
U.S. PATENT NO. 4,218,184, AUGUST 19, 1980.

THIS WINDMILL INCLUDES A BASE, A ROTOR JOURNALED FROM THE BASE FOR ROTATION AT THE FIRST AXIS, INCLUDING A PLURALITY OF VANES JOURNALED THERE FOR ROTATION ON SECOND AXES SPACED ABOUT AND RADIALLY OUTWARDLY FROM FIRST AXIS. VANE DISPLACEMENT CONTROL MEANS ARE OPERATIVELY CONNECTED BETWEEN THE BASE AND VANES FOR PROPORTIONALLY ANGULARLY DISPLACING VANES RELATIVE TO THE ROTOR 180 DEG. IN ONE DIRECTION DURING EACH 360 DEG. ROTATION IN THE OPPOSITE DIRECTION. THE VANES ARE ANGULARLY DISPLACED IN OPTIMUM POSITIONS RELATIVE TO THE ROTOR AND EACH OTHER TO DEVELOP MAXIMUM THRUST TO ROTATE IN OPPOSITE DIRECTIONS RESPONSIVE TO FLUID FLOW. THE WINDMILL HAS A SENSING TAIL PIVOTALLY SUPPORTED FOR SWINGING AN AXIS GENERALLY PARALLELING FIRST AXIS AND OPERATIVELY CONNECTED BETWEEN ROTOR AND VANE DISPLACEMENT CONTROL. MEANS FOR MAINTAINING THE OPTIMUM POSITIONS OF THE VANES RELATIVE TO EACH OTHER AND TO THE ROTOR DURING CHANGES IN THE DIRECTION OF FLUID FLOW, RELATIVE TO THE BASE, AGAINST THE VANES, AND WITH ONE OF THE VANES IS SUBSTANTIALLY PARALLING THE TAIL WHEN ONE VANE IS MOVING IN A DIRECTION OPPOSITE TO THE DIRECTION IN WHICH THE TAIL IS SWUNG. THE EXCESS ROTOR ROTATION SPEED OVERRIDE CONTROL IS OPERATIVELY CONNECTED BETWEEN THE VANE DISPLACEMENT CONTROL AND WIND DIRECTION SENSING TAIL OPERATIVE TO CONTROL ANGULAR DISPLACED VANES OTHER THAN ONE VANE FROM OPTIMUM POSITIONS.

1980-0352 MAJOR REDUCTION IN ELECTRIC ENERGY STORAGE COSTS.
IND. RES. DEV. 22(3): 97-98, MARCH 1980.

AN ENERGY-STORAGE SYSTEM CALLED REDOX (FOR REDUCTION OXIDATION), DEVELOPED AT THE NASA LEWIS RESEARCH CENTER, CLEVELAND, OHIO, UNDER A PROGRAM JOINTLY FUNDED BY THE U.S. DEPARTMENT OF ENERGY AND NASA, OFFERS THE PROMISE OF MAJOR COST REDUCTIONS IN THE STORING OF ELECTRICAL ENERGY. REDOX SYSTEMS IN THE KILOWATT RANGE CAN SOON CONTRIBUTE TO THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN A MAJOR DRAWBACK. AT A THIRD THE COST OF CONVENTIONAL LEAD-ACID STORAGE BATTERY SYSTEMS NOW IN USE, THE REDOX BATTERY SYSTEM WILL MAKE SOLAR ELECTRIC AND WIND-ENERGY UNITS MUCH MORE PRACTICAL.

1980-0353 MARIER A
WIND POWER: ENERGY ALTERNATIVE FOR THE UPPER MIDWEST. CONFERENCE REPORT.
ALTERN. SOURCES ENERGY NO. 45: 3, SEPTEMBER/OCTOBER 1980.

A CONFERENCE HELD IN ROCHESTER, MINNESOTA IN APRIL 1980, SPONSORED BY ALTERNATIVE SOURCES OF ENERGY, INC. AND THE ROCHESTER ENERGY INFORMATION CENTER, IS REVIEWED.

1980-0354 MARTIN B, DIESENDORF M
THE CAPACITY CREDIT OF WIND POWER: A NUMERICAL MODEL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L3, P. 555-564.

THE VALUE OF WIND POWER AS FIRM CAPACITY IN A REAL AND A HYPOTHETICAL ELECTRICITY GRID WITHOUT STORAGE IS INVESTIGATED BY MEANS OF A NUMERICAL PROBABILISTIC MODEL. THE MAGNITUDE OF WIND POWER CAPACITY CREDIT IS USUALLY FOUND TO BE GREATER THAN 40 PERCENT OF THE CAPACITY CREDIT OF A TYPICAL CONVENTIONAL UNIT WITH THE SAME AVERAGE POWER OUTPUT. FOR VERY SMALL VALUES OF WIND POWER PENETRATION INTO THE GRID, THE TWO MEASURES OF CAPACITY CREDIT UTILISED ARE EACH APPROXIMATELY EQUAL TO THE AVERAGE WIND POWER, WHILE FOR LARGE PENETRATIONS THE MEASURES APPROACH DIFFERENT CONSTANT VALUES. THE BEHAVIOR AT BOTH LIMITS IS IN GOOD AGREEMENT WITH THE RESULTS OF AN ANALYTIC PROBABILISTIC MODEL. THE RESULTS ARE ALSO COMPARED WITH THOSE FROM AN HOUR BY HOUR COMPUTER SIMULATION. IT IS FOUND THAT WIND POWER CAPACITY CREDIT IS VERY SENSITIVE TO THE PENETRATION OF WIND POWER INTO THE GRID, TO THE UNIT SIZES OF THE CONVENTIONAL PLANT IN THE GRID AND TO THE START UP SPEED OF THE AEROGENERATORS. THE CREDIT IS MODERATELY SENSITIVE TO THE REPLACEMENT OF THE LOAD DISTRIBUTION BY A GAUSSIAN DISTRIBUTION AND TO THE MAGNITUDE OF THE LOSS OF LOAD PROBABILITY IN THE ABSENCE OF WIND POWER PLANT. THE CREDIT IS FOUND TO BE INSENSITIVE TO THE FORCED OUTAGE RATE OF CONVENTIONAL PLANT AND TO THE RATED SPEED OF THE AEROGENERATORS (GIVEN THE SAME AVERAGE WIND POWER OUTPUT).

1980-0355 MARTINSSON J
FUTURE ELECTRIC POWER FROM THE SUN AND WIND?
SAEHKOW 53(5-6): 169-172, MAY-JUNE 1980. (IN SWEDISH)

THE LOW POWER DENSITY AND HIGH VARIATIONS WITH TIME IN THE FLOWING SOLAR AND WIND ENERGY SOURCES HAVE UNFAVOURABLE EFFECTS ON THE ECONOMY OF ELECTRICITY PRODUCTION FROM THESE EARLY STAGES OF DEVELOPMENT. EVEN IF THE COSTS OF SOLAR CELLS DEVELOP FAVOURABLY, IT IS DOUBTFUL WHETHER THIS FORM OF ELECTRICITY PRODUCTION CAN BECOME COMPETITIVE IN THE REASONABLY NEAR FUTURE. WIND POWER IS NOW AT THE DEMONSTRATION STAGE. EXPERIENCE OF LARGE-SCALE WINDMILL POWER PLANTS WILL BE GAINED IN THE 1980S. THE PRODUCTION COSTS OF A RATHER LIMITED ANNUAL AMOUNT OF ELECTRIC ENERGY ARE NOT EXPECTED TO BE VERY HIGH.

1980-0356 MAULE P
OREGON ANEMOMETER LOAN PROGRAM.
WIND POWER DIG. NO. 20: 36, 38, 40-41, SUMMER 1980.

1980-0357 MEEKER L D, OSSENBRUGGEN P J, PREGENT G
TECHNIQUES FOR SPATIAL EXTRAPOLATION OF WIND DATA.
ASCE ENG. MECH. DIV. J. 106(2): 201-212, APRIL 1980.

THE ASSESSMENT OF WIND ENERGY POTENTIAL THROUGHOUT A GIVEN REGION IS USUALLY DIFFICULT BECAUSE OF THE LACK OF A SUITABLE DATA BASE. TYPICALLY, ADEQUATELY LONG WIND HISTORIES EXIST FOR ONLY A RELATIVELY FEW REGULAR WIND MEASUREMENT STATIONS. THIS PAPER IS CONCERNED WITH THE ESTIMATION OF WIND SYSTEM PARAMETERS AT A POSSIBLE WIND GENERATION SITE, Y, BY MEANS OF A SHORT OBSERVED RECORD AT THAT SITE AND EXTRAPOLATION OF A LONG TERM

RECORD AT A REGIONAL WEATHER STATION, X. THE ESTIMATION IS ACCOMPLISHED BY ASSUMING THAT THE WIND SYSTEM AT EACH SITE IS GENERATED BY A COMMON NON-STATIONARY PROCESS MODIFIED BY SITE-SPECIFIC SCALE FACTORS AND STATIONARY NOISE PROCESSES. ELIMINATION OF THE UNKNOWN NON-STATIONARY COMPONENT LEADS TO A REPRESENTATION OF THE WIND RECORD AT Y IN TERMS OF THE RECORD AT X AND A STATIONARY NOISE PROCESS. THE PROCEDURE IS EXEMPLIFIED USING WIND RECORDS FROM BOSTON AIRPORT AND THE BOSTON LIGHT VESSEL.

1980-0358 THE MEHRKAM WIND TURBINE.
MOTHER EARTH NEWS NO. 63: 132-133, MAY/JUNE 1980.

THIS ARTICLE DETAILS THE MEHRKAM SYSTEM (FOUNDED BY TERRY MEHRKAM OF THE MEHRKAM ENERGY DEVELOPMENT COMPANY) AND THE REASONS FOR ITS SUCCESS. THE FIRM DESIGNS AND MARKETS "STATE-OF-THE-ART" WINDPOWER SYSTEMS. THESE WINDPLANTS, POWER INDEPENDENT OR WITH BACKUP SYSTEMS, ARE DESIGNED TO BE LOW-MAINTENANCE, HIGH-RELIABILITY PIECES OF EQUIPMENT.

1980-0359 SENGUPTA D L, SENIOR T B A
TELEVISION RECEPTION NEAR THE WIND TURBINE ON BLOCK ISLAND, RI.
DOE ENVIRONMENTAL CONTROL SYMPOSIUM, 2ND, RESTON, VIRGINIA, MARCH 17, 1980. VOLUME 2. PROCEEDINGS. NTIS, JUNE 1980. VOLUME 2. P.. 209-227.
CONF-800334-(VOL.2)

1980-0360 TOMPKINS D
WIND ENERGY IN MARYLAND.
NTIS, JULY 1980. 37 P.
PB81-199937

THIS REPORT MARKS ONE OF THE FIRST STEPS IN DEFINING THE WIND ENERGY OPTION IN MARYLAND. IN THE FOLLOWING SECTIONS THE STATE-OF-THE-ART IS REVIEWED, APPLICATIONS, ECONOMIC, AND ENVIRONMENTAL ISSUES WERE INTRODUCED, THE RESULTS OF A PRELIMINARY WIND ENERGY RESOURCE ASSESSMENT COMPLETED IN APRIL OF 1979 ARE DISCUSSED, AND RECOMMENDATIONS ARE MADE FOR FURTHER RESOURCE DEFINITION.

1980-0361 MELISS M
RENEWABLE SOURCES OF ENERGY.
BRENNST.-WAERME-KRAFT 32(4): 140-146, APRIL 1980. (IN GERMAN)

THE ARTICLE ESTIMATES THE EXTENT TO WHICH, BY 2000 AD, RENEWABLE SOURCES OF ENERGY CAN BE EXPECTED TO CONTRIBUTE TO THE PRIMARY ENERGY NEEDS OF W. GERMANY AND INDICATES THE AMOUNTS OF MONEY BEING SPENT ON RELEVANT RESEARCH. IT REVIEWS RECENT DEVELOPMENTS INCLUDING PASSIVE SYSTEMS USING SOLAR RADIATION AND HEAT PUMPS FOR SPACE HEATING, HIGH TEMPERATURE COLLECTORS AND SOLAR CELLS, WIND-DRIVEN GENERATORS (INCLUDING THE GROWIAN I OF 3 MW CAPACITY NEAR BRUNSBUTTEL) AND BRIEFLY DESCRIBES CURRENT W. GERMAN DEVELOPMENTS IN USING GEOTHERMAL, WAVE AND BIOMASS ENERGY.

1980-0362 MENZIES R W, MATHUR R M
ALTERNATOR DESIGNS FOR DIRECT COUPLING TO REMOTE WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F1, P. 269-278.

CONSIDERABLE RESEARCH AND DEVELOPMENT ON THE VERTICAL AXIS WIND TURBINE HAS TAKEN PLACE IN CANADA DURING THE LAST DECADE. THE APPLICABILITY OF SUCH AN ENERGY SOURCE, ESPECIALLY IN THE ARCTIC, HAS BEEN PROVEN BY SUCH INSTALLATIONS AS THE BEAUFORT SEA AUTOMATIC METEOROLOGICAL STATION. THE MAIN APPLICATION OF THESE WIND TURBINES APPEARS TO BE IN THE SUPPLY OF ELECTRICAL ENERGY EITHER FOR STORAGE OR AS THE TRANSMISSION LINK BETWEEN THE TURBINE AND ELECTRIC MOTORS. THE MECHANICAL POWER AVAILABLE FROM THE SHAFT OF THE WIND TURBINE IS NOT SUITABLE FOR DIRECT USE BY CONVENTIONAL ALTERNATORS OR GENERATORS. THE REASONS BEING THAT THE SHAFT SPEED IS VERY LOW, ESPECIALLY AS THE POWER RATING INCREASES, AND THE SHAFT POWER VARIES AS THE CUBE OF THE SHAFT SPEED. IN THE PAST, THIS PROBLEM HAS BEEN SOLVED BY THE USE OF GEARS AND SEVERAL ALTERNATORS AND/OR GENERATORS TO MATCH THE WIDE POWER RANGE OF THE TURBINE. THIS HAS LED TO REDUCED EFFICIENCY AND RELIABILITY OF THE OVERALL SYSTEM. THIS PAPER WILL EXAMINE THE DESIRABLE PERFORMANCE SPECIFICATIONS OF DIRECT-DRIVE ALTERNATORS SUITABLE FOR MEETING DIVERSE LOAD REQUIREMENTS AND COMPARE ADAPTATIONS OF SEVERAL CONVENTIONAL GENERATORS/ALTERNATORS WITH SEVERAL NOVEL DESIGNS.

1980-0363 MERONEY R N
WIND-TUNNEL SIMULATION OF THE FLOW OVER HILLS AND COMPLEX TERRAIN.
J. IND. AERODYN. 5(3-4): 297-321, MAY 1980.

A STUDY HAS BEEN COMPLETED TO EVALUATE THE ACCURACY OF A WIND TUNNEL INVESTIGATION OF FLOW OVER A COMPLEX TERRAIN MODEL. BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION OF NEW ZEALAND WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1'5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS, ON TWO SPRING DAYS. SELECTED FOR STRONG ADIABATIC DOWN VALLEY WIND FLOW, THREE TEAMS OF INVESTIGATORS SURVEYED UP TO 27 SITES ON EITHER SIDE AND WITHIN THE RIVER GORGE. MEASUREMENTS CONSISTED OF WIND SPEED AND DIRECTION AT A 10 M HEIGHT. THE LABORATORY SIMULATION RESULTS WERE COMPARED WITH THE AVAILABLE FIELD DATA BY MEANS OF STATISTICAL CORRELATION AND SCATTER DIAGRAMS. THE MODEL AND FIELD RESULTS HAVE BEEN USED TO ASSESS THE VALUE OF LABORATORY EXPERIMENTS AS PART OF A STRATEGY TO DEVELOP AND DEMONSTRATE EFFICIENT AND ECONOMICAL TECHNIQUES FOR IDENTIFYING FAVORABLE WIND ENERGY CONVERSION SITES.

1980-0364 MERRIAM M F
CHARACTERISTICS AND USES OF WIND MACHINES.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. EDITED BY W. C. DICKINSON AND P. N. CHEREMISINOFF. NEW YORK, MARCEL DEKKER, 1980. P. 665-718.

INFORMATION IS PRESENTED CONCERNING CHARACTERISTICS OF WIND MACHINES; TYPES OF HORIZONTAL-AXIS MACHINES; TYPES OF VERTICAL-AXIS MACHINES; USES OF WIND MACHINES; AND ENVIRONMENTAL ASPECTS.

1980-0365 MEYERS C E, WAGNER N K
COASTAL WIND POWER IN AND NEAR CORPUS CHRISTI, TEXAS.
CONFERENCE ON COASTAL METEOROLOGY OF THE AMERICAN METEOROLOGICAL SOCIETY, 2D, LOS ANGELES, JANUARY 30 - FEBRUARY 1, 1980. PREPRINTS. BOSTON, MASSACHUSETTS, AMERICAN METEOROLOGICAL SOCIETY, 1980. P. 220-226.

THIS PAPER SUMMARIZES WIND AND WIND ENERGY CHARACTERISTICS OF SEVERAL LOCATIONS BOTH INLAND AND OFFSHORE FROM THE TEXAS COASTLINE NEAR CORPUS CHRISTI. A WEIBULL DISTRIBUTION IS FITTED TO HOURLY WIND SPEED DATA TO DESCRIBE THE PROBABILITY OF OCCURRENCE OF VARIOUS WIND SPEEDS. DIURNAL, SEASONAL AND HORIZONTAL SPATIAL VARIATIONS OF WIND AND WIND ENERGY ARE EVALUATED. POWER OUTPUT CHARACTERISTICS OF THREE DIFFERENT SIZED

AEROGENERATORS ARE USED IN CONJUNCTION WITH THE OBSERVED AND WEIBULL WIND SPEED DISTRIBUTIONS TO SIMULATE POTENTIAL ELECTRIC WIND ENERGY GENERATION CAPACITY. POTENTIAL WIND GENERATED POWER IS COMPARED WITH POWER DEMAND CURVES FOR THE CORPUS CHRISTI AREA.

1980-0366 MIGLIORE P G, WOLFE W P
THE EFFECTS OF FLOW CURVATURE ON THE AERODYNAMICS OF DARRIEUS WIND TURBINES.
NTIS, JULY 1980. 111 P.
ORO-5135-77/7

A THEORETICAL AND EXPERIMENTAL INVESTIGATION WAS CONDUCTED WHICH CLEARLY SHOWED THE EFFECTS OF FLOW CURVATURE TO BE SIGNIFICANT DETERMINANTS FOF DARRIEUS TURBINE BLADE AERODYNAMICS; QUALITATIVELY, THESE RESULTS APPLY EQUALLY TO STRAIGHT OR CURVED BLADED MACHINES. UNUSUALLY LARGE BOUNDARY LAYER RADIAL PRESSURE GRADIENTS AND VIRTUALLY ALTERED CAMBER AND INCIDENCE ARE THE PHENOMENA OF PRIMARY IMPORTANCE. CONFORMAL MAPPING TECHNIQUES WERE DEVELOPED WHICH TRANSFORM THE GEOMETRIC TURBINE AIRFOILS IN CURVED FLOW TO THEIR VIRTUAL EQUIVALENTS IN RECTILINEAR FLOW, THEREBY PERMITTING THE MORE ACCURATE SELECTION OF AIRFOIL AERODYNAMIC COEFFICIENTS FROM PUBLISHED SECTIONAL DATA. IT IS DEMONSTRATED THAT ONCE THE FLOW IDIOSYNCRACIES ARE FULLY UNDERSTOOD, THEY MAY BE USED TO ADVANTAGE TO IMPROVE THE WIND ENERGY EXTRACTION EFFICIENCY OF THESE MACHINES.

1980-0367 MILBORROW D J
THE PERFORMANCE OF ARRAYS OF WIND TURBINES.
J. IND. AERODYN. 5(3-4): 403-430, MAY 1980.

TO ASSESS THE AMOUNT OF POWER AVAILABLE IN THE WIND, INTERACTIONS BETWEEN WIND TURBINES IN AN ARRAY, OR CLUSTER, HAVE BEEN STUDIED USING A NUMBER OF EXPERIMENTAL TECHNIQUES, AND METHODS OF MATHEMATICAL ANALYSIS. THESE STUDIES HAVE INCLUDED WAKE MEASUREMENTS BEHIND WIND TURBINE ROTORS AND WIND TUNNEL TESTS OF MODEL CLUSTERS, TOGETHER WITH ANALYSIS USING WAKE MIXING AND BOUNDARY-LAYER THEORIES. THE RESULTS FROM THESE STUDIES HAVE BEEN REVIEWED AND COMPARED AND IT IS SHOWN THAT THERE IS REASONABLE AGREEMENT BETWEEN THE ESTIMATES FOR THE POWER LOSS DUE TO INTERACTIVE EFFECTS IN A CLUSTER GENERATING 1000 MW (ABOUT 25 PERCENT IS LOST, IF THE ROTORS ARE SPACED 10 DIAMETERS APART). ESTIMATES OF THE OUTPUT FROM LARGE ARRAYS SHOW SOME VARIATION AND THERE ARE CONFLICTING VIEWS ON THE EFFECTS OF CERTAIN PARAMETERS--SUCH AS ROTOR HEIGHT. OTHER TOPICS REQUIRING FURTHER STUDY--SUCH AS THE INFLUENCE OF MACHINE DESIGN--ARE ALSO IDENTIFIED AND DISCUSSED.

1980-0368 MILLER A H
IMPLICATIONS OF THE EFFECTS OF WIND CHARACTERISTICS ON THE OPERATION OF LARGE WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1154-1158.

THIS BRIEF PAPER DEALS PRIMARILY WITH THE SUBJECT OF THE WIND CHARACTERISTICS AS THEY AFFECT OVERALL PERFORMANCE OF LARGE WTGS. THE FIRST SIMULATION OF TURBINE OUTPUT INCLUDING THE OPERATING STRATEGY THOUGH FAR FROM COMPLETE, EVIDENCES THE POTENTIAL NEED FOR DEVELOPING SITE SPECIFIC STRATEGIES TO OPTIMIZE ANNUAL OUTPUT OF A TURBINE.

1980-0369 MILLER D E, NORD A R
MODAL TESTING OF THE VERTICAL AXIS WIND TURBINE.
ENGINEERING FOUNDATION CONFERENCE, RINDGE, N.H., JULY 27, 1980. NTIS, 1980. 23 P.
SAND-80-1639C, CONF-800746-1

THE VAWT IS A 17-METER STRUCTURE WHICH HAS BEEN TESTED IN A VARIETY OF CONFIGURATIONS. EARLY IN THE PROGRAM THERE WERE THREE FIBERGLASS BLADES REINFORCED WITH STRUTS. A LATER CONFIGURATION HAD TWO ALUMIMUN BLADES. BOTH OF THESE HAVE BEEN TESTED BY THE MODAL ANALYSIS GROUP. THERE IS ALSO A THREE-BLADED ALUMINUM STRUCTURE WHICH WILL BE TESTED IN THE COMING MONTHS. TEST RESULTS ARE PRESENTED.

1980-0370 MILLER G, HOFFERT M, RUGG B, CORREN D
THE LEBOST WIND TURBINE EXPERIMENTAL PROGRAM. REPORT FOR SEPTEMBER 1978 - MAY 1980.
NTIS, MAY 1980. 55 P.
PB81-141467

THE LEBOST WIND TURBINE IS UNIQUE IN TWO RESPECTS: IT CONSISTS OF A VERTICAL AXIS TURBINE WHICH IS ENCASED IN A PERFORATED HEMISPHERICAL SHROUD WHICH ACTS TO FOCUS OR CONCENTRATE AMBIENT WIND ENERGY ONTO THE TURBINE BLADES; AND THE TURBINE'S SHAFT IS DIRECTLY COUPLED TO A WATER TWISTER/HEAT BRAKE ASSEMBLY WHICH HEATS WATER VIA DIRECT MECHANICAL AGITATION; IN OTHER WORDS, THE TURBINE CAN BE USED TO HEAT WATER WITHOUT ELECTRICAL INTERFACE. THIS REPORT DETAILS THE RESULTS OF AN EXPERIMENTAL FIELD TEST/EVALUATION OF A 20-FOOT DIAMETER LEBOST TURBINE. ONE CONCLUSION OF THE STUDY IS THAT THE TURBINE LENDS ITSELF RATHER WELL TO URBAN APPLICATIONS, AS WELL AS OTHER APPLICATIONS.

1980-0371 MINDER R, GILBY D
SUBSTITUTION OF DIESEL POWER PLANTS BY SOLAR AND WIND ELECTRICITY GENERATORS. A CASE STUDY FOR A TROPICAL ISLAND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K3, P. 521-531.

THIS PAPER DESCRIBES THE RESULTS OF A RECENTLY COMPLETED STUDY WHICH EXAMINED THE FEASIBILITY OF ELECTRICITY GENERATION USING WIND AND SOLAR POWER FOR A CARIBBEAN ISLAND. THE STUDY RECOMMENDED THE CONSTRUCTION OF A 100 KW SOLAR THERMAL POWER PLANT AND THE INSTALLATION OF TEN MEDIUM SIZE WIND DRIVEN GENERATORS WITH A TOTAL RATED OUPUT OF 400 KW. THE VIABILITY OF THIS 500 KW FIRST ALTERNATIVE ENERGY PLANT IS EXAMINED AND IT IS SHOWN THAT THE LARGE INITIAL INVESTMENT IS MORE THAN COMPENSATED BY THE DIESEL FUEL SAVINGS. A LONG TERM ALTERNATIVE ENERGY PLANT PROGRAMME, INVOLVING THE INSTALLATION OF SOME 10 MW OF WIND AND SOLAR POWER PLANTS BY 1990, IS ALSO EVALUATED AND IT IS SHOWN THAT SUCH A PROGRAMME WOULD RESULT IN SUBSTANTIALLY REDUCED TOTAL OPERATING COSTS FOR THE ELECTRICITY SUPPLY SYSTEM.

1980-0372 MISKELL J T
EXOTIC ENERGY R & D HAS POTENTIAL.
ENERGY 5(1): 6-7, WINTER 1980.

FUTURE CULTIVATION OF THE OCEAN TO MAKE RAW MATERIAL FOR THE PRODUCTION OF METHANE AND AN INNOVATIVE WIND TUNNEL DESIGN TO PRODUCE ENERGY IN LARGE AMOUNTS FROM LITTLE OR NO WIND ARE POTENTIAL ENERGY RESOURCES. THE TURBINE WIND TOWER, OR THE TORNADO MACHINE, IS THE MOST INTERESTING OF THE NEW WIND-USING ENERGY GENERATORS. IT IS BASED ON A LARGE STATIONARY TOWER WITH A SMALL VERTICAL AXIS TURBINE AT THE BASE. THE LOW PRESSURE OF THE CENTRAL VORTEX ABOVE THE TURBINE CONTINUOUSLY ACCELERATES THE INCREASING AIR BELOW, ALLOWING A GREATER POWER COEFFICIENCY.

1980-0373 MOD 2 WIND TURBINE DEVELOPMENT PROJECT.
NTIS, OCTOBER 1980. 24 P.
SERI/SP-732-728

THE PRIMARY OBJECTIVE IN THE DEVELOPMENT OF MOD 2 WAS TO DESIGN A WIND TURBINE TO PRODUCE ENERGY FOR LESS THAN 5 CENTS/KWH BASED ON 1980 COST FORECASTS. THE PRICING METHOD USED TO PROJECT THE MOD 2 ENERGY COSTS IS THE LEVELIZED FIXED CHARGE RATE APPROACH, GENERALLY ACCEPTED IN THE ELECTRIC UTILITY INDUSTRY AS A BASIS FOR RELATIVE RANKING OF ENERGY ALTERNATIVES. THIS METHOD DERIVES A LEVELIZED ENERGY PRICE NECESSARY TO RECOVER UTILITY'S PURCHASING, INSTALLING, OWNING, OPERATING, AND MAINTENANCE COSTS.

1980-0374 MOMENT R L, TRENKA A R
INTERIM STATUS REPORT ON DOE PROTOTYPE DEVELOPMENT SWECS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 815-820.

DEVELOPMENT OF SEVERAL SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) HAVE BEEN UNDERWAY FOR OVER TWO YEARS AS PART OF THE DOE'S SMALL WIND SYSTEMS PROGRAM. DESIGN AND FABRICATION EFFORTS ARE COMPLETE ON PROTOTYPE SYSTEMS IN THREE SIZES: 1-2 KW FOR REMOTE APPLICATIONS REQUIRING HIGH RELIABILITY, 8 KW AND 40 KW, THESE LATTER TWO FOR INTERTIE WITH UTILITIES. THREE CONTRACTS WERE AWARDED TO DEVELOP EACH OF THE TWO SMALLER SIZE SYSTEMS, AND TWO FOR THE 40 KW ONES. BECAUSE THE 40 KW SYSTEMS WERE DELIVERED MUCH LATER THAN THE 1-2 KW AND 8 KW UNITS, THERE IS PRESENTLY LITTLE TEST DATA COLLECTED FROM THESE UNITS. CONSEQUENTLY, THIS PAPER FOCUSES ON SYSTEMS OF THE TWO SMALLER SIZES. THIS PAPER DISCUSSES THE DESIGN OBJECTIVES FOR THESE DEVELOPMENT PROGRAMS AND OFFERS A GENERIC ASSESSMENT OF HOW WELL THOSE OBJECTIVES HAVE BEEN MET.

1980-0375 MUEHLOECKER H
ELECTRICAL EQUIPMENT FOR A LARGE WIND-POWER PLANT.
SIEMENS POWER ENG. 2(2): 47-51, FEBRUARY 1980.

A DOUBLE-FED ASYNCHRONOUS GENERATOR WITH SLIPRING ROTOR AND WITH VARIABLE FREQUENCY CONVERTER IN THE ROTOR CIRCUIT WAS ADOPTED FOR THE WIND TURBINE OF 100.4 M WITH A TOWER HEIGHT OF 100 M AND ELECTRICAL RATING OF 3 MW. A DESCRIPTION IS GIVEN OF ELECTRICAL EQUIPMENT NEEDED FOR LARGE WIND-POWER PLANTS WHICH DESPITE VARYING SPEEDS OF ROTATION SUPPLY POWER TO THE SYSTEM AT CONSTANT FREQUENCY AND VOLTAGE.

1980-0376 MUSGROVE P J
OFFSHORE WIND ENERGY SYSTEMS.
METEOROL. MAG. 109(1293): 113-119, APRIL 1980.

IT IS SHOWN THAT ARRAYS OF WINDMILLS DEPLOYED IN THE SHALLOW WATERS OF THE SOUTHERN NORTH SEA COULD PRODUCE 20 PERCENT OF THE ELECTRICITY NEEDS OF THE UNITED KINGDOM. COSTINGS BASED ON 1976 PRICES SHOW THAT WIND-GENERATED ELECTRICITY IS ALREADY COMPETITIVE WITH THAT FROM OIL- AND COAL-FIRED POWER STATIONS.

1980-0377 MYERS W N, HEIN L A
AMPLIFIED WIND TURBINE APPARATUS.
NTIS, MARCH 12, 1980. 16 P.
PAT-APPL-6-129 780, NASA-CASE-MFS-23830-1

AN AMPLIFIED WIND TURBINE APPARATUS IS DISCLOSED WHEREIN AMBIENT INLET AIR IS PREROTATED IN AN AIR ROTATION CHAMBER HAVING A HIGH PRESSURE PROFILE. A SECOND ROTATION CHAMBER ADJACENT AND DOWNSTREAM OF THE TURBINE HAS A LOW PRESSURE CORE PROFILE WHEREBY FLOW ACROSS THE TURBINE IS ACCELERATED AND THEREAFTER EXITS THE TURBINE APPARATUS THROUGH A DRAFT ANTI-INTERFERENCE DEVICE. THE DRAFT DEVICE ELIMINATES INTERFERENCE WITH AMBIENT WINDS AT THE OUTLET OF THE TURBINE APPARATUS. PIVOTABLE VANES CONTROLLED IN RESPONSE TO PREVAILING WIND DIRECTION ADMIT AIR TO THE CHAMBERS AND AID IN IMPARTING ROTATION.

1980-0378 THOMAS R L
WORKING GROUP REPORT ON LARGE SCALE SYSTEMS: DESIGN AND R & D.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 493-506.
CONF-791097

1980-0379 TRENKA A R
WORKING GROUP REPORT ON SMALL SCALE SYSTEMS: R&D AND UTILITY INTERFACE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 483-492.
CONF-791097

1980-0380 VAS I E
ECONOMICS ASSOCIATED WITH WIND POWER SYSTEMS.
AM. NUCL. SOC. TRANS. 34: 9-10, 1980.

1980-0381 NELLUMS R O
POWER PRODUCTION FROM DARRIEUS WIND TURBINES.
INT. POWER GENERATION 3(7): 27, OCTOBER 30, 1980.

D.J.M. DARRIEUS, A FRENCH INVENTOR, ORIGINALLY PATENTED THE WIND ENERGY DEVICE BEARING HIS NAME IN 1929. HOWEVER, THE PATENT DREW LITTLE ATTENTION UNTIL DEVELOPMENT PROGRAMMES WERE LAUNCHED BY THE NATIONAL RESEARCH COUNCIL OF CANADA IN 1966 AND BY SANDIA NATIONAL LABORATORIES, SUPPORTED BY THE US DEPARTMENT OF ENERGY (DOE) IN 1974. RECENT ECONOMIC ASSESSMENT OF THE DARRIEUS TURBINE HAS LED THE US DEPARTMENT OF ENERGY TO CONCLUDE THAT DARRIEUS TECHNOLOGY HAS BECOME ECONOMICALLY COMPETITIVE WITH PROPELLER WIND TURBINES FOR GRID CONNECTED UTILITY POWER GENERATION.

1980-0382 NELSON V
THE DEVELOPMENT OF WIND ENERGY.
SOL. ENG. MAG. 5(9): 20-23, AUGUST 1980.

WIND, ONCE A MAJOR POWER SOURCE IN THE UNITED STATES, IS ONCE AGAIN TAKING A PLACE IN THE ENERGY RESOURCE BASE. AT THE PRESENT TIME, OVER 50 MANUFACTURERS ARE PRODUCING WIND ENERGY CONVERSION SYSTEMS WITH RATINGS FROM LESS THAN 1 KILOWATT TO 4000 KILOWATTS. IT IS ESTIMATED THAT THE EXTRACTABLE WIND POWER FOR THE 48 STATES IS TWO MILLION MEGAWATTS. THE MAJOR WIND AREAS ARE THE GREAT PLAINS, ALONG THE COAST AND OFF-SHORE ALASKA AND HAWAII. IN CONTRAST TO THERMAL PROCESSES FOR GENERATING ELECTRICITY, WIND POWER MAKES NO DEMAND ON WATER RESOURCES. WIND ENERGY CONVERSION SYSTEMS (WECS) MAY WELL BE THE BEST NEAR-TERM OPTION, BOTH TECHNOLOGICALLY AND ECONOMICALLY, FOR GENERATING ELECTRICITY FROM RENEWABLE RESOURCES.

1980-0383 NELSON V, MOORING M
PROCEEDINGS OF THE A.W.E.A. NATIONAL CONFERENCE, SUMMER 1980.
WASHINGTON, D.C., AMERICAN WIND ENERGY ASSOCIATION, 1980. 167 P.
AMERICAN WIND ENERGY ASSOCIATION NATIONAL CONFERENCE, PITTSBURGH, PENNSYLVANIA, JUNE 1980.

THIRTY-THREE PAPERS REPRESENTING THE STATE-OF-THE-ART OF WINDPOWER ARE INCLUDED.

1980-0384 NESBIT W
GOING WITH THE WIND.
EPRI J. 5(2): 6-17, MARCH 1980.

EXTRACTING ELECTRIC POWER FROM THE WIND REQUIRES AEROGENERATOR SITES WITH SUITABLE CHARACTERISTICS, RELIABLE MACHINES, AND POWER SYSTEMS WITH SUFFICIENT FLEXIBILITY TO ABSORB THE WIND GENERATED POWER. A MAP OF WIND POWER DENSITY ACROSS THE USA ILLUSTRATING AREAS WITH OVER 500W/SQUARE METER IS GIVEN. IMPROVEMENTS IN AEROGENERATOR DESIGN ARE DISCUSSED, WITH REFERENCE TO THE MOD 2 TURBINE (2.5 MW OUTPUT AND 300 FT DIAMETER) TO BE ERECTED AT GOLDENDALE IN WASHINGTON IN 1980. THE STATISTICAL CONTRIBUTION OF WINDPOWER TO AN ELECTRIC UTILITY IS SHOWN, ILLUSTRATING THAT WINDPOWER AVAILABILITY AND MAXIMUM DEMAND ARE TYPICALLY OUT OF PHASE, REQUIRING CLOSE CONTROL OF POWER SYSTEM CHARACTERISTICS FOR EFFECTIVE WINDPOWER EXPLOITATION.

1980-0385 NEUSTADTER H E
DATA ACQUISITION AND ANALYSIS IN THE DOE/NASA WIND ENERGY PROGRAM.
NTIS, 1980. 19 P.
DOE/NASA/1028-28, NASA-TM-81603, N81-13463, CONF-801059-2

THE FOCUS OF THIS REPORT IS ON THE TECHNOLOGY DATA SYSTEM WHICH CONSISTS OF THE FOLLOWING ELEMENTS: (1) SENSORS WHICH MEASURE CRITICAL PARAMETERS SUCH AS WIND SPEED AND DIRECTION, OUTPUT POWER, BLADE LOADS AND STRAINS, AND TOWER VIBRATIONS; (2) REMOTE MULTIPLEXING UNITS (RMUS) MOUNTED ON EACH WIND TURBINE WHICH FREQUENCY MODULATE, MULTIPLEX AND TRANSMIT SENSOR OUTPUTS; (3) THE INSTRUMENTATION AVAILABLE TO RECORD, PROCESS AND DISPLAY THESE SIGNALS; AND (4) CENTRALIZED COMPUTER ANALYSIS OF DATA AT THE NASA-LEWIS RESEARCH CENTER IN CLEVELAND, OHIO. RMU CHARACTERISTICS AND MULTIPLEXING TECHNIQUES ARE PRESENTED. DATA PROCESSING IS ILLUSTRATED BY FOLLOWING A TYPICAL SIGNAL THROUGH INSTRUMENTS SUCH AS THE ANALOG TAPE RECORDER, ANALOG-TO-DIGITAL CONVERTER, DATA COMPRESSOR, DIGITAL TAPE RECORDER, VIDEO (CRT) DISPLAY, AND STRIP CHART RECORDER. SAMPLE OUTPUT DATA FROM THE 200 KW MOD-0A WIND TURBINE AT CLAYTON, NEW MEXICO, ARE PRESENTED.

1980-0386 NITTEBERG J
THE NORWEGIAN WIND ENERGY PROGRAM: STATUS PER AUGUST 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 307-320.
CONF-791097

THE R&D ON WIND ENERGY IN NORWAY IS SO FAR ENTIRELY AIMED AT ESTABLISHMENT OF DEPENDABLE DATA AND INFORMATION ON WHICH A TECHNICAL AND ECONOMICAL ASSESSMENT OF WIND ENERGY COULD BE BASED. THE FIRST FOUR PROJECTS WILL INVESTIGATE THE WIND RESOURCES AND WIND CHARACTERISTICS AND DEVELOP METHODS FOR THIS PURPOSE. THE FIFTH PROJECT WILL EVALUATE THE TECHNICAL AND ECONOMICAL FEASIBILITY, THE SIXTH PROJECT IS A SAFETY AND ENVIRONMENTAL STUDY AND THE SEVENTH PROJECT ESTABLISHES CRITERIA FOR CONSTRUCTION AND OPERATIONS OF WECS. PROJECT 8 IS A SUMMING UP OF THE OTHER PROJECTS GIVING AN ASSESSMENT OF THE POTENTIAL ROLE OF WIND ENERGY IN NORWAY. FINALLY, PROJECT 9 IS A DETAILED PLANNING OF THE NEXT PHASE, GIVING SPECIFICATIONS OF EXPERIMENTAL WIND GENERATORS AND DETAILS OF THE EXPERIMENTAL PROGRAM.

1980-0387 NOLL R B, HAM N D, ZVARA J
PRELIMINARY PERFORMANCE ANALYSIS FOR A FLEXROTOR INNOVATIVE WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 183-192.
SERI/CP-635-938

THE FLEXROTOR IS AN INNOVATIVE THREE-BLADED, VERTICAL-AXIS WIND ENERGY SYSTEM MOUNTED ON AN UNGUYED, FREE-STANDING TOWER. THE STRAIGHT, UNTWISTED BLADES AND STRUTS ARE MADE OF COMMERCIALLY-AVAILABLE STANDARD EXTRUSIONS TO SIMPLIFY CONSTRUCTION AND REDUCE COST. HIGH STRENGTH CABLES ARE USED IN THE BLADE TO CARRY LARGE TENSION FORCES AND OFFSET CENTRIFUGAL LOADING. CONTROL OF OVERSPEED IS BY MEANS OF AN AEROELASTICALLY INDUCED PITCH ANGLE PRODUCED THROUGH A CANTED HINGE CALLED THE FLEXHINGE. THIS PAPER PRESENTS A DESCRIPTION OF THE FLEXROTOR DESIGN FEATURES; PRELIMINARY PERFORMANCE ANALYSIS RESULTS SHOWING THE EFFECTS OF SIZE, BLADE SWEPT AREA, ROTOR SOLIDITY, ROTOR SPEED AND WIND SPEED; AND A DESCRIPTION OF THE SYSTEM OPERATION.

1980-0388 NOUN R J
PRODUCT LIABILITY INSURANCE FOR WECS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY CONFERENCE, PHOENIX, ARIZONA, JUNE 2, 1980. NTIS, JUNE 1980. 7 P.
SERI/TP-744-466R, CONF-800604-30

PRELIMINARY FINDINGS FROM A SAMPLING OF MANUFACTURERS INDICATE THAT, IN MANY CASES, PRODUCT LIABILITY INSURANCE FOR WECS IS STILL DIFFICULT TO OBTAIN. ABOUT HALF OF THE 21 WECS MANUFACTURERS CONTACTED SAID THEY DID NOT HAVE PRODUCT LIABILITY INSURANCE. ABOUT ONE MANUFACTURER IN THREE WHO ATTEMPTED TO OBTAIN INSURANCE WAS REJECTED BY AT LEAST ONE INSURANCE COMPANY. IN SOME INSTANCES, ALTHOUGH AN INSURER HAD OFFERED TO PROVIDE COVERAGE, THE MANUFACTURER FOUND THE RATES QUOTED TO BE PROHIBITIVELY EXPENSIVE. FOR EXAMPLE, IN ONE CASE A WECS MANUFACTURER HAD BEEN OFFERED PRODUCT LIABILITY INSURANCE, BUT AT AN ANNUAL RATE OF 30% OF HIS GROSS SALES.

1980-0389 OSBORN W C
NORTHEAST: A TIME OF STARK RECKONING.
SOL. AGE 5(1): 16-17, JANUARY 1980.

THE SHORTAGE OF FUEL SUPPLIES IN THE NORTHEASTERN STATES AND POSSIBLE SOLUTIONS TO THE PROBLEM ARE DISCUSSED. THE NORTHEAST'S RELIANCE ON AND HIGH USE OF OIL HAS LED TO ECONOMIC PROBLEMS; THERE ARE SEVERAL GOVERNMENTAL AGENCIES WHICH HAVE BEEN FORMED REGIONALLY TO ADDRESS THE ENERGY PROBLEM. THE NORTHEAST WILL BE SIGNIFICANTLY AFFECTED BY FEDERAL POLICY DECISIONS ON NUCLEAR PLANT ACCIDENTS, DECONTROL OF DOMESTIC OIL PRICES, SYNFUEL PROGRAMS, SUPPORT OF PHOTOVOLTAIC CELL MARKETING FOR ELECTRICITY GENERATION, AND GOVERNMENT POLICY TOWARD THE TREATMENT OF COGENERATORS AND SMALL POWER PRODUCERS BY THE PUBLIC UTILITY COMPANIES. APPLICATIONS OF SOLAR ENERGY IN HOUSES AND BUILDINGS IN THE NORTHEASTERN U.S. ARE HIGHLIGHTED AND INCLUDE RETROFITTING OF APARTMENTS, A SCHOOL, A MOBILE HOME, A WIND ENERGY CONVERSION PLANT, A SEWAGE TREATMENT PLANT, A PLANNED VILLAGE COMPLEX, HYBRID SYSTEMS, AND GREENHOUSES.

1980-0390 OTAWA T
WIND ENERGY PLANNING: DEVELOPMENT AND APPLICATION OF A SITE SELECTION METHOD FOR WIND ENERGY CONVERSION SYSTEMS (WECS).
INT. J. ENERGY RES. 4(3): 283-306, JULY-SEPTEMBER 1980.

THE USE OF WIND ENERGY BY MEANS OF ITS CONVERSION TO ELECTRICITY INVOLVES A NUMBER OF CONSTRAINTS SUCH AS ECONOMIC, ENVIRONMENTAL, TECHNICAL, LEGAL, SOCIAL AND INSTITUTIONAL REQUIREMENTS. PLANNING FOR WIND ENERGY SHOULD SOLVE THESE ISSUES IN THE PLANNING PROCESS BY ENCOURAGING OPPORTUNITIES AND DISCOURAGING CONSTRAINTS ASSOCIATED WITH THE USE OF WIND ENERGY. THE OPPORTUNITIES AND CONSTRAINTS SIGNIFICANT AT THE REGIONAL LEVEL WERE IDENTIFIED, AND A SYSTEMATIC METHOD WAS DEVELOPED TO SELECT SITES FOR LARGE WECS BY INCORPORATING THE IDENTIFIED FACTORS. THESE FACTORS INCLUDE: WIND RESOURCE, PROXIMITY TO LOAD CENTRES, PROXIMITY TO TIE-IN POINTS, AND EXCLUSIVE LAND-USE AREAS. THE DEVELOPED METHOD WAS APPLIED TO THE WESTERN MASSACHUSETTS REGION, AND THE FIRST RESULTS OF THE STUDY HAVE BEEN ACQUIRED.

1980-0391 PALMGREN D, OTIS D R
WIND ENERGY CAPACITY OF A SINGLE AIRFOIL WITH VERTICAL AXIS ON A CIRCULAR TRACK.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 840-845.

THIS PAPER DESCRIBES A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM CONSISTING OF A SINGLE VERTICAL AIRFOIL TRAVELING AT CONSTANT SPEED AROUND A HORIZONTAL CIRCULAR TRACK. A COMPUTER SIMULATION DETERMINES THRUST, NORMAL FORCE AND POWER COEFFICIENTS, AND AIRFOIL ANGLE OF ATTACK FOR TWO STANDARD NACA AIRFOILS FOR AIRFOIL SPEEDS UP TO 10 TIMES THE WIND SPEED. THE AIRFOIL IS ARTICULATED FOR OPTIMUM PERFORMANCE. THE SIMULATION SHOWS THAT FOR THE ARTICULATED CASE, MAXIMUM AVERAGE THRUST IS ATTAINED AT AIRFOIL SPEEDS OF SEVEN TIMES THE WIND SPEED, AND AT THIS SPEED THE ARTICULATED AIRFOIL PRODUCES 43% MORE THRUST (AND POWER) THAN THE NONARTICULATED AIRFOIL. ANGLE OF ATTACK, THRUST FORCE AND NORMAL FORCES ARE PRESENTED AS A FUNCTION OF TRACK POSITION.

1980-0392 PATENT PROFILES: SOLAR ENERGY.
NTIS, JANUARY 1980. 195 P.
PB80-190010

THE REPORT PRESENTS PROFILES OF UNITED STATES PATENTING IN FIVE MAJOR AREAS OF SOLAR ENERGY TECHNOLOGY, AND IN RELATED AREAS OF WIND, GEOTHERMAL AND TIDE AND WAVE ENERGY. EACH OF THE PROFILES IS DIVIDED INTO THREE PARTS: PART 1, THE FIRST PAGE OF THE PROFILE, IDENTIFIES THE AREA WHICH IS EXAMINED, LISTS THE PERTINENT U.S. PATENT CLASSIFICATION(S) INVOLVED, AND GRAPHICALLY ILLUSTRATES PATENT ACTIVITY (ACROSS A DESIGNATED 10-YEAR SPAN). IN PART 2A, THE FIRST TABLE SHOWS THE YEARLY DISTRIBUTION OF PATENTS BY THE DATE OF THE PATENT GRANT, WHILE THE SECOND TABLE REDISTRIBUTES THIS DATA BASED ON THE APPLICATION FILING DATE OF THE PATENTS. PART 2B PROVIDES A LIST OF ASSIGNEES RANKED BY THE NUMBER OF PATENTS, IN THE TECHNOLOGY TO WHICH THEY HELD TITLE AT THE TIME OF THE PATENT GRANT. IN PART 2C, ASSIGNEES ARE LISTED ALPHABETICALLY FOLLOWED BY A NUMERICAL LISTING OF PATENTS TO WHICH THEY HELD TITLE AT THE TIME OF PATENT GRANT. PART 2D PRESENTS AN ALPHABETICAL LISTING OF INVENTORS OF UNASSIGNED PATENTS (1975-1978) TOGETHER WITH THEIR ADDRESSES, THE PATENT NUMBERS AND TITLES. PART 3 UPDATES THE PRECEDING MATERIAL BY LISTING PATENT NUMBERS, ASSIGNEE OR INVENTOR, AND TITLE FOR THOSE PATENTS WHICH ISSUED FROM JANUARY TO OCTOBER, 1979.

1980-0393 PEDERSEN B M
DESCRIPTION OF THE TWO DANISH 630 KW WIND TURBINES, NIBE-A AND NIBE-B, AND SOME PRELIMINARY TEST RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E1, P. 223-238.

A BRIEF DESCRIPTION OF THE TWO DEMONSTRATION WIND TURBINES, NIBE-A AND NIBE-B, OF THE DANISH WIND ENERGY PROGRAMME IS GIVEN. PRELIMINARY RESULTS OBTAINED DURING COMMISSIONING OF NIBE-A ARE PRESENTED.

1980-0394 PENNELL W T, WEGLEY H L
EFFECT OF SITE WIND CHARACTERISTICS ON ENERGY PRODUCTION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 3D, MIAMI BEACH, FLORIDA, DECEMBER 15, 1980.
NTIS, DECEMBER 1980. 20 P.
PNL-SA-9066

THE EFFECT OF DIFFERENCES IN WIND CHARACTERISTICS ON ESTIMATES OF WIND TURBINE PERFORMANCE HAS BEEN EXAMINED. NET ENERGY PRODUCTION OVER A GIVEN PERIOD CAN BE ESTIMATED IF BOTH THE PERFORMANCE CHARACTERISTICS OF THE TURBINE AND THE WIND SPEED PROBABILITY DENSITY FUNCTION (PDF) ARE KNOWN. SIMULATIONS COVERING A RANGE OF PDFS AND MACHINE PERFORMANCE CHARACTERISTICS SHOWED THAT REASONABLE ESTIMATES OF NET ENERGY PRODUCTION CAN BE MADE USING SIMPLE, ANALYTICAL PDFS. THE ANALYTICAL PDFS ONLY REQUIRE KNOWLEDGE OF THE AVERAGE WIND SPEED AT A SITE. SOME WIND ENERGY APPLICATIONS REQUIRE KNOWLEDGE OF HOW TEMPORAL VARIATIONS IN TURBINE OUTPUT INTERACT WITH TEMPORAL VARIATIONS IN LOAD. THE EFFECT OF VARIATIONS IN THE DIURNAL MODULATION OF WIND SPEED ON LOAD MATCHING WAS EXAMINED BY SIMULATING THE ENERGY TRANSFER BETWEEN A UTILITY AND A RESIDENCE EQUIPPED WITH A SMALL WIND TURBINE GENERATOR. TURBINE PERFORMANCE WAS SIMULATED AT SIX SITES HAVING A WIDE RANGE OF DIURNAL CHARACTERISTICS.

1980-0395 PENNELL W T, BARCHET W R, ELLIOTT D L, WENDELL L L, HIESTER T R
METEOROLOGICAL ASPECTS OF WIND ENERGY: ASSESSING THE RESOURCE AND SELECTING THE SITES.
J. IND. AERODYN. 5(3-4): 223-246, MAY 1980.

RESEARCH ON WIND CHARACTERISTICS WITHIN THE UNITED STATES WIND ENERGY PROGRAM IS ADDRESSING PROBLEMS OF RESOURCE ASSESSMENT, SITE SELECTION, DESIGN AND PERFORMANCE EVALUATION OF WIND MACHINES, AND DAY-TO-DAY OPERATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN UTILITY GRIDS. WORK DESIGNED TO IMPROVE OUR UNDERSTANDING OF THE WIND ENERGY RESOURCE WITHIN THE UNITED STATES IS DISCUSSED. THE TECHNIQUES AND PROCEDURES THAT HAVE BEEN DEVELOPED FOR FINDING WIND MACHINE SITES ARE ALSO EXAMINED.

1980-0396 PETERSEN H
SMALL WINDMILLS IN DENMARK
WIND ENG. 4(2): 87-114, 1980.

THE REPORT DESCRIBES THE PROJECT FOR SMALL WINDMILLS FUNDED BY THE MINISTRY OF ENERGY, AND MANAGED AND CARRIED OUT AT RISO NATIONAL LABORATORY. THE TEST PLANT IS DESCRIBED AND A SURVEY OF DANISH WINDMILLS IS PRESENTED. SOME REQUIREMENTS FOR WINDMILLS ARE MENTIONED AND REGULATIONS GOVERNING THE INTERFACE BETWEEN GRID-CONNECTED WINDMILLS AND THE ELECTRIC UTILITIES ARE EXPLAINED AND DISCUSSED.

1980-0397 PETERSEN H
THE TEST PLANT FOR SMALLER WINDMILLS AND A SURVEY OF SMALL DANISH WINDMILLS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 437-450.
CONF-791097

THE MAIN ACTIVITY FOR THE PROJECT IS TO ESTABLISH AND RUN A TEST PLANT FOR SMALLER WINDMILLS. PLANNING OF THE TEST PLANT WAS INITIATED IN JUNE 1978. SEVEN PLATFORMS FOR WINDMILLS HAVE BEEN ESTABLISHED. BY SEPTEMBER 1979 SIX WINDMILLS HAD BEEN ERECTED AND THE DATA SAMPLING AND -HANDLING SYSTEM HAD BEEN COMPLETED.

1980-0398 PETERSEN H
TEST PLANT FOR AND A SURVEY OF SMALL DANISH WINDMILLS.
RISO NATL. LAB. REP. NO. 2193: FEBRUARY 1980. 52 P.

THE REPORT DESCRIBES THE PROJECT FOR SMALL WINDMILLS. THE TEST PLANT IS DESCRIBED AND A SURVEY OF DANISH WINDMILLS IS PRESENTED. SOME REQUIREMENTS FOR WINDMILLS ARE MENTIONED AND THE INTERFACE WITH THE ELECTRIC UTILITIES IS ALSO GIVEN.

1980-0399 PEXTON A F
A FUELS POLICY FOR THE U.K. INTO THE 21ST CENTURY.
NUCL. ENERGY 19(1): 19-35, FEBRUARY 1980.

BECAUSE OF THE FINITE LIFE OF NORTH SEA OIL AND GAS SUPPLIES A BROAD FUELS POLICY IS NECESSARY IN THE UK. THE AUTHOR CONSIDERS THE ROLE OF CONSERVATION AND CONTRIBUTIONS FROM VARIOUS RENEWABLE SOURCES SUCH AS WIND POWER, TIDAL POWER, SOLAR POWER, GEOTHERMAL ENERGY AND NUCLEAR FUSION. THE MINIMUM RISK POLICY FOR THE UK IS TO PREPARE FOR SELF-SUFFICIENCY IN PRIMARY ENERGY. A POLICY OF CONVERTING COAL TO GAS AND OIL INITIALLY AND A TRANSFER TO NUCLEAR POWER FOR ELECTRICITY GENERATION (SO AS TO LEAVE COAL FOR OTHER PURPOSES) IS SUGGESTED.

1980-0400 PICKERING K E, VILARDO J M, SCHAKENBACH J T, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 4. THE NORTHEAST REGION.
NTIS, SEPTEMBER 1980. 230 P.
PNL-3195-WERA-4

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH STATE OF THE REGION. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED IN THIS CHAPTER INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. AN INTRODUCTION AND OUTLINE ARE PROVIDED FOR IN THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH STATE. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED. THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE STATE CHAPTERS.

1980-0401 PIEPERS G G
THE NETHERLANDS WIND ENERGY RESEARCH PROGRAMME.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 287-300.
CONF-791097

THE OBJECTIVE OF THE PROGRAMME IS NOT IN THE FIRST PLACE TO COVER THE COUNTRY AGAIN WITH MINDMILLS, BUT TO INVESTIGATE THE FEASIBILITY OF THE UTILISATION OF WIND POWER, BOTH ON A LARGE SCALE, TO PRODUCE ELECTRICITY SUITABLE FOR FEEDING INTO THE NATIONAL GRID (CENTRALISED APPLICATION), AND ON A SMALLER SCALE, FOR ENERGY SUPPLY DIRECT TO INDUSTRIES, GLASSHOUSES, WATER PUMPING STATIONS, SMALL COMMUNITIES, ETC. (DECENTRALISED APPLICATION).

1980-0402 PORCH W M
NUMERICAL WIND FIELD MODEL VALIDATION IN COMPLEX TERRAIN WITH APPLICATION TO POLLUTANT TRANSPORT.
NTIS, MARCH 1980. 7 P.
CONF-800327-3, UCRL-83269

THE INTERACTION OF METEOROLOGICAL DATA TAKEN AT POINTS IN A REGION WITH NUMERICAL MODELS CAN BE DONE SMOOTHLY IN GENTLY VARYING TERRAIN. HOWEVER, IT IS FRAUGHT WITH DIFFICULTIES IN COMPLEX TERRAIN. COMPUTER MEMORY SIZE LIMITS THE RESOLUTION OF THE TOPOGRAPHY AND A POINT MEASUREMENT BECOMES REPRESENTATIVE OF SMALLER SCALES AS THE TOPOGRAPHY BECOMES MORE COMPLEX. THIS PAPER DESCRIBES HOW REMOTELY SENSED SPATIALLY AVERAGED WINDS FROM OPTICAL ANEMOMETERS CAN BE USED TO HELP THE INTERACTION OF WIND MEASUREMENTS MADE AT POINTS WITHIN A REGION AND NUMERICAL REGIONAL WIND FIELD MODELS. IN THIS PAPER, EMPHASIS WILL BE PLACED ON MODEL VALIDATION BOTH AS WIND FIELD ESTIMATES FOR APPLICATIONS SUCH AS WIND ENERGY PROSPECTING, AND AS INPUT TO POLLUTANT DISPERSION MODELS.

1980-0403 PORCH W M, GREEN T J
APPLICATION OF A PHOTODIODE-ARRAY OPTICAL TURBULENCE SENSOR TO WIND STUDIES IN COMPLEX TERRAIN.
NTIS, APRIL 1980. 18 P.
CONF-800480-3, UCRL-84503

A DIGITAL PHOTODIODE-ARRAY OPTICAL TURBULENCE SENSOR WAS USED TO GATHER DATA SIMULTANEOUSLY WITH ANALOG OPTICAL ANEMOMETER MEASUREMENTS DURING THE JULY 1979 ASCOT EXPERIMENT. THIS SYSTEM PROVIDED USEFUL INFORMATION REGARDING THE UNIFORMITY OF OPTICAL TURBULENCE USED BY THE OPTICAL ANEMOMETER TO DERIVE CROSS-PATH WIND SPEEDS. WIND SPEEDS DERIVED FROM DIGITAL ANALYSIS OF THE PHOTODIODE-ARRAY INTENSITIES ALSO PROVIDED AN INDEPENDENT MEASURE OF THE CROSS-PATH WIND SPEED. CLOSE AGREEMENT WAS FOUND BETWEEN THESE TWO MEASURES OF THE WIND.

1980-0404 POWELL W R
OUTPUT POWER OF WIND MACHINES.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 229-232.
SERI/TP-351-431

A NEW MODEL OF WIND MACHINE OUTPUT POWER IS SUGGESTED. THIS MODEL NOT ONLY AVOIDS ERRORS ASSOCIATED WITH PRIOR MODELS, BUT ALSO ALLOWS THE AVERAGE POWER PRODUCED BY A WIND MACHINE TO BE CALCULATED WITHOUT RESORT TO NUMERICAL METHODS. THE AVERAGE POWER IS EXPRESSED AS A FUNCTION OF THE "CUT-IN", "RATED", AND "MAXIMUM" SPEEDS OF THE WIND MACHINE AND THE TWO PARAMETERS USED TO CHARACTERIZE WIND SPEEDS WITH WEIBULL STATISTICS. THE VARIATION OF AVERAGE POWER AND CAPACITY FACTORS WITH CHANGES IN WIND-MACHINE DESIGN IS EXPLORED.

1980-0405 POWELL D C, CONNELL J R
DEFINITION OF GUST MODEL CONCEPTS AND REVIEW OF GUST MODELS.
NTIS, JUNE 1980. 100 P.
PNL-3138

FOUR MODELS ARE EXAMINED WHICH ATTEMPT TO DESCRIBE WIND FLUCTUATIONS IN RELATION TO A WIND ENERGY CONVERSION SYSTEM (WECS) THAT IS SUBJECTED TO THESE FLUCTUATIONS OBSERVED FROM A FIXED LOCATION WITHIN THE ATMOSPHERIC BOUNDARY LAYER. THE PRIMARY PURPOSE OF THIS EXAMINATION IS TO PROVIDE A BASIS FOR UNDERSTANDING PRESENT AND FUTURE DEVELOPMENTS IN GUST AND GUST-RISE MODELS. THE EXAMINATION IS ACCOMPLISHED BY IDENTIFYING THE GUST DEFINITIONS USED IN THE MODELS AND RELATING THEM TO A BASIC DEFINITION GIVEN.

1980-0406 BIELAWA R L
THE USE OF LARGE AMPLITUDE BENDING-TORSION FLUTTER AS A WECS MECHANISM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 67-88.
SERI/CP-635-1601

AN OSCILLATING VANE WIND ENERGY CONVERSION SYSTEM, INCORPORATING THE CLASSIC BENDING-TORSION FLUTTER CHARACTERISTICS OF A CANTILEVERED WING, IS DESCRIBED. THE SYSTEM IS CHARACTERIZED BY RELATIVELY LARGE RESPONSE AMPLITUDES AND UTILIZES A CONSTRUCTION SCHEME BASED ON THE HIGH FATIGUE STRENGTH CHARACTERISTICS OF A COMPOSITE MATERIAL. THE RESULTS OF AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF THE POTENTIAL OF THIS SYSTEM ARE PRESENTED. THE EXPERIMENTAL RESULTS CONSIST OF THE MECHANICAL POWER GENERATION, AND DYNAMIC RESPONSE AND STRESS CHARACTERISTICS FOR A ONE METER SPAN MODEL. TWO COMPLEMENTARY ANALYSES ARE DESCRIBED: A FLUTTER EIGENSOLUTION TO CALCULATE CONDITIONS FOR SELF-START, AND A NONLINEAR TIME-HISTORY ANALYSIS TO CALCULATE OUTPUT POWER CHARACTERISTICS. RESULTS OF THE CORRELATION OF THESE ANALYSES WITH TEST DATA ARE PRESENTED.

1980-0407 FOREMAN K M
THE DIFFUSER AUGMENTED WIND TURBINE (DAWT): A COST-COMPETITIVE INNOVATIVE ENERGY CONVERSION SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 103-111.
SERI/CP-635-1601

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS AN INNOVATIVE APPROACH UNDER INVESTIGATION SINCE 1975. ITS GOAL IS TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION. THROUGH THE USE OF A UNIQUE COMPACT DIFFUSER, THE VOLUMETRIC FLOW PROCESSED BY THE TURBINE IS MUCH GREATER THAN CONVENTIONAL ROTORS OF THE SAME DIAMETER AND MORE NATURAL WIND POWER IS CONVERTED. ADDITIONALLY, BECAUSE THE NATURAL WIND IS ACCELERATED INTO THE ROTOR DISK BY THE DIFFUSER'S ACTION, THE DAWT IS ABLE TO PRODUCE USEFUL POWER AT LOWER CUT-IN WIND SPEEDS THAN A BARE TURBINE AND CAN PRODUCE GREATER ANNUAL ENERGY OUTPUTS. HOWEVER, THE DIFFUSER STRUCTURE IS AN ECONOMIC BURDEN THAT POTENTIALLY CAN OFFSET THE TECHNICAL PERFORMANCE GAINS OF THE CONCEPT. TO PREVENT THIS FROM OCCURRING, CAREFUL ATTENTION MUST BE ACCORDED THE DESIGN AND MANUFACTURING APPROACHES OF THE DIFFUSER AND ITS SUPPORTING STRUCTURE TO ASSURE LOW ENOUGH COSTS TO RETAIN ATTRACTIVE OVERALL SYSTEM PROSPECTS. THIS PAPER REPORTS ON WORK CONDUCTED TO EXPLORE SYSTEM ENGINEERING DESIGN ALTERNATIVES AND TO DETERMINE COST AND ENERGY OUTPUT OF COST EFFECTIVE DAWTS.

1980-0408 FURUYA O, MAEKAWA S
PRELIMINARY REPORT ON AN ASSESSMENT OF A TETHERED WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 37-53
SERI/CP-635-1601

IN SEPTEMBER 1980, WE STARTED A STUDY FOR ASSESSING A TETHERED WIND ENERGY SYSTEM AS A POSSIBLE ENERGY SOURCE IN THE NEAR FUTURE UNDER CONTRACT FROM THE SOLAR ENERGY RESEARCH INSTITUTE OF THE DEPARTMENT OF ENERGY OF THE UNITED STATES. THIS IS A PRELIMINARY REPORT WHICH DESCRIBES THE SUBJECTS TO BE STUDIED IN THIS PROJECT AND THUS IDENTIFIES THE PROBLEM AREAS TO BE CLARIFIED. IN THIS STUDY, EMPHASIS WILL BE PLACED UPON SEVERAL KEY ITEMS IN IMPLEMENTING A TETHERED WIND ENERGY SYSTEM (TWES). ALTHOUGH OTHER MINOR TECHNICAL PROBLEMS WILL BE TOUCHED UPON DURING THE COURSE OF STUDY, IT IS BELIEVED THAT IF THE KEY ITEMS ARE JUDGED TO BE NEGATIVE FOR THE SYSTEM IMPLEMENTATION, THE WHOLE CONCEPT WILL BECOME INADEQUATE FOR FURTHER STUDIES. THESE KEY ITEMS INCLUDE THE RELATIONSHIP BETWEEN (1) THE RATED POWER AND ALTITUDE AS A FUNCTION OF THE SEASONAL WIND SPEED, (2) REQUIRED LIFTING FORCE FOR CARRYING THE PLATFORM AND CABLE WEIGHT, AND (3) GENERATED POWER AND CABLE DIAMETER (I.E., POWER TRANSMISSION PROBLEM). SINCE THESE THREE RELATIONSHIPS ARE ALL INTERRELATED, AN ITERATION PROCESS WILL BE EMPLOYED BY WRITING A SIMPLIFIED COMPUTER PROGRAM TO DETERMINE THESE RELATIONSHIPS UNIQUELY. FURTHERMORE, THE SURVIVABILITY OF THE TWES IN A WIND GUST OR OTHER ACCIDENT, AND THE PROBLEM OF MAINTENANCE AND REPAIR WILL BE CAREFULLY STUDIED IN RELATION TO THE ECONOMY OF THE SYSTEM.

1980-0409 LEIGH G G
A CONCEPT FOR AUTOMATIC BLADE PITCH FOR A DARRIEUS VERTICAL AXIS WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 143-163.
SERI/CP-635-1601

A CONCEPT IS REVEALED WHERE THE PITCH ANGLES OF THE BLADES OF A DARRIEUS-TYPE VERTICAL AXIS WIND TURBINE ARE AUTOMATICALLY MODULATED BY AERODYNAMIC FORCES TO PROVIDE IMPROVED ANGLE OF ATTACK AND INCREASED POWER OUTPUT FROM THE TURBINE. THE TURBINE BLADES ARE PIVOTED FORWARD OF THE CENTER OF PRESSURE SO THAT AERODYNAMIC FORCES TEND TO ROTATE THE BLADES, THUS CHANGING THE ANGLE OF ATTACK AND IMPROVING THE AERODYNAMIC PERFORMANCE. COUNTERBALANCE WEIGHTS, LOCATED IN THE BLADE SUPPORT STRUTS, PROVIDE A MASS BALANCE ABOUT THE BLADE PIVOT POINT, THUS ELIMINATING ANY CENTRIFUGAL PITCHING FORCES ON THE BLADES. SPRINGS AND MECHANICAL STOPS, LOCATED IN THE BLADE SUPPORT STRUTS, ARE USED TO CONTROL THE AMOUNT OF BLADE PITCH AND RETURN THE BLADES TO NEUTRAL WHEN THE AERODYNAMIC LIFT FORCES ARE REDUCED. NO MECHANICAL OR ELECTROMECHANICAL MECHANISMS ARE UTILIZED TO ACHIEVE THE IMPROVED PERFORMANCE; HENCE THE COST OF MANUFACTURING AND MAINTENANCE REQUIREMENTS FOR THE TURBINE SHOULD BE SUBSTANTIALLY REDUCED.

1980-0410 LISSAMAN P B S, ZALAY A D, HIBBS B
DEVELOPMENT OF THE DYNAMIC INDUCER WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 113-135.
SERI/CP-635-1601

THE PERFORMANCE BENEFITS OF THE DYNAMIC INDUCER TIP VANE SYSTEM HAVE BEEN EXPERIMENTALLY DEMONSTRATED FOR THE FIRST TIME. WIND TUNNEL TESTS CONDUCTED ON A THREE-BLADED 1.2 M DIAMETER ROTOR IN THE CALTECH 10' WIND TUNNEL HAVE NOW SHOWN THAT A DYNAMIC INDUCER CAN ACHIEVE A POWER COEFFICIENT (BASED ON POWER BLADE AREA) OF 0.62 WHICH

EXCEEDS THAT OF THE PLAIN ROTOR BY ABOUT 70%. THE DYNAMIC INDUCER SUBSTANTIALLY IMPROVES THE PERFORMANCE OF CONVENTIONAL ROTORS AND INDICATIONS ARE THAT HIGHER POWER COEFFICIENTS CAN BE ACHIEVED THROUGH ADDITIONAL AERODYNAMIC OPTIMIZATION. THE WIND TUNNEL MEASUREMENTS SUMMARIZED IN THIS PAPER SUGGEST THAT THE DYNAMIC INDUCER CAN PLAY A MAJOR ROLE IN FUTURE TURBINE TECHNOLOGY. A NEW METHOD FOR CALCULATING WIND TUNNEL CORRECTIONS FOR AUGMENTED WIND TURBINES IS DEVELOPED. THIS SHOWS THAT CORRECTIONS ARE VERY SIGNIFICANT. FOR EXAMPLE, WITH A BLOCKAGE OF 16%, THE CORRECTED POWER COEFFICIENT IS ABOUT 20% LOWER THAN THAT ACTUALLY MEASURED.

1980-0411 MINARDI J E, LAWSON M O
RESEARCH PROGRESS ON THE ELECTROFLUID DYNAMIC WIND GENERATOR.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 169-189.
SERI/CP-635-1601

THE OBJECTIVE OF THE PROGRAM IS TO CONDUCT RESEARCH LEADING TO THE SUCCESSFUL DEVELOPMENT OF ELECTROFLUID DYNAMIC (EFD) WIND GENERATORS. APPLICATION OF THE EFD DIRECT ENERGY CONVERSION PRINCIPLE PROMISES A SIMPLER, LESS EXPENSIVE SYSTEM, FREE OF FRONTAL AREA AND VELOCITY LIMITATIONS OF CONVENTIONAL ROTATING WIND ENERGY CONVERSION SYSTEMS. THE PRESENT RESEARCH IS DIRECTED TOWARD THE ACHIEVEMENT OF A THIRD AND LAST MILESTONE, THE ENERGY ECONOMIC PRODUCTION OF CHARGED WATER DROPLETS HAVING THE PROPER CHARACTERISTICS FOR EFD WIND ENERGY APPLICATION. THIS PAPER REPORTS ON THE PROGRESS MADE TOWARD ATTAINING THIS THIRD MILESTONE.

1980-0412 NOLL R B, HAM N D
TETHERED GYROTURBINE WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 19-26.
SERI/CP-635-1601

THE GYROTURBINE CONSISTS OF A BODY/ROTOR SYSTEM OPERATING IN AN AUTOGYRO MODE IN THE JET STREAM AND TETHERED TO A GROUND ANCHOR SYSTEM BY A HIGH STRENGTH CABLE. THE ROTOR PRODUCES SUFFICIENT POWER IN THE AUTOGYRO MODE TO SUSTAIN THE WEIGHT OF THE ENTIRE SYSTEM AND TO TURN AN INDUCTION GENERATOR WHICH PRODUCES POWER IN THE MEGAWATT RANGE. THE GYROTURBINE IS FLOWN IN A HELICOPTER MODE TO LIFT THE SYSTEM INTO THE JET STREAM OR TO RECOVER THE SYSTEM. THE GYROTURBINE SYSTEM AND ITS OPERATIONAL MODES ARE DESCRIBED, AND ITS FEASIBILITY IS DISCUSSED FOR SYSTEMS OF SEVERAL SIZES.

1980-0413 PAYNE P R
CABLE STRUMMING TO COLLECT WIND POWER.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 91-101.
SERI/CP-635-1601

"GALLOPING" OF POWER LINES IN A WIND GIVES RISE TO LARGE FATIGUE STRESSES WHICH CAN CAUSE FAILURE. WE WONDERED IF MECHANICAL POWER COULD BE USEFULLY EXTRACTED FROM THIS PHENOMENON, BUT THE BRIEF STUDY REPORTED HEREIN SHOWED THAT THE ENERGY EXTRACTION EFFICIENCY IS FAR TOO LOW. WE THEN CONSIDERED TWO PARALLEL CABLES ACROSS A VALLEY, THE SPACE BETWEEN BEING COVERED WITH PLASTIC OR CLOTH, SO THAT THE WING-LIKE STRUCTURE RESULTING WOULD EXECUTE A COUPLED HEAVE AND PITCH BINARY FLUTTER. PRELIMINARY INDICATIONS ARE THAT SUCH A SYSTEM EXTRACTS ENERGY WITH REASONABLE EFFICIENCY. SINCE CABLE SPANS ACROSS A VALLEY CAN BE A MILE OR MORE, THIS OPENS UP THE POSSIBILITY OF A ONE HUNDRED MEGAWATT WINDMILL.

1980-0414 POWER H M
A SIMULATION MODEL FOR WIND TURBINES.
APPL. ENERGY 6(5): 395-399, SEPTEMBER, 1980.

THE EQUATION OF MOTION OF A WIND TURBINE MAY BE WRITTEN AS J(D(OMEGA)/DT)=G(V,OMEGA)-T, WHERE J IS MOMENT OF INERTIA, T LOAD TORQUE, V WIND SPEED AND OMEGA ANGULAR VELOCITY. IT IS PROPOSED THAT THE GENERATED TORQUE G(V,OMEGA) MAY BE DESCRIBED BY AN HOMOGENEOUS SECOND-DEGREE FUNCTION IN V AND OMEGA. THIS FUNCTION IS DEFINED AND SOME RELEVANT PROPERTIES ARE EXPLORED.

1980-0415 PREUSS R D, SUCIU E O, MORINO L
UNSTEADY POTENTIAL AERODYNAMICS OF ROTORS WITH APPLICATIONS TO HORIZONTAL-AXIS WINDMILLS.
AIAA J. 18(4): 385-393, APRIL 1980.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL IN INCOMPRESSIBLE, POTENTIAL FLOW IS CONSIDERED. THE PROBLEM IS FORMULATED IN A FRAME OF REFERENCE RIGIDLY CONNECTED WITH THE ROTOR. TWO DIFFERENT INTEGRAL EQUATIONS (FOR FINITE-THICKNESS AND ZERO-THICKNESS BLADES) ARE PRESENTED. THE FINITE-THICKNESS INTEGRAL EQUATION RELATES THE VALUES OF THE POTENTIAL ON THE SURFACE OF THE WINDMILL TO THE VALUES OF THE NORMAL DERIVATIVE, WHICH ARE KNOWN FROM THE BOUNDARY CONDITIONS. THE WAKE IS TREATED AS A DOUBLET LAYER OF PRESCRIBED HELICOIDAL GEOMETRY. IN ORDER TO SOLVE THE INTEGRAL EQUATION, THE WINDMILL SURFACE IS DIVIDED INTO SMALL QUADRILATERAL SURFACE ELEMENTS. EACH ELEMENT IS APPROXIMATED BY A PORTION OF A HYPERBOLOIDAL PARABOLOID PASSING THROUGH THE CORNERS OF THE ACTUAL SURFACE ELEMENT. THE VALUES OF THE POTENTIAL AND ITS NORMAL DERIVATIVE WITHIN EACH ELEMENT ARE ASSUMED TO BE CONSTANT AND EQUAL TO THE VALUES AT THE CENTROID OF THE ELEMENT. THIS YIELDS A SET OF LINEAR ALGEBRAIC EQUATIONS IN THE UNKNOWN VALUES OF THE POTENTIAL. THE ZERO-THICKNESS INTEGRAL EQUATION IS TREATED IN A SIMILAR WAY. NUMERICAL RESULTS FOR POTENTIAL AND POWER COEFFICIENT FOR FINITE-THICKNESS AND ZERO-THICKNESS HORIZONTAL-AXIS WINDMILLS IN STEADY AND UNSTEADY INCOMPRESSIBLE, POTENTIAL FLOWS ARE PRESENTED. COMPARISON WITH EXPERIMENT IS PRESENTED FOR HELICOPTER ROTORS IN HOVER.

1980-0416 PROCEEDINGS OF THE FOURTH BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
NTIS, JUNE 1980. 641 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL, WASHINGTON, D.C., OCTOBER 29-31, 1979.
CONF-791097

THE 46 PAPERS IN THIS PROCEEDINGS REPRESENT SUMMARIES WHICH HAVE COME OUT OF A SERIES OF SMALLER WORKSHOPS ON VARIOUS ASPECTS OF WIND ENERGY CONVERSION SYSTEMS.

1980-0417 MEIJER S
A COMPARISON OF RESULTS OBTAINED WITH TWO DIFFERENT METHODS FOR CALCULATION OF HORIZONTAL AXIS WIND TURBINE PERFORMANCE, PART 4.
NTIS, FEBRUARY 6, 1980. 31 P.
N81-22580, FFA-TN-HU-2189-PT-4

THE TURBINE AND FLOW FIELD ARE DESCRIBED WITH FINITE ELEMENT TECHNIQUES. FOR THE CASE OF A WIND TURBINE

OPERATING IN STEADY UNIFORM FLOW, PERFORMANCE AND LOAD CHARACTERISTICS WERE CALCULATED AND COMPARED WITH THE RESULTS FROM THE STANDARD COMPUTER PROGRAM, WINRO, BASED ON A COMBINATION OF BLADE ELEMENT AND MOMENTUM THEORY. THE CALCULATIONS WERE MADE FOR A REFERENCE TEST CASE AT DIFFERENT WIND SPEEDS. THE REFERENCE UNIT IS A 9 M RADIUS TWO BLADED 65 KW TURBINE. THE RESULTS ARE IN EXCELLENT AGREEMENT EXCEPT FOR LOW WIND SPEEDS PROBABLY BECAUSE THREE DIMENSIONAL EFFECTS ARE MORE IMPORTANT FOR LOW WIND SPEEDS THAN FOR HIGH.

1980-0418 RAAB A
COMBINED EFFECTS OF DETERMINISTIC AND RANDOM LOADS IN WIND TURBINE DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D1, P. 169-182.

LOADS ON WIND TURBINE BLADES ARE PERIODIC BECAUSE OF THE ROTATION OF THE BLADE. WELL DEFINED (DETERMINISTIC) LOADS ARE THOSE DUE TO THE MEAN WIND, WIND SHEAR, TOWER SHADOW (INTERACTION OF THE TOWER WITH THE MEAN WIND), GRAVITATION AND CENTRIFUGAL FORCES, ON CONDITION THAT THE MEAN WIND IS SPECIFIED. THEY CAUSE THE MAJOR PART OF FATIGUE DAMAGE. RANDOM FORCES TAKE RISE FROM TURBULENCE AND ITS INTERACTION WITH THE TOWER. THOUGH LESS IMPORTANT ON THEIR OWN, THEIR INTERACTION WITH THE DETERMINISTIC LOADS PRECIPITATE FATIGUE. THUS A GLOBAL TREATMENT OF ALL KINDS OF LOADS IS NECESSARY. TWO METHODS WILL BE CONSIDERED: NUMERICAL SIMULATION AND PROBABILISTIC INTERACTION. FOR SIMULATION A DIGITAL FILTER TECHNIQUE AND A METHOD USING TRIANGULAR DECOMPOSITION OF THE CORRELATION MATRIX ARE KNOWN. WORK ON THE LATTER IS IN PROGRESS. PRINCIPLES OF THE PROBABILISTIC METHOD WILL BE SHOWN.

1980-0419 RAJVANASHI A K
A SCHEME FOR LARGE SCALE DESALINATION OF SEA WATER BY SOLAR ENERGY.
SOL. ENERGY 24(6): 551-560, 1980.

A SCHEME IS PROPOSED TO DESALINATE SEA WATER USING SOLAR ENERGY FOR THE THAR DESERT OF INDIA. THE SOLAR COLLECTORS ARE RECTANGULAR CONCRETE TUBES, HALF BURRIED IN THE GROUND, THROUGH WHICH SEA WATER FLOWS AND IS HEATED BY SOLAR ENERGY. THE HEATED SEA WATER IS THEN FLASH EVAPORATED IN A MULTI-STAGE FLASH EVAPORATOR (MSF) UNIT TO YIELD FRESH WATER. PUMPING OF THE SEA WATER TO THE SITE AND THROUGH THE MSF UNIT IS POWERED BY 415 WIND TURBINES EACH OF 200 KW CAPACITY. ECONOMIC ANALYSIS OF THE SCHEME SHOWS THAT IT COMPARES FAVOURABLY WITH THE EXISTING FOSSIL FUEL FIRED DESALINATION PLANTS OF THE EQUIVALENT CAPACITY.

1980-0420 RAMSDELL J V, HOUSTON S, WEGLEY H L
MEASUREMENT STRATEGIES FOR ESTIMATING LONG-TERM AVERAGE WIND SPEEDS.
SOL. ENERGY 25(6): 495-503, 1980.

THE UNCERTAINTY AND BIAS IN ESTIMATES OF LONG-TERM AVERAGE WIND SPEEDS INHERENT IN CONTINUOUS AND INTERMITTENT MEASUREMENT STRATEGIES ARE EXAMINED BY SIMULATING THE APPLICATION OF THE STRATEGIES TO 40 DATA SETS. CONTINUOUS STRATEGIES HAVE THE SMALLER UNCERTAINTIES FOR FIXED DURATION MEASUREMENT PROGRAMS, BUT INTERMITTENT STRATEGIES MAKE MORE EFFICIENT USE OF INSTRUMENTS AND HAVE SMALLER UNCERTAINTIES FOR A FIXED AMOUNT OF INSTRUMENT USE.

1980-0421 RAMSDELL J V, HOUSTON S, WEGLEY H L
MEASUREMENT STRATEGIES FOR ESTIMATING LONG-TERM AVERAGE WIND SPEEDS.
NTIS, OCTOBER 1980. 29 P.
PNL-3448

THE UNCERTAINTY AND BIAS IN ESTIMATES OF LONG-TERM AVERAGE WIND SPEEDS INHERENT IN CONTINUOUS AND INTERMITTENT MEASUREMENT STRATEGIES ARE EXAMINED BY SIMULATING THE APPLICATION OF THE STRATEGIES TO 40 DATA SETS. CONTINUOUS STRATEGIES HAVE THE SMALLER UNCERTAINTIES FOR FIXED DURATION MEASUREMENT PROGRAMS, BUT INTERMITTENT STRATEGIES MAKE MORE EFFICIENT USE OF INSTRUMENTS AND HAVE SMALLER UNCERTAINTIES FOR A FIXED AMOUNT OF INSTRUMENT USE. CONTINUOUS STRATEGIES TEND TO GIVE BIASED ESTIMATES OF THE LONG-TERM ANNUAL MEAN SPEED UNLESS AN INTEGRAL NUMBER OF YEARS' DATA IS COLLECTED OR THE MEASUREMENT PROGRAM EXCEEDS 3 YEARS IN DURATION. INTERMITTENT STRATEGIES WITH 3 OR MORE MONTH-LONG MEASUREMENT PERIODS/YR DO NOT SHOW ANY TENDENCY TOWARD BIAS.

1980-0422 RASMUSSEN F
EFFEKTMALINGER PA SJ-10 KW-R VINDMOLLE. (POWER MEASUREMENTS ON SJ-10 KW-R WINDMILL.)
RISO NATL. LAB. REP. NO. 2225: MARCH 1980. 20 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 21 P.
RISO-M-2225, PB81-174047

THIS REPORT CONTAINS RESULTS FROM MEASURMENTS OF POWER OUTPUT FOR A 10 KW, 5.65M DIAMETER WINDROSE. THE IMPROVEMENTS OF THE WINDMILL DURING THE TESTS ARE DESCRIBED AND THE YEARLY ENERGY OUTPUT IS COMPUTED FOR THE WINDMILL SITUATED AT DIFFERENT WIND LOCATIONS.

1980-0423 RASMUSSEN F
EFFEKTMALINGER PA 15-KW GYROMOLLE. (POWER MEASUREMENTS OF 15-KW GIRO WINDMILL.)
RISO NATL. LAB. REP. NO. 2226: MARCH 1980. 14 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 15 P.
RISO-M-2226, PB81-174054

IT IS INVESTIGATED IF THE RESULTS FROM TEMPORARY MEASUREMENTS OF POWER OUTPUT FOR A 15-KW GIRO WINDMILL ARE IN REASONABLE ACCORDANCE WITH COMPUTED VALUES.

1980-0424 RASMUSSEN F
EFFEKTMALINGER PA 30-KW RIISAGERMOLLE. (POWER MEASUREMENTS OF 30-KW RIISAGER WINDMILL.)
RISO NATL. LAB. REP. NO. 2227: MARCH 1980. 14 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 15 P.
RISO-M-2227, PB81-174062

THIS REPORT CONTAINS RESULTS FROM MEASUREMENTS OF POWER OUTPUT FOR A 30-KW, 10-M DIAMETER RIISAGER WINDMILL. THE POWER CURVE IS MEASURED INTO THE STALLED REGION, WHICH FORMS THE BASIS OF A CALCULATION OF A MORE SUITABLE ROTATION SPEED FOR THE ROTOR.

1980-0425 RCS AUDITOR TRAINEE MANUAL: RENEWABLE RESOURCE MEASURES (REVISED).
NTIS, OCTOBER 1980. 196 P.
SERI/SP-722-739

THIS MANUAL DESCRIBES THE USE OF RENEWABLE MEASURES AND THE PROCEDURES USED TO AUDIT FOR THEM. INCLUDED ARE ACTIVE SOLAR SPACE AND WATER HEATING SYSTEMS, PASSIVE SOLAR SPACE AND WATER HEATING SYSTEMS, AND WIND ENERGY SYSTEMS. SAMPLE AUDIT FORMS ARE COMPLETED FOR A HOUSE IN OKLAHOMA CITY, OKLAHOMA. A SUMMARY OF INSTALLATION STANDARDS FOR ACTIVE SOLAR SYSTEMS IS INCLUDED.

1980-0426 REDDOCH T W, KLEIN J W
ELECTRICAL ENERGY FROM THE WIND IN A U.S. TOWN.
ELETTROTECNICA 67(7): 673-678, JULY 1980. (IN ITALIAN)

THE ARTICLE DESCRIBES THE EXPERIMENTAL 200 KW WIND GENERATOR INSTALLED BY WESTINGHOUSE ELECTRIC IN CLAYTON, NEW MEXICO. AFTER SOME TEETHING TROUBLES IS HAS NOW (MARCH 1979) OPERATED SATISFACTORILY FOR 1500 HOURS SUPPLYING 15 PERCENT OF THE TOTAL SYSTEM LOAD IN CLAYTON. THE MAIN FEATURES OF THE DESIGN ARE PRESENTED, TOGETHER WITH INFORMATION ON THE WORKING OF THE WIND GENERATOR IN PARALLEL WITH THE MAIN DIESEL ENGINE DRIVEN PLANT.

1980-0427 REDDOCH T W
THE WIND-ELECTRIC POWER PLANT AS A UTILITY COMPONENT.
IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS, HOUSTON, APRIL 28-30, 1980. PROCEEDINGS. NEW YORK, IEEE, 1980. P. 71-73.

IN AN EFFORT TO DEVELOP A CONCEPTUAL FRAMEWORK FOR WIND-ELECTRIC SYSTEM DESIGN, A STRUCTURE IS PROPOSED FOR CHARACTERIZING ITS VARIOUS SUBSYSTEMS. AN UNDERSTANDING OF THESE SUBSYSTEMS AND THEIR INTERACTION ALLOWS FOR THE DERIVATION OF RATIONAL ARGUMENTS FOR BOTH TECHNICAL AND ECONOMIC TRADE-OFFS IN THE DESIGN OF THE WIND-ELECTRIC SYSTEMS FOR INTERTIE TO ELECTRIC UTILITY SYSTEMS. THE FIVE SUBSYSTEMS CONSIST OF THE MECHANICAL SYSTEM (AEROTURBINE), THE MECHANICAL INTERFACE, THE ELECTRIC SYSTEM, THE ELECTRICAL INTERFACE WITH THE UTILITY SYSTEM AND THE WIND-ELECTRIC CONTROL SYSTEM. THE FUNCTIONAL SPECIFICATIONS OF EACH SUBSYSTEM ARE DISCUSSED WITH EMPHASIS ON THEIR MACRO BEHAVIOR.

1980-0428 REID M A, THALLER L H
IMPROVEMENT AND SCALE-UP OF THE NASA REDOX STORAGE SYSTEM.
NTIS, 1980. 10 P.
NASA-TM-81632, CONF-800806-40, DOE/NASA/12726-6

AS LARGER CELLS AND STACKS ARE DEVELOPED AND TESTED, THE NASA REDOX ENERGY STORAGE SYSTEM CONTINUES TO SHOW THE TECHNICAL PERFORMANCE REQUIRED AND COST-EFFECTIVENESS FOR USE WITH STAND-ALONE PHOTOVOLTAIC AND WIND TURBINE INSTALLATIONS AND ELECTRIC UTILITY LOAD-LEVELING. OVER THE PAST YEAR, THE ANION EXCHANGE MEMBRANES AND CHROMIUM ELECTRODES HAVE BEEN FURTHER IMPROVED. PARAMETRIC FLOW STUDIES SHOW THAT PUMPING POWER REQUIREMENTS AND SHUNT CURRENT LOSSES IN COMPLETE SYSTEMS WILL BE ACCEPTABLE. MORE REFINED COST ESTIMATES CONFIRM EARLIER PREDICTIONS THAT SYSTEM COSTS SHOULD BE ATTRACTIVELY LOW. A PREPROTOTYPE 1.0 KW REDOX SYSTEM (2 KW PEAK) WITH 11 KWH STORAGE CAPACITY HAS BEEN BUILT AND INTEGRATED WITH THE NASA/DOE PHOTOVOLTAIC TEST FACILITY AT NASA LEWIS. THIS FULL FUNCTION REDOX SYSTEM INCLUDES FOUR SUBTRACKS OF 39 CELLS EACH (1/3 SQ. FT. ACTIVE AREA) WHICH ARE CONNECTED HYDRAULICALLY IN PARALLEL AND ELECTRICALLY IN SERIES. AN OPEN CIRCUIT VOLTAGE CELL AND A SET OF REBALANCE CELLS ARE USED TO CONTINUOUSLY MONITOR THE SYSTEM STATE OF CHARGE AND AUTOMATICALLY MAINTAIN THE ANODE AND CATHODE REACTANTS ELECTROCHEMICALLY IN BALANCE. RECENT MEMBRANE AND ELECTRODE ADVANCES ARE REVIEWED, AND THE RESULTS OF MULTICELL STACK TESTS OF 1 SQ. FT. HARDWARE AND THE DESIGN OF THE 1 KW (2 KW PEAK) INTEGRATED SYSTEM ARE BRIEFLY DESCRIBED.

1980-0429 RENEWABLE RESOURCES: A NATIONAL CATALOG OF MODEL PROJECTS. VOL.1: NORTHEAST SOLAR ENERGY CENTER REGION; VOL.2: MID-AMERICAN SOLAR ENERGY COMPLEX REGION; VOL. 3: SOUTHERN SOLAR ENERGY CENTER REGION; VOL.4: WESTERN SOLAR UTILIZATION NETWORK REGION.
NTIS, JULY 1980. VOL.1: 414 P.; VOL.2: 444 P.; VOL.3: 779 P.; VOL.4: 542 P.
DOE/CS/30098-1(VOL. 1-4)

THIS COMPILATION OF DIVERSE CONSERVATION AND RENEWABLE ENERGY PROJECTS ACROSS THE UNITED STATES WAS PREPARED THROUGH THE ENTHUSIASTIC PARTICIPATION OF SOLAR AND ALTERNATE ENERGY GROUPS FROM EVERY STATE AND REGION. COMPILED AND EDITED BY THE CENTER FOR RENEWABLE RESOURCES, THESE PROJECTS REFLECT MANY LEVELS OF INNOVATION AND TECHNICAL EXPERTISE. IN MANY CASES, A CRITIQUE ANALYSIS IS PRESENTED OF HOW PROJECTS PERFORMED AND OF THE INSTITUTIONAL CONDITIONS ASSOCIATED WITH THEIR SUCCESS OR FAILURE. SOME 2000 PROJECTS ARE INCLUDED IN THIS COMPILATION; MOST HAVE WORKED, SOME HAVE NOT. INFORMATION ABOUT ALL IS PRESENTED TO AID LEARNING FROM THESE EXPERIENCES. THE FOUR VOLUMES IN THIS SET ARE ARRANGED IN STATE SECTIONS BY GEOGRAPHIC REGION, COINCIDING WITH THE FOUR REGIONAL SOLAR ENERGY CENTERS. THE TABLE OF CONTENTS IS ORGANIZED BY PROJECT CATEGORY SO THAT MAXIMUM CROSS-REFERENCING MAY BE OBTAINED.

1980-0430 RENNE D S, SANDUSKY W F
DOE CANDIDATE SITE METEOROLOGICAL MEASUREMENT PROGRAM.
IEA EXPERT MEETING, BOONE, N.C., SEPTEMBER 26, 1979. NTIS, JANUARY 1980. 10 P.
PNL-SA-7840

IN MARCH 1976, DOE ISSUED AN RFP TO ACQUIRE, ON A COMPETITIVE BASIS, A GROUP OF CANDIDATE SITES, PROPOSED BY UTILITIES INTERESTED IN THE FIELD TESTING PROGRAM. A TOTAL OF 17 CANDIDATE SITES WERE SELECTED FROM THE 64 PROPOSALS SUBMITTED IN RESPONSE TO THE RFP. FROM THESE SITES, FIVE HAVE BEEN CHOSEN THUS FAR TO RECEIVE TURBINES FOR FIELD TESTING. THIS PAPER DISCUSSES THE METEOROLOGICAL MEASUREMENT ACTIVITIES AT THESE SITES AND PROVIDES DETAILS OF THE MEASUREMENT PROGRAM AS IT EXISTS IN LATE 1979. IN ADDITION, THE PAPER BRIEFLY DISCUSSES THE DIRECTIONS THIS PROGRAM WILL TAKE IN THE NEAR FUTURE, AND THE OPTIONS INTERESTED ELECTRICAL SERVICE ORGANIZATIONS HAVE FOR PARTICIPATING IN THE PROGRAM.

1980-0431 REUTER R C
TORQUE RIPPLE IN A DARRIEUS, VERTICAL AXIS WIND TURBINE.
ASME PAPER 80-WA/SOL-13, 1980. 7 P.

INTERACTION BETWEEN A STEADY WIND AND A ROTATING, DARRIEUS, VERTICAL AXIS WIND TURBINE PRODUCES TIME PERIODIC AERODYNAMIC LOADS WHICH CAUSE TIME DEPENDENT TORQUE VARIATIONS, REFERRED TO AS TORQUE RIPPLE, TO OCCUR IN THE MECHANICAL LINK BETWEEN THE TURBINE AND THE ELECTRICAL GENERATOR. AN ANALYTICAL SOLUTION CHARACTERIZING THE PHENOMENON OF TORQUE RIPPLE HAS BEEN OBTAINED WHICH IS BASED UPON A FOURIER EXPANSION OF THE TIME DEPENDENT FEATURES OF THE PROBLEM.

1980-0432 REUTER R C
TORQUE RIPPLE IN A DARRIEUS, VERTICAL AXIS WIND TURBINE.
NTIS, 1980. 21 P.
SAND-80-0475

INTERACTION BETWEEN A STEADY WIND AND A ROTATING, DARRIEUS, VERTICAL AXIS WIND TURBINE PRODUCES TIME PERIODIC AERODYNAMIC LOADS WHICH CAUSE TIME DEPENDENT TORQUE VARIATIONS, REFERRED TO AS TORQUE RIPPLE, TO OCCUR IN THE MECHANICAL LINK BETWEEN THE TURBINE AND THE ELECTRICAL GENERATOR. THERE IS CONCERN FOR THE EFFECT OF TORQUE RIPPLE UPON FATIGUE LIFE OF DRIVE TRAIN COMPONENTS AND UPON POWER QUALITY. AN ANALYTICAL SOLUTION CHARACTERIZING THE PHENOMENON OF TORQUE RIPPLE HAS BEEN OBTAINED WHICH IS BASED UPON A FOURIER EXPANSION OF THE

TIME DEPENDENT FEATURES OF THE PROBLEM. NUMERICAL RESULTS FOR TORQUE RIPPLE, SOME EXPERIMENTAL DATA, DETERMINATION OF ACCEPTABLE LEVELS AND METHODS OF CONTROLLING IT, ARE PRESENTED AND DISCUSSED.

1980-0433 REVELL P S, EVERITT K W
SAILWING DARRIEUS ROTORS.
WIND ENG. 4(1): 11-31, 1980.

RECENTLY PUBLISHED DATA FOR A NUMBER OF SIMPLY CONSTRUCTED SAILWINGS ARE USED IN A NUMERICAL ANALYSIS OF THE PERFORMANCE OF FLEXIBLE BLADED DARRIEUS ROTORS. TO FACILITATE COMPARISONS, THE ANALYSIS HAS BEEN REPEATED USING DATA FOR A SOLID AEROFOIL. AN IMPROVED UNDERSTANDING OF THE OPERATION OF SAILWING ROTORS HAS BEEN GAINED AND SOME CRITERIA FOR THEIR DESIGN ARE REACHED. IT IS CONCLUDED THAT SUCH ROTORS CAN RELIABLY SELF-START AND ACHIEVE A HIGHER POWER COEFFICIENT THAN SO FAR REPORTED, ALTHOUGH STILL RATHER LOWER THAN CAN BE OBTAINED WITH SOLID BLADES, BUT THAT THEIR FULL POTENTIAL WILL NOT BE REALIZED IN VERY SMALL SCALE APPLICATIONS.

1980-0434 REYNOLDS R D, BARNETT K M
PRELIMINARY INVESTIGATION OF EXCEPTIONALLY STRONG WINDS IN MOUNTAINOUS AREAS OF NEW MEXICO.
SANTA FE, NEW MEXICO, NEW MEXICO ENERGY AND MINERALS DEPARTMENT, OCTOBER 1980. 26 P.
EMD-78-2227

THE MEAN WIND SPEED IN FOUR MOUNTAINOUS AREAS IN NEW MEXICO WERE SAMPLED FOR ONE YEAR USING WIND DATA ACCUMULATORS. THE SITES STUDIED WERE: (1) SAN AUGUSTIN PASS, 15 MILES NORTHEAST OF LAS CRUCES; (2) SIERRA GRANDE, AN ISOLATED PEAK MIDWAY BETWEEN RATON AND CLAYTON; (3) BUCK MOUNTAIN, 10 MILES NORTHEAST OF SIERRA BLANCA PEAK NEAR RUIDOSO, AND (4) PALOMAS MESA, 20 MILES WEST-SOUTHWEST OF TUCUMCARI.

1980-0435 RIEDLINGER T
NEW WINDMILLS WRING PROFIT FROM OLD ENERGY SOURCE.
MOD. MET. 35(12): 12, 14, 16, 18, JANUARY 1980.

THE AUTHOR BRIEFLY DISCUSSES THE POSSIBILITY OF USING WIND-POWERED GENERATORS OR "WIND TURBINES" AS A COST-EFFECTIVE SOURCE OF ELECTRIC POWER. ALSO DISCUSSED ARE ALUMINUM COMPANY OF AMERICA'S EFFORTS TO DEVELOP AND MARKET THE TWO- OR THREE-BLADED VERTICAL AXIS WIND TURBINES (VAWTS) USING EXTRUDED ALUMINUM BLADES OF 6063-T6 ALLOY. THE MANUFACTURE OF THE BLADES THROUGH A BRIDGE DIE IS DETAILED, AND THE BLADE DESIGN AND COST FACTORS INVOLVED ARE DISCUSSED.

1980-0436 RIEGLER G, RIEDLER W, HORVATH E
FEASIBILITY STUDY FOR A HIGH ALTITUDE WIND POWER PLANT.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 93-111.
SERI/CP-635-938

THE BASIC CONCEPT OF A HIGH-ALTITUDE WIND POWER PLANT CONSISTS OF A BALLOON-BORNE PLATFORM FOR ELECTRICAL POWER GENERATORS, A CONNECTION BY CABLE FOR TETHERING AND ENERGY TRANSFER AND A GROUND STATION FOR METEOROLOGICAL AND TECHNICAL CONTROL AS WELL AS FOR ENERGY DISTRIBUTION. OF GREAT IMPORTANCE IS THE NOMINAL WIND SPEED OF THE TURBINE, WHICH DEPENDS ON THE LOCAL WIND STATISTICS, SINCE IT DETERMINES THE DRAG OF THE SYSTEM AND THEREFORE THE MAIN FORCES AND THE MAXIMUM POWER OUTPUT. THE ULTIMATE AIM FOR THESE POWER PLANTS IS CONSIDERED TO BE THE CONTINUOUS POWER OUTPUT OF 80 TO 100 MW FOR A PLATFORM GENERATING ELECTRICITY WITH CAPITAL AND OPERATING COSTS COMPETITIVE WITH CONVENTIONAL THERMAL POWER STATIONS. THE PAPER DESCRIBES THE BASIC CONCEPTS AND PROVES THE FEASIBILITY OF THE SUGGESTED PROJECT.

1980-0437 RILEY J J, GELLER E W, COON M D, SCHEDVIN J C
A REVIEW OF WIND TURBINE WAKE EFFECTS. FINAL REPORT.
NTIS, JANUARY 1980. 124 P.
DOE/ET/23160-80/1

FOR WIND ENERGY TO HAVE A SIGNIFICANT IMPACT ON U.S. ELECTRICAL POWER PRODUCTION, WIND TURBINES WILL HAVE TO BE GROUPED TOGETHER INTO ARRAYS, OR WIND FARMS. WHILE MANY FACTORS (E.G., CONSTRUCTION COSTS, MAINTENANCE, LAND COSTS) CALL FOR THE UNITS TO BE PLACED AS CLOSELY TOGETHER AS POSSIBLE, A CLOSE SPACING CAN LEAD TO DOWNWIND UNITS BEING IN THE WAKES OF UPWIND UNITS, CAUSING POSSIBLE DETRIMENTAL EFFECTS ON POWER OUTPUT AND STRUCTURAL INTEGRITY. IN THIS REPORT THE CRITICAL ISSUES RELEVANT TO WAKE EFFECTS ARE DEFINED, PAST WORK RELATED TO WAKE EFFECTS IS REVIEWED, AND FINALLY RECOMMENDATIONS ARE MADE ON A FURTHER COURSE OF ACTION NECESSARY TO RESOLVE THE IMPORTANT ISSUES.

1980-0438 ROBBINS W H, THOMAS R L, BALDWIN D H
LARGE WIND TURBINES--A UTILITY OPTION FOR THE GENERATION OF ELECTRICITY.
NTIS, 1980. 19 P.
DOE/NASA/23139-1, NASA-TM-81502, N80-32858

THE WIND RESOURCE IS SUCH THAT WIND ENERGY GENERATION HAS THE POTENTIAL TO SAVE 6 TO 7 QUADS OF ENERGY NATIONALLY. THUS, THE FEDERAL GOVERNMENT IS SPONSORING AND ENCOURAGING THE DEVELOPMENT OF COST EFFECTIVE AND RELIABLE WIND TURBINES. ONE ELEMENT OF THE FEDERAL WIND ENERGY PROGRAMS, LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT, IS MANAGED BY THE NASA LEWIS RESEARCH CENTER FOR THE DEPARTMENT OF ENERGY. THERE ARE SEVERAL ONGOING WIND SYSTEM DEVELOPMENT PROJECTS ORIENTED PRIMARILY TOWARD UTILITY APPLICATION WITHIN THIS PROGRAM ELEMENT. IN ADDITION, A COMPREHENSIVE TECHNOLOGY PROGRAM SUPPORTING THE WIND TURBINE DEVELOPMENT PROJECTS IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES WITH EMPHASIS ON APPLICATION OF LARGE WIND TURBINES FOR GENERATION OF ELECTRICITY BY UTILITY SYSTEMS.

1980-0439 ROBERTS B W, BLACKLER J
VARIOUS SYSTEMS FOR THE GENERATION OF ELECTRICITY USING UPPER ATMOSPHERIC WINDS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 67-90.
SERI/CP-635-938

THE STRENGTH AND PERSISTENCE OF TROPOSPHERIC WIND GENERALLY INCREASES WITH INCREASING ALTITUDE. IN MID-LATITUDES THE JET STREAMS BOOST THE AVAILABLE POWER DENSITIES TO AROUND 20 KW/SQ.-M. SIX DIFFERENT TETHERED SYSTEMS ARE REVIEWED. THESE RANGE FROM BALLOONS THROUGH FIXED WIND SYSTEMS WITH OPEN OR DUCTED TURBINES. HOWEVER, NONE OF THESE SYSTEMS ARE AS ATTRACTIVE AS A ROTARY-WIND DEVICE, WHICH IS DESCRIBED IN SOME DETAIL. GESSOW'S ROTARY-WIND THEORY HAS BEEN EXTENDED TO JUSTIFY A SUCCESSFUL SERIES OF WIND-TUNNEL TESTS ON A TWIN ROTOR, GYROMILL. A STABILITY THEORY WILL BE PRESENTED TO INDICATE THE IDEAL LOCATION OF THE TETHER ATTACHMENT POINT OR POINTS, TAKING DUE ACCOUNT OF THE ELECTRICAL CONDUCTORS. A BRIEF FEASIBILITY STUDY IS ALSO GIVEN.

1980-0440 ROBERTS F
ENERGY ACCOUNTING OF ALTERNATIVE ENERGY SOURCES.
APPL. ENERGY 6(1): 1-20, JANUARY-FEBRUARY 1980.

THE PAPER IS DEVOTED TO AN ENERGY ACCOUNTING ESTIMATE FOR THE FIVE SYSTEMS--SOLAR, GEOTHERMAL, WIND, WAVE, AND TIDAL POWER. IN EACH CASE THE DATA SOURCES, THE ASSUMPTIONS, AN OUTLINE OF THE PROCEDURE, RESULTS, AND SOME GENERAL COMMENTS ARE GIVEN. THE PAPER REVEALS HOW MUCH OUR PRIMARY NONRENEWABLE FUELS COULD BE CONSERVED BY USING THEM TO OPERATE RENEWABLE ENERGY RESOURCE SYSTEMS ALTHOUGH ECONOMIC ASSESSMENTS AT THE PRESENT TIME MIGHT NOT PROVIDE JUSTIFICATION FOR SUCH A POLICY.

1980-0441 ROSS F
WIND POWER GENERATOR.
U.S. PATENT NO. 4,219,309, AUGUST 26, 1980.

THIS WIND POWERED GENERATOR IS COMPRISED OF A MEANS FOR OPPOSING THE FORCE OF A WIND BEING MOUNTED TO A FIRST PIVOT AND EXTENDING RADIALLY FROM WIND OPPOSING WITH A FIRST AND SECOND PORTION. THERE IS A COUNTERWEIGHTING THAT IS MOUNTED TO THE FIRST PIVOT AND EXTENDS RADIALLY SO THAT THE AXIS OF THE PIVOT IS INTERPOSED AND THE WIND FORCE OPPOSES IT. THE FIRST WEIGHT IS FIXED ALONG THE AXIS OF THE SECOND PIVOT. THERE IS ALSO A MEANS FOR AIDING THE TURNING OF THE WIND OPPOSING DEVICE AROUND THE FIRST PIVOT.

1980-0442 RUTLEDGE G, LANE D, EDBLOM G
SITING CRITERIA AND PRELIMINARY SCREENING OF COMMUNITIES FOR ALTERNATE ENERGY USE.
ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT. PHASE 2: COAL, HYDROELECTRIC AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE. NTIS, 1980. P. 17.1--17.10.
DOE/EV/73002-1(VOL.3)

SITING CRITERIA ARE DISCUSSED FOR WIND POWER, HYDROELECTRIC POWER, GEOTHERMAL ENERGY, AND FUEL CELLS. A PRELIMINARY EVALUATION LISTS THE APPROPRIATENESS OF USING THESE FOUR ALTERNATIVE ENERGY APPLICATIONS FOR 365 ALASKAN COMMUNITIES.

1980-0443 RUTLEDGE G, LANE D, EDBLOM G
WIND.
ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT. PHASE 2: COAL, HYDROELECTRIC AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE. NTIS, 1980. P. 15.1--15.66.
DOE/EV/73002-1(VOL.3)

THE HISTORY OF THE USE OF WINDMILLS IN ALASKA IS TRACED. THE TECHNOLOGY, ENVIRONMENTAL IMPACT, AND APPLICABILITY OF WIND POWER TO RURAL ALASKA ARE DISCUSSED. TABLES OF WIND DATA OBTAINED AT ALASKAN LOCATIONS ARE INCLUDED.

1980-0444 SAKR I A, ABDEL HAFIEZ M S, HEGAZY A S
COMBINATION OF WIND AND SOLAR ENERGIES AT THE NORTHERN COAST OF EGYPT.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1862-1870.

THIS PAPER PRESENTS A MATHEMATICAL AND NUMERICAL ANALYSIS OF THE POSSIBLE COMBINATIONS OF WIND AND SOLAR ENERGIES TO SHOW THE EFFECT OF SUCH COMBINATIONS ON VOLUME AND PERFORMANCE OF THE STORAGE SYSTEM. A PROCEDURE FOR CHOOSING THE BEST COMBINATION OF THE TWO ENERGIES BASED ON MINIMUM STORAGE VOLUME IS PROPOSED.

1980-0445 SAMBAR H, PAVELIC V, WARNER R J
COMPUTER SIMULATION AND DESIGN OF THE CONTROL SYSTEM FOR A WIND TURBINE GENERATOR.
ASME TRANS. J. MECH. DES. 102(1): 14-18, JANUARY 1980.

THIS PROJECT IS A PART OF AN OVERALL STUDY AIMED AT PRODUCING A NEW GENERATION OF WIND TURBINE GENERATORS. THE WIND TURBINE GENERATOR PROPOSED IS A HORIZONTAL AXIS MACHINE WITH THREE BLADES OPERATING DOWNWIND. A HYDRAULIC SYSTEM ACTUATES MECHANICAL LINKAGES TO CONTROL BLADE PITCH DURING OPERATION. THE BLADE PITCH CONTROL CONCEPT PROVIDES ACTIVE CONTROL OF ROTOR RPM ABOVE THE RATED WIND SPEED AND DURING NO LOAD CONDITION. THE LOWERING OF BLADE AND TOWER LOADS WHILE PROVIDING THE CAPABILITY FOR WELL TUNED ROTOR CONTROL ARE ITS PRIMARY FEATURES. A HYDRAULIC SYSTEM, DESIGNED TO CONTROL THE PITCH OF THE BLADES OF A WIND TURBINE GENERATOR, IS SIMULATED ON THE DIGITAL COMPUTER USING THE RUNGE-KUTTA METHOD. THE CONTROL SYSTEM SUBROUTINE IS COUPLED WITH THE AERODYNAMIC SUBROUTINES OF THE BLADES TO REPRESENT THE MODEL FOR THE WIND TURBINE GENERATOR. THE RESPONSE OF THE SIMULATED WIND TURBINE TO A REAL WIND CASE IS SHOWN TO AGREE WITH THE DESIRED RESPONSE.

1980-0446 SAMMELLS A F, FEJER A A
WIND ENERGY FOR ELECTRIC VEHICLE RECHARGE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 835-839.

THE SPATIALLY DILUTED CHARACTER OF THE KINETIC ENERGY CONTENT OF WIND MAKES IT AN ATTRACTIVE MEANS OF ENERGY SUPPLY FOR ELECTRIC VEHICLES INTENDED FOR LOCAL TRAFFIC IN SUBURBAN AREAS WHERE INDIVIDUALLY OWNED WINDMILLS USED FOR THIS PURPOSE CAN BE SPACED AT LARGE ENOUGH DISTANCES FROM ONE ANOTHER TO AVOID UNDESIRABLE INTERFERENCE EFFECTS. THESE WINDMILLS WOULD CHARGE LARGE STATIONARY BATTERIES WHENEVER THE WIND INTENSITY IS SUFFICIENTLY HIGH, AND THE BATTERIES WOULD TRANSFER THEIR CHARGE OVERNIGHT TO THE SMALL BATTERIES CARRIED BY THE VEHICLES. SUCH SYSTEMS USING WIND GENERATORS OF RELATIVELY SMALL SIZE (5 TO 10 KW) ARE SIMPLE AND RUGGED AND SHOULD BE ABLE TO OPERATE OVER LONG PERIODS BETWEEN OVERHAULS. SINCE IT WOULD BE EQUIPPED WITH AUTOMATIC CONTROLS, IT COULD OPERATE UNATTENDED AND COULD BRING ABOUT A SIGNIFICANT NEAR-TERM SAVINGS IN THE FUEL REQUIRED FOR TRANSPORTATION. THIS PAPER EXAMINES VARIOUS ASPECTS OF SYSTEMS OF THIS TYPE, LEADING TO THE CONCLUSION THAT WITH THE MAJOR COMPONENTS OF THE SYSTEM ALREADY WELL-DEVELOPED, THIS SOURCE OF ENERGY COULD BE UTILIZED IN A COST-EFFECTIVE MANNER IN MOST PARTS OF THIS COUNTRY.

1980-0447 SATHIKH S, RAMAMURTI V, CHARI R T
ACCEPTANCE CURVE FOR OVERHEAD LINE DAMPER EVALUATION.
IEEE PROC. 68(5): 634-635, MAY 1980.

A METHOD TO DEVELOP AN ACCEPTANCE CURVE USING ABSOLUTE POWER QUANTITIES OBTAINED FROM WIND POWER AVAILABLE IN LITERATURE AND DIRECT LABORATORY MEASUREMENT OF DISSIPATION POWERS OF DAMPER AND CONDUCTOR IN QUESTION IS ADVANCED. IT IS AN EASY-TO-UNDERSTAND AND RELATIVELY-SIMPLE-TO-APPLY TECHNIQUE OF DAMPER EVALUATION AND WOULD

BE HELPFUL TO THE MANUFACTURER AND USER OF DAMPERS IN OVERHEAD TRANSMISSION LINES.

1980-0448 SCHATZLE P R, KLIMAS P C, SPAHR H R
AERODYNAMIC INTERFERENCE BETWEEN TWO DARRIEUS WIND TURBINES.
NTIS, 1980. 6 P.
CONF-800406-2, SAND-79-1984C

THE EFFECT OF AERODYNAMIC INTERFERENCE ON THE PERFORMANCE OF TWO CURVED BLADED DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES HAS BEEN CALCULATED USING A VORTEX/LIFTING LINE AERODYNAMIC MODEL. THE TURBINES HAVE A TOWER-TO-TOWER SEPARATION DISTANCE OF 1.5 TURBINE DIAMETERS, WITH THE LINE OF TURBINE CENTERS VARYING WITH RESPECT TO THE AMBIENT WIND DIRECTION. THE EFFECTS OF FREESTREAM TURBULENCE WERE NEGLECTED. FOR THE CASES EXAMINED, THE CALCULATIONS SHOWED THAT THE DOWNWIND TURBINE POWER DECREMENT (1) WAS SIGNIFICANT ONLY WHEN THE LINE OF TURBINE CENTERS WAS COINCIDENT WITH THE AMBIENT WIND DIRECTION, (2) INCREASED WITH INCREASING TIP-SPEED-RATIO, AND (3) IS DUE MORE TO INDUCED FLOW ANGULARITIES DOWNSTREAM THAN TO SPEED DEFICITS NEAR THE DOWNSTREAM TURBINE.

1980-0449 SCHELLENS F J C
THE 25 M EXPERIMENTAL HORIZONTAL AXIS WIND TURBINE (25 M HAT).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H2, P. 375-390.

THIS PROJECT FORMS PART OF THE NETHERLANDS NATIONAL RESEARCH PROGRAMME INTO THE USE OF WIND ENERGY FOR ELECTRICITY GENERATION. THIS PROGRAMME INCLUDES: THE DESIGN, CONSTRUCTION AND TESTING OF A HORIZONTAL AXIS WIND TURBINE, AS WELL AS AN EVALUATION OF THIS TYPE OF TURBINE. THE DESIGN HAS BEEN PREPARED TO THE ORDER OF ECN BY FDO TECHNISCHE ADVISEURS, WHO ARE ALSO CO-ORDINATING THE CONSTRUCTION WHICH IS BEING CARRIED OUT BY A NUMBER OF OTHER DUTCH COMPANIES AND INSTITUTIONS TO BE NAMED LATER. COMPLETION DATE IS EXPECTED TO BE AT THE END OF 1980. THE DESIGN WAS REQUIRED TO BE BASED ON TWO FUNCTIONS, THOSE OF: -PROTOTYPE POWER PLANT -TEST SYSTEM. A PARTICULAR DETAIL CONSIDERATION WHICH HAD TO BE TAKEN INTO ACCOUNT IN THE DESIGN IS THE LOCATION OF THE SITE IN RELATION TO LOCAL TRAFFIC. THE WIND TURBINE IS SITUATED ON THE ECN SITE AT PETTEN, IN THE NORTH-WEST OF THE NETHERLANDS ADJACENT TO THE NORTH SEA COAST. (PETTEN IS APPROXIMATELY 65 KM NORTH OF AMSTERDAM).

1980-0450 SCHENK K F, UKO P, RAU N S
INTEGRATION OF INTERMITTENT ENERGY SOURCES INTO A UTILITY RESOURCE PLAN BY THE METHOD OF MOMENTS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 15-17, 1980. NEW YORK, IEEE, 1980. P. 223-229.

THE PAPER DESCRIBES THE APPLICATION OF THE METHOD OF MOMENTS IN THE EVALUATION OF LOSS OF LOAD PROBABILITY AND PRODUCTION COSTING FOR GENERATION EXPANSION PLANNING, FOR A SYSTEM OF CONVENTIONAL GENERATING UNITS AND AN INTERMITTENT ENERGY SOURCE, NAMELY A WIND ENERGY CONVERSION SYSTEM, OPERATING ON A NON-DEMAND BASIS. THE OUTPUT OF SUCH A SYSTEM MUST BE ASSUMED TO BE A MULTISTATE STOCHASTIC PROCESS DEPENDENT ON THE VARIABILITY OF THE WIND. THIS PROCESS MAY BE REPRESENTED BY SEVERAL AVAILABLE CAPACITY STATES, WITH EACH STATE DESCRIBED BY A PROBABILITY OF OCCURRENCE. THESE PROBABILITIES ARE COMPUTED AS THE PERCENTAGE OF POSSIBLE TIMES THAT THE OUTPUT FALLS BETWEEN SPECIFIED CAPACITY LEVEL INTERVALS FOR THE PARTICULAR HOUR OR PERIOD CONSIDERED. RANDOM MECHANICAL FAILURE IS INCORPORATED BY CHANGING THE PROBABILITIES OF OCCURRENCE OF THE PARTIAL CAPACITY STATES. THE METHOD OF MOMENTS IS IDEALLY SUITED FOR PROBABILISTIC SIMULATION OF SUCH MULTISTATE UNITS AS WELL AS FOR AN EQUAL MARGINAL COST LOADING OF CONVENTIONAL CYCLING UNITS. THE PROCEDURE IS APPLIED TO THE IEEE RELIABILITY TEST SYSTEM.

1980-0451 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
ASSESSMENT OF THE EFFECTS OF LARGE WIND GENERATOR ARRAYS ON POWER SYSTEM OPERATION.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, NY, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH 1523-4/80, 1980. 9 P.

THE EFFECTS OF LARGE RAPID CHANGES IN GENERATION FROM LARGE ARRAYS OF WIND TURBINE GENERATORS ON THE OPERATION OF AUTOMATIC GENERATION CONTROL AND FREQUENCY REGULATION ARE ASSESSED. THE MAXIMUM CHANGE AND RATES OF CHANGE OF GENERATION FROM AN ARRAY OF WIND TURBINES DUE TO PASSAGE OF A THUNDERSTORM FRONT IS DETERMINED FIRST. THE ASSESSMENT REQUIRES (1) MODELING AN ARRAY OF WIND TURBINES IN ORDER TO DETERMINE POWER VARIATION FOR CHANGES IN WIND SPEED CAUSED BY A STORM FRONT; (2) SIMULATION OF THE MODEL TO DETERMINE POWER VARIATION FOR A WORST CASE COASTAL FORM DUE TO PASSAGE OF A FRONT, AND (3) ANALYSIS OF THE MAXIMUM CHANGE AND RATES OF CHANGE FROM THE PORTION OF THE ARRAY AFFECTED BY THE FRONT. CONSTRAINTS ON THE PENETRATION OF THE PORTION OF AN ECHELON AND FARM THAT ARE AFFECTED BY THE FRONT ARE DERIVED SO THAT POWER VARIATION RATES WILL NOT EXCEED THE RESPONSE RATE CAPABILITY OF A TYPICAL SYSTEM.

1980-0452 SCHOENMACKERS R, BARNETT K
NEW MEXICO WIND ENERGY PROGRAM.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 243-246.
CONF-800995

THE STATE OF NEW MEXICO, PRIMARILY THROUGH THE DEPARTMENT OF ENERGY AND MINERALS, IS SPONSORING AN ENERGY RESEARCH AND DEVELOPMENT PROGRAM STARTED IN 1974 TO DEVELOP NEW ENERGY OPTIONS FOR THE FUTURE. THIS PROGRAM IS ADMINISTERED BY THREE ENERGY INSTITUTES, WHICH ARE RESPONSIBLE FOR DIFFERENT AREAS OF ENERGY RESEARCH. IN 1977, IN ADDITION TO THESE, THE NEW MEXICO STATE LEGISLATURE ESTABLISHED THE NEW MEXICO SOLAR ENERGY INSTITUTE. SINCE ITS CREATION, THE NEW MEXICO SOLAR ENERGY INSTITUTE HAS DEVELOPED INTO THE CENTER FOR THE STATE'S SOLAR ENERGY RESEARCH. RESEARCH ACTIVITIES INCLUDE SOLAR HEATING AND COOLING, PHOTOVOLTAIC DEMONSTRATIONS, BIOMASS, AND WIND ENERGY TECHNOLOGIES. ACTIVITIES IN WIND TURBINE TECHNOLOGY ARE SUMMARIZED.

1980-0453 SCHOLZ H J, SIMHAN K
REMARKS ON THE REGULATION AND CONTROL SYSTEM OF WIND ENERGY CONVERTERS WITH A VERTICAL AXIS.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 468-480.

AS OPPOSED TO WIND ENERGY CONVERTERS WITH A HORIZONTAL AXIS THE NUMBER OF CONVERTERS WITH VERTICAL AXIS IN OPERATION IS LIMITED AND MOST OF THEM SERVE RESEARCH AND DEVELOPMENT AIMS. THEREFORE THE DEFINITION OF THE REGULATION AND CONTROL SYSTEM IS STILL IN A PRELIMINARY STAGE. THE LACK OF EXPERIENCE NECESSITATES A FREE PROGRAMMABLE REGULATION AND CONTROL SYSTEM WHICH IS CAPABLE OF A FLEXIBLE REACTION IN FACE OF FAILURE AND PROHIBITED SITUATIONS, WHICH ARE DEFINABLE TO A LIMITED EXTENT ONLY. THE FOLLOWING PAPER DESCRIBES, ON THE BASIS OF A 2.5 KW WIND ENERGY CONVERTER REALISED AND UNDER OPERATION AT THE UNIVERSITY OF BREMEN, AND A DRAFT DESIGN FOR A CONVERTER PREPARED THROUGH ERNO, BREMEN, THE BROAD PRINCIPLES UNDERLYING SUCH SYSTEMS.

1980-0454 SCHUETTE K W
RELAY PROTECTION FOR SMALL WIND-DRIVEN TURBINE-GENERATORS WITH INTERCONNECTIONS TO A UTILITY POWER SYSTEM. MINUTES OF THE MEETING OF THE PENNSYLVANIA ELECTRIC ASSOCIATION, ERIE, PENNSYLVANIA, MAY 22, 1980. HARRISBURG, PENNSYLVANIA, PENNSYLVANIA ELECTRIC ASSOCIATION, 1980. P. 28.

THE PAPER EXAMINES THE DESIGN PHILOSOPHY AND THE EQUIPMENT NECESSARY TO ADEQUATELY PROTECT SMALL WIND-DRIVEN TURBINE-GENERATORS INSTALLED BY AN INDIVIDUAL HOMEOWNER OR A SMALL BUSINESS, AND INTERCONNECTIONS TO A UTILITY POWER SYSTEM. STANDARD RELAYS CAN BE COMBINED IN SCHEMES TO PROVIDE ADEQUATE PROTECTION FOR THESE SYSTEMS.

1980-0455 SEDEFIAN L
ON THE VERTICAL EXTRAPOLATION OF MEAN WIND POWER DENSITY.
J. APPL. METEOROL. 19(4): 488-493, APRIL 1980.

A SIMPLE METHOD OF ESTIMATING THE HEIGHT VARIATION OF THE MEAN WIND POWER DENSITY IS PRESENTED WHICH ACCOUNTS FOR THE VARIATION OF THE EXPONENT P, OF THE WIND SPEED POWER LAW, WITH STABILITY AND ROUGHNESS. MEASUREMENTS ARE USED TO COMPARE THE NEW METHOD TO TWO PREVIOUSLY SUGGESTED METHODS. THE RESULTS INDICATE THAT THE PRESENTLY SUGGESTED METHOD GIVES THE MOST ACCURATE ESTIMATE OF THE EXTRAPOLATED MEAN WIND POWER DENSITIES.

1980-0456 SELZER H
ECONOMICAL ASPECTS FOR LARGE WEC.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 2: FRAGEN DER WIRTSCHAFTLICHKEIT. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980.) MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 142-148.

THE ESTIMATION OF SOME ECONOMICAL ASPECTS FOR LARGE WEC RESULTED IN: THE ENERGY NEEDED FOR PRODUCTION WILL BE RAPID IN 2 TO 3 MONTHS BY WIND ENERGY; THE GENERATION PRICE WILL BE APPROXIMATELY 0.06 DM/KWH IN CASE OF SERIES PRODUCTION; APPROXIMATELY 65 MENYEARS ARE NEEDED FOR THE PRODUCTION OF ONE LARGE UNIT.

1980-0457 SELZER H
WIND ENERGY IN EUROPE.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 6(2): 14-16, APRIL 1980. (IN GERMAN)

WIND ENERGY ACTIVITIES IN DENMARK ARE REVIEWED. APART FROM THE SMALL CONVERTERS, THERE ARE FOUR LARGE SYSTEMS WHICH ARE DESCRIBED IN THIS ARTICLE. IN THE FRAMEWORK OF A PROGRAMME SPONSORED BY THE MINISTER FOR ENERGY, A TEST FIELD IS NOW BEING SET UP WHERE SMALL WIND POWER PLANTS CAN BE TESTED.

1980-0458 ANDERSEN T S, BODENSCHATZ C A, EGGERS A G, HUGHES P S, LAMPE R F, LIPNER M H, SCHORNHORST J R
MOD-0A 200 KW WIND TURBINE GENERATOR DESIGN AND ANALYSIS REPORT.
NTIS, AUGUST 1980. 393 P.
NASA-CR-165128, AESD-TME-3052, DOE/NASA/0163-2

THIS REPORT DOCUMENTS THE DESIGN, ANALYSIS, AND INITIAL PERFORMANCE OF THE MOD-0A 200 KW WIND TURBINE GENERATOR AT CLAYTON, N.M. THE REPORT DISCUSSES THE PROJECT REQUIREMENTS, APPROACH, SYSTEM DESCRIPTION, DESIGN REQUIREMENTS, DESIGN ANALYSIS, SYSTEM TESTS, INSTALLATION, SAFETY CONSIDERATIONS, FAILURE MODES AND EFFECTS ANALYSIS, DATA ACQUISITION, AND INITIAL PERFORMANCE FOR THE WIND TURBINE.

1980-0459 SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE. VOLUME II.
NTIS, 1980. 214 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, 2ND, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980.
SERI/CP-635-1061

FOR VOLUME I SEE 1980-0336.

1980-0460 SETHURAMAN S, RAYNOR G S
COMPARISON OF MEAN WIND SPEEDS AND TURBULENCE AT A COASTAL SITE AND AN OFFSHORE LOCATION.
J. APPL. METEOROL. 19(1): 15-21, JANUARY 1980.

OBSERVATIONS ARE REPORTED OF MEAN WIND SPEED AND LONGITUDINAL TURBULENCE MEASURED SIMULTANEOUSLY AT A HEIGHT OF 8M ABOVE THE SEA 5KM OFF LONG ISLAND, AND ON THE BEACH. MEAN WINDS OVER THE OCEAN WERE 15-100% HIGHER THAN AT THE BEACH. CHANGES IN TURBULENCE APPEARED TO DEPEND ON VARIATIONS IN AERODYNAMIC ROUGHNESS OF THE SEA SURFACE AND THE THERMAL PROCESSES WHICH OCCUR OVER WATER.

1980-0461 SEXTON J H
GRUMMAN WINDSTREAM 25 WIND TURBINE GENERATOR. FINAL TEST REPORT.
NTIS, MARCH 1980. 20 P.
RFP-3134

THE GRUMMAN WINDSTREAM 25 WIND TURBINE GENERATOR (WTG) TESTED AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) WAS ONE OF NINETEEN WINDSTREAM 25'S MANUFACTURED BY GRUMMAN ENERGY SYSTEMS, INC. THE MACHINE WAS CONSIDERED A FIRST GENERATION PROTOTYPE AND IS NO LONGER BEING PRODUCED. WHILE BEING TESTED AT THE WSTC, THE WINDSTREAM 25 WAS STILL IN A DEVELOPMENTAL STAGE, AND OPERATIONAL PROBLEMS WERE EXPERIENCED DURING ITS TESTING PERIOD. IT IS IMPORTANT TO UNDERSCORE, HOWEVER, THAT PROBLEMS ENCOUNTERED DURING TESTING OF THE MACHINE CREATED VALUABLE GAINS IN EXPERIENCE AND DATA FOR BOTH ROCKY FLATS AND GRUMMAN PERSONNEL. IT IS BELIEVED THESE GAINS HAVE CONTRIBUTED SIGNIFICANTLY TO FURTHER DEVELOPMENT OF GRUMMAN WTG'S.

1980-0462 SEXTON J H
NORTH WIND EAGLE WIND TURBINE GENERATOR. FINAL TEST REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JANUARY 1980. 23 P.
RFP-3071/3533/80/9

THE NORTH WIND EAGLE 3 WIND TURBINE GENERATOR HAS MET OR EXCEEDED ALL MANUFACTURER CLAIMS OF PERFORMANCE AND SURVIVABILITY. AFTER PROBLEMS ENCOUNTERED DURING EARLY STAGES OF TESTING WERE CORRECTED BY THE NORTH WIND POWER COMPANY, THE EAGLE OPERATED IN WINDS EXCEEDING 40 M/S (90 MPH) SEVERAL TIMES WITHOUT INCURRING DAMAGE. DURING CONTROLLED VELOCITY TESTING, THE MACHINE PRODUCED OVER 4 KW OF OUTPUT. THE NORTH WIND EAGLE 3 HAS BEEN TAKEN OUT OF PRODUCTION AND IS NO LONGER COMMERCIALLY AVAILABLE.

1980-0463 SFORZA P M
HIGH YIELD WIND ENERGY RESOURCES IN NEW YORK STATE. FINAL REPORT MAY 1979 - MAY 1980.
NTIS, JUNE 1980. 177 P. ALSO: ALBANY, NEW YORK, NYSERDA, JUNE 1980. 173 P.
PB81-142754, NYSERDA-80-11

THIS REPORT DETAILS A WIND ENERGY INVENTORY FOR NEW YORK STATE. THE INVENTORY IS BASED ON DATA COLLECTED AT NUMEROUS METEOROLOGICAL STATIONS AND ANEMOMETERS THROUGHOUT THE STATE. THE DATA INDICATES THERE ARE A NUMBER OF REGIONS IN THE STATE WHICH COULD POSSIBLY HOST ONE OR MORE LARGE (GREATER THAN 100 KW) WIND TURBINE GENERATORS. THE REPORT ALSO CONTAINS AN EXTENSIVE ANALYSIS OF LIFE CYCLE ELECTRICAL ENERGY PRODUCTION COSTS OF VARIOUS WIND TURBINE GENERATORS WHICH ARE NOW BEING MANUFACTURED OR WHICH WILL BE MANUFACTURED IN THE NEAR FUTURE.

1980-0464 SHELDAHL R E
AERODYNAMIC PERFORMANCE OF A 5-M-DIAMETER DARRIEUS TURBINE.
J. ENERGY 4(5): 227-232, SEPTEMBER-OCTOBER, 1980.

A 5-M-DIAM VERTICAL-AXIS WIND TURBINE HAS UNDERGONE CONTINUED TESTING SINCE 1976 AT THE SANDIA NATIONAL LABORATORIES WIND TURBINE SITE. THE LATEST TESTS OF THIS MACHINE HAVE BEEN WITH EXTRUDED ALUMINUM BLADES OF NACA-0015 AIRFOIL CROSS SECTION. THE RESULTS OF THESE TESTS AT SEVERAL TURBINE ROTATIONAL SPEEDS ARE PRESENTED AND COMPARED WITH EARLIER TEST RESULTS. A PERFORMANCE COMPARISON IS MADE WITH A VORTEX/LIFTING LINE COMPUTATIONAL CODE. THE PERFORMANCE OF THE TURBINE WITH THE EXTRUDED BLADES MET ALL EXPECTATIONS.

1980-0465 SHERMAN D J
WIND ENERGY--HOW RELIABLE?
NTIS, JANUARY 1980. 36 P.
AD-A94988, ARL/STRUC-380

THE RELIABILITY OF A WIND ENERGY SYSTEM DEPENDS ON THE SIZE OF THE PROPELLER AND THE SIZE OF THE BACK-UP ENERGY STORAGE. DESIGN OF THE OPTIMUM SYSTEM FOR A GIVEN RELIABILITY LEVEL CAN BE PERFORMED IF A TIME SERIES OF WIND SPEED DATA IS AVAILABLE. HOWEVER, A DESIGN BASED ON CONVENTIONAL METEOROLOGICAL RECORDS, WHICH SAMPLE THE WIND SPEED WITH A TEN MINUTE AVERAGING TIME AT THREE-HOURLY INTERVALS, WILL OVER-ESTIMATE THE STORAGE BY A FACTOR OF APPROXIMATELY 2, AND IF THE WIND SPEED IS ONLY AVAILABLE ON A DAILY BASIS THE STORAGE WILL BE OVER-ESTIMATED BY A FACTOR OF 2.5 TO 4.0. THIS IS BECAUSE A PROPELLER CAN RESPOND TO WIND SPEED CHANGES IN MUCH LESS THAN TEN MINUTES AND ALSO BECAUSE THREE-HOURLY SAMPLING DOES NOT OFTEN PICK UP THE BRIEF HIGH-SPEED INCIDENTS WHICH GENERATE A SIGNIFICANT PART OF THE WIND ENERGY. A NOMOGRAM IS PRESENTED, BASED ON SOME CONTINUOUS WIND SPEED MEASUREMENTS, WHICH ENABLES STORAGES CALCULATED FROM THREE-HOURLY OR DAILY DATA TO BE APPROPRIATELY REDUCED BECAUSE OF THESE TWO EFFECTS.

1980-0466 SHISHODIA K S, KUMAR K L, SAH P L
VERTICAL AXIS WIND MILL MODELS: DESIGN TESTING AND EVALUATION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 458-467.

IN THE PRESENT WORK, AUTHORS HAVE DESIGNED VERTICAL AXIS WIND MILL MODELS TO BE ACCOMMODATED IN THE TEST SECTION OF A WIND TUNNEL OF THE DIMENSION 75 CM X 45 CM. THE BLADES ARE OF AIRFOIL SECTIONS, AND THE NUMBER OF BLADES IN THE WIND MILL VARY FROM 4 TO 8. THE WIND MILL MODELS ARE TESTED IN THE SUBSONIC LOW MACH NUMBER WIND TUNNEL AT THE WIND SPEEDS OF 3.66 METERS PER SECOND AND AT 5.1 METERS PER SECOND. ON THE BASIS OF THESE TESTS, OPTIMUM NUMBER OF BLADES AND THEIR ORIENTATION ARE ARRIVED AT.

1980-0467 SIMMS D
WIRING FOR YOUR HOMEMADE ELECTRICITY.
ALTERN. SOURCES ENERGY NO. 46: 22-26, NOVEMBER/DECEMBER 1980.

1980-0468 SIMON R L
LOCATION OF SITES FOR WIND POWER DEVELOPMENT IN NORTHEASTERN CALIFORNIA. FINAL REPORT.
SAN JOSE, CALIFORNIA, GLOBAL WEATHER CONSULTANTS, MAY 1980. 147 P. AVAILABLE: SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION.
P-500-80-053

A WIND ENERGY PROSPECTING METHODOLOGY DEVELOPED BY THE CALIFORNIA ENERGY COMMISSION WAS APPLIED AND EVALUATED DURING A ONE-YEAR STUDY IN REMOTE NORTHEASTERN CALIFORNIA, WHERE ONLY SKETCHY INFORMATION ABOUT THE WIND RESOURCE POTENTIAL WAS AVAILABLE. EXISTING WIND DATA WERE ANALYZED, AND A FIELD SURVEY OF THE REGION WAS MADE TO DETERMINE THE GENERAL CHARACTERISTICS OF THE WIND REGIME AND SELECT SITES FOR ANEMOMETER INSTALLATION. WINDS WERE MEASURED AT TWENTY-FIVE LOCATIONS AS PART OF THIS STUDY, WITH MOSTLY TOTALIZING AND SEVERAL RECORDING ANEMOMETERS. AN EXCELLENT WIND RESOURCE WAS FOUND IN NORTHEASTERN CALIFORNIA ONLY AT HIGH, WELL-EXPOSED ELEVATIONS. MEAN ANNUAL WIND SPEEDS APPARENTLY EXCEED 15 MPH ALONG THE ENTIRE 60-MILE CRESTLINE OF THE WARNER MOUNTAINS, THE ONE TOPOGRAPHIC FEATURE OF THE REGION WELL-SUITED FOR WIND FARM DEVELOPMENT.

1980-0469 SIMON R L, NORMAN G T, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 9. THE SOUTHWEST REGION.
NTIS, NOVEMBER 1980. 128 P.
PNL-3195-WERA-9

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN NEVADA AND CALIFORNIA. BACKGROUND ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED IS PRESENTED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. AN INTRODUCTION AND OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH STATE ARE GIVEN. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED AS SEPARATE CHAPTERS. THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED.

1980-0470 SITE INSOLATION AND WIND POWER CHARACTERISTICS, TECHNICAL REPORT NORTHEAST REGION. VOL. 2.
NTIS, AUGUST 1980. 104 P.
DOE/CS/20160-01(V.2)

THIS PHASE OF THE SITE INSOLATION AND WIND POWER CHARACTERISTICS STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS SITES IN THE NORTHEAST REGION OF THE U.S. HISTORIC DATA (SOLMET), AT 8 NATIONAL WEATHER SERVICE STATIONS WITH HOURLY SOLAR INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS.

1980-0471 SITE INSOLATION AND WIND POWER CHARACTERISTICS, TECHNICAL REPORT WESTERN REGION (NORTH SECTION). VOL. 5.
NTIS, AUGUST 1980. 213 P.

THIS PHASE OF THE SITE INSOLATION AND WIND POWER CHARACTERISTICS STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS SITES IN THE WESTERN REGION, NORTH SECTION OF THE U.S. HISTORIC DATA (SOLMET), AT 21 NATIONAL WEATHER SERVICE STATIONS WITH HOURLY INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS.

1980-0472 SIVASEGARAM S
TRANSIENT BEHAVIOR OF WIND ENERGY SYSTEMS.
WIND ENG. 4(2): 53-63, 1980.

THE TRANSIENT RESPONSE OF WIND ENERGY SYSTEMS TO SUDDEN CHANGES IN WIND SPEED AND TO FLUCTUATING WIND SPEEDS ARE STUDIED USING SIMPLE AND GENERALIZED REPRESENTATIONS OF ROTOR AND LOAD CHARACTERISTICS. IT IS SHOWN THAT ANALYTICAL SOLUTIONS ARE POSSIBLE IN A LIMITED NUMBER OF INSTANCES AND THAT RESULTS OF GENERAL VALIDITY CAN BE OBTAINED. THE RESPONSE TIME IS SHOWN TO BE DEPENDENT UPON THE MAGNITUDE OF THE CHANGE IN WIND SPEED AND THAT THE TIME CONSTANT USED IN CONTROL THEORY FOR SMALL PERTURBANCES WILL BE OFTEN INADEQUATE TO DESCRIBE SYSTEM BEHAVIOR. THE EXTRACTION OF THE EXCESS ENERGY AVAILABLE IN THE WIND BECAUSE OF FLUCTUATIONS OF WIND SPEED IS SHOWN TO BE AFFECTED BY THE NONLINEARITY OF THE CHARACTERISTICS AND BY THE FREQUENCY AND AMPLITUDE OF THE FLUCTUATIONS. IT IS, AGAIN, DEMONSTRATED THAT SMALL PERTURBATION MODELS ARE INADEQUATE FOR DESCRIBING THE SYSTEM.

1980-0473 SIVIER K R
A PRELIMINARY STUDY OF A TETHERED WIND ENERGY SYSTEM INCLUDING THE EFFECT OF A DUCTED ROTOR.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 65.
SERI/CP-635-1601

A PRELIMINARY DESIGN STUDY WAS MADE OF A TETHERED WIND ENERGY SYSTEM (TWES). ALTITUDES FROM 150 M TO 3050 M WERE INVESTIGATED. THE BASIC STUDY INVOLVED SYSTEMS WITH FREE (OR UNDUCTED) ROTORS. IN ADDITION, PRELIMINARY ESTIMATES WERE MADE OF THE EFFECTS OF USING A DUCTED ROTOR. BECAUSE OF THE INCREASE IN MEAN WINDSPEED WITH ALTITUDE, THE ROTOR DIAMETER AND WEIGHT OF THE BASIC WIND ENERGY SYSTEM (WES) DECREASE WITH ALTITUDE. HOWEVER, THE AEROSTAT VOLUME AND THE TOTAL TWES WEIGHT EXHIBIT MINIMUMS AT MODERATE (600 TO 1200 M) ALTITUDES. IT WAS FOUND ALSO THAT AEROSTAT VOLUME AND TWES WEIGHT CAN BE REDUCED BY ADDING AERODYNAMIC LIFT. PRELIMINARY ESTIMATES SUGGEST THE POTENTIAL FOR DESIGN AND PERFORMANCE ADVANTAGES WITH THE USE OF DUCTED ROTORS.

1980-0474 SMITH O J M
SOW WIND TURBINES AND REAP THE WIND.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1796-1833.

THIS PAPER DESCRIBES THE DESIGN AND DEVELOPMENT OF A 6-METER DIAMETER WIND TURBINE. IT IS LIKE A BICYCLE WHEEL WITH THIN AIRFOILS THREADED OVER THE SPOKES. THIS IS A MODIFICATION OF THE TRADITIONAL MULTI-BLADED FARMER'S WINDMILL PUMP IMPROVED TO 35% EFFICIENCY. AN ADVANTAGE IS THAT THE GENERATOR IS AT THE BOTTOM, WITH THE POWER TAKE OFF BEING A RUBBER TIRE ON THE RIM OF THE WHEEL. NO GEARS OR BELTS ARE USED. THIS 6-METER DIAMETER TURBINE CAN DELIVER 10 KW IN A 45 KM/H WIND AND 17 KW IN A 60 KM/H WIND. IN A REGION WITH 25 KM/H AVERAGE WIND SPEED, IT CAN DELIVER 51 KWH PER DAY AT A COST OF 2.1 CENTS/KWH. IN A REGION WITH 30 KM/H AVERAGE WIND SPEED, THE TURBINE CAN DELIVER 105 KWH PER DAY AT A COST OF ONLY ONE CENT PER KWH. BOTH THE GENERATOR AND THE WIND TURBINE ARE MOUNTED ON A LOW ROTATING TOWER. A ROTATING WIND SCOOP MADE OF SAIL CLOTH CAN INCREASE THE POWER OUTPUT WITH MINIMUM INCREASED CAPITAL COST.

1980-0475 SMITH P R
WINDMILL TOWER.
U.S. PATENT NO. 4,217,738, AUGUST 19, 1980.

THIS WINDMILL IS COMPRISED OF: A BASE MEMBER WITH MEANS FOR ANCHORING, IN THE GROUND, LATERALLY ADJACENT, A WELL; AN ELONGATED UPRIGHT TOWER ON BASE AND HAVING A SUPPORT PLATFORM FIXED AT ITS UPPER END EXTENDING LATERALLY TO A POSITION OVER WELL. THE TOWER IS COMPRISED OF A TUBULAR MEMBER HAVING EXTERNAL BRACING TRUSSES. THE HINGE MOUNTING TOWER TO BASE FOR PIVOTAL MOVEMENT IS ON A HORIZONTAL AXIS WHERE THE TOWER MAY BE PIVOTALLY LOWERED IN A DIRECTION AWAY FROM THE WELL TO A HORIZONTAL POSITION ADJACENT TO THE GROUND. THIS INCLUDES THE MEANS FOR LOCKING THE TOWER IN AN UPRIGHT POSITION. THE MOUNTING SECURING THE TOWER TO THE HINGE FOR RELATIVE ROTATION ON THE LONGITUDINAL AXIS OF THE TOWER SO IT MAY BE ROTATED IS IN AN UPRIGHT POSITION SO IT MAY SWING THE SUPPORT PLATFORM AWAY FROM A POSITION OVER THE WELL.

1980-0476 SMITH R J
WIND POWER EXCITES UTILITY INTEREST.
SCIENCE 207(4432): 739-742, FEBRUARY 15, 1980.

SEVERAL LARGE-SCALE UTILITY APPLICATIONS OF WIND POWER ARE DISCUSSED.

1980-0477 SNECK H J, DUFFY R E, SCHLOSSER A
WASTE ENERGY POWER GENERATION CONCEPT--THE PLUMEMILL.
ASME PAPER 80-JPGC/PWR-9, 1980. 8 P.

A SET OF EQUATIONS DESCRIBING THE FLOW IN A NATURAL DRAFT DRY COOLING TOWER WERE DEVELOPED AND SOLVED ON THE COMPUTER. EXIT AND INLET CONDITIONS, SUCH AS VELOCITY AND TEMPERATURE, WERE DETERMINED FOR A RANGE OF TOWER SIZES, TOWER SHAPES, AND HEAT EXCHANGER FLUXES AND DRAG COEFFICIENTS. THE TOWER EQUATIONS WERE EXTENDED TO INCLUDE THE POTENTIAL FOR POWER EXTRACTION INSIDE THE TOWER. HARNESSING THIS ENERGY WITH A WINDMILL INSIDE THE TOWER IS PROPOSED. THE AMOUNT OF EXTRACTABLE WORK WAS FOUND FOR THE SAME PARAMETERS AS ABOVE. THE MAXIMUM AMOUNT OF WORK WAS FOUND TO BE A LINEAR FUNCTION OF THE HEAT INPUT AND THE TOWER HEIGHT.

1980-0478 SODERHOLM L H
INTERFACING WIND SYSTEMS WITH THE UTILITY GRID.
ASAE PAPER 80-3042, 1980. 5 P.

THE METHODS AND FACTORS THAT MUST BE WEIGHED IN THE INTER-CONNECTION OF WIND ENERGY SYSTEMS WITH A UTILITY GRID FOR SUPPLYING ELECTRICAL POWER ARE PRESENTED IN RELATION TO PERFORMANCE AND APPLICATION. FOR BEST UTILIZATION OF WIND SYSTEMS, THESE FACTORS MUST BE CAREFULLY CONSIDERED TO ENSURE SAFETY AND PERFORMANCE.

1980-0479 SODERHOLM L H, ANDREW J F

FIELD CONTROL FOR WIND-DRIVEN GENERATORS.
U.S. PATENT APPLICATION. NTIS, OCTOBER 3, 1980. 12 P.
PB81-129678, PAT-APPL-6-193-877

THE FIELD CURRENT OF A WIND-DRIVEN GENERATOR IS AUTOMATICALLY CONTROLLED IN RESPONSE TO A FIRST SIGNAL REPRESENTING THE WIND SPEED AND A SECOND SIGNAL REPRESENTING THE IMPELLER TIP SPEED SO AS TO CONTINUOUSLY LOAD THE WIND MACHINE TO THE EXTENT NECESSARY FOR MAINTAINING A CONSTANT TIP SPEED/WIND SPEED RATIO, THEREBY OPTIMIZING THE PERFORMANCE OF THE MACHINE.

1980-0480 SOLAR BUDGET CUTS.
WIND POWER DIG. NO. 20: 42-44, SUMMER 1980.

1980-0481 SOLAR ENERGY: PROGRAM SUMMARY DOCUMENT FY 1981.
NTIS, AUGUST 1980. 376 P.
DOE/CS/0050

AN OVERVIEW OF THE US DEPARTMENT OF ENERGY SOLAR ENERGY PROGRAM IN THE OFFICE OF THE ASSISTANT SECRETARY FOR CONSERVATION AND SOLAR ENERGY IS PRESENTED. THE SOLAR TECHNOLOGIES ARE BIOMASS ENERGY SYSTEMS, PHOTOVOLTAIC ENERGY SYSTEMS, WIND ENERGY CONVERSION SYSTEMS, SOLAR THERMAL POWER, OCEAN SYSTEMS, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT, ACTIVE SOLAR HEATING AND COOLING, AND PASSIVE AND HYBRID SOLAR HEATING AND COOLING. THE STATUS OF THE SOLAR PROGRAMS IN EACH OF THESE TEHCNOLOGY AREAS IS REVIEWED, AND PROPOSED FY 1981 ACTIVITIES ARE PRESENTED.

1980-0482 SOREL J, BAINVILLE D, MAEGEY M, NOEL J M, SEGER G
APPLICATION OF THE FINITE ELEMENT METHOD TO THE STUDY OF THE BEHAVIOUR OF BLADES OF INDUSTRIAL WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D3, P. 193-206.

AMONGST AVAILABLE ENERGY FORMS, WIND ENERGY HAS BEEN USED FOR MANY YEARS TO PRODUCE ELECTRICITY. THE DEVELOPMENT OF NEW MATERIALS AND THE IMPROVEMENT OF MANUFACTURING TECHNIQUES HAVE MADE POSSIBLE HIGH POWER (100 KW) WIND ENERGY SYSTEMS (WECS) WITH LARGE DIAMETER (18 M) PROPELLERS. THOSE ERECTED ON WINDY SITES ARE OFTEN EXPOSED TO HEAVY MECHANICAL OVERLOADS DUE TO SEVERE CLIMATIC CONDITIONS. THE BLADE ATTACHMENT IS THUS CRITICAL AND LED US TO INTRODUCE POLYMERS AS AN ECONOMIC WAY OF STRAIN DISTRIBUTION. THE BLADE FOOTING HAS THEN BEEN COMPUTED BY THE FINITE ELEMENT METHOD. THE RESULT IS A STRAIN MAPPING PROVIDING VITAL INFORMATION CONCERNING WIND TURBINE DESIGN.

1980-0483 SORENSEN B
A REGIONAL WIND-HYDRO ELECTRICITY SUPPLY SYSTEM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L1, P. 533-543.

THE COMBINATION OF A WIND-BASED ELECTRICITY GENERATING SYSTEM WITH A HYDRO-BASED SYSTEM IS INVESTIGATED BY USE OF A SIMULATION MODEL. THE HYDRO-POWER SYSTEM IS AN IDEALISED VERSION OF THE NORWEGIAN SYSTEM, AND THE WIND-POWER SYSTEM CORRESPONDS TO GENERATING ALL THE ELECTRIC POWER NEEDED IN DENMARK BY WIND. A TRANSMISSION CAPABILITY BETWEEN THE TWO COUNTRIES IS ASSUMED TO ALLOW A POWER TRANSFER UP TO 2.5 TIMES THE MAXIMUM CAPACITY OF THE PRESENT INTERCONNECTIONS. THE MODEL HAS BEEN USED TO SIMULATE THE PERFORMANCE OF SUCH A SYSTEM, USING WIND AND HYDRO DATA FOR THE RESPECTIVE COUNTRIES. NOT ONLY "TYPICAL" OR AVERAGE YEARS HAVE BEEN CONSIDERED, BUT ALSO THE VARIATIONS CAUSED BY EXCEPTIONALLY GOOD OR BAD WIND YEARS OR HYDRO YEARS. IT IS CONCLUDED THAT THE COMBINED SYSTEM IS AS DEPENDABLE AS THE HYDRO SYSTEM ALONE, AND THAT THE COMBINATION THUS OFFERS A WAY OF LARGE-SCALE ELECTRICITY SUPPLY BY USE OF WIND ENERGY, WITHOUT BACKUP OR STORAGE SYSTEMS OTHER THAN THE HYDRO SYSTEM. THE EXTRA TRANSMISSION LOSSES ASSOCIATED WITH THE POWER EXCHANGE BETWEEN THE WIND AND THE HYDRO SYSTEM AMOUNTS TO 8.9% OF THE WIND ENERGY PRODUCTION.

1980-0484 SORENSEN B
A SCANDINAVIAN ENERGY SYSTEM BASED ON RENEWABLE ENERGY.
FRA FYS. VERDEN 42(2): 30-33, 1980. (IN NORWEGIAN)

THIS REPORT QUOTES SOME STATISTICS FOR THE ENERGY REQUIREMENTS AND RESOURCES OF NORWAY, DENMARK, AND SWEDEN. THE AUTHOR ATTEMPTS TO SHOW THAT THE ENERGY REQUIREMENTS OF THESE COUNTRIES CAN BE MET BY A COMBINATION OF SOLAR UNITS, WINDMILLS ALONG THE COASTS, WATER POWER STATIONS, WAVE ENERGY, AND BIO-FUELLED POWER PLANT. THIS WOULD INVOLVE SOME CHANGES IN THE LIFE-STYLE OF THE INHABITANTS AND MORE FLOW OF ENERGY ACROSS NATIONAL FRONTIERS.

1980-0485 SOUTH P, JACOBS E W
EVALUATION OF INNOVATIVE WIND ENERGY CONCEPTS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 11-32.
SERI/CP-635-938

THE PAPER DESCRIBES THE PROCESS BEING DEVELOPED AT SERI TO EFFICIENTLY, CONSISTENTLY, AND OBJECTIVELY EVALUATE INNOVATIVE WIND ENERGY CONCEPTS. COSTING METHODS ARE BEING DEVISED WHEREBY DEVELOPMENTAL, PRE-PRODUCTION, AND PRODUCTION COSTS CAN BE ASSESSED FOR INNOVATIVE WIND ENERGY SYSTEMS IN THEIR CONCEPTUAL AND/OR DEVELOPMENTAL STAGES. PRELIMINARY AERODYNAMIC AND ENGINEERING ANALYSES WILL BE PERFORMED IN CONJUNCTION WITH THE COST ANALYSES TO DETERMINE RELEVANT PERFORMANCE, STRUCTURAL, AND MATERIAL CHARACTERISTICS. THESE ESTIMATES WILL BE USED TO IDENTIFY INNOVATIVE IDEAS WARRANTING MORE DETAILED AND COMPREHENSIVE STUDIES. THE OBJECTIVE EMPHASIZES FINDING USEFUL AND VIABLE INNOVATIVE WIND ENERGY CONCEPTS.

1980-0486 SPERA D A, VITERNA L A, RICHARDS T R, NEUSTADTER H E
PRELIMINARY ANALYSIS OF PERFORMANCE AND LOADS DATA FROM THE 2MW MOD-1 WIND TURBINE GENERATOR.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 99-118.
CONF-791097

THE DOE/NASA MOD-1 WIND TURBINE GENERATOR INSTALLED ON HOWARD'S KNOB NEAR BOONE, NORTH CAROLINA, WAS DEDICATED ON JULY 11, 1979. WITH A RATED POWER OF 2 MW AND A ROTOR DIAMETER OF 61 METERS, THE MOD-1 IS THE LARGEST WIND TURBINE EVER CONSTRUCTED. INITIAL OPERATION DURING AUGUST, SEPTEMBER, AND OCTOBER OF 1979 HAS PRODUCED PRELIMINARY TEST DATA ON OUTPUT POWER VERSUS WIND SPEED, ROTOR BLADE LOADS, SYSTEM DYNAMIC BEHAVIOR, AND START/STOP CHARACTERISTICS. THESE DATA HAVE BEEN ANALYZED STATISTICALLY AND ARE COMPARED WITH DESIGN PREDICTIONS OF SYSTEM PERFORMANCE AND LOADS.

1980-0487 STARR P J
ENERGY FROM WIND POWERED OSCILLATORS. SEMI-ANNUAL TECHNICAL PROGRESS REPORT, AUGUST 1, 1979-JANUARY 31, 1980.
NTIS, 1980. 10 P.
DOE/R5/10129-1

INFORMATION IS PRESENTED CONCERNING A LITERATURE REVIEW ON FLOW INDUCED VIBRATIONS; AN ESTIMATION OF AVAILABLE POWER; DESIGN PROCEDURE FOR BOTH VORTEX SHEDDING AND GALLOPING; AND CONVERSION SCHEMES.

1980-0488 STEPHENS H S, STAPLETON C A
PAPERS PRESENTED AT THE INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY. VOLUME 2: DISCUSSION.
INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY, CANTERBURY, ENGLAND, SEPTEMBER 27-29, 1978. CRANFIELD, BEDFORD, ENGLAND, BHRA, 1980. VARIOUS PAGING.

THIS VOLUME CONTAINS 11 PAPERS PRIMARILY CONCERNED WITH ELECTRIC POWER GENERATION RESULTING FROM THE UTILIZATION OF WIND AND WATER WAVE ENERGY.

1980-0489 STEPHENS H S, STAPLETON C A
PAPERS PRESENTED AT THE THIRD INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. 587 P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, COPENHAGEN, AUGUST 26-29, 1980.

1980-0490 STOUT B A, CLARK J A, MAYCOCK P, ASMUSSEN J
OVERVIEW OF SOLAR-ENERGY TECHNOLOGIES: HEATING, PHOTOVOLTAICS, WIND AND BIOMASS.
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS ANNUAL MEETING, 46TH, DETROIT, MICHIGAN, JULY 20, 1980. ENERGY AWARENESS LUNCHEON AND ENERGY SEMINAR. NTIS, JULY 23, 1980. P. 69-128.
CONF-800780-(VOL.1)

SOLAR ENERGY IS A TECHNICALLY AND ENVIRONMENTALLY FEASIBLE ALTERNATIVE TO FOSSIL FUELS. AN OVERVIEW OF FOUR SOLAR TECHNOLOGIES AND THEIR COSTS COVERS SPACE AND WATER HEATING, PHOTOVOLTAICS, WIND, AND BIOMASS. A LIFE-CYCLE MODEL OF SOLAR-SPACE-HEATING SYSTEMS CONSIDERS FOUR SPECIFIC TYPES OF INVESTMENT POSSIBILITIES. A TI-59 PROGRAMMABLE CALCULATOR ANALYZES THE ECONOMICS OF SOLAR-WATER-HEATING SYSTEMS. SOLAR HEATING AND COOLING COULD CONTRIBUTE 5.6 QUADS PER YEAR BY 2000. ANOTHER QUAD COULD COME FROM PHOTOVOLTAICS IF THE PRICE OF SOLAR CELL MODULES IS REDUCED ENOUGH, WHILE DOE ESTIMATES THE WIND POTENTIAL AT 1.7 AND BIOMASS AT 5.5 QUADS. THE DISCUSSION FOR EACH TECHNOLOGY INCLUDES A TECHNICAL AND ECONOMIC ASSESSMENT AND THE POTENTIAL FOR APPLICATION.

1980-0491 STROCK O J
DOE/NASA WIND TURBINE DATA ACQUISITION. PART 1: EQUIPMENT.
NTIS, JANUARY 1980. 56 P.
NASA-CR-159779, EMR-827053

LARGE QUANTITIES OF DATA WERE COLLECTED, STORED, AND ANALYZED IN CONNECTION WITH RESEARCH AND DEVELOPMENT PROGRAMS ON WIND TURBINES. THE HARDWARE CONFIGURATION OF THE WIND ENERGY REMOTE DATA ACQUISITION SYSTEM IS DESCRIBED ALONG WITH ITS USE ON THE NASA/DOE WIND ENERGY PROGRAM.

1980-0492 STROJAN C L
ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TECHNOLOGIES.
NTIS, SEPTEMBER 1980. 21 P.
SERI/TP-743-826

SOLAR ENERGY TECHNOLOGIES HAVE ENVIRONMENTAL EFFECTS, AND THESE MAY BE POSITIVE OR NEGATIVE COMPARED WITH CURRENT WAYS OF PRODUCING ENERGY. IN THIS RESPECT, SOLAR ENERGY TECHNOLOGIES ARE NO DIFFERENT FROM OTHER ENERGY SYSTEMS. WHERE SOLAR ENERGY TECHNOLOGIES DIFFER IS THAT NO UNRESOLVABLE TECHNOLOGICAL PROBLEMS (E.G., CARBON DIOXIDE EMISSIONS) OR SOCIOPOLITICAL BARRIERS (E.G., WASTE DISPOSAL, CATASTROPHIC ACCIDENTS) HAVE BEEN IDENTIFIED. THIS REPORT REVIEWS SOME OF THE ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TECHNOLOGIES AND ONGOING RESEARCH DESIGNED TO IDENTIFY AND RESOLVE POTENTIAL ENVIRONMENTAL CONCERNS. IT IS IMPORTANT TO CONTINUE RESEARCH AND ASSESSMENT OF ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TO ENSURE THAT UNANTICIPATED PROBLEMS DO NOT ARISE. IT IS ALSO IMPORTANT THAT THE KNOWLEDGE GAINED THROUGH SUCH ENVIRONMENTAL RESEARCH BE INCORPORATED INTO TECHNOLOGY DEVELOPMENT PROGRAMS AND POLICY INITIATIVES.

1980-0493 STROJAN C L, LAWRENCE K, O'DONNELL D
FIELD STUDY OF THE AESTHETICS OF SMALL WIND MACHINES: A PRELIMINARY REPORT.
NTIS, MARCH 1980. 4 P.
CONF-800406-3, SERI/TP-743-621

A FIELD STUDY WAS CONDUCTED AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER TO DETERMINE IF AESTHETIC PREFERENCES EXIST FOR PARTICULAR DESIGNS OF SMALL WIND MACHINES, AND TO GATHER DATA ON THE IMPORTANCE OF AESTHETICS RELATIVE TO OTHER WIND SYSTEM ISSUES. PARTICIPANTS ON PUBLIC TOURS OF THE TEST CENTER WERE ASKED TO ANSWER SEVERAL GENERAL QUESTIONS AND TO RATE THE VISUAL APPEARANCE OF VARIOUS WORKING PARTS (ROTOR AND NACELLE), TOWERS, AND COMPLETE MACHINES. WORKING PARTS INCLUDED VERTICAL- AND HORIZONTAL-AXIS DESIGNS (BOTH UPWIND AND DOWNWIND), WHILE TOWERS INCLUDED WOOD, CONCRETE AND STEEL COLUMNS, AND VARIOUS TRUSS DESIGNS. IN SPITE OF A RELATIVELY SMALL SAMPLE SIZE (N=139), THE RESULTS INDICATE DEFINITE PREFERENCES FOR PARTICULAR DESIGNS, WITH DOWNWIND HORIZONTAL-AXIS WORKING PARTS AND COLUMNAR TOWERS RECEIVING THE HIGHEST RATINGS.

1980-0494 SULLIVAN W N, LEONARD T M
A COMPUTER SUBROUTINE FOR ESTIMATING AERODYNAMIC BLADE LOADS ON DARRIEUS VERTICAL AXIS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, NOVEMBER 1980. 34 P.
SAND-80-2407

AN IMPORTANT ASPECT OF STRUCTURAL DESIGN OF THE DARRIEUS ROTOR IS THE DETERMINATION OF AERODYNAMIC BLADE LOADS. THIS REPORT DESCRIBES A LOAD GENERATOR WHICH HAS BEEN USED AT SANDIA FOR QUASI-STATIC AND DYNAMIC ROTOR ANALYSES. THE GENERATOR IS BASED ON THE SINGLE STREAMTUBE AERODYNAMIC FLOW MODEL AND IS CONSTRUCTED AS A FORTRAN IV SUBROUTINE TO FACILITATE ITS USE IN FINITE ELEMENT STRUCTURAL MODELS. INPUT AND OUTPUT CHARACTERISTICS OF THE SUBROUTINE ARE DESCRIBED AND A COMPLETE LISTING IS ATTACHED AS AN APPENDIX.

1980-0495 SUMMARY OF SOLAR ENERGY TECHNOLOGY CHARACTERIZATIONS.
NTIS, SEPTEMBER 1980. 190 P.
DOE/EV-0099

THIS REPORT SUMMARIZES THE DESIGN, OPERATING, ENERGY, ENVIRONMENTAL, AND ECONOMIC CHARACTERISTICS OF 38 MODEL SOLAR ENERGY SYSTEMS USED IN THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY SYSTEMS PROJECT INCLUDING SOLAR HEATING

AND COOLING OF BUILDINGS. WIND ENERGY IS INCLUDED.

1980-0496 SUPPOSE THE OIL STOPS...
ENERGY AND TECHNOLOGY REVIEW. NTIS, JUNE 1980. P. 19-27.
UCRL-52000-80-6

CONTINUED TURMOIL IN THE MIDDLE EAST MAKES A COMPLETE CUTOFF OF IMPORTED OIL SUPPLIES FROM THAT REGION A POSSIBILITY THAT MUST BE CONSIDERED. IF A MAJOR OIL CUTOFF OCCURRED, IT WOULD CAUSE DISASTROUS SHORT- AND MID-RANGE CONSEQUENCES TO OUR ECONOMY. DRASTIC CONSERVATION MEASURES WOULD HELP TO STRETCH THE REMAINING SUPPLIES BUT ONLY ENOUGH TO COVER ABOUT HALF OF THE SHORTFALL. EFFORTS TO PRODUCE SIGNIFICANT EFFECTS BY INTRODUCING OTHER ENERGY TECHNOLOGIES AND SUPPLIES INVOLVE LONG LEAD TIMES AND THEREFORE CANNOT BE EFFECTIVE IN THE SHORT TERM. FORESIGHT AND INITIATIVE WILL BE REQUIRED IF WE ARE TO DEVELOP EFFECTIVE COPING STRATEGIES BEFOREHAND. OUR PURPOSE IN THIS ARTICLE IS TO ESTIMATE THE MAGNITUDE OF THE MAXIMUM SHORTFALL, TO IDENTIFY THE MAJOR SHORT-TERM ACTIONS POSSIBLE IN RESPONSE TO SUCH A CRISIS, AND TO POINT OUT SOME LONGER RANGE ACTIONS TO COMPLETE OUR RECOVERY.

1980-0497 SUTZ R
WIND MACHINE SYSTEM FOR PUSHING AND LIFTING LOADS AND HAVING IMPROVED COUNTERBALANCING.
U.S. PATENT NO. 4,211,126, JULY 8, 1980. 5 P.

A DESCRIPTION IS GIVEN OF A WIND MACHINE SYSTEM ADAPTED FOR BOTH LIFTING UP AND PUSHING DOWN EXTERNAL LOADS, COMPRISING: A STATIONARY ELEVATED SUPPORT; TRANSMISSION MEANS MOUNTED ON SAID SUPPORT AND ARRANGED FOR CONVERTING ROTARY MOTION TO RECIPROCATING MOTION; A MULTIPLE BLADE ROTOR DRIVEN BY WIND AND CONNECTED TO SAID TRANSMISSION MEANS TO DRIVE THE SAME; A VERTICAL SHAFT CONNECTED TO SAID TRANSMISSION MEANS AND CYCLICALLY RECIPROCATED THEREBY FOR LIFTING UP AND PUSHING DOWN SAID LOADS WHEN SAID ROTOR ROTATES; AND MOUNTING MEANS ARRANGED TO RETAIN AND RESTRAIN SAID TRANSMISSION MEANS ON SAID SUPPORT IN SUCH A WAY THAT SAID TRANSMISSION MEANS PUSHES SAID SHAFT DOWN AND PULLS SAID SHAFT UP WITH EQUAL MAXIMUM FORCES DURING EACH CYCLE OF RECIPROCATION OF SAID SHAFT.

1980-0498 SWEDISH WIND PROJECTS.
WIND POWER DIG. NO. 20: 34-35, SUMMER 1980.

1980-0499 TAYLOR P A
ON WAKE DECAY AND ROW SPACING FOR WECS FARMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J4, P. 451-468.

A NUMERICAL MODEL OF WAKES IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS DEVELOPED AND APPLIED TO THE FLOW BEHIND HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE MODEL IS LINEARIZED, USES BOUNDARY LAYER APPROXIMATIONS AND IS INTEGRATED ACROSS TURBINE ROWS BUT SHOULD STILL PROVIDE USEFUL ESTIMATES OF POWER REDUCTIONS AT TURBINES IN SECOND AND SUBSEQUENT ROWS OF A WECS FARM ARRAY. VARIATIONS WITH TURBINE SIZE AND OTHER CHARACTERISTICS ARE INVESTIGATED AS WELL AS VARIATIONS DUE TO DIFFERENT SURFACE ROUGHNESS, WIND SPEED AND DIRECTION. COMPARISONS ARE MADE WITH OTHER THEORIES OF WAKE INTERACTIONS AND WITH WIND TUNNEL INVESTIGATIONS.

1980-0500 TAYLOR P A
ON WAKE DECAY AND ROW SPACING FOR WECS FARMS.
DOWNVIEW, ONTARIO, ATMOSPHERIC ENVIRONMENT SERVICE, BOUNDARY LAYER RESEARCH DIVISION, 1980. 42 P.
AQRB-80-001-L

A NUMERICAL MODEL OF WAKES IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS DEVELOPED AND APPLIED TO THE FLOW BEHIND HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE MODEL IS LINEARIZED, USES BOUNDARY LAYER APPROXIMATIONS AND IS INTEGRATED ACROSS TURBINE ROWS BUT SHOULD STILL PROVIDE USEFUL ESTIMATES OF POWER REDUCTIONS AT TURBINES IN SECOND AND SUBSEQUENT ROWS OF A WECS FARM ARRAY. VARIATIONS WITH TURBINE SIZE AND OTHER CHARACTERISTICS ARE INVESTIGATED AS WELL AS VARIATIONS DUE TO DIFFERENT SURFACE ROUGHNESS, WIND SPEED AND DIRECTION. COMPARISONS ARE MADE WITH OTHER THEORIES OF WAKE INTERACTIONS (CRAFOORD AND LISSAMAN) AND WITH WIND TUNNEL INVESTIGATIONS (BUILTJES).

1980-0501 TAYLOR P A
WAKE DECAY AND POWER REDUCTION IN WIND FARM ARRAYS--AN APPLICATION TO THE ARRAY PROPOSED FOR THE KAHUKU HILLS.
WIND ENG. 4(2): 76-79, 1980.

A NUMERICAL MODEL OF WIND TURBINE WAKE DECAY IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS BRIEFLY DESCRIBED. IT IS A LINEARISED, TWO DIMENSIONAL MODEL OF THE WAKE BEHIND A ROW OF WIND TURBINES AND CAN BE USED TO ESTIMATE POWER REDUCTIONS AT SECOND AND SUBSEQUENT ROWS IN WIND FARM ARRAYS. A TENTATIVE APPLICATION TO THE PROPOSED KAHUKU HILLS 80 MW WIND FARM ARRAY SUGGESTS A POWER LOSS OF ABOUT 10% WITH THE PLANNED FOUR ROW CONFIGURATION FOR THE PREVAILING EASTERLY WIND AT RATED SPEED. A TWO ROW CONFIGURATION ON THE SAME SITE COULD POSSIBLY REDUCE THIS LOSS TO 5%.

1980-0502 TAYLOR R H, SWIFT-HOOK D T
WIND POWER STUDIES IN THE CENTRAL ELECTRICITY GENERATING BOARD, U.K.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 269-286.
CONF-791097

THE CEGB IS CURRENTLY PARTICIPATING WITH PRIVATE INDUSTRY AND UNIVERSITY GROUPS IN A STUDY FUNDED BY THE UK DEPT. OF ENERGY TO ASSESS THE TECHNICAL PROBLEMS AND ECONOMICS OF OFFSHORE WINDPOWER. OUR OWN STUDIES HAVE CENTERED AROUND OBTAINING, INFERRING AND ANALYSING WIND DATA FROM OFFSHORE AREAS; DETERMINING THE OPTIMUM LAYOUT AND SPACINGS OF AEROGENERATORS WITHIN LARGE CLUSTERS AND THE ENERGY LOSS ASSOCIATED WITH SHADOWING EFFECTS; AND THE INTEGRATION OF LARGE AMOUNTS OF WIND ENERGY INTO THE NATIONAL GRID SYSTEM.

1980-0503 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. FY 1980 PROGRAM SUMMARY.
NTIS, MARCH 1, 1980. 41 P.
RFP-3121/3533/80/8

THIS DOCUMENT GIVES AN OVERVIEW OF THE ROCKY FLATS SMALL WIND SYSTEMS PROGRAM OPERATED BY THE ROCKWELL INTERNATIONAL ENERGY SYSTEMS GROUP FOR THE US DEPARTMENT OF ENERGY. THIS PROGRAM PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. THE OVERALL OBJECTIVE IS TO STIMULATE THE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. THE INFORMATION PROVIDED IN THIS DOCUMENT DESCRIBES THE CURRENT RELATIONSHIPS, PROGRAM ADMINISTRATION, ACTIVITY HIGHLIGHTS, AND PLANS FOR FY 1980 AS WELL AS PROJECTIONS THROUGH 1982.

1980-0504 TEGTH U
TV-INTERFERENCE MEASUREMENTS FROM THE TRIAL WIND POWER PLANT IN KALKUNGEN.
TELE (SWEDISH ED) 86(3): 41-48, 1980. (IN SWEDISH)

ROTATING METAL BLADES, AS USED ON A POWER GENERATING WIND MILL CAN ADVERSELY AFFECT TV RECEPTION. THE ARTICLE REPORTS ON MEASUREMENTS TAKEN IN THE AREA AFFECTED BY THE WIND MILL IN KALKUNGEN.

1980-0505 TELLER E
EMERGENCY PLANNING FOR THE PERSIAN GULF.
NTIS, JUNE 1980. 20 P.
LA-8383-MS

THIS WAS A TALK GIVEN BY EDWARD TELLER FOR THE LAMPF USERS GROUP, INC. THE SUBJECTS DISCUSSED INCLUDED: THE SALT TREATY, MILITARY STRENGTHS OF THE USSR AND USA, CIVIL DEFENSE PREPAREDNESS, THE PRESENT IRANIAN-AFGHANISTAN SITUATIONS, AND THE POSSIBILITY THAT THE USSR WILL GAIN CONTROL OF THE MID-EAST OIL INDUSTRY. HE SUGGESTED THE FOLLOWING POSSIBILITIES IN PREPARING FOR THE LATTER SITUATION: THE SYNTHESIS OF OIL FROM WOOD; THE USE OF ALASKAN COAL BY COAL-SLURRY TRANSPORT; THE USE OF METHA-COAL; THE USE OF IN-SITU COAL GASIFICATION; THE USE OF WIND POWER; AND THE USE OF NUCLEAR POWER. SEVERAL INNOVATIONS CURRENTLY UNDERWAY IN THE STATE OF WASHINGTON UNDER THE DIRECTION OF GOVERNOR DIXIE LEE RAY ARE POINTED OUT.

1980-0506 TEMPLIN R J
THE CANADIAN WIND ENERGY PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 301-306.
CONF-791097

THE NATIONAL RESEARCH COUNCIL WAS ASSIGNED RESPONSIBILITY FOR COORDINATION OF R&D ON RENEWABLE ENERGY, INCLUDING HYDRAULIC, SOLAR, BIOMASS, GEOTHERMAL, AND WIND ENERGY. THIS PAPER DETAILS AREAS OF STUDY IN WIND RESOURCE ASSESSMENT, WECS DEVELOPMENT, AND THE MEGAWATT SCALE VAWT.

1980-0507 TENNYSON G
OVERVIEW OF THE FEDERAL DISPERSED WIND SYSTEMS PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 339-342.
CONF-791097

THE RESOURCE WORK IS BEING DONE IN RICHLAND, WASHINGTON, BY THE RICHLAND OPERATIONS OFFICE AND BATTELLE/PNL. THIS WORK TELLS US WHERE AND HOW MUCH WIND THERE IS, WHAT ARE THE WIND CHARACTERISTICS TO DESIGN FOR AND HOW YOU FORECAST THE WIND FOR POWER GENERATION.

1980-0508 THOMAS R L
KEY ISSUES ASSOCIATED WITH LARGE SCALE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 137-151.
CONF-791097

THIS PAPER SUMMARIZES THE KEY ISSUES ASSOCIATED WITH LARGE WIND TURBINES: TECHNOLOGY READINESS, POTENTIAL FOR SIGNIFICANT IMPACT, WILL THE USERS REALLY ACCEPT THESE MACHINES, WHAT DOES IT TAKE FOR THE CREATION OF A COMPETITIVE WIND TURBINE INDUSTRY, AND WILL THE PUBLIC ACCEPT THEM?

1980-0509 THOMAS R L, ROBBINS W H
LARGE WIND TURBINE PROJECTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 75-98.
CONF-791097

THE OBJECTIVE OF THE UNITED STATES WIND ENERGY PROGRAM IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS AND ENABLE THE EARLIEST POSSIBLE COMMERCIALIZATION OF WIND POWER. TO ACHIEVE THIS OBJECTIVE REQUIRES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE, AND ADDRESSING THE NON-TECHNOLOGICAL ISSUES WHICH COULD DETER THE USE OF WIND ENERGY.

1980-0510 THOMAS R L, ROBBINS W H
LARGE WIND-TURBINE PROJECTS IN THE UNITED STATES WIND ENERGY PROGRAM.
J. IND. AERODYN. 5(3-4): 323-335, MAY 1980.

THIS PAPER DESCRIBES THE DEVELOPMENT STATUS OF LARGE, HORIZONTAL AXIS WIND TURBINES (100 TO 2500 KW) FROM MOD-0 TO MOD-2 DESIGN. THE WIND TURBINE COST-OF-ELECTRICITY IS CALCULATED. THE OBJECTIVES OF THE US WIND ENERGY PROGRAM ARE OUTLINED.

1980-0511 THOMPSON J E
FLUID FLOW INTENSIFIER FOR TIDE, CURRENT OR WIND GENERATOR.
U.S. PATENT NO. 4,224,527, SEPTEMBER 23, 1980.

THIS REPORT DESCRIBES A METHOD OF INTENSIFYING A FLUID FLOW, CAUSING A RELATIVELY SLOW SPEED NATURAL SUBSTANTIALLY HORIZONTAL FLOW OF A NATURAL FLUID TO TURN ROTARY ABOUT A HORIZONTAL AXIS, CAUSING THE ROTARY TO ACT DIRECTLY ON A WORKING FLUID AND FORCING THE WORKING FLUID THROUGH A PIPE SYSTEM WITHOUT THE FORMATION OF AN ELEVATED HEAD TO A FLOW INTENSIFIER IN THE FORM OF A CONSTRICTION. THEREFORE, THE FLOW OF WORKING FLUID IS SUFFICIENT TO DRIVE MEANS FOR GENERATING ELECTRICITY.

1980-0512 TIELEMAN H W
PLANETARY BOUNDARY LAYER WIND MODEL EVALUATION AT A MID-ATLANTIC COASTAL SITE.
NTIS, OCTOBER 1980. 184 P.
DOE/ET/23007-80/1

THE PURPOSE OF THIS REPORT IS TO PROVIDE INFORMATION ON THE LOCAL WIND CLIMATE AT A MID-ATLANTIC COASTAL SITE. THE ACQUIRED INFORMATION CAN BE USED FOR THE DESIGN OF WIND-TURBINE GENERATORS AT SIMILAR SITES. SINCE WIND IS A VERY IMPORTANT DESIGN PARAMETER FOR THESE GENERATORS, INFORMATION IS PROVIDED IN THIS REPORT ON WIND SPEED, WIND DIRECTION, WIND SHEAR AND WIND TURBULENCE. THE DATA PRESENTED IN THIS REPORT WERE COLLECTED FROM AN INSTRUMENTED METEOROLOGICAL TOWER, 76.2 M (250 FT) TALL AND LOCATED AT WALLOPS ISLAND. THE RESULTS ACQUIRED FROM THIS FACILITY SHOULD BE TYPICAL FOR ANY ATLANTIC COASTAL SITE, ALTHOUGH LOCAL EFFECTS SUCH AS UPSTREAM BUILDINGS AND OBSTACLES AND CHANGES IN SURFACE ROUGHNESS AND SURFACE TEMPERATURE MODIFY THE FLOW NEAR THE SURFACE.

1980-0513 TORNKVIST G

LOAD CASES FOR WIND ENERGY CONVERSION SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D2, P. 183-192.

AN INTERNATIONAL PROGRAMME FOR RESEARCH AND DEVELOPMENT ON WIND ENERGY CONVERSION SYSTEMS (WECS) IS ORGANISED BY THE INTERNATIONAL ENERGY AGENCY (IEA). ONE OF THE PROJECTS OF THE PROGRAMME CONCERNS LOAD CASE RECOMMENDATIONS. THE STATUS OF THE PROJECT IS PRESENTED AND RESULTS ON WIND DATA FOR WECS AND ON MAIN LOAD CASES ARE GIVEN.

1980-0514 TRACI R M, WYATT D C, PATNAIK P C, PHILLIPS G T
WIND ENERGY SITING METHODOLOGY WINDFIELD MODEL VERIFICATION PROGRAM. II. NEVADA TEST SITE DATA SET. INTERIM REPORT FOR THE PERIOD JUNE 15, 1979-FEBRUARY 15, 1980.
NTIS, FEBRUARY 1980. 138 P.
DOE/ET/20280-80/2

RESULTS ARE PRESENTED FROM THE SECOND PART OF A TWO PART VERIFICATION PROGRAM FOR A MATHEMATICAL-MODEL-BASED WIND ENERGY CONVERSION SYSTEM SITING METHODOLOGY. THE FIRST PART OF THE PROGRAM INVOLVED WINDFIELD SIMULATIONS AND WIND DATA COMPARISONS FOR THE ISLAND OF OAHU, HAWAII. THE OBJECTIVE OF THE PRESENT PROGRAM IS TO EXPAND THE MODEL VERIFICATION BY ASSESSING THE QUANTITATIVE ACCURACY OF THE MODELS RELATIVE TO OBSERVED DATA FOR A MIDCONTINENTAL REGION OF COMPLEX TOPOGRAPHY AND METEOROLOGY; THE NEVADA TEST SITE (NTS), NEVADA. IN PARTICULAR, THE GOAL IS TO DETERMINE THE ABILITY OF THE DETAILED-PHYSICS SIGMET MODEL TO DESCRIBE DYNAMIC ATMOSPHERIC AND BOUNDARY LAYER EFFECTS ON THE WINDFIELD IN A MESOSCALE REGION WITH COMPLEX TERRAIN AND TO DETERMINE THE ABILITY OF THE SIMPLIFIED-PHYSICS NOABL MODEL TO PREDICT WINDFIELDS UTILIZING A SMALL AMOUNT OF DATA. TO THIS END, RESULTS OF TWO SIGMET, NOABL AND LINMET SIMULATIONS FOR TYPICAL FLOW EVENTS ARE COMPARED AND CONTRASTED WITH AVAILABLE WIND DATA. LINMET IS A LINEAR THEORY MODEL, WHICH WAS ADDED TO THE MODEL COMPARISON STUDY, TO PROVIDE COMPARATIVE RESULTS FROM A STATE-OF-THE-ART MODELING APPROACH INTERMEDIATE BETWEEN SIGMET AND NOABL. IN ADDITION, 112 NOABL SIMULATIONS OF ACTUAL "WIND EVENTS" IN THE NTS DATA NETWORK HISTORICAL RECORD WERE PERFORMED AND A DETAILED STATISTICAL ANALYSIS OF THE RESULTS RELATIVE TO THE DATA IS PRESENTED.

1980-0515 TRENKA A R
KEY ISSUES ASSOCIATED WITH THE COMMERCIALIZATION OF SMALL WIND ENERGY CONVERSION SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 59-74.
CONF-791097

ONE OF OUR PRIME TASKS, DURING THE SMALL WIND SYSTEMS WORKSHOP COORDINATED BY ROCKY FLATS IN FEBRUARY-MARCH 1979, WAS TO IDENTIFY AND DISCUSS KEY ISSUES RELEVANT TO THE COMMERCIALIZATION OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). WE ARE ALL AWARE OF THE TECHNOLOGICAL AND ECONOMIC BARRIERS WHICH LED TO THE DEVELOPMENT OF THE SMALL WIND SYSTEMS ELEMENT OF THE FEDERAL WIND ENERGY PROGRAM. THE KEY ISSUES IDENTIFIED BY PARTICIPANTS IN THE WORKSHOP ARE SUBSETS OF THESE BARRIERS. THEIR RESOLUTION WOULD CONTRIBUTE TO MEETING THE OVERALL PROGRAM OBJECTIVES OF COST COMPETITIVENESS, RELIABILITY IMPROVEMENT AND PUBLIC ACCEPTANCE OF SWECS.

1980-0516 TUMA J
NEW ENERGY RESOURCES AND THEIR UTILISATION IN THE FUTURE.
ENERGETIKA 30(11): 507-509, NOVEMBER 1980. (IN CZECHOSLOVAKIAN)

THIS ARTICLE DISCUSSES THE STATE OF ENERGY RESOURCES AVAILABLE FOR FUTURE UTILISATION. IN PARTICULAR, SOLAR POWER, PHOTOELECTRIC CONVERSION, GEOTHERMAL SOURCES, WIND POWER AND BIOLOGICAL CONVERSION ARE CONSIDERED. THE EXPECTED UTILISATION OF SOLAR POWER IN CZECHOSLOVAKIA DURING YEARS 1985 TO 2000 IS ESTIMATED.

1980-0517 TWISS R H, SMITH P L, GATZKE A E, MCCREARY S T
LAND USE AND ENVIRONMENTAL IMPACTS OF DECENTRALIZED SOLAR ENERGY USE.
NTIS, JANUARY 1980. 206 P.
DOE/EV-0067

THE PHYSICAL, SPATIAL AND LAND-USE IMPACTS OF DECENTRALIZED SOLAR TECHNOLOGIES APPLIED AT THE COMMUNITY LEVEL BY THE YEAR 2000 ARE EXAMINED. THE RESULTS OF THE STUDY ARE INTENDED TO PROVIDE A BASIS FOR EVALUATING THE WAY IN WHICH A SHIFT TOWARD RELIANCE ON DECENTRALIZED ENERGY TECHNOLOGIES MAY EVENTUALLY ALTER COMMUNITY FORM. SIX LAND-USE TYPES REPRESENTATIVE OF THOSE FOUND IN MOST US CITIES ARE ANALYZED ACCORDING TO SOLAR PENETRATION LEVELS IDENTIFIED IN THE MAXIMUM SOLAR SCENARIO FOR THE YEAR 2000. THE SCENARIO IS TRANSLATED INTO SHARES OF END USE DEMAND IN THE RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS. THESE PROPORTIONS BECOME THE SCENARIO GOALS TO BE MET BY THE USE OF DECENTRALIZED SOLAR ENERGY SYSTEMS. THE PERCENTAGE OF TOTAL ENERGY DEMAND IS ASSUMED TO BE 36.5 PERCENT, 18.8 PERCENT AND 22.6 PERCENT IN THE RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS RESPECTIVELY. THE COMMUNITY LEVEL SCENARIO STIPULATED THAT A CERTAIN PERCENTAGE OF THE TOTAL DEMAND BE MET BY ON-SITE SOLAR COLLECTION, I.E. PHOTOVOLTAIC AND THERMAL COLLECTORS, AND BY PASSIVE DESIGN. THIS ON-SITE SOLAR GOAL IS 31.9 PERCENT (RESIDENTIAL), 16.8 PERCENT (COMMERCIAL) AND 13.1 PERCENT (INDUSTRIAL).

1980-0518 UPMALIS A
COMBINED OPERATION OF SOLAR-HEAT AND WIND-POWER GENERATING PLANTS.
WAERME 86(6): 109-111, DECEMBER 1980. (IN GERMAN)

THE ARTICLE DEALS FIRST WITH THE HEAT BALANCE OF THE EARTH RESULTING FROM INSOLATION AND WITH THE INFLUENCE THEREON OF ATMOSPHERIC POLLUTION, GOING ON TO DISCUSS THE DESIGN AND PERFORMANCE OF SOLAR COLLECTORS AND TO GIVE A BRIEF RESUME OF THE INCIDENCE OF WIND-POWER IN BELGIUM, AND CONCLUDES BY DESCRIBING AN INSTALLATION IN A HOUSE NEAR BRUSSELS CONSISTING OF A WIND-DRIVEN GENERATOR PRODUCING AN AVERAGE OF 2 KW AND A 40 SQ. M. SOLAR COLLECTOR. WITH SOME EMERGENCY HELP FROM A WOOD-BURNING BOILER IT IS HOPED THAT THE INSTALLATION WILL BE SELF-SUFFICIENT.

1980-0519 UTILIZATION OF FIBER REINFORCED PLASTICS IN ROTOR BLADES OF WIND TURBINES. WF INFORMATION.
NTIS, 1980. 70 P. (IN GERMAN)
NP-25123

IN ORDER TO PRODUCE WIND POWER PLANTS OF THE FUTURE WITH HIGH POWER (1-5 MW), THE WIND TURBINES ARE CONSTRUCTED WITH LARGE ROTOR DIAMETERS (UP TO 145 M). THE ROTOR BLADE HAS TO BE DESIGNED FOR A SERVICE LIFE OF AT LEAST 25 YEARS. THE FIBER BONDED OR HYBRID STRUCTURE (METAL + FIBER COMPOSITE MATERIAL) IS CERTAINLY ATTRACTIVE, ESPECIALLY IN CORROSIVE ENVIRONMENT, COMPARED TO CONVENTIONAL METAL CONSTRUCTIONS (STEEL OR ALUMINUM IN WELDED, RIVETED, OR BOLTED FORM). LIGHT, RIGID, AND DYNAMICALLY HIGH-STRENGTH ROTOR BLADES CAN BE BUILT WITH FIBER REINFORCED PLASTICS. THE PRESENT REPORT GIVES A SURVEY OF THE MATERIAL PROBLEMS ARISING IN SUCH PLANTS.

1980-0520 VACHON W A

LARGE WIND TURBINE GENERATOR PERFORMANCE ASSESSMENT. TECHNOLOGY STATUS REPORT NO. 1.
NTIS, JANUARY 1980. 90 P.
EPRI-AP-1317

THE RESULTS OF LARGE WIND TURBINE GENERATOR (WT) DEVELOPMENT AND FIELD TEST ACTIVITIES ARE PRESENTED. AN APPROACH FOR GATHERING, DISTILLING, AND ASSESSING WT TEST DATA IS PRESENTED, WITH EMPHASIS ON THE USEFULNESS OF THE DATA TO THE INDUSTRY. TEST RESULTS TO DATE HAVE VALIDATED THE DOE/NASA WT DESIGN PROCEDURES WHICH HAVE BEEN ESTABLISHED BY BOTH SUPPORTING RESEARCH AND TECHNOLOGY AND SOUND ENGINEERING PROGRAMS. THESE PROGRAMS HAVE EMPLOYED FIRST-GENERATION, HORIZONTAL AXIS WT'S IN RESEARCH AND OPERATION TESTS. COST OF ENERGY (COE) PROJECTIONS INDICATE THAT LATER GENERATION WT'S ARE LIKELY TO PROVIDE ELECTRICITY AT COMPETITIVE COSTS IN SOME UTILITY SYSTEMS WITHIN SEVERAL YEARS. SEVERAL PRIVATELY FUNDED HORIZONTAL AND VERTICAL-AXIS WT'S ARE PRESENTLY EITHER IN THE PLANNING OR CONSTRUCTION PHASE, OR ACTUALLY UNDER TEST IN UTILITY GRIDS. TEST RESULTS FROM THESE WT'S WILL BE PRESENTED IN FUTURE REPORTS.

1980-0521 VACHON W A
LARGE WIND TURBINE GENERATOR PERFORMANCE ASSESSMENT. TECHNOLOGY STATUS REPORT NO. 2.
NTIS, DECEMBER 1980. 77 P.
EPRI-AP-1641

THIS REPORT IS THE SECOND IN A SERIES DOCUMENTING A PROJECT WHOSE MAIN OBJECTIVE IS TO COMMUNICATE THE SIGNIFICANT RESULTS OF FEDERAL AND PRIVATELY FUNDED LARGE WIND TURBINE (WT) GENERATOR DEVELOPMENT AND FIELD TESTS. THIS INFORMATION IS BEING COMMUNICATED PRIMARILY TO THE ELECTRIC UTILITY INDUSTRY.

1980-0522 VAN DER AUWERA L, DE MEYER F, MALET L M
USE OF THE WEIBULL THREE-PARAMETER MODEL FOR ESTIMATING MEAN WIND POWER DENSITIES.
J. APPL. METEOROL. 19(7): 819-825, JULY 1980.

THE WEIBULL THREE-PARAMETER MODEL IS DISCUSSED FOR ESTIMATION OF MEAN WIND POWER DENSITIES. THIS PROBABILITY DENSITY FUNCTION IS A GENERALIZATION OF A NUMBER OF MORE CONVENTIONAL DENSITY FUNCTIONS. USING WIND SPEED OBSERVATIONS, IT IS SHOWN THAT THIS MODEL GENERALLY GIVES A MORE RELIABLE FIT TO THE EMPIRICAL WIND SPEED FREQUENCY DATA THAN THE DENSITY FUNCTIONS WITH ONE OR TWO PARAMETERS. WIND POWER DENSITY ESTIMATIONS TURN OUT TO BE STRONGLY DEPENDENT ON THE HYPOTHESIZED PROBABILITY DENSITY FUNCTION. THE VARIATION WITH HEIGHT OF THE THREE PARAMETERS OF THE DISCUSSED MODEL IS INVESTIGATED; NO SIMPLE HEIGHT DEPENDENCE CAN BE PROPOSED.

1980-0523 VANKUIKEN J C, BUEHRING W A, HUBER C C, HUB K A
RELIABILITY, ENERGY, AND COST EFFECTS OF WIND-POWERED GENERATION INTEGRATED WITH A CONVENTIONAL GENERATING SYSTEM.
NTIS, JANUARY 1980. 114 P.
ANL-AA-17

THE PURPOSE OF THIS INVESTIGATION IS TO EXAMINE THE POTENTIAL IMPACTS OF INCORPORATING WIND TURBINES, WITHOUT THE AID OF ENERGY-STORAGE DEVICES, INTO A CONVENTIONAL ELECTRICAL GENERATING SYSTEM. THIS STUDY FOCUSES ON THE CONTRIBUTION TO GENERATING-SYSTEM RELIABILITY OF WIND TURBINES, AND THE METHODS USED TO CALCULATE THESE BENEFITS. IN ADDITION, A SIMPLE COST MODEL WAS DEVELOPED TO ESTIMATE RANGES OF BREAKEVEN COSTS FOR WIND TURBINES BASED ON THE SUM OF FUEL COST SAVINGS, VARIABLE OPERATION AND MAINTENANCE (O AND M) COST SAVINGS, AND RELIABILITY BENEFITS OF THE WIND TURBINES.

1980-0524 VAN LEERSUM J
ESTIMATING SIZES AND OUTPUTS FROM WIND ENERGY SYSTEMS.
INST. ENG. AUST. ELECTR. ENG. TRANS. EE16(3): 120-127, SEPTEMBER 1980.

A SIMPLE METHOD FOR EVALUATING THE ANNUAL ENERGY OUTPUT FROM WIND TURBO GENERATORS CONNECTED INTO AN EXISTING ELECTRICAL NETWORK IS GIVEN. A MODEL FOR DETERMINING THE RELATIONSHIP BETWEEN LOAD FRACTION SUPPLIED BY WIND AND STORAGE SIZE IS DEVELOPED FOR WIND ENERGY CONVERSION SYSTEMS CONTAINING ENERGY STORES AND AUXILIARY POWER SUPPLIES. SOME GENERAL TRENDS PREDICTED BY THIS MODEL ARE GIVEN, AND RELATED CONCLUSIONS DRAWN.

1980-0525 VAS I E
KEY ISSUES ASSOCIATED WITH WIND ENERGY INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 417-418.
CONF-791097

EARLIER THIS YEAR WE HELD THE FIRST CONFERENCE SOLELY DEDICATED TO INNOVATIVE CONCEPTS. REVIEW PAPERS WERE PRESENTED ON THE EFFORTS BEING CARRIED OUT BY MAJOR CONTRACTORS OF THE WIND PROGRAM. PAPERS WERE ALSO PRESENTED BY THE PRINCIPAL INVESTIGATORS OF RESEARCH STUDIES FUNDED BY DOE. IN ADDITION, CONSIDERABLE TIME WAS ALLOWED FOR OPEN DISCUSSION OF THE PAPERS, AND RECOMMENDATIONS FOR THE FUTURE DIRECTION OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM. THE ISSUES THAT I WISH TO DISCUSS ARE THOSE THAT WERE BROUGHT UP AT THAT CONFERENCE, TOGETHER WITH A FEW ADDITIONAL MATTERS RELATING TO THE INNOVATIVE PROGRAM.

1980-0526 VAS I E, SOUTH P
A REVIEW OF THE SERI WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A4, P. 61-74.

THIS PAPER PRESENTS THE MAJOR EFFORTS OF THE SUBCONTRACTED RESEARCH STUDIES OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM SUPPORTED BY THE SOLAR ENERGY RESEARCH INSTITUTE. ELEVEN OF THE 17 STUDIES FUNDED ARE R & D STUDIES THAT CONSIDER POTENTIALLY COST-EFFECTIVE INNOVATIVE CONCEPTS. HIGHLIGHTS OF THESE CONCEPTS ARE DISCUSSED.

1980-0527 VAS I E
WORKING GROUP REPORT ON INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 523-526.
CONF-791097

1980-0528 VAS I E
WORKSHOP SUMMARY. WIND ENERGY INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 577-580.
CONF-791097

1980-0529 VAS I E, MITCHELL R L
A REVIEW OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.

CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 349-416.
CONF-791097

· THE OBJECTIVE OF THE PROGRAM IS TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF POTENTIALLY COST COMPETITIVE INNOVATIVE SYSTEMS. STUDIES PERFORMED IN THIS PROGRAM ARE SUBCONTRACTED TO SMALL AND LARGE PRIVATE COMPANIES AS WELL AS TO UNIVERSITIES. IN FY79, 17 STUDIES WERE FUNDED, 11 OF WHICH WERE R&D STUDIES THAT ADDRESS VARIOUS TYPES OF INNOVATIVE EXTRACTION, AUGMENTATION, AND ELECTROFLUID DYNAMIC TYPE SYSTEMS. THE REMAINING WERE SHORT TERM STUDIES ASSESSING THE VALUE OF INNOVATIVE SYSTEMS BY GENERIC ORDER.

1980-0530 VEENHUIZEN S D, LIN J T
WIND FIELD PREDICTIONS FOR THE COLUMBIA GORGE AND THE GOODNOE HILLS WIND TURBINE SITE.
NTIS, AUGUST 1980. 104 P.
DOE/BP/18979-T1

NUMERICAL ESTIMATES OF THE LONG TERM SEASONAL MEAN WIND SPEEDS, WIND DIRECTIONS, AND AVAILABLE WIND POWER DENSITY WERE CONDUCTED FOR COMPARISON WITH THE RESULTS OF FIELD WIND MEASUREMENTS OBTAINED BY THE BONNEVILLE POWER ADMINISTRATION FOR THE COLUMBIA GORGE REGION ALONG THE OREGON-WASHINGTON BORDER. THE AUTHORS HAD PREVIOUSLY USED THE NUMERICAL METHOD OF ESTIMATING WIND FLOWS IN COMPLEX TERRAIN TO IDENTIFY HIGH WIND ENERGY AREAS WITHIN THE OLYMPIC PENINSULA AND NORTHERN CASCADE REGIONS OF THE STATE OF WASHINGTON. THE NUMERICAL TECHNIQUE WAS USED AS A GENERALIZED WIND PROSPECTING TOOL TO PROVIDE THE LINK BETWEEN REGIONAL ASSESSMENTS AND ON-SITE BIOLOGICAL OR GEOMORPHOLOGICAL INDICATORS OF MEAN WIND SPEEDS AND AVAILABLE WIND ENERGY. THE WIND FLOW MODEL USED IS A TWO DIMENSIONAL MODEL BASED UPON SIMPLIFIED HYDRODYNAMICAL EQUATIONS DESCRIBING THE FLUID AND THERMODYNAMIC MOTION OF THE ATMOSPHERE.

1980-0531 VEENHUIZEN S D, LIN J-T, YAMAGIWA A T
WIND RESOURCE ASSESSMENT IN THE UPPER SKAGIT RIVER VALLEY OF WASHINGTON.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1143-1148.

EARLY IN 1979 SEATTLE CITY LIGHT BEGAN A PROGRAM WITH UNITED INDUSTRIES CORP. TO INVESTIGATE AND ASSESS THE POTENTIAL FOR ELECTRICAL GENERATION BY THE WIND WITHIN THE BONNEVILLE POWER ADMINISTRATION, THE STATE OF WASHINGTON, AND IN PARTICULAR, CITY LIGHT'S GENERATION AREA. TO OBTAIN MORE DETAILED WIND ESTIMATES FOR THE COMPLEX TERRAIN OF THE UPPER SKAGIT RIVER VALLEY, THE WIND FIELD WAS NUMERICALLY ESTIMATED OVER AN AREA 24 KM BY 26 KM WITH A GRID SPACING OF 318 METERS, AND OVER AN AREA 6 KM BY 14 KM WITH A GRID SPACING OF 127 M. THE DETAILED NUMERICAL ESTIMATES SUGGEST A VERY HIGH WIND SPEED OVER MOUNTAIN RIDGES THAT LIE PERPENDICULAR TO THE PREVAILING BACKGROUND WIND DIRECTION, IN THE GORGE BETWEEN GORGE DAM AND DIABLO DAM AND IN THE VICINITY OF ROSS DAM. IN CONJUNCTION WITH THE NUMERICAL ESTIMATES AN ON-SITE SURVEY WAS CONDUCTED IN THE DIABLO DAM AND ROSS DAM AREAS TO EXAMINE THE EVERGREEN TREES FOR EFFECTS OF STRONG AND PERSISTENT WINDS. FLAGGED TREES WERE OBSERVED THROUGHOUT THE AREA OF THE UPPER SKAGIT RIVER VALLEY. THE WIND DIRECTIONS AND SPEEDS EXHIBITED BY THE TREE DEFORMATION GENERALLY AGREE WELL WITH THE RESULTS OF THE NUMERICAL ESTIMATES. A SITE SELECTION CRITERION WAS DEVELOPED, AND THE RESULTS OF THE NUMERICAL ESTIMATES AND ON-SITE SURVEYS WERE USED TO SELECT TWO SITES FOR FUTURE INSTALLATION OF WIND SPEED MEASURING EQUIPMENT.

1980-0532 VERMUELEN P E J
AN EXPERIMENTAL ANALYSIS OF WIND TURBINE WAKES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J3, 431-450.

EXPERIMENTAL DATA FROM VARIOUS STUDIES ARE USED TO DEVELOP A SEMI-EMPIRICAL CALCULATION METHOD FOR (THE DOWNSTREAM GROWTH AND DECAY OF) THE WAKE OF A SINGLE WIND TURBINE.

1980-0533 WALDON C A
WIND MACHINE FATIGUE ANALYSIS AND LIFE PREDICTION.
NTIS, APRIL 1980. 68 P.
RFP-3135/3533/80-19

WIND MACHINES ARE, INHERENTLY, GENERATORS OF FATIGUE. THIS IS TRUE FOR ALL TYPES AND SIZES. TESTING AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER HAS SHOWN THAT FATIGUE IS THE DOMINANT MODE OF STRUCTURAL FAILURE AND ITS PREDICTION IS THE HARDEST TASK FOR THE MANUFACTURER. THE OBJECTIVE OF THIS PAPER IS TO PRESENT A TECHNIQUE, DEVELOPED BY THE AUTHOR, FOR MEASURING FATIGUE AND PREDICTING FATIGUE LIFE FOR DIFFERENT WIND REGIMES. PRESENTED HEREIN ARE THE TECHNIQUES FOR LOCATING HIGH STRESS MEASURING POINTS, OBTAINING DATA, USING COMPUTER PROGRAMS FOR CALCULATING FATIGUE REDUCTION, AND FINALLY PREDICTING FATIGUE LIFE. THIS PAPER ALSO PRESENTS CURRENT WORK WHICH EXTENDS THE LIFE PREDICTION TECHNIQUE TO OTHER WIND REGIMES.

1980-0534 WALLACE V
CONVERSION OF ENERGY BY MEANS OF TETHERED WHIRLWINDS.
U.S. PATENT NO. 4,211,084, JULY 8, 1980. 5 P.

A DESCRIPTION IS GIVEN OF A PROCESS FOR TRANSFORMING HEAT CONTAINED IN SUPERDIABATIC AIR AT OR NEAR GROUND LEVEL INTO USEFUL WIND ENERGY IN THE FORM OF A TETHERED ARTIFICIAL WHIRLWIND WHICH COMPRISES (A) INITIATING A TETHERED WHIRLWIND COLUMN, (B) POWERING SAID WHIRLWIND COLUMN BY CAUSING SAID SUPERDIABATIC AIR TO FLOW INTO THE BASE OF THE WHIRLWIND COLUMN, AND (C) UTILIZING THE WIND ENERGY CONTAINED IN SAID WHIRLWIND COLUMN.

1980-0535 WALLENSTEIN A R
UTILITY COMPANY INTERFACE WITH ALTERNATE ENERGY SYSTEMS.
PUBLIC UTIL. FORTN. 105(13): 28-37, JUNE 19, 1980.

LEGAL ISSUES MAY ARISE WHEN UTILITIES--EITHER INVESTOR-OWNED OR PUBLICLY OWNED--SELL POWER TO OR PURCHASE POWER FROM CUSTOMERS WHO OWN SOLAR OR WIND ENERGY SYSTEMS, OR IF THE UTILITIES SELL, INSTALL, OR FINANCE SUCH SYSTEMS. ISSUES MAY ALSO ARISE WHEN A UTILITY COMPANY ATTEMPTS TO SELF-GENERATE POWER BY A CENTRALIZED ALTERNATE ENERGY SYSTEM. THESE INCLUDE RATE STRUCTURE, OWNERSHIP, COMPETITION, FINANCING ARRANGEMENTS, LAND USE, SAFETY, AND RELIABILITY. THE APPENDIX LISTS SOLAR RATES AND POLICIES OF 27 UTILITY COMPANY AND PUBLIC UTILITY COMMISSIONS. A COMPLETE SURVEY AND SUMMARY OF UTILITY SOLAR AND WIND PROJECTS CAN BE FOUND IN AN ELECTRIC POWER RESEARCH INSTITUTE REPORT, ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES, 1978 SURVEY, EPRI-ER-966-SR, MAY 1979.

1980-0536 WALTERS R E, MIGLIORE P G, WOLFE W P
VERTICAL AXIS WIND TURBINE RESEARCH AT WEST VIRGINIA UNIVERSITY.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 159-178.

SEVERAL ASPECTS OF VAWT DESIGN HAVE BEEN INVESTIGATED. INDOOR BLADE TESTING IS COMPLICATED BY AN INDUCED OUTFLOW, ANALOGOUS TO INDUCED DOWNWASH BEHIND A FINITE SPAN WING. ANALYTICAL METHODS ARE PRESENTED WHICH MODEL THE PHENOMENON AND FROM WHICH THE INDUCED VELOCITIES CAN BE CALCULATED, ALLOWING CORRECTIONS TO INDOOR TEST DATA. ALSO, A COMPUTER CODE HAS BEEN DEVELOPED TO CALCULATE TARE TORQUES CAUSED BY VARIOUS STRUCTURAL COMPONENTS OF VAWTS. CALCULATIONS ARE COMPARED WITH RESULTS FROM WVU TESTS WITH EXCELLENT AGREEMENT. THE CODE IS VALID FOR BOTH STRAIGHT AND CURVED BLADED VAWTS. DISCUSSION IS INCLUDED REGARDING SOME MECHANICAL AND AERODYNAMIC (BLADE) DESIGN FEATURES OF A CIRCULATION CONTROLLED VAWT.

1980-0537 WALTON J J, SHERMAN C A, KNOX J B
WIND-POWER SITE-SCREENING METHODOLOGY. FINAL REPORT.
NTIS, OCTOBER 1980. 66 P.
UCRL-52938

IN 1975, THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) REQUESTED THAT THE LAWRENCE LIVERMORE LABORATORY DEVELOP, VALIDATE, AND DEMONSTRATE A WIND-ENERGY SITE-SCREENING METHODOLOGY SUITABLE FOR DEFINING THE LOCATION, GEOGRAPHIC EXTENT, AND STRENGTH OF THE RESOURCE. THE APPROPRIATE CORE CAPABILITIES EXISTING AT THAT TIME, NAMELY PRINCIPAL-COMPONENTS ANALYSIS TECHNIQUES FOR CLASSIFYING TYPES OF REGIONAL FLOW FIELDS, AND A THREE-DIMENSIONAL DIAGNOSTIC FLOW MODEL WERE BLENDED INTO A RATIONALE FOR SCREENING WIND SITES IN THE PRESENCE OF COMPLEX TERRAIN. THIS REPORT DESCRIBES THE RELEVANT CONTRIBUTING CAPABILITIES, THE DEVELOPED SCREENING METHODOLOGY, THE PROSPECTORS' PRELIMINARY WIND-RESOURCE MAPS FOR THE ISLAND OF OAHU--GENERATED TO GUIDE THE DEVELOPMENT OF THE OBSERVATIONAL NETWORK, AND THE DATA BASE DEVELOPED FOR TESTING. IT ALSO ILLUSTRATES THE USE OF THE METHODOLOGY ON THE ISLAND OF OAHU AND DESCRIBES TWO ANNUAL ASSESSMENTS OF OAHU'S WIND-ENERGY POTENTIAL. THE METHODOLOGY, TESTED ON AN INDEPENDENT SET OF SEVERAL STATIONS WITHHELD FROM MODEL DEVELOPMENT, IS SHOWN AS ABLE TO IDENTIFY WIND-ENERGY RESOURCES CREATED BY TERRAIN ENHANCEMENT QUITE WELL, WITH THE ANNUAL MEAN WIND SPEED FOR THE INDEPENDENT DATA SET DEPICTED WITHIN ABOUT 1 M/S FOR A REASONABLE RANGE OF ANNUAL WIND SPEEDS.

1980-0538 WARDMAN J C, ADAMS J Y
SOLAR AND WIND ENERGIZED POWER GENERATION DEVICE.
U.S. PATENT NO. 4,222,241, SEPTEMBER 16, 1980.

THIS IS A SOLAR AND WIND ENERGIZED POWER GENERATION DEVICE COMPRISED OF A COLD FLUID RESERVOIR CONTAINING A FIRST BODY OF FLUID, A HOT FLUID RESERVOIR CONTAINING A SECOND BODY OF FLUID, AND A COVERING FOR THE TWO. THE COVER CONTAINS A HEAT TRAPPING PORTION WHICH CONFINES HEAT IN THE SECOND BODY OF FLUID AND AN AIRFOIL PORTION WHICH CAN DIRECT WIND PAST THE COLD FLUID RESERVOIR TO COOL THE FIRST BODY OF FLUID. THE HEAT EXCHANGE FOR CONVERTING THE THERMAL ENERGY RESIDING IN THE TEMPERATURE DIFFERENCE BETWEEN THE BODIES OF FLUID INTO MECHANICAL ENERGY IS CAPABLE OF PERFORMING USEFUL WORK.

1980-0539 WARMBRODT W, FRIEDMANN P
COUPLED ROTOR/TOWER AEROELASTIC ANALYSIS OF LARGE HORIZONTAL AXIS WIND TURBINES.
AIAA J. 18(9): 1118-1124, SEPTEMBER 1980.

FORMULATION OF THE GOVERNING NONLINEAR EQUATIONS OF MOTION FOR THE COUPLED ROTOR/TOWER DYNAMICS OF A LARGE TWO-BLADED HORIZONTAL AXIS WIND TURBINE (HAWT) IS PRESENTED. EACH BLADE HAS ELASTIC FLAP AND LEAD-LAG BENDING DEFLECTIONS. ROTOR/TOWER COUPLING IS ACCOMPLISHED BY ENFORCING DYNAMIC EQUILIBRIUM BETWEEN THE ROTOR AND THE TOP OF THE TOWER. THE NONLINEAR PERIODIC COEFFICIENT EQUATIONS OF MOTION ARE USED TO STUDY AEROELASTIC STABILITY AND RESPONSE OF THE NASA/DOE 100 KW MOD-0 WIND TURBINE. THE INFLUENCE OF THE FLEXIBLE TOWER AND NONLINEAR TERMS ON ROTOR STABILITY IS EXAMINED. ISOLATED ROTOR BLADE BEHAVIOR IS COMPARED TO THE COMPLETE COUPLED ROTOR/TOWER SYSTEM AND THE BASIC DIFFERENCES ARE IDENTIFIED. IT IS CONCLUDED THAT FOR HIGH TOWER STIFFNESS, THE AEROELASTIC RESPONSE IS PRIMARILY DEPENDENT ON ISOLATED ROTOR FORCING, YAW MECHANISM FLEXIBILITY, AND TOWER SHADOW EFFECT.

1980-0540 WEBER W
THE CONCEPTUAL DESIGN OF THE HIGH SPEED RATIO WIND ROTOR FOR THE 52 M DIAMETER HORIZONTAL AXIS VOITH WIND ENERGY CONVERTER.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E2, P. 239-251.

THE VOITH WIND TURBINE IS A DEVELOPMENT OF A HORIZONTAL AXIS TURBINE WITH TWO BLADES FULLY CONSTRUCTED IN COMPOSITE MATERIALS. IT IS DESIGNED EITHER TO SUPPLY ELECTRIC POWER WITH A 265 KW GENERATOR TO AN ELECTRIC GRID OR TO BE AN INDEPENDENT ELECTRICITY SOURCE FOR SPECIFIC TASKS IN HIGHLY DEVELOPED COUNTRIES AND IN REMOTE AREAS. FOR THIS REASON THE CONCEPTUAL PHILOSOPHY OF THIS WIND TURBINE GOES IN A SLIGHTLY DIFFERENT DIRECTION TO OTHER DEVELOPMENTS OF WIND ENERGY CONVERTERS ACTUALLY DESIGNED AND IN OPERATION, A SITUATION WHICH MAY BE EXPLAINED IN THE FIRST CHAPTER.

1980-0541 WEGLEY H L, RAMSDELL J V, ORGILL M M, DRAKE R L
SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, MARCH 1980. 90 P.
PNL-2521(REV.1)

THIS HANDBOOK WAS WRITTEN TO SERVE AS A SITING GUIDE FOR INDIVIDUALS WISHING TO INSTALL SMALL WIND ENERGY CONVERSION SYSTEMS (WECS); THAT IS, MACHINES HAVING A RATED CAPACITY OF LESS THAN 100 KILOWATTS. IT INCORPORATES HALF A CENTURY OF SITING EXPERIENCE GAINED BY WECS OWNERS AND MANUFACTURERS, AS WELL AS RECENTLY DEVELOPED SITING TECHNIQUES. THE USER NEEDS NO TECHNICAL BACKGROUND IN METEOROLOGY OR ENGINEERING TO UNDERSTAND AND APPLY THE SITING PRINCIPLES DISCUSSED; HE NEEDS ONLY A KNOWLEDGE OF BASIC ARITHMETIC AND THE ABILITY TO UNDERSTAND SIMPLE GRAPHS AND TABLES. BY PROPERLY USING THE SITING TECHNIQUES, AN OWNER CAN SELECT A SITE THAT WILL YIELD THE MOST POWER AT THE LEAST INSTALLATION COST, THE LEAST MAINTENANCE COST, AND THE LEAST RISK OF DAMAGE OR ACCIDENTAL INJURY.

1980-0542 WEIS P
PROCEEDINGS: PANEL ON INFORMATION DISSEMINATION FOR WIND ENERGY.
NTIS, APRIL 1980. 86 P.
PANEL ON INFORMATION DISSEMINATION FOR WIND ENERGY, ALBUQUERQUE, N.M., AUGUST 2-3, 1979.
SERI/TP-732-343

THIS MEETING WAS CALLED AS PART OF A MULTI-YEAR PLANNING EFFORT. GROUPS INVOLVED IN THE PRODUCTION AND/OR DISSEMINATION OF INFORMATION ON WIND ENERGY WERE INVITED TO DESCRIBE THEIR CURRENT ACTIVITIES AND THEIR PERCEPTIONS OF THE NEEDS OF THE 80'S IN THIS AREA. PARTICIPANTS EXCHANGED COPIES OF MATERIALS THEY DISTRIBUTE REGULARLY AND DISCUSSED FREQUENTLY ASKED QUESTIONS.

1980-0543 WEISBRICH A L
ALTERNATIVE ENERGY FOR DOMESTIC HOT WATER: WIND OR SOLAR?
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM/WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1834-1849.

A COMPARATIVE PARAMETRIC ANALYSIS ON ENERGY COST IS PRESENTED FOR WIND ENERGY CONVERSION SYSTEMS (WECS) AND SOLAR COLLECTOR SYSTEMS DESIGNED FOR HEATING WATER.

1980-0544 WEISBRICH A L, DUFFY R E
DEVELOPMENT STATUS OF THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) FOR WIND ENERGY CONVERSION.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 55-65.
SERI/CP-635-938

RECENT MODEL WIND TUNNEL TESTS AT RENSSELAER POLYTECHNIC INSTITUTE UNDER NEW YORK STATE ERDA CONTRACT OF THE MOST PRIMITIVE TARP CONFIGURATION WITH AN INSTALLED CONVENTIONAL HORIZONTAL AXIS WIND TURBINE ROTOR HAVE DEMONSTRATED POWER OUTPUT AMPLIFICATION FOR THAT ROTOR IN EXCESS OF 4.5 TIMES ITS MAXIMUM IDENTICAL FREE STREAM OUTPUT. THE TARP FURTHERMORE REPRESENTS A UNIQUE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN IN THAT ITS STRUCTURE CAN SERVE A MULTI-FUNCTIONAL (E.G., HOUSING) AND HENCE IMPORTANT, RESOURCE CONSERVING AND ECONOMIZING ROLE.

1980-0545 WENDELL L L
FEDERAL WIND ENERGY PROGRAM FOR WIND RESOURCE ASSESSMENT AND SITING: AN OVERVIEW.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 255-261.
CONF-800995

IN THIS OVERVIEW, THE TECHNICAL PROGRESS IN WIND RESOURCE ASSESSMENT AND SITING IS HIGHLIGHTED FROM THE WORK OF THE PACIFIC NORTHWEST LABORATORY (PNL) AND ITS SUBCONTRACTORS. ONE OF THE MAJOR EFFORTS IN THE PROGRAM IS THE COMPLETION OF THE REGIONAL WIND ENERGY ASSESSMENTS COVERING THE UNITED STATES AND ITS TERRITORIES. ALSO, METHODS FOR SELECTING THE SPECIFIC LOCATIONS OF WIND TURBINES HAVE BEEN DEVELOPED FOR BOTH LARGE AND SMALL MACHINES.

1980-0546 WENDELL L L
KEY ISSUES ASSOCIATED WITH WIND CHARACTERISTICS AND WIND ENERGY SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 245-248.
CONF-791097

THE FOUR MAJOR TASK AREAS IN THE WIND CHARACTERISTICS PROGRAM ARE: RESOURCE ASSESSMENT, SITING METHODOLOGIES, DESIGN AND PERFORMANCE EVALUATION, AND WIND CHARACTERISTICS FOR OPERATIONS. THESE KEY ISSUES ARE PROPOSED FOR DISCUSSION IN THIS PAPER.

1980-0547 WENDELL L L
OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 209-244.
CONF-791097

THE PACIFIC NORTHWEST LABORATORY (PNL) HAS BEEN RESPONSIBLE FOR THE TECHNICAL MANAGEMENT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE FEDERAL WIND PROGRAM SINCE APRIL OF 1976. IN THIS OVERVIEW, THE TECHNICAL PROGRESS IN WIND CHARACTERISTICS WILL BE HIGHLIGHTED FROM THE WORK OF PNL AND SUBCONTRACTOR CONTRIBUTORS.

1980-0548 WENDELL L L
WORKING GROUP REPORT ON WIND CHARACTERISTICS AND SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 513-518.
CONF-791097

1980-0549 WENDELL L L
WORKSHOP SUMMARY. WIND CHARACTERISTICS AND WIND ENERGY SITING 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 581-588.
CONF-791097

1980-0550 WENDELL L L, BARCHET W R, CONNELL J R, MILLER A H, PENNELL W T
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, JULY 1978-SEPTEMBER 1979.
NTIS, MAY 1980. 209 P.
PNL-3211

AS A SERVICE ELEMENT WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN: THE DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS); ENERGY PROGRAM PLANNING; SELECTING SITES FOR WECS INSTALLATION; AND THE OPERATION OF WECS. TO EFFECTIVELY PRODUCE THE INFORMATION NEEDED IN THESE FOUR CATEGORIES, THE WCPE, FOR WHICH THE PACIFIC NORTHWEST LABORATORY (PNL) HAS THE RESPONSIBILITY FOR MANAGEMENT AND TECHNICAL ASSISTANCE, HAS BEEN DIVIDED INTO FOUR TECHNICAL PROGRAM AREAS. DURING THIS REPORTING PERIOD PNL WAS ALSO ASSIGNED THE MANAGEMENT RESPONSIBILITY FOR THE DATA COLLECTION AT THE US DEPARTMENT OF ENERGY'S (DOE'S) CANDIDATE SITES, AS WELL AS THE TASK OF PROVIDING TECHNICAL ASSISTANCE TO DOE EVALUATION AND SITE SELECTION PANELS FOR NEW CANDIDATE SITES.

1980-0551 WENTWORTH M C
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1980 SURVEY.
NTIS, DECEMBER 1980. 283 P.
EPRI-AP-1713-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS OF 839 PROJECTS BEING CONDUCTED BY 236 UTILITY COMPANIES ARE GIVEN. ALSO INCLUDED ARE AN INDEX OF PROJECTS BY CATEGORY, A STATISTICAL SUMMARY, A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATE, A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS, AND A LIST OF PROJECTS HAVING MULTIPLE UTILITY PARTICIPANTS. PROJECT CATEGORIES INCLUDE SOLAR HEATING AND COOLING OF BUILDINGS, WIND ENERGY CONVERSION, SOLAR-THERMAL ELECTRIC POWER, PHOTOVOLTAICS, BIOMASS CONVERSION, PROCESS

HEAT, AND OCEAN ENERGY CONVERSION.

1980-0552 WENTZ W H, SNYDER M H, CALHOUN J T
FEASIBILITY STUDIES OF SPOILER AND AILERON CONTROL SYSTEMS FOR LARGE HORIZONTAL-AXIS WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1138-1142.

STUDIES HAVE BEEN CONDUCTED TO DETERMINE THE FEASIBILITY OF USING AILERON OR SPOILER CONTROLS AS ALTERNATES TO PITCH CONTROL FOR LARGE HORIZONTAL AXIS WIND TURBINES. THE NASA MOD-0 MACHINE WAS USED AS THE BASIS FOR THIS STUDY. RESULTS OF THE STUDY SHOW THAT EITHER AILERONS OR SPOILERS CAN PROVIDE CONTROL NECESSARY TO LIMIT TURBINE POWER IN HIGH WIND CONDITIONS. AN AILERON SYSTEM IS RECOMMENDED FOR THE PRESENT APPLICATION, BASED UPON THE ABILITY OF AILERONS TO PROVIDE SELF-STARTING AND ADDED POWER AT LOW WIND SPEED CONDITIONS. THE PRELIMINARY DESIGN STUDY INCLUDING AILERON COMPONENT SIZING AND MAXIMUM HINGE MOMENTS WAS COMPLETED AND AILERONS WILL BE FABRICATED FOR TESTING ON THE MOD-0 TURBINE.

1980-0553 WENTZ W H, SNYDER M H, CALHOUN J T
FEASIBILITY STUDY OF AILERON AND SPOILER CONTROL SYSTEMS FOR LARGE HORIZONTAL AXIS WIND TURBINES.
NTIS, MAY 1980. 69 P.
NASA-CR-159856, DOE/NASA/3277-1, N80-27803/9

THE FEASIBILITY OF USING AILERON OR SPOILER CONTROLS AS ALTERNATES TO PITCH CONTROL FOR LARGE HORIZONTAL AXIS WIND TURBINES WAS STUDIED. THE NASA MOD-0 100 KW MACHINE WAS USED AS THE BASIS FOR THE STUDY. SPECIFIC PERFORMANCE STUDIES WERE CONDUCTED FOR 20% CHORD AILERONS OVER THE OUTBOARD 30% SPAN, AND FOR 10% CHORD SPOILERS OVER THE SAME PORTION OF THE SPAN. BOTH CONTROL SYSTEMS UTILIZED CONTROL DEFLECTIONS UP TO 60 DEGREES. RESULTS OF THE STUDY SHOW THAT EITHER AILERONS OR SPOILERS CAN PROVIDE THE CONTROL NECESSARY TO LIMIT TURBINE POWER IN HIGH WIND CONDITIONS. THE AILERON SYSTEM, AS DESIGNED, PROVIDES OVERSPEED PROTECTION AT HURRICANE WIND SPEEDS, LOW WIND SPEED STARTING TORQUE OF 778 N-M (574 FT-LB) AT 3.6 M/S, AND A 1.3 TO 1.5% INCREASE IN ANNUAL ENERGY COMPARED TO A FIXED PITCH ROTOR. THE AILERON CONTROL SYSTEM PRELIMINARY DESIGN STUDY INCLUDES AILERON LOADS ANALYSIS AND THE DESIGN OF A FAILSAFE FLYWEIGHT ACTUATOR FOR OVERSPEED PROTECTION IN THE EVENT OF A HYDRAULIC SYSTEM FAILURE.

1980-0554 WHAT PRICE WIND.
ENERGY MANAGER 3(6): 44-46, 53, OCTOBER 1980.

A COST BREAKDOWN OF WIND-POWERED SYSTEMS AND AN ASSESSMENT OF THE VALUE OF WIND-GENERATED POWER IS DEVELOPED USING CURRENT WINDMILL TECHNOLOGY. THE MOD 2 WINDMILL IS ECONOMICALLY FEASIBLE FOR UNITED KINGDOM SITES HAVING 12 MILE-PER-HOUR WIND SPEEDS IF PRODUCTION AND DISCOUNT RATES AND REAL FUEL PRICE INCREASES DEVELOP AS EXPECTED.

1980-0555 WHITTLE G E, BOSSANYI E A, MACLEAN C, DUNN P D, LIPMAN N H, MUSGROVE P J
A SIMULATION MODEL OF AN ELECTRICITY GENERATING SYSTEM INCORPORATING WIND TURBINE PLANT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L2, P. 545-554.

AN HOUR-BY-HOUR SIMULATION MODEL OF AN ELECTRICITY GENERATING SYSTEM INCORPORATING WIND TURBINE PLANT IS DESCRIBED. IT IS FORMULATED IN A WAY WHICH MAKES IT APPROPRIATE TO THE CENTRAL ELECTRICITY GENERATING BOARD GRID SYSTEM. WIND PLANT RATINGS OF UP TO 25 GW (60% OF MAXIMUM SYSTEM DEMAND) ARE CONSIDERED. THE EFFECT OF THE FLUCTUATING WIND POWER ON THE OUTPUT OF THE CONVENTIONAL PLANT IS IDENTIFIED AS WELL AS THE AMOUNT OF WIND ENERGY LOST DUE TO SHORT TERM EXCESSES OF WIND POWER. THE USE OF STEAM PLANT SPINNING RESERVE AND GAS TURBINE POWER TO COMPENSATE FOR UNCERTAINTIES IN WIND POWER AVAILABILITY IS STUDIED. ASSUMPTIONS ABOUT RELATIVE FUEL COSTS ARE MADE TO DETERMINE AN OPTIMUM SPINNING RESERVE, AND TO CALCULATE A FUEL COST PENALTY ON THE VALUE OF FUEL SAVED BY THE WIND ENERGY SYSTEM.

1980-0556 WILLIAMS R A
AN UPDATE ON ACTIVITIES AT ROCKY FLATS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 9-38.
CONF-791097

THE ROCKY FLATS WIND SYSTEMS PROGRAM IS DESCRIBED. THE PROGRAM OBJECTIVES ARE TO 1) REDUCE COSTS, 2) IMPROVE RELIABILITY AND SAFETY, 3) PROMOTE THE INDUSTRIAL INFRASTRUCTURE, 4) IDENTIFY AND ELIMINATE INSTITUTIONAL BARRIERS, AND 5) INCREASE PUBLIC AWARENESS.

1980-0557 WILSON R E
WIND-TURBINE AERODYNAMICS.
J. IND. AERODYN. 5(3-4): 357-372, MAY 1980.

THE AERODYNAMICS OF WIND TURBINES IS REVIEWED STARTING WITH EFFECTS OF LIFT AND DRAG ON TRANSLATING DEVICES AND PROCEEDING THROUGH THE PERFORMANCE AERODYNAMICS OF THE HORIZONTAL-AXIS AND VERTICAL-AXIS MACHINES CURRENTLY IN SERVICE. HORIZONTAL-AXIS ROTOR AERODYNAMICS IS OUTLINED AND THE PERFORMANCE LIMITS ARE PRESENTED ALONG WITH KEY ASSUMPTIONS AND PROBLEM AREAS. THE DARRIEUS ROTOR MULTIPLE STREAMTUBE ANALYSIS IS DEVELOPED AND COMPARED WITH FIXED AND FREE WAKE ANALYSES FOR AN IDEALIZED CASE.

1980-0558 WIND ENERGY EQUIPMENT MANUFACTURERS.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, NOVEMBER 1980. 9 P.
SEIDB INF. MOD. 10201

MANUFACTURERS OF WIND ENERGY EQUIPMENT ARE LISTED IN A CLASSIFIED INDEX, BY PRODUCT CATEGORY, AND ALPHABETICALLY IN A MANUFACTURERS INDEX.

1980-0559 WIND ENERGY IN AGRICULTURE: QUICK BIBLIOGRAPHY SERIES. JANUARY 1970 - DECEMBER 1979. PART I. 48 CITATIONS. PART II. 122 CITATIONS.
BELTSVILLE, MARYLAND, NATIONAL AGRICULTURAL LIBRARY, 1980. 35 P.

BIBLIOGRAPHIES IN THIS SERIES ARE DERIVED FROM COMPUTERIZED ON-LINE SEARCHES OF SELECTED DATA BASES. TIMELINESS OF THE TOPIC AND EVIDENCE OF EXTENSIVE INTEREST ARE SELECTION CRITERIA. COMPREHENSIVE SUBJECT COVERAGE IS NOT AN OBJECTIVE; HOWEVER, THE CITATIONS PROVIDE A SUBSTANTIAL RECENT RESOURCE FOR INVESTIGATION OF THE SUBJECT. EACH BIBLIOGRAPHY IS UPDATED OR DROPPED AFTER SIX MONTHS.

1980-0560 WIND ENERGY INTEGRATION STUDY.
NTIS, AUGUST 1980. 77 P.

DOE/BP/10552-17

THE OVERALL OBJECTIVE OF THIS STUDY WAS TO INVESTIGATE THE FEASIBILITY OF INTEGRATING A SIMULATED 3000 MEGAWATT (MW) WIND ENERGY CONVERSION NETWORK INTO THE PACIFIC NORTHWEST HYDRO-THERMAL GENERATION SYSTEM. THE SPECIFIC PURPOSE WAS TO IDENTIFY THOSE SIGNIFICANT EFFECTS WHICH REQUIRE PLANNING CONSIDERATION AND FURTHER STUDY PRIOR TO EXTENSIVE DEVELOPMENT OF WIND ENERGY. THE FOLLOWING AREAS WERE IDENTIFIED FOR PRELIMINARY ANALYSIS: SEASONAL POWER PLANNING (REGULATION); SECONDARY ENERGY (SURPLUS); ENERGY RESERVE PLANNING; PEAK RESERVES; AND HOURLY PLANNING.

1980-0561 WIND ENERGY SYSTEMS: PROGRAM SUMMARY.
NTIS, MAY 1980. 237 P.
DOE/CS/20097-01

THE FEDERAL WIND ENERGY PROGRAM (FWEP) WAS INITIATED TO PROVIDE FOCUS, DIRECTION AND FUNDS FOR THE DEVELOPMENT OF WIND POWER. EACH YEAR A SUMMARY IS PREPARED TO PROVIDE THE AMERICAN PUBLIC WITH AN OVERVIEW OF GOVERNMENT SPONSORED ACTIVITIES IN THE FWEP. THIS PROGRAM SUMMARY DESCRIBES EACH OF THE DEPARTMENT OF ENERGY'S (DOE) CURRENT WIND ENERGY PROJECTS INITIATED OR RENEWED DURING FY 1979 (OCTOBER 1, 1978 THROUGH SEPTEMBER 30, 1979) AND REFLECTS THEIR STATUS AS OF APRIL 30, 1980. THE SUMMARY HIGHLIGHTS ON-GOING RESEARCH, DEVELOPMENT AND DEMONSTRATION EFFORTS AND SERVES AS A RECORD OF PROGRESS TOWARDS THE PROGRAM OBJECTIVES. IT ALSO PROVIDES: THE PROGRAM'S GENERAL MANAGEMENT STRUCTURE; REVIEW OF LAST YEAR'S ACHIEVEMENTS; FORECAST OF EXPECTED FUTURE TRENDS; DOCUMENTATION OF THE PROJECTS CONDUCTED DURING FY 1979; AND LIST OF KEY WIND ENERGY PUBLICATIONS.

1980-0562 WIND ENERGY SYSTEMS. QUARTERLY REVIEW, APRIL 1, 1980 - JUNE 30, 1980.
NTIS, NOVEMBER 1980. 215 P.
SERI/PR-635-770

THE QUARTERLY REVIEW FOR THE WIND ENERGY SYSTEMS (WES) PROGRAM IS PREPARED BY THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) AS AN OVERVIEW OF THE PROGRAM EFFORTS. THE REVIEW PRESENTS THE OBJECTIVES, ACCOMPLISHMENTS, PLANNED ACTIVITIES, AND OUTPUTS OF EACH TASK IN THE WES PROGRAM.

1980-0563 WIND ENERGY TASK FORCE. FINAL REPORT.
SALEM, OREGON, OREGON DEPARTMENT OF ENERGY, 1980. 153 P.
NP-25026

RECENT ESTIMATES MADE BY BATTELLE PACIFIC NORTHWEST LABORATORIES INDICATE THAT ABOUT 4.7% OR 4500 SQUARE MILES OF OREGON HAS SUFFICIENT WIND ENERGY DENSITY FOR THE SITING OF WIND TURBINE GENERATORS (WTGS). IF THREE 3 MEGAWATT (MW) WTGS WERE SITED IN EACH SQUARE MILE, THE TOTAL GROSS INSTALLED NAMEPLATE CAPACITY WOULD BE ABOUT 40,500 MW. THIS DRAFT PRESENTS THE WORK OF THE WIND ENERGY TASK FORCE IN ITS INVESTIGATION OF WIND ENERGY IN OREGON. WHILE THE GROSS POTENTIAL ABOVE IS SUBSTANTIAL, NUMEROUS CONSTRAINTS--RANGING FROM THE COST AND POTENTIAL AVAILABILITY OF COMMERCIAL HARDWARE TO SITING AND ZONING ISSUES--WERE EXAMINED BY THE TASK FORCE. THE RESULTING NET POTENTIAL FOR WIND ENERGY SYSTEMS/NAMEPLACE CAPACITY BY THE YEAR 2000 IS APPROXIMATELY 1400 MW.

1980-0564 WIND GENERATES EXCITEMENT.
N. ENGL. BUS. 2(6): 34-36, APRIL 1, 1980.

WIND TURBINES DESIGNED BY KAMAN AEROSPACE CORPORATION AND UNITED TECHNOLOGIES CORPORATION'S HAMILTON STANDARD DIVISION AND RESEARCH CENTER ARE DESCRIBED.

1980-0565 WIND-HYDROELECTRIC IN MEDICINE BOW.
WIND POWER DIG. NO. 20: 20-29, SUMMER 1980.

1980-0566 WIND POWER: SLOW OUT OF THE SOLAR GATE OF THE 70'S... PICKING UP SPEED IN THE BACKSTRETCH OF THE 80'S.
ALTERN. SOURCES ENERGY NO. 46: 8-10, NOVEMBER/DECEMBER 1980.

THIS ARTICLE IS A REPORT ON THE AMERICAN WIND ENERGY ASSOCIATION CONFERENCE IN PITTSBURGH IN JUNE 1980.

1980-0567 WIND RESOURCE OF THE AREA SURROUNDING MEDICINE BOW, WYOMING.
NTIS, AUGUST 1980. 39 P.
PB81-109621

FIVE HIGH-WIND SITES IN THE VICINITY OF MEDICINE BOW, WYOMING, WERE INSTRUMENTED TO RECORD WIND RESOURCE DATA, WITH THE ULTIMATE GOAL OF INSTALLING A LARGE NUMBER OF WTG'S (WIND TURBINE GENERATORS), I.E., ESTABLISHING A WINDFARM. INTEGRATION OF WINDPOWER AND HYDROELECTRIC POWER WOULD BE ACCOMPLISHED BY TYING THE WINDFARM OUTPUT INTO AN EXISTING HYDROPOWER ELECTRICAL GRID. THIS REPORT PRESENTS DATA COLLECTED FROM FEBRUARY 1, 1978, THROUGH OCTOBER 31, 1979. THE DATA IS PRESENTED IN THE FORM OF PLOTS OF MONTHLY MEAN WINDSPEED, DURATION WINDSPEED EXCEEDED, WINDSPEED FREQUENCY, AND POLAR WIND ROSES.

1980-0568 WIND/WATER ENERGY CONVERTER: A PROPOSED DEVICE THAT COULD BE DRIVEN BY WIND OR WATER CURRENTS WOULD GENERATE ELECTRICITY TO OPERATE PUMPS.
NTIS, 1980. 1 P.
PB80-971940

1980-0569 WIND-WHEEL ELECTRIC-POWER GENERATOR: A ROTOR MOUNTED IN A SPECIAL HOUSING UTILIZES WIND CURRENTS TO GENERATE ELECTRIC POWERS.
NTIS, 1980. 1 P.
PB80-974480, PB80-925303

THIS TECHNICAL NOTE IS NOT AVAILABLE SEPARATELY. IT MUST BE ORDERED AS PB80-925393 (ENERGY).

1980-0570 WINDHEIM R, NEUMANN R
WIND ENERGY R&D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY AND CURRENT WIND ENERGY PROJECTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 249-268.
CONF-791097

THE WIND ENERGY R&D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY, PART OF THE GOVERNMENT'S PROGRAM FOR ENERGY RESEARCH AND TECHNOLOGIES, FOLLOWS THE OBJECTIVE TO DEVELOP RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS) AND TO BRING ABOUT THE COMMERCIALIZATION OF WIND POWER. TO ACHIEVE THIS OBJECTIVE MORE THAN 40 PROJECTS ARE SUPPORTED BY THE PROGRAM. THESE PROJECTS COVER THE FOLLOWING PROGRAM ELEMENTS: ADAPTION OF SMALL WECS WITH HORIZONTAL OR VERTICAL AXIS FOR SPECIAL APPLICATIONS, AND ELECTRICITY GENERATION BY

LARGE SCALE WECS FOR THE NATIONAL GRID, ESPECIALLY THE GROWIAN PROGRAM.

1980-0571 WORSTELL M H
AERODYNAMIC PERFORMANCE OF THE 17-M-DIAMETER DARRIEUS WIND TURBINE IN THE THREE-BLADED CONFIGURATION: AN ADDENDUM.
NTIS, FEBRUARY 1980. 59 P.
SAND-79-1753

THE US DEPARTMENT OF ENERGY (DOE)/SANDIA 17-M WIND TURBINE HAS BEEN TESTED IN THE THREE-BLADED CONFIGURATION AT FIVE ROTATIONAL SPEEDS. THESE DATA ARE PRESENTED ALONG WITH SOME FUNDAMENTAL COMPARISONS TO THE EARLIER TWO-BLADED RESULTS. ALSO INCLUDED IS THE THEORETICAL OUTPUT OF THE THREE-BLADED 17-M WIND TURBINE AT TWO SELECTED ROTATIONAL SPEEDS.

1980-0572 WORSTELL M H
PERFORMANCE OF THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 149-155.

THE DOE/SANDIA 17-M WIND TURBINE HAS BEEN IN OPERATION SINCE MARCH 1977. THIS MACHINE IS FUNDED BY THE DEPARTMENT OF ENERGY TO PROVIDE FIELD TEST DATA OF A LARGE DARRIEUS WIND TURBINE TO BE USED IN CONJUNCTION WITH ONGOING ANALYTICAL STUDIES. THE 17-M TURBINE HAS ALSO PROVIDED VALUABLE EXPERIENCE FROM BOTH CONSTRUCTION AND OPERATIONAL STANDPOINTS. THIS PAPER WILL ADDRESS TURBINE PERFORMANCE.

1980-0573 WRIGHT P, STEVENS B
ALLISON'S WIND ENGINE: SPIRALED BLADES FOR HIGH EFFICIENCY.
POP. SCI. 216(3): 64-65, 68, MARCH 1980.

A HORIZONTAL AXIS WIND TURBINE WITH MULTIPLE SPIRAL-ARRANGED BLADES DEVELOPED BY WILLIAM ALLISON IS DESCRIBED.

1980-0574 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: OUTLINE OF RECENT DEVELOPMENTS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 9-18.
SERI/CP-635-1601

AN OUTLINE OF RECENT DEVELOPMENTS ON TORNADO-TYPE WIND ENERGY SYSTEM (TWES) IS PRESENTED. SMALL MODELS UP TO 1.1 M (42 INCHES) IN TOWER HEIGHT AND 0.1 M (4 INCHES) IN TURBINE DIAMETER WERE TESTED IN THE GRUMMAN RESEARCH TUNNEL, FOLLOWED BY A SHORT TEST IN THE NASA LANGLEY V/STOL TUNNEL. THE MODELS TESTED WERE CONSTRUCTED WITH FIXED OMNIDIRECTIONAL PERIPHERAL VANES. DATA OBTAINED FROM THE GRUMMAN TUNNEL SHOW A BEST POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA OF AROUND 14%, WHILE THE LANGLEY TEST SHOWS A MAXIMUM VALUE OF AROUND 10%. HOWEVER, DUE TO THE SHORT DURATION (1 1/2 DAYS) OF THE LANGLEY TEST, WE WERE NOT ABLE TO BRING OUT THE BEST PERFORMANCE OF THE MODEL TESTED. A COST ANALYSIS BASED ON A 10% POWER COEFFICIENT WAS CARRIED OUT. RESULTS SHOW THAT FOR MASS PRODUCED FULL-SCALE UNITS THE CAPITAL COST WOULD BE LESS THAN $700 PER RATED KW AND THE ENERGY COST WOULD BE BELOW 4 CENTS PER KWH. THUS, IT IS CONCLUDED THAT THE TWES HAS A GOOD COMMERCIAL POTENTIAL, REINFORCING THE CONCLUSIONS WE HAVE REACHED IN PREVIOUS COST ANALYSES.

1979-0130 AKINS R E
WIND CHARACTERISTICS FOR FIELD TESTING OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, NOVEMBER 1979. 53 P.
SAND-78-1563

TECHNIQUES ARE PRESENTED TO DETERMINE PLACEMENT OF INSTRUMENTATION TO BE USED IN MEASUREMENT OF WIND CHARACTERISTICS FOR FIELD TESTING OF WIND ENERGY CONVERSION SYSTEMS (WECS). POTENTIAL ERRORS IN THE MEASUREMENT OF A REFERENCE WIND VELOCITY AS A RESULT OF PHYSICAL SEPARATION BETWEEN AN ANEMOMETER AND A WECS AND INTERFERENCE BETWEEN THE WECS AND THE REFERENCE ANEMOMETER ARE OUTLINED. METHODS OF CORRECTING ERRORS CAUSED BY BOTH OF THESE SOURCES ARE DEVELOPED.

1979-0131 ALTSEIMER J H, BLAUNSTEIN R P
STATUS REVIEW OF THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY PROGRAM.
NTIS, 1979. 6 P.
LA-UR-79-1369, CONF-790541-4

AN INTERIM STATUS REPORT IS GIVEN ON THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY (TASE) PROGRAM SPONSORED BY THE OFFICE OF ENVIRONMENT OF THE DEPARTMENT OF ENERGY (DOE). A NUMBER OF EMERGING SOLAR TECHNOLOGIES AND SELECTED APPLICATIONS ARE BEING ASSESSED FOR THE ENVIRONMENTAL, INSTITUTIONAL, AND SOCIAL IMPACTS RESULTING FROM THE LARGE-SCALE DEPLOYMENT OF DECENTRALIZED SOLAR TECHNOLOGIES. TWO NATIONAL ENERGY SCENARIOS FOR THE YEAR 2000 ARE BEING USED, ONE PREDICTING 6 QUADS OF SOLAR AND THE OTHER 14.2 QUADS. A FEW RESULTS OF A PRELIMINARY STUDY OF THE SYSTEM CHARACTERIZATION DATA ARE GIVEN.

1979-0132 ANDERSEN P S, KRABBE U, LUNDSAGER P, PETERSEN H
BASIC MATERIALS FOR THE CALCULATION OF THE WIND TURBINE POWER.
ROSKILDE, DENMARK, RISO NATIONAL LABORATORY, FEBRUARY 1979. (IN DANISH)
RISO-M-2153

THIS REPORT TREATS ELEMENTS OF BASIC WIND TURBINE THEORY. THE SUBJECTS ARE: AERODYNAMICS OF THE HORIZONTAL SHAFT ROTOR INCLUDING COMPUTATION OF LOADS AND EXPECTED POWER PRODUCTION; STRUCTURAL STATIC AND DYNAMIC ANALYSIS OF THE ROTOR BLADES; AND THE USE OF ASYNCHRONOUS MACHINES AS GENERATORS FOR WIND-MILLS AND VARIOUS POSSIBLITIES FOR THE CONTROL OF THE GENERATOR. THE THEORETICAL TREATMENT IS ILLUSTRATED WITH EXAMPLES TO FACILITATE APPLICATION OF THEORY.

1979-0133 MOMENT R L
NEW DEVELOPMENTS IN SMALL WIND ENERGY CONVERSION SYSTEMS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 220-232.
040 CONF-7905109

THE GOAL OF THE ROCKY FLATS WIND ENERGY PROGRAM, SPONSORED BY THE DEPARTMENT OF ENERGY'S WIND SYSTEMS BRANCH, IS TO STIMULATE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY PRIVATE INDUSTRY AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. SPECIFIC OBJECTIVES ARE REDUCING WIND GENERATED ENERGY COSTS THROUGH LOWERING HARDWARE CAPITAL INVESTMENT REQUIREMENTS AND IMPROVING SYSTEM RELIABILITY. ONE APPROACH TO MEETING THESE OBJECTIVES HAS BEEN FUNDING AND MANAGING THE DEVELOPMENT OF A NEW GENERATION OF SWECS. DURING 1977 AND 1978, NINE CONTRACTS WERE AWARDED FOR THE DESIGN AND CONSTRUCTION OF PROTOTYPE SYSTEMS IN 1-2 KW, 8 KW, AND 40 KW SIZE RANGES. THIS REPORT WILL UPDATE STATUS ON THESE EFFORTS AND OFFER A GLANCE AT ADDITIONAL SYSTEMS DEVELOPMENT PROJECTS JUST GETTING UNDERWAY.

1979-0134 BPA SITE SELECTED FOR MOD-2 CLUSTER.
WIND ENERGY REP.: 1, 3-4, 12, OCTOBER 1979.

THE BONNEVILLE POWER ADMINISTRATION (BPA) HAS BEEN SELECTED TO FIELD TEST THREE BOEING MOD-2 2.5-MEGAWATT WIND TURBINES AT A SITE ALONG THE COLUMBIA RIVER GORGE IN SOUTHERN WASHINGTON STATE.

1979-0135 BAIN D
SMALL-SCALE WIND AND THE PUBLIC UTILITY REGULATORY POLICIES ACT.
WIND POWER DIG. NO. 17: 5-6, FALL 1979.

THE ARTICLE IS AN EXCERPT OF TESTIMONY PRESENTED AT FEDERAL ENERGY REGULATORY COMMISSION HEARINGS IN CALIFORNIA. THE HEARINGS DEALT WITH THE FINAL DRAFT OF RULES WHICH WILL GOVERN THE PUBLIC UTILITY REGULATORY POLICIES ACT (PURPA). MANY SECTIONS OF THIS LEGISLATION ARE CONCERNED WITH THE RELATIONSHIP BETWEEN UTILITIES AND INDIVIDUAL POWER PRODUCERS, WHICH CAN AFFECT WIND POWER PRODUCERS. THE DRAFT PROPOSALS SUGGEST THAT SMALL POWER PLANTS WITH A RATED CAPACITY OF LESS THAN 10 KW BE EXEMPT FROM PURPA REGULATIONS WHICH REQUIRE UTILITIES TO ALLOW HOOKUPS AND TO ESTABLISH FORMAL RATE STRUCTURES BETWEEN THE INDIVIDUAL CONSUMER AND THE UTILITY.

1979-0136 BAKER R W
WINDPOWER POTENTIAL OF THE NORTHWEST REGION.
POWER ENG. 83(6): 64-67, JUNE 1979.

RESULTS OF A SIMULATED WIND TURBINE GENERATOR NETWORK STUDY INDICATE THAT SUFFICIENT WIND IS AVAILABLE IN THE BONNEVILLE POWER ADMINISTRATION SERVICE AREA TO SUCCESSFULLY OPERATE LARGE WIND TURBINE GENERATOR (WTG) UNITS IN THE 2 MW-4 RANGE. THE MONTHLY ZERO OUTPUT TIME VARIED FROM 0.1% TO 7.4% FOR THE NETWORK AND AVERAGED FROM 10.0% TO 78.0% AT INDIVIDUAL STATIONS. THE LONGEST CONTINUOUS NETWORK OUTAGE FOR A SINGLE DAY WAS 8 HOURS AND THE AVERAGE DOWNTIME, WHEN THERE WAS ZERO NETWORK POWER OUTPUT, WAS 3.5 HR. IF THIS LACK OF WIND COULD BE CONSTRUED AS A FORCED OUTAGE, THE BASE LOAD CAPABILITY OF THE WTG NETWORK WOULD NOT BE ZERO. DISTRIBUTING THE TURBINES OVER A LARGER AREA WOULD MOST LIKELY FURTHER REDUCE THE CHANCE OF ZERO NETWORK OUTPUT.

1979-0137 BERKOVITCH I
DESIGNING APPROPRIATE ENERGY SOURCES FOR DEVELOPING COUNTRIES (WINDMILLS).
DES. ENG. 67: 69-70, MAY 1979.

THIS ARTICLE DESCRIBES SOME OF THE IDEAS FOR SMALL SCALE ENERGY PRODUCTION FOR DEVELOPING COUNTRIES PRESENTED AT A RECENT CONFERENCE OF THE INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP.

1979-0138 BIRD M
NEW CONCEPT IN FARM WINDMILLS.
N. Z. J. AGRIC. 138(6): 65, JUNE 1979.

A NEW CONCEPT IN WINDMILL DESIGN SEEMS LIKELY TO LEAD TO A BIG DROP IN THE PRICE OF FARM WINDMILLS. THE

CONCEPT IS A VARIABLE-GEOMETRY, VERTICAL-AXIS MACHINE.

1979-0139 BIRD M
NEW WINDMILL HAS ROTARY SHAFT.
N. Z. J. AGRIC. 139(2): 41-42, AUGUST 1979.

GREAT IMPROVEMENTS IN THE PERFORMANCE OF THE OLD AMERICAN-TYPE WINDMILL HAVE RESULTED FROM 15 YEARS OF RESEARCH AND DEVELOPMENT BY G. ELLIS, AN ENGINEER IN NAMIBIA. IT IS A ROTARY SYSTEM WHICH HAS NUMEROUS ADVANTAGES OVER THE OLD PLUNGING-SHAFT SYSTEM, NOT THE LEAST OF WHICH IS AN ABILITY TO LIFT AND DELIVER MORE WATER IN AN HOUR THAN WINDMILLS HAVE PREVIOUSLY BEEN ABLE TO DO.

1979-0140 BLACK T W
PP&L TESTS POWER FROM THE WIND.
POWER ENG. 83(7): 79-81, JULY 1979.

RESEARCHERS AT PENNSYLVANIA POWER & LIGHT ARE TESTING THE PERFORMANCE OF A SMALL WIND TURBINE-GENERATOR (WTG) AS PART OF A CONTINUING PP&L-FINANCED PROGRAM IN WHICH DIFFERENT FORMS OF ENERGY TECHNOLOGY ARE BEING ASSESSED. EVERY ASPECT OF THE WIND TURBINE GENERATOR'S PERFORMANCE IS BEING MONITORED AS IT FEEDS SYNCHRONIZED POWER INTO PP&L'S DISTRIBUTION SYSTEM.

1979-0141 NELSON V, GILMORE E
SMALL WIND TURBINE SYSTEM OPERATION IN RURAL APPLICATIONS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 264-270.
CONF-7905109

THE ALTERNATIVE ENERGY INSTITUTE (AEI) IS DEDICATED TO THE DEVELOPMENT OF ALTERNATIVE SOURCES OF ENERGY (WIND, SOLAR, AND BIOMASS). AEI'S PRIMARY EMPHASIS IS ON ENERGY FOR RURAL OPERATIONS, PARTICULARLY SMALL SYSTEMS FOR USE IN THE TEXAS PANHANDLE REGION. THE PROGRAM TO DATE HAS BEEN MAINLY DIRECTED TOWARD DEVELOPING WIND ENERGY, DELINEATING WIND CHARACTERISTICS FOR TEXAS, TESTING OF PROTOTYPE WIND TURBINES, AND DISSEMINATION OF INFORMATION TO STUDENTS AND THE PUBLIC. AEI AIMS TO ENLIST AS EARLY AS PRACTICAL THE AID OF FARMERS AND RANCHERS--THE EVENTUAL USERS OF SMALL WIND SYSTEMS--IN FIELD TESTS OF THESE CONCEPTS AND THE PROTOTYPE WIND MACHINES.

1979-0142 SODERHOLM L H
WIND ENERGY FOR HEATING FARM STRUCTURES.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 108-123.
CONF-7905109

HEATING OF FARM STRUCTURES CONSUMES APPROXIMATELY 10 PERCENT OF THE ENERGY USED IN AGRICULTURAL PRODUCTION. THE MAJOR SOURCES OF ENERGY FOR HEATING IN RURAL AREAS ARE PRESENTLY FROM THE USE OF TWO NONRENEWABLE RESOURCES, OIL AND LIQUIFIED PETROLEUM (LP) GAS. USE OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE FOR HEATING CAN BOTH REDUCE OUR USE OF NONRENEWABLE ENERGY AND HELP HEATING LOADS BY REDUCING DEMANDS ON THE RURAL POWER DISTRIBUTION SYSTEM.

1979-0143 BRAY R E
SOLAR-CLIMATIC STATISTICAL STUDY.
NTIS, FEBRUARY 1979. 570 P.
HCP/T4016-01/2

THE SOLAR-CLIMATIC STATISTICAL STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS NATIONWIDE SITES. HISTORIC DATA (SOLMET), AT 26 NATIONAL WEATHER SERVICE STATIONS REPORTING HOURLY SOLAR INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS. SOLAR DATA ARE GLOBAL RADIATION INCIDENT ON A HORIZONTAL SURFACE, AND WIND DATA REPRESENT WIND POWER NORMAL TO THE AIR FLOW. SELECTED INSOLATION AND WIND POWER CONDITIONS WERE INVESTIGATED FOR THEIR OCCURRENCE AND PERSISTENCE, FOR DEFINED PERIODS OF TIME, ON A MONTHLY BASIS.

1979-0144 BROCK B C
SCATTERED EM FIELD DUE TO ROTATING BLADES OF HORIZONTAL-AXIS WIND MACHINES.
NTIS, MARCH 1979. 35 P.
SAND-79-0434

AN ANALYSIS OF THE SCATTERED ELECTROMAGNETIC FIELD FROM THE ROTATING BLADES OF A HORIZONTAL AXIS WIND MACHINE IS PRESENTED. THE GENERAL ANALYSIS INCLUDES ALL OF THE NEAR FIELD TERMS AND DOES NOT SPECIFY THE BLADE GEOMETRY. AFTER THE GENERAL RESULT IS DEVELOPED, APPROPRIATE APPROXIMATIONS WILL BE MADE AND A SIMPLE BLADE GEOMETRY WILL BE SPECIFIED IN ORDER TO SIMPLIFY NUMERICAL CALCULATIONS.

1979-0145 BURLEY R R, SAVINO J M, WAGNER L H, DIEDRICH J H
SOME TECHNIQUES FOR REDUCING THE TOWER SHADOW OF THE DOE/NASA MOD-0 WIND TURBINE TOWER.
NTIS, SEPTEMBER 1979. 128 P.
DOE/NASA/20370-79/17, NASA-TM-79202

DETAILED WIND SPEED PROFILE MEASUREMENTS WERE MADE IN THE WAKE OF 1/25 SCALE MODELS OF THE TOWER AND IN THE WAKE OF CERTAIN FULL SCALE COMPONENTS TO DETERMINE THE MAGNITUDE OF THE SPEED REDUCTION (TOWER SHADOW). TEST RESULTS ARE PRESENTED FOR THE FOLLOWING SHADOW ABATEMENT TECHNIQUES: REMOVAL OF DIAGONALS, REPLACEMENT OF DIAGONALS WITH SIMULATED TENSION RODS, REPLACEMENT OF DIAGONALS AND HORIZONTALS WITH ROUND CROSS-SECTION MEMBERS, INSTALLATION OF ELLIPTICAL SHAPES ON HORIZONTAL MEMBERS, INSTALLATION OF AIRFOILS ON VERTICAL MEMBERS, APPLICATION OF SURFACE ROUGHNESS TO VERTICAL MEMBERS. ALL TECHNIQUES OFFERED SOME REDUCTION IN TOWER SHADOW AT ALL WIND DIRECTIONS.

1979-0146 CALIFORNIA WATER AGENCY ACQUIRING VAWT.
WIND ENERGY REP. : 1,6, DECEMBER 1979.

1979-0147 CALVERT N G
WINDPOWER PRINCIPLES: THEIR APPLICATION ON THE SMALL SCALE.
N.Y., HALSTED PRESS, 1979. 122 P.

THIS BOOK IS FOR THE EXPERIMENTER WITH SOME CONSTRUCTIONAL ENGINEERING KNOWLEDGE AND PRACTICAL EXPERIENCE. IT

PROVIDES BASIC INFORMATION AND GUIDELINES NECESSARY FOR CONSTRUCTING SMALL-SCALE WINDPOWER PLANTS.

1979-0148 CHEN H C, CHEN J M
INTERACTION BETWEEN THE ARTIFICIAL VORTEX AND THE VORTEX JET.
J. IND. AERODYN. 4(2): 113-122, MARCH 1979.

A STUDY OF A VORTEX GENERATOR HAS BEEN MADE WHICH EXAMINES THE EFFECT OF A VORTEX JET WHICH SIMULATES THE FLOW ABOVE A HORIZONTAL TURBINE LOCATED AT THE THROAT OF AN INLET THAT IS OPEN AT THE BOTTOM OF THE TOWER. FOR A STRONG AND CONCENTRATIVE VORTEX JET, THE LOW-PRESSURE REGION WILL NOT COLLAPSE DUE TO THE PRESENCE OF THE TURBINE.

1979-0149 CHEN J-M
WIND AND SOLAR ENERGIES IN THE TORNADO TYPE WIND ENERGY SYSTEM.
INT. J. HEAT MASS TRANSFER 22 (7): 1159-1161, JULY 1979.

THE EFFECT OF A LINE HEAT SOURCE ON A TORNADO-TYPE WIND ENERGY GENERATOR HAS BEEN STUDIED. USING THE SIMILARITY TECHNIQUE, A SET OF ORDINARY DIFFERENTIAL EQUATIONS HAS BEEN DERIVED. IT IS FOUND THAT THE HEAT FROM THE SOLAR COLLECTOR AFFECTS THE TANGENTIAL VELOCITY AND PRESSURE DISTRIBUTION OF THE VORTEX. THE MAXIMUM PRESSURE DROP AT THE VORTEX CENTER AXIS WILL INCREASE AS THE STRENGTH OF THE LINE HEAT SOURCE INCREASES.

1979-0150 WITWER J G
DEVELOPING WIND POWER IN THE UNITED STATES.
ENERGY ENGINEERING TECHNOLOGY. WORLD ENERGY ENGINEERS CONGRESS, ATLANTA, GEORGIA, OCTOBER 31, 1978. ATLANTA, GEORGIA, FAIRMONT PRESS, 1979. P. 167-170.

THE KEY ECONOMIC, LEGAL, AND SOCIAL CONSIDERATIONS WHICH WILL PLAY AN IMPORTANT ROLE IN SHAPING THE EXPANSION OF WIND USE IN THE UNITED STATES ARE DISCUSSED.

1979-0151 CHENEY M C
DEVELOPMENT OF AN 8 KW WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE 1-DESIGN & ANALYSIS. VOLUME 11-TECHNICAL REPORT.
NTIS, JUNE 25, 1979. 240 P.
RFP-3006/68186/3533/79/14-2

THIS PHASE 1 SUMMARY REPORT CONTAINS A DESCRIPTION OF THE 8 KW WIND ENERGY CONVERSION SYSTEM DEVELOPED BY THE UNITED TECHNOLOGIES RESEARCH CENTER (UTRC) FOR THE DEPARTMENT OF ENERGY. THE WIND TURBINE EMPLOYS THE UTRC BEARINGLESS ROTOR CONCEPT IN CONJUNCTION WITH A PASSIVE PENDULUM CONTROL SYSTEM WHICH CONTROLS BLADE PITCH FOR START-UP, EFFICIENT POWER GENERATION, AND HIGH-SPEED SURVIVABILITY. THE REPORT CONTAINS A SUMMARY OF THE EXPERIMENTAL AND ANALYTICAL PROGRAMS IN SUPPORT OF DESIGN EFFORTS.

1979-0152 CHOPRA I, DUGUNDJI J
NON-LINEAR DYNAMIC RESPONSE OF A WIND TURBINE BLADE.
J. SOUND VIB. 63(2): 265-286, MARCH 22, 1979.

THE NON-LINEAR EQUATIONS OF MOTION FOR AN ISOLATED THREE-DEGREE FLAP-LAG-FEATHER ROTOR BLADE UNDER THE ACTION OF A GRAVITY FIELD ARE DERIVED, BY USING LAGRANGE'S EQUATIONS, FOR ARBITRARILY LARGE ANGULAR DEFLECTIONS. QUASI-STEADY AIRFOIL THEORY IS USED TO OBTAIN AERODYNAMIC FORCES FOR SHEARED WIND. THE EFFECTS OF SEVERAL PARAMETERS ON THE FORCED RESPONSE OF THE BLADE ARE EXAMINED, INCLUDING CONING ANGLE, STRUCTURAL DAMPING, LOCK NUMBER, INFLOW RATIO, AND WIND VELOCITY GRADIENT.

1979-0153 TENNYSON G P
THE FEDERAL WIND ENERGY PROGRAM: AN OVERVIEW.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 172-201.
CONF-7905109

PRESENT PROGRAM ACTIVITIES AND PLANNED DEVELOPMENT OF WIND POWER PLANTS IS REVIEWED. POWER COSTS ESTIMATES FOR LARGE WIND POWER PLANTS ARE PRESENTED.

1979-0154 PENNELL W T, WEGLEY H L
SITING SMALL WIND TURBINES.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P 202-219.
CONF-7905109

A RECENT SURVEY INDICATED THAT IMPROPER SITING WAS A COMMON CAUSE OF DISSATISFACTION AMONG USERS OF SMALL WIND TURBINES. IN OTHER WORDS, THE USER DID NOT GET THE POWER OUTPUT OR MACHINE LIFE HE HAD EXPECTED. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE TURBINE SITE. THIS PAPER PRESENTS A PROCEDURE FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND TURBINE AND FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN. IN SOME CASES, EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF TURBINE PERFORMANCE CAN BE MADE.

1979-0155 COROTIS R B
STATISTICAL MODELS FOR WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT, SEPTEMBER 15, 1977 - OCTOBER 14, 1978.
NTIS, JANUARY 1979. 86 P.
DOE/ET/20283-1

SIMPLE MODELS AND GUIDELINES ARE DEVELOPED FOR WIND ENERGY SITE SURVEYS. PROBABILISTIC PROCEDURES ARE EMPLOYED TO ASSESS SURVEY DURATION, CLIMATOLOGICAL ADJUSTMENT, AND RUN DURATION STATISTICS.

1979-0156 CRISP J N, BISHOP W S, PINSON J D, ANDERSON L A
ANALYSIS OF REMOTE SITE ENERGY STORAGE AND GENERATION SYSTEMS.
NTIS, JULY 1979. 148 P.
AD-A074869,UDR-TR-79-35, UDSE-TR-79-02

THIS REPORT PRESENTS THE RESULTS OF AN INVESTIGATION AND ANALYSIS OF ENERGY STORAGE SYSTEMS AND ALTERNATE ENERGY SOURCES FOR REMOTE SITE APPLICATIONS. THE FIRST PHASE OF THE EFFORT CENTERED ON THE BROAD BASED STUDY

OF HYDROGEN STORAGE, THERMAL STORAGE, BATTERIES, AND FLYWHEELS AS ENERGY STORAGE SYSTEMS ALONG WITH WIND TURBINE, SOLAR PHOTOVOLTAIC, AND SOLAR THERMIONIC ENERGY CONVERTERS. A WIND TURBINE BATTERY SYSTEM WAS RECOMMENDED BASED ON PERFORMANCE, COST AND AVAILABILITY. EFFORT UNDER THE SECOND PHASE OF THE PROGRAM CONCENTRATED ON A SYSTEM USING TWO SEPARATE NOMINAL EIGHT KILOWATT WIND TURBINE MODULES IN CONJUNCTION WITH A LEAD-ACID BATTERY ENERGY STORAGE UNIT. THE SYSTEM WAS SPECIFIED TO OPERATE IN CONJUNCTION WITH AN EXISTING POWER GRID SYSTEM LOCATED AT BAR MAIN, BARTER ISLAND, ALASKA. SPECIFIC SYSTEM CONCEPTS AND RECOMMENDATIONS ARE PRESENTED WITH SUPPORTING ANALYSES. A DESIGN CHECKLIST IS INCLUDED WITH SPECIFIC ITEMS FOR CONSIDERATION IN THE PREPARATION OF A DESIGN SPECIFICATION.

1979-0157 DASH P K, SAHU B, RAHMAN M A
DYNAMIC PERFORMANCE OF A WIND POWER CONVERSION SYSTEM (DIGITAL SIMULATION).
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A & M UNIVERSITY, MARCH 19-21, 1979. CONFERENCE RECORD. NEW YORK, IEEE, NO. 79CH1377-1 REG 5, 1979. P. 154.

ONLY A SUMMARY OF THE PAPER WAS GIVEN. THE PAPER PRESENTS THE RESULTS OF A COMPUTER SIMULATION CONDUCTED FOR AN AEROTURBINE DRIVEN SYNCHRONOUS OR BRUSHLESS GENERATOR SUPPLYING A BATTERY STORAGE SYSTEM THROUGH A 3-PHASE BRIDGE RECTIFIER.

1979-0158 DAVID M L, BUZENBERG R J, GLYNN E F, JOHNSON G L, SHULTIS J K, WAGNER J P
WIND ENERGY APPLICATIONS IN AGRICULTURE. FINAL REPORT. EXECUTIVE SUMMARY.
NTIS, AUGUST 1979. 201 P.
DOE/SEA-1109-20401/79/2

THIS REPORT PRESENTS AN ASSESSMENT OF THE POTENTIAL USE OF WIND TURBINE GENERATOR SYSTEMS (WTGS) IN U.S. AGRICULTURE. IN PARTICULAR, THIS REPORT PRESENTS THE NUMBER OF WTGS'S ECONOMICALLY FEASIBLE FOR USE IN U.S. AGRICULTURE AND THE CONDITIONS WHICH YIELDED ECONOMIC FEASIBILITY OF WTGS'S FOR CERTAIN AGRICULTURAL APPLICATIONS.

1979-0159 BRAASCH R H
THE DESIGN, CONSTRUCTION, TESTING, AND MANUFACTURING OF VERTICAL AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E3/23-38.

A SUBSTANTIAL DESIGN AND DEVELOPMENT PROGRAM HAS BEEN UNDERWAY IN THE UNITED STATES OF AMERICA ON THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT). THE PURPOSE OF THIS REPORT IS TO PRESENT CURRENTLY AVAILABLE INFORMATION ON A) DESIGN, CONSTRUCTION AND TESTING OF A 17 METER RESEARCH TURBINE, B) VAWT PERFORMANCE-COST OPTIMIZATION STUDY, AND C) VAWT MANUFACTURING STUDIES.

1979-0160 DE RENZO D J
WIND POWER: RECENT DEVELOPMENTS.
PARK RIDGE, N.J., NOYES DATA CORPORATION, 1979. 347 P.

SOME OF THE TOPICS COVERED ARE THE TECHNICAL RESEARCH GOING ON AT LOCKHEED AND BOEING HAVING TO DO WITH STRUCTURAL STRESS FACTORS, AND WORK BEING DONE FOR THESE CORPORATIONS AT MIT AND GEORGIA TECH; ECONOMICS; RURAL SELF-SUFFICIENCY; WIND CHARACTERISTICS FOR DIFFERENT REGIONS; ROTOR DESIGN AND BLADE SPECIFICATIONS; INNOVATIVE WIND TURBINES; APPLICATION TO ELECTRIC UTILITIES; WIND SYSTEMS FOR FARMS AND RURAL REGIONS; AND LEGAL, SOCIAL, AND ENVIRONMENTAL ISSUES.

1979-0161 DESHMUKH R G, RAMAKUMAR R
RELIABILITY OF WIND-ASSISTED UTILITY SYSTEMS.
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A & M UNIVERSITY, MARCH 19-21, 1979. CONFERENCE RECORD. NEW YORK, IEEE, NO. 79CH1377-1 REG 5, 1979. P. 143-148.

THIS PAPER DISCUSSES THE APPLICATION OF MARKOV MODELS IN THE STUDY OF WECS AND CONVENTIONAL GENERATORS OPERATING IN PARALLEL, FEEDING A COMMON LOAD. THE BASIC FACTORS INVOLVED IN THE RELIABILITY EVALUATION AND THEIR POSSIBLE INFLUENCE ON PLANNING THE LARGE SCALE INCORPORATION OF WECS AS A COMPONENT IN THE GENERATION MIX ARE DISCUSSED USING COMPUTER SIMULATION RESULTS OBTAINED FOR MODELS DEVELOPED WITH THE HELP OF HOURLY WIND-SPEED DATA FOR A TWO-YEAR PERIOD FOR POTENTIAL SITES IN THE HAWAIIAN ISLANDS.

1979-0162 DESIGN AND FABRICATION OF A LOW COST DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEM. PHASE 1. TECHNICAL REPORT.
NTIS, JUNE 22, 1979. 335 P.
ALO-4272-T2

PRESENTED IN THIS REPORT IS THE WORK COMPLETED IN PHASE 1, THE DESIGN PHASE OF THE "DESIGN AND FABRICATION OF A LOW COST DARRIEUS." THE OBJECTIVES ARE TO OBTAIN REALISTIC FABRICATION COST DATA BASED ON CURRENT TECHNOLOGY AND TO PROVIDE A LOW COST SYSTEM DESIGN SUITABLE FOR CONTINUED PRODUCTION AND/OR TO SERVE AS A BASELINE FOR FURTHER COST REDUCTION AS WELL AS ENGINEERING IMPROVEMENT EFFORTS.

1979-0163 DESIGN AND FABRICATION OF A LOW COST DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEM. PHASE 1. EXECUTIVE SUMMARY.
NTIS, JUNE 22, 1979. 49 P.
ALO-4272-T1

THE MAIN OBJECTIVES OF THIS PROJECT ARE TO OBTAIN REALISTIC FABRICATION COST DATA BASED ON CURRENT TECHNOLOGY AND TO PROVIDE A LOW COST SYSTEM DESIGN SUITABLE FOR CONTINUED PRODUCTION AND/OR TO SERVE AS A BASELINE FOR FURTHER COST REDUCTION AS WELL AS ENGINEERING IMPROVEMENT EFFORTS.

1979-0164 SEXTON J H
ZEPHYR WIND DYNAMO WIND TURBINE GENERATOR. FINAL TEST REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, OCTOBER 1979. 21 P.
RFP-3071/3533/79/13

THE ZEPHYR WIND DYNAMO INCORPORATES AN INNOVATIVE ALTERNATOR AND CONTROL SYSTEM THAT SHOWS GREAT PROMISE FOR FUTURE WIND TURBINE GENERATORS (WTGS) OF THE SAME SIZE. FEW MACHINES OF THIS TYPE (I.E., WITH A PERMANENT MAGNET ALTERNATOR AND POSITIVE YAW DRIVE) HAVE BEEN BUILT. IT WAS, THEREFORE, A GOOD CANDIDATE FOR TESTING AT THE ROCKY FLATS WIND SYSTEMS TEST CENTER (WSTC). UNFORTUNATELY, VERY LITTLE LONG-TERM QUANTITATIVE DATA WERE TAKEN FROM THE MACHINE DUE TO PROBLEMS WITH THE DATA ACQUISITION SYSTEM WHICH WAS IN EARLY STAGES OF DEVELOPMENT DURING THIS TIME PERIOD.

1979-0165 SOLAR ENERGY EDUCATION PACKET FOR ELEMENTARY AND SECONDARY STUDENTS.
WASHINGTON, D.C., CENTER FOR RENEWABLE RESOURCES, 1979. 64 P.

EDUCATIONAL MATERIALS AND PROJECTS FOR DEMONSTRATING SOLAR ENERGY AT BOTH ELEMENTARY AND SECONDARY LEVELS ARE PRESENTED. SOLAR ENERGY FACTS AND TERMINOLOGY ARE INTRODUCED. ENERGY CONSERVATION, PASSIVE SOLAR CONCEPTS, AND HEAT STORAGE ARE DISCUSSED.

1979-0166 DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME III - SYSTEM ANALYSIS. FINAL REPORT.
NTIS, JUNE 14, 1979. 188 P.
WASH-2330-78/4(VOL.3)

IN THIS VOLUME, THE STATE-OF-THE-ART COMPONENTS DESCRIBED IN VOLUME II ARE INTEGRATED TO FORM OPTIMUM OFFSHORE WIND ENERGY CONVERSION SYSTEMS. THE COST AND PERFORMANCE OF THESE SYSTEMS ARE DEVELOPED FOR A VARIETY OF CONDITIONS AND THE TRADE-OFF BETWEEN COST AND ENERGY PRODUCTION IS MADE FOR THE WIDE RANGE OF SCENARIOS CONSIDERED.

1979-0167 SOLAR ENERGY ON THE RESERVATION.
ENERGY ALTERN. Q. 3(2): 18-21, SUMMER 1979.

VARIOUS APPLICATIONS OF SOLAR ENERGY TECHNOLOGY ON INDIAN RESERVATIONS IN ARIZONA AND NEW MEXICO ARE REVIEWED. A SCHOOL IN BIRDSPRINGS, AZ, INCORPORATES TWO GEODESIC DOMES HEATED BY AN ACTIVE SOLAR ENERGY SYSTEM AND POWERED BY A WIND GENERATOR. IN SWEETWATER, AZ, A NAVAJO VILLAGE HAS SIX ARRAYS OF PHOTOVOLTAIC CELLS THAT PROVIDE POWER FOR PUMPING DRINKING WATER TO 50 HOMES. SOLAR GREENHOUSES HAVE BEEN ATTACHED TO SCHOOLS, CHAPTER HOUSES AND OTHER BUILDINGS FOR PASSIVE SOLAR HEATING. PROBLEMS WITH SOLAR ENERGY APPLICATIONS HAVE INCLUDED FAULTY EQUIPMENT, THE DELAYED APPROVAL OF WOOD-BURNING STOVES AND FIREPLACES AS THE ONLY FORM OF BACKUP HEAT, AND MISTRUST IN THE APPARATUS ASSOCIATED WITH SOLAR HEATING.

1979-0168 HAGEN L J, SHARIF M
DESIGN AND FIELD TESTING OF A VARIABLE-SPEED VAWT SYSTEM FOR LOW-LIFT IRRIGATION PUMPING.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 87-104.
CONF-7905109

1979-0169 HAGEN L J, LYLES L, SKIDMORE E L, SHARIF M
EVALUATION OF METHODS FOR APPLYING WIND ENERGY IN GREAT PLAINS IRRIGATION.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 42-66.
CONF-7905109

1979-0170 EDESESS M, MCCONNELL R D
A GENERAL RELIABILITY AND SAFETY METHODOLOGY AND ITS APPLICATION TO WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 1979. 52 P.
SERI/TR-35-234

IN CONVENTIONAL SYSTEM RELIABILITY CALCULATIONS, EACH COMPONENT MAY BE IN THE OPERABLE STATE OR THE UNDER REPAIR STATE. THESE CALCULATIONS DERIVE SYSTEM UNAVAILABILITY, OR THE PROBABILITY OF THE SYSTEM'S BEING DOWN FOR REPAIRS. BY INTRODUCING A THIRD COMPONENT STATE BETWEEN OPERABLE AND UNDER REPAIR--NAMELY, DEFECTIVE, BUT DEFECT UNDETECTED--THE METHODS DEVELOPED IN THIS REPORT ENABLE SYSTEM SAFETY PROJECTIONS TO BE MADE IN ADDITION TO AVAILABILITY PROJECTIONS. ALSO PROVIDED IS A MECHANISM OF COMPUTING THE EFFECTS OF INSPECTION SCHEDULES ON BOTH SAFETY AND AVAILABILITY. A RELIABILITY AND SAFETY PROGRAM (RASP) IS DETAILED WHICH PERFORMS THESE COMPUTATIONS AND ALSO CALCULATES COSTS FOR SYSTEM INSPECTIONS AND REPAIRS.

1979-0171 ELDRIDGE F
WIND MACHINES. 2ND ED.
NEW YORK, VAN NOSTRAND REINHOLD, 1979. 213 P.

ECONOMIC VIABILITY, PUBLIC ACCEPTANCE (INCLUDING PROBLEMS OF INTERFERANCE WITH TV), HISTORY, STATE-OF-THE-ART, ARE ALL COVERED. THE BOOK INCLUDES MANY ILLUSTRATIONS, AND SOME TECHNICAL CHARTS AND TABLES.

1979-0172 INNOVATIVE WIND FARM PROPOSED.
WIND POWER DIG. NO. 17: 17, FALL 1979.

1979-0173 O'BRIEN W F, VAUGHAN D H, SCHETZ J A
APPLICATION OF WINDMILLS TO APPLE COOLING AND STORAGE.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 158-171.
CONF-7905109

ENERGY USAGE FOR CROP STORAGE IS SIGNIFICANT IN AGRICULTURAL APPLICATIONS. WIND ENERGY REPRESENTS A POTENTIALLY IMPORTANT SOURCE FOR OBTAINING SOME OF THIS ENERGY. THIS REPORT DESCRIBES A RESEARCH PROJECT, WITH THE GOAL OF EVALUATING WIND ENERGY AS A SOURCE FOR THE ENERGY REQUIRED FOR THE LOW TEMPERATURE STORAGE OF APPLES. TO CONDUCT THE PROGRAM, A RESEARCH FACILITY WAS CONSTRUCTED AT THE HORTICULTURE FARM OF VIRGINIA POLYTECHNIC INSTITUTE, CONSISTING OF A WIND GENERATOR, A VAPOR COMPRESSION COOLING SYSTEM, A WELL-INSULATED STORAGE BUILDING, AND NECESSARY CONTROL AND INSTRUMENTATION DEVICES TO EVALUATE PERFORMANCE. INITIAL TESTS OF THE SYSTEM WERE DONE IN MARCH 1978. SINCE THEN, SOME MODIFICATIONS AND IMPROVEMENTS TO THE SYSTEM HAVE BEEN MADE, AND RECENTLY A CONTINUOUS PERFORMANCE TEST OF THE WIND-POWERED APPLE STORAGE WAREHOUSE SYSTEM WAS CONDUCTED. THE PRESENT REPORT DESCRIBES THE DESIGN AND CONSTRUCTION FEATURES OF THE SYSTEM, AND CONTAINS RESULTS OF SOME OF THE MOST RECENT TESTS.

1979-0174 ENVIRONMENTAL DEVELOPMENT PLAN. WIND ENERGY CONVERSION.
NTIS, JULY 1979. 34 P.
DOE/EDP-0030

THE ENVIRONMENTAL DEVELOPMENT PLAN (EDP) SYSTEM IS DESIGNED TO PROVIDE A COMMON BASIS FOR PLANNING, MANAGING, AND REVIEWING THE ENVIRONMENTAL ASPECTS OF THE VARIOUS ENERGY TECHNOLOGY PROGRAMS UNDER THE DEPARTMENT OF ENERGY'S (DOE) JURISDICTION.

1979-0175 EPRI: UTILITIES' INTEREST GROWS IN WIND POWER.
WIND ENERGY REP. : 5, OCTOBER 1979.

1979-0176 ESKINAZI S, GOETHALS R

MULTIPLE PUMP STAGE LOADING OF A VARIABLE-RPM WIND TURBINE.
J. ENERGY 3(2): 114-119, MARCH - APRIL 1979.

THIS PAPER STUDIES THE WIND ENERGY CAPTURE EFFICIENCY OF A MULTIPLE PUMP STAGE SYSTEM DRIVEN BY A 50-KW WIND TURBINE IN A SPECIFIED AVAILABLE WIND ENERGY PROBABILITY DENSITY. THIS WIND ENERGY PROBABILITY DENSITY CORRESPONDS TO AN AVERAGE SPRING WIND ON THE EASTERN SHORE OF LAKE ONTARIO. THESE RESULTS ARE COMPARED WITH THOSE OF THE SAME BLADE OPERATING AT OPTIMUM POWER COEFFICIENT; WITH FIXED OPTIMUM PITCH AND CONSTANT RPM; WITH THAT OF A CONVENTIONAL CONSTANT-RPM VARIABLE-PITCH BLADE DRIVING A SYNCHRONOUS GENERATOR.

1979-0177 EVERSOLE R A
SPECTRAL CHARACTERISTICS OF BOUNDARY LAYER OVER IRREGULAR TERRAIN.
NTIS, JUNE 1979. 115 P.
CSU-ATSP-314

THE SPECTRAL BEHAVIOR OF TURBULENCE IN A CONVECTIVELY UNSTABLE BOUNDARY LAYER OVER UNDULATING TERRAIN IS DISCUSSED. THE WIND AND TEMPERATURE FLUCTUATIONS WERE MEASURED WITH FAST RESPONSE SENSORS MOUNTED ON THE 300 M TOWER AT THE BOULDER ATMOSPHERIC OBSERVATORY (BAO). THE BOUNDARY LAYER IS DIVIDED INTO THREE LAYERS (SURFACE, MATCHING, AND MIXED). THE SPECTRA OF EACH LAYER ARE NORMALIZED USING THE APPROPRIATE SCALING RULES. THE GENERALIZED SPECTRA FOLLOW SIMILARITY THEORY. THIS PAPER COMPARES THE BAO RESULTS WITH THE DATA OBTAINED DURING AFCRL'S FIELD EXPERIMENTS IN KANSAS (1968) AND MINNESOTA (1973) OVER FLAT, UNIFORM TERRAIN.

1979-0178 EXECUTIVE SUMMARY. MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT.
NTIS, MAY 1979. 60 P.
DOE/NASA/0058-79/3, NASA-CR-159497

THE MOD-1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN IN TABLE 1-1. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN.

1979-0179 NELLUMS R O
TOOLS FOR ECONOMIC VAWT DESIGN AT SANDIA.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 233-246.
CONF-7905109

1979-0180 JOHNSON G L
PRELIMINARY RESULTS OF A 5 KW SAVONIUS WIND TURBINE TEST.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 289-296.
CONF-7905109

1979-0181 FERC SETTING RULES ON SMALL PRODUCERS.
WIND ENERGY REP.: 1-2, OCTOBER 1979.

PROPOSED REGULATIONS ISSUED BY THE FEDERAL ENERGY REGULATORY COMMISSION ARE DESCRIBED.

1979-0182 FLETCHER C A J, ROBERTS B W
ELECTRICITY GENERATION FROM JET-STREAM WINDS.
J. ENERGY 3(4): 241-249, JULY-AUGUST 1979.

THE FEASIBILITY OF GENERATING ELECTRICITY FROM JET-STREAM WINDS HAS BEEN INVESTIGATED. ANALYSIS OF PUBLISHED METEOROLOGICAL DATA INDICATES THAT ANNUAL AVERAGE POWER DENSITIES APPROACHING 20 KW/M2 ARE AVAILABLE IN THE JET-STREAM ALTITUDES OVER THE COMPLETE WEST-EAST EXTENT OF AUSTRALIA AT A LATITUDE OF ABOUT 30 DEGREES S. COMPUTER-BASED OPTIMIZATION STUDIES INDICATE THAT A 100 MW POWER STATION BASED ON TETHERED AERODYNAMIC GENERATING PLATFORMS LOCATED AT A JET-STREAM ALTITUDE WOULD GENERATE ELECTRICITY AT CAPITAL AND OPERATING COSTS THAT ARE COMPETITIVE WITH OTHER METHODS OF ELECTRICITY GENERATION.

1979-0183 FOREMAN K M, GILBERT B L
FURTHER INVESTIGATIONS OF DIFFUSER AUGMENTED WIND TURBINES. PART 2 - TECHNICAL REPORT. FINAL REPORT.
NTIS, JULY 1979. 63 P.
COO-2616-2(PT.2)(REV.2), RE-585

THIS PAPER DESCRIBES A MULTIPHASED INVESTIGATION INVOLVING THREE TEST FACILITIES, OF SEVERAL COMPACT DIFFUSER APPROACHES. SCREENS, TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED AND SOME OF THE KEY ISSUES ARE DISCUSSED THAT CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION

1979-0184 FOREMAN K M, GILBERT B L
FURTHER INVESTIGATIONS OF DIFFUSER AUGMENTED WIND TURBINES. PART 1 - EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, JULY 1979. 10 P.
COO-2616-2(PT.1)(REV.1), RE-585

THIS PROJECT USED A MULTIPHASED EXPERIMENTAL APPROACH INVOLVING THREE WIND TUNNEL TEST FACILITIES, AND MODELS OF SEVERAL COMPACT DIFFUSER CONFIGURATIONS. SCREENS TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED, AND SOME OF THE KEY TECHNICAL AND ECONOMIC ISSUES WHICH CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION ARE DISCUSSED.

1979-0185 GEWEHR H W
DESIGN, FABRICATION, TEST, AND EVALUATION OF A PROTO-TYPE 150-FOOT LONG COMPOSITE WIND TURBINE BLADE.
NTIS, SEPTEMBER 1979. 135 P.
DOE/NASA/0600-79/1, NASA-CR-159775, R-1575

THE DESIGN, FABRICATION, TESTING, AND EVALUATION OF A PROTOTYPE 150 FOOT LONG COMPOSITE WIND TURBINE BLADE IS DESCRIBED. THE DESIGN APPROACH AND MATERIAL SELECTION, COMPATIBLE WITH LOW COST FABRICATION METHODS AND OBJECTIVES, ARE HIGHLIGHTED. THE OPERATING CHARACTERISTICS OF THE BLADE DURING ROTATING AND NONROTATING CONDITIONS ARE PRESENTED. THE TENSILE, COMPRESSION, AND SHEAR PROPERTIES OF THE BLADE ARE REPORTED. THE BLADE FABRICATION, TOOLING, AND QUALITY ASSURANCE ARE DISCUSSED.

1979-0186 GILBERT B L, FOREMAN K M
EXPERIMENTAL DEMONSTRATION OF THE DIFFUSER-AUGMENTED WIND TURBINE CONCEPT.
J. ENERGY 3(4): 235-240, JULY-AUGUST 1979.

THE SURFACE AREA REQUIREMENTS OF AN EFFICIENT DIFFUSER HAS BEEN REDUCED BY INNOVATIVE USE OF THE EXTERNAL WIND TO PRODUCE A COST-EFFECTIVE WIND ENERGY CONVERSION SYSTEM (WECS). THREE SETS OF TESTS WERE CONDUCTED ON VERY COMPACT DIFFUSERS: 1 ON SMALL-SCALE MODELS USING SCREENS TO SIMULATE A REAL TURBINE; 2 ON TEN TIMES LARGER SCALE MODELS WITH SCREENS; AND 3 ON A REAL TURBINE. THE FIRST-GENERATION NONOPTIMIZED DIFFUSER-AUGMENTED WIND TURBINE (DAWT) CONFIGURATION IS A CONICAL, 60 DEG INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS FOR BOUNDARY-LAYER CONTROL. THIS BASELINE MODEL PROVIDED OVER THREE TIMES THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE EFFICIENCY, DIAMETER, AND FREE WIND. AN OPTIMIZED CONFIGURATION SHOULD PROVIDE AUGMENTATIONS GREATER THAN FOUR.

1979-0187 GIPE P
ESTIMATING WECS COSTS: A SIMPLIFIED CALCULATION METHOD FOR CONSUMERS.
WIND POWER DIG. NO. 17: 7-12, FALL 1979.

THE ARTICLE DESCRIBES A METHOD FOR CALCULATING THE LENGTH OF TIME REQUIRED BEFORE A WIND SYSTEM PAYS FOR ITSELF: THE LENGTH OF TIME TO PAYBACK. THE METHOD MAKES USE OF SIMPLE FORMULAS THAT CAN BE SOLVED ON A POCKET CALCULATOR, AND DEMANDS USE OF ONLY ONE TABLE.

1979-0188 GIPE P
LONE STAR WIND; AN OVERVIEW OF CURRENT WIND ACTIVITIES IN TEXAS.
WIND POWER DIG. NO. 17: 36-40, FALL 1979.

THE ACTIVITIES OF TEXAS COMPANY WIND ENGINEERING, AND COY HARRIS, ARE DESCRIBED; PARTICULARLY THEIR WIND TURBINE WIND GEN 25.

1979-0189 GIPE P
WIND AND UTILITIES; ALCOA MARKET VAWTS.
WIND POWER DIG. NO. 17: 29-32, FALL 1979.

ALCOA (ALUMINUM COMPANY OF AMERICA) HAS ANNOUNCED THAT IT IS TEST MARKETING AN INTRODUCTORY LINE OF DARRIEUS TURBINES. FIVE MODELS RANGE IN CAPACITY FROM 8 TO 500 KW, AND IN PRICE FROM $10,000 TO $190,000.

1979-0190 GLOSSARY OF WIND ENERGY TERMINOLOGY.
WIND POWER DIG. NO. 17: 50-53, FALL 1979.

1979-0191 GOELA J S
WIND POWER THROUGH KITES.
MECH. ENG. 101(6): 42-43, JUNE 1979.

IT IS PROPOSED IN THIS ARTICLE TO USE KITES TO EXTRACT ENERGY FROM THE WIND. IN ADDITION TO AVOIDING THE USE OF HIGH-CAPITAL-COST COMPONENTS SUCH AS TOWERS AND LARGE ROTORS, THE IMPORTANT ADVANTAGE OF USING THE PROPOSED SCHEME IS THAT IT UTILIZES THE FULL AVAILABLE POTENTIAL OF THE WIND. THE MOTION OF AIR GENERATES A PULL IN THE ROPE THAT HOLDS THE KITE. THIS PULL IS A FUNCTION OF BOTH THE ANGLE OF ATTACK OF THE KITE AND THE KITE AREA NORMAL TO THE WIND DIRECTION, AND BY VARYING ANY OF THESE WE CAN VARY THE PULL ON THE ROPE. ON THE SURFACE OF THE EARTH, THIS ROPE WILL BE SUITABLY CONNECTED TO AN ENERGY SYSTEM WHICH WILL CONVERT THE VARIATION IN DEVELOPED FORCE ON THE ROPE INTO THE ROTATIONAL ENERGY OF A ROTOR. A DETAILED THEORETICAL ANALYSIS OF THE PROPOSED TECHNIQUE HAS BEEN CARRIED OUT.

1979-0192 GRIMMER D
DARRIEUS BLADE CONSTRUCTION.
WIND POWER DIG. NO. 17: 54-57, FALL 1979.

THIS ARTICLE DESCRIBES A LOW-COST METHOD OF CONSTRUCTING DARRIEUS WIND-TURBINE BLADES THAT IS SUITABLE TO BOTH MASS-PRODUCTION AND HOME-CRAFTSMAN MANUFACTURE. A MILD STEEL STRIP BENT INTO THE TROPOSKIEN SHAPE FORMS THE CENTER OF THE DARRIEUS BLADE IN THIS LOW-COST METHOD OF CONSTRUCTION. THE STEEL STRIP IS CUT AS WIDE AS THE DESIRED AIRFOIL WIDTH, AND CAN BE MORE THAN ONE PIECE, FASTENED TOGETHER WITH RIVETS. EXPANDABLE PAPER HONEYCOMB IS USED TO FORM THE CURVED AIRFOIL CROSS-SECTION.

1979-0193 GROVER R D, KADLEC E G
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME III. POINT DESIGNS.
NTIS, AUGUST 1979. 94 P.
SAND-78-0962

VOLUME III OF THIS STUDY DISCUSSES MAJOR FEATURES OF THE DARRIEUS VERTICAL-AXIS WIND TURBINE DESIGN INCLUDING THE BLADES, THE SPEED INCREASER, GUY CABLES AND CABLE ANCHORS, TRANSMISSION, CLUTCH, BRAKES, AND THE ELECTRICAL SYSTEM. SYSTEM WEIGHT CHARACTERISTICS ARE TABULATED. THE REPORT DISCUSSES OPERATION AND MAINTENANCE COSTS AND REQUIREMENTS AND CONCLUDES WITH DETAILED DESCRIPTIONS OF POINT DESIGNS FOR 120, 200, 500, AND 1600-KW DARRIEUS VERTICAL-AXIS WIND-ENERGY SYSTEMS. THESE SAME POINT DESIGNS ARE USED FOR THE DETAILED ECONOMIC ANALYSES DISCUSSED IN VOLUME IV.

1979-0194 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. VOL.1. 1964 - AUGUST 1978 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1979. 264 P.
PB80-800303

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY, ALONG WITH VOL. 2, SUPERCEDES PREVIOUS ONES BY THE SAME AUTHOR.

1979-0195 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. VOL.2. SEPTEMBER 1978 - SEPTEMBER 1979 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1979. 99 P.
PB80-800311

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY, ALONG WITH VOL. 1, SUPERCEDES EARLIER ONES BY THE SAME AUTHOR.

1979-0196 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1979. 271 P.
PB80-800329

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE RESEARCH REPORTS GATHERED IN A WORLDWIDE LITERATURE SURVEY. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY SUPERCEDES PREVIOUS BIBLIOGRAPHIES BY THE SAME AUTHOR.

1979-0197 HAGEN L J, LYLES L, SKIDMORE E L
APPLICATION OF WIND ENERGY TO GREAT PLAINS IRRIGATION PUMPING. FINAL REPORT.
NTIS, OCTOBER 1979. 158 P.
DOE/SEA-3707-20741/80/1

WE INVESTIGATED APPLICATION OF DEDICATED WIND ENERGY SYSTEMS WITHOUT ENERGY STORAGE FOR IRRIGATION IN THE GREAT PLAINS. MAJOR USES OF IRRIGATION ENERGY WERE IDENTIFIED AS PUMPING FOR SURFACE DISTRIBUTION SYSTEMS, WHICH COULD BE SUPPLIED BY VARIABLE FLOW, AND PUMPING FOR SPRINKLER SYSTEMS USING CONSTANT FLOW.

1979-0198 HEWSON E W, WADE J E, BAKER R W
A HANDBOOK ON THE USE OF TREES AS AN INDICATOR OF WIND POWER POTENTIAL. FINAL REPORT.
NTIS, JUNE 1979. 26 P.
RLO-2227-79/3

THIS HANDBOOK DESCRIBES TECHNIQUES FOR USING TREES AS INDICATORS OF WIND POWER POTENTIAL AND IS AIMED AT PROVIDING THE WIND PROSPECTOR WITH AN INITIAL ASSESSMENT OF THE WIND POWER POTENTIAL. SUBSEQUENT SECTIONS WILL DESCRIBE TECHNIQUES FOR USING TREES IN A WIND SURVEY, THE ROLE OF VEGETATION INDICATORS IN SITE SELECTION AND THE LIMITATIONS OF THESE TECHNIQUES.

1979-0199 JACOBS UNVEILS NEW MACHINE.
WIND POWER DIG. NO. 17: 18, FALL 1979.

1979-0200 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. ANNUAL PROGRESS REPORT, JUNE 15, 1978 - MARCH 14, 1979.
NTIS, MARCH 1979. 15 P.
DOE/ET/20316-79/2, RLO-2227-T24-79-2

THE MOST IMPORTANT RESULTS ARE PRESENTED OF WORK COMPLETED DURING THE PAST YEAR OF THIS STUDY. THE MOST IMPORTANT ACHIEVEMENT DURING THE PAST YEAR WAS THE COMPLETION OF A DRAFT OF A HANDBOOK ON THE USE OF TREES AS AN INDICATOR OF WIND POWER POTENTIAL. THIS HANDBOOK DESCRIBES RELATIONSHIPS BETWEEN MEAN ANNUAL WIND SPEED AND INDICES OF WIND DEFORMATION OF TWO SPECIES OF TREES WIDELY DISTRIBUTED IN THE WESTERN UNITED STATES. WORK DURING THE PAST YEAR ON OTHER SPECIES OF TREES INDICATES THAT THE TECHNIQUES CALIBRATED INITIALLY FOR ONLY DOUGLAS-FIR AND PONDEROSA PINE CAN ALSO BE CALIBRATED ON OTHER TREES INCLUDING BROADLEAF TREES SUCH AS OAKS.

1979-0201 HOFFMAN J A
WIND ENERGY SYSTEM TIME-DOMAIN (WEST) ANALYZERS USING HYBRID SIMULATION TECHNIQUES.
NTIS, OCTOBER 1979. 30 P.
DOE/NASA/0026-79/1, NASA-CR-159737, PPI-1030-6, N80-20909

TWO STAND-ALONE ANALYZERS CONSTRUCTED FOR REAL TIME SIMULATION OF THE COMPLEX DYNAMIC CHARACTERISTICS OF HORIZONTAL-AXIS WIND ENERGY SYSTEMS ARE DESCRIBED. MATHEMATICAL MODELS FOR AN AEROELASTIC ROTOR, INCLUDING NONLINEAR AERODYNAMIC AND ELASTIC LOADS, ARE IMPLEMENTED WITH HIGH SPEED DIGITAL AND ANALOG CIRCUITRY. MODELS FOR ELASTIC SUPPORTS, A POWER TRAIN, A CONTROL SYSTEM, AND A ROTOR GIMBAL SYSTEM ARE ALSO INCLUDED.

1979-0202 HUBBARTT J E
STUDY OF A VORTEX AUGMENTOR FOR A WIND-POWERED TURBINE.
J. ENERGY 3(6): 344-348, NOVEMBER - DECEMBER 1979.

AN EXPERIMENTAL INVESTIGATION OF AN AUGMENTOR WHICH EMPLOYS A VORTEX TO CREATE A LOW PRESSURE SINK FOR THE DISCHARGE OF A WIND-POWERED TURBINE IS REPORTED. THE TEST MODEL HAS A HORIZONTAL AXIS WITH THE VORTEX PRODUCED BY AN ANNULAR CASCADE OF STATOR VANES SURROUNDING THE TURBINE DUCT. THE MAXIMUM VALUE OF THE EXPERIMENTAL POWER COEFFICIENT WAS ONLY ABOUT ONE-THIRD OF THE IDEAL FLOW LIMIT. FURTHERMORE, THE POWER AUGMENTATION WITH THIS VORTEX PUMP WAS ONLY SLIGHTLY HIGHER THAN THAT OBTAINED WHEN THE STATOR-VANE ANNULUS WAS COMPLETELY BLOCKED. THUS, IT IS CONCLUDED THAT THIS TYPE OF VORTEX AUGMENTOR IS INEFFECTIVE.

1979-0203 IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS.
FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS.
NTIS, JANUARY 1979. 268 P.
SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978.
JUEL-SPEZ-28

PAPERS ARE PRESENTED CONCERNING THE AERODYNAMICS, STABILITY, AND DESIGN ASPECTS OF LARGE WIND TURBINES.

1979-0204 INGLIS D R
A WINDMILL'S THEORETICAL MAXIMUM EXTRACTION OF POWER FROM THE WIND.
AM. J. PHYS. 47(5): 416-420, MAY 1979.

THE FRACTION OF THE KINETIC ENERGY OF THE WIND IMPINGING ON ITS AREA, THAT A WIND TURBINE CAN CONVERT TO USEFUL POWER, HAS BEEN SHOWN BY BETZ IN AN IDEALIZED LAMINAR-FLOW MODEL TO HAVE AN UPPER LIMIT OF 16/27 OR 59 PERCENT. THE LIMIT IS HERE SIMPLY REDERIVED AND IT IS SHOWN HOW DEVIATIONS FROM THE IDEALIZED MODEL, INVOLVING ROTATIONAL KINETIC ENERGY OF THE DOWNWIND STREAM AND TURBULENT MIXING FROM OUTSIDE THE BOUNDARIES OF THE IDEALIZED STREAM, CAN EITHER INCREASE OR DECREASE THE POWER AVAILABLE. THE LIMIT IS THUS NOT A STRICT UPPER LIMIT IN PRACTICE.

1979-0205 HARPER M R

AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS ASSESSMENT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 185-200.
SERI/TP-245-184, CONF-790501

AERODYNAMIC DEVICES THAT AUGMENT NATURAL WINDS OF LOW KINETIC ENERGY DENSITY HAVE THE POTENTIAL FOR PROVIDING A COST-EFFECTIVE ENERGY RESOURCE SYSTEM. SEVERAL CONCEPTS ARE DISCUSSED IN WHICH AN AUGMENTOR SURFACE IS USED TO INCREASE THE MASS FLOW THROUGH A TURBINE, INCREASING THE TURBINE'S POWER OUTPUT.

1979-0206 HEALY T J
ROCKY FLATS SMALL WIND SYSTEMS PROGRAM OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 41-56.
SERI/TP-245-184, CONF-790501

THIS PAPER PROVIDES AN OVERVIEW OF THE ROCKY FLATS SMALL WIND SYSTEMS PROGRAM SPONSORED BY THE UNITED STATES DEPARTMENT OF ENERGY (DOE). THIS PROGRAM PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. THE OVERALL OBJECTIVE IS TO STIMULATE THE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. THE INFORMATION PROVIDED IN THIS PAPER DESCRIBES THE CURRENT PROGRAM IN TERMS OF ITS OBJECTIVES, ACTIVITY HIGHLIGHTS AND FUTURE PLANS FOR FY1979 AS WELL AS PROJECTIONS THROUGH 1981.

1979-0207 HOFFERT M I, MILLER G
AUGMENTED VERTICAL AXIS WIND ENERGY SYSTEM EVALUATION.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 245-266.
SERI/TP-245-184, CONF-790501

PERFORMANCE AND COST CHARACTERISTICS OF WIND ENERGY CONVERSION SYSTEMS EMPLOYING BOTH A VERTICAL AXIS OF ROTATION AND SOME FORM OF AUGMENTATION BEYOND A "STAND-ALONE" ROTOR ARE ASSESSED, WITH EMPHASIS ON TWO SYSTEMS CURRENTLY APPROACHING COMMERCIAL FEASIBILITY: (1) THE TORNADO-VORTEX YEN WIND TURBINE (YWT) AND (2) THE DIFFUSOR-AUGMENTED LEBOST WIND TURBINE (LWT). BOTH TECHNOLOGICAL AND COST-EFFECTIVENESS CONSIDERATIONS ARE DISCUSSED FOR THESE SYSTEMS WITH EMPHASIS ON DEVELOPING APPROPRIATE ECONOMIC MEASURE FOR THEIR RESPECTIVE APPLICATIONS.

1979-0208 J. B. BUCHANAN'S WINDMILL COLLECTION: A BIT OF WIND POWER HISTORY IS PRESERVED.
WIND POWER DIG. NO. 17: 48-49, FALL 1979.

J. B. BUCHANAN'S COLLECTION OF OLD WINDMILLS IN TEXAS IS DESCRIBED.

1979-0209 J. CARTER'S DEVELOPMENT OF FIBERGLASS TECHNOLOGY.
WIND POWER DIG. NO. 17: 40-44, FALL 1979.

JAY CARTER'S WIND SYSTEM IS DESCRIBED: A UNIQUE 32-FOOT DIAMETER, TWO BLADED, DOWNWIND TURBINE CAPABLE OF 25 KILOWATTS AT WIND SPEEDS OF 25 MPH AND ABOVE.

1979-0210 JAYADEV T S, HENDERSON J, BINGHAM C
CONVERSION SYSTEM OVERVIEW ASSESSMENT. VOLUME II. SOLAR-WIND HYBRID SYSTEMS.
NTIS, AUGUST 1979. 34 P.
SERI/TR-35-078

SOLAR-WIND HYBRID SYSTEMS ARE DISCUSSED. IT IS SHOWN THAT THERE ARE LARGE AREAS IN THE UNITED STATES WHERE SOLAR AND WIND RESOURCES ARE COMPARABLE IN MAGNITUDE AND THERE ARE DIURNAL AND SEASONAL COMPLEMENTARITIES WHICH OFFER THE POTENTIAL FOR COST-EFFECTIVE HYBRID SYSTEMS. THERE ARE ALSO DISTINCT ENGINEERING FEATURES OF THE TWO CONVERSION TECHNOLOGIES. ELECTRIC POWER GENERATION FROM WIND IS STRAIGHTFORWARD AND COST-EFFECTIVE, WHEREAS SOLAR THERMAL CONVERSION TO GENERATE HEAT IS MORE COST-EFFECTIVE THAN TO GENERATE ELECTRICITY. EXAMPLES OF HYBRID SYSTEMS UTILIZING THESE FEATURES IN TOTAL ENERGY APPLICATIONS ARE PRESENTED.

1979-0211 KLUETER H H
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS.
NTIS, 1979. 324 P.
USDA WIND WORKSHOP, AMES, IOWA, MAY 15-17, 1979.
CONF-7905109

1979-0212 BELIVEAU K D
SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) INFORMATION CENTRE.
SOLAR ENERGY: BRINGING IT DOWN TO EARTH. VOLUME 1. NTIS, 1979. PAPER 79-50, 9 P.
CONF-7908116-(VOL.1)

THE SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) WAS ESTABLISHED IN AUGUST, 1977 TO PROVIDE ALBERTANS WITH CURRENT AND COMPREHENSIVE INFORMATION ON SOLAR AND WIND ENERGY RESOURCES IN ALBERTA. ACTIVITIES OF THE SWERP STAFF FALL INTO THREE CATEGORIES: COLLECTING AND INDEXING A LIBRARY OF REFERENCE MATERIAL ON SOLAR AND WIND ENERGY; DEVELOPING AND MAINTAINING A NETWORK OF MONITORING STATIONS THROUGHOUT ALBERTA; AND PARTICIPATING IN VARIOUS RESEARCH PROJECTS AND SPECIAL EVENTS. THE SWERP INFORMATION CENTRE MAINTAINS THE FIRST COMPUTERIZED INDEX OF SOLAR AND WIND ENERGY INFORMATION IN CANADA. THE IMPORTANT FEATURES OF THE DATABASE AND OTHER INFORMATION SERVICES AT SWERP ARE DISCUSSED.

1979-0213 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 36, FEBRUARY/MARCH 1979; NO. 37, MAY/JUNE 1979; NO. 38, JULY/AUGUST 1979; NO. 39, SEPTEMBER/OCTOBER 1979; NO. 40, NOVEMBER/DECEMBER 1979.

1979-0214 KMW/ERNO WIN SWEDISH WECS BID.
WIND ENERGY REP. :5, OCTOBER 1979.

1979-0215 KANAKI M T, PROBERT S D
CRETAN WINDMILLS.
APPL. ENERGY 5(3): 215-222, JULY 1979.

A RESURGENCE OF INTEREST IN THIS TYPE OF WINDMILL HAS OCCURRED RECENTLY BECAUSE OF ITS DESIGN SIMPLICITY AND LOW COST. WITH IT A RELATIVELY HIGH RATE OF ENERGY EXTRACTION MAY BE ACHIEVED FROM LOW-SPEED WINDS.

1979-0216 KAZA K R V, KVATERNIK R G

AEROELASTIC EQUATIONS OF MOTION OF A DARRIEUS VERTICAL-AXIS WIND-TURBINE BLADE.
NTIS, DECEMBER 1979. 57 P.
DOE/NASA/1028-79/25, NASA-TM-79295

THE SECOND-DEGREE NONLINEAR AEROELASTIC EQUATIONS OF MOTION FOR A SLENDER, FLEXIBLE, NONUNIFORM, DARRIEUS VERTICAL-AXIS WIND TURBINE BLADE WHICH IS UNDERGOING COMBINED FLATWISE BENDING, EDGEWISE BENDING, TORSION, AND EXTENSION ARE DEVELOPED USING HAMILTON'S PRINCIPLE. THE BLADE AERODYNAMIC LOADING IS OBTAINED FROM STRIP THEORY BASED ON A QUASI-STEADY APPROXIMATION OF TWO-DIMENSIONAL INCOMPRESSIBLE UNSTEADY AIRFOIL THEORY. THE DERIVATION OF THE EQUATIONS HAS ITS BASIS IN THE GEOMETRIC NONLINEAR THEORY OF ELASTICITY AND THE RESULTING EQUATIONS ARE CONSISTENT WITH THE SMALL DEFORMATION APPROXIMATION IN WHICH THE ELONGATIONS AND SHEARS ARE NEGLIGIBLE COMPARED TO UNITY.

1979-0217 KAZA K R V, JANETZKE D C, SULLIVAN T L
EVALUATION OF MOSTAS COMPUTER CODE FOR PREDICTING DYNAMIC LOADS IN TWO-BLADED WIND TURBINES.
STRUCTURES, STRUCTURAL DYNAMICS & MATERIALS, 20TH CONFERENCE, ST. LOUIS, APRIL 4-6, 1979. COLLECT. TECH. PAPERS. NEW YORK, AIAA, 1979. PAPER 79-00733, P. 53-63.

CALCULATED DYNAMIC BLADE LOADS ARE COMPARED WITH MEASURED LOADS OVER A RANGE OF YAW STIFFNESSES OF THE DOE/NASA MOD-0 WIND TURBINE TO EVALUATE THE PERFORMANCE OF TWO VERSIONS OF THE MOSTAS COMPUTER CODE. THE FIRST VERSION USED A TIME-AVERAGED COEFFICIENT APPROXIMATION IN CONJUNCTION WITH A MULTIBLADE COORDINATE TRANSFORMATION FOR TWO-BLADED ROTORS TO SOLVE THE EQUATIONS OF MOTION BY STANDARD EIGENANALYSIS. THE RESULTS OBTAINED WITH THIS APPROXIMATE ANALYSIS DO NOT AGREE WITH DYNAMIC BLADE LOAD AMPLIFICATIONS AT OR CLOSE TO RESONANCE CONDITIONS.

1979-0218 KILAR L A
WIND BLOWS ANEW.
POWER 123(5): 40-42, MAY 1979.

BUSBAR ENERGY COSTS OF WIND-ENERGY CONVERSION SYSTEMS (WECS) DEPEND ON ENVIRONMENTAL AND APPLICATION PARAMETERS AS WELL AS ON MACHINE TYPE, BUT 40 TO 80 MILLS/KWH IS TYPICAL OF CURRENT FORECASTS FOR INTERMEDIATE (100-600-KW) AND LARGE (OVER-600-KW) UNITS ALTHOUGH ENERGY COSTS FOR SMALL COMMERCIAL WIND TURBINES CAN RUN TWO TO THREE TIMES THAT. DOE'S SHORT-RANGE GOAL FOR 200-KW-SIZE MACHINES IS 15-25 MILLS/KWH. BESIDES THE FICKLENESS OF LOCAL WIND CONDITIONS, TECHNICAL, ENVIRONMENTAL, AND SOCIAL PROBLEMS MUST BE ADDRESSED. WIND-TURBINE/GENERATORS ARE CATEGORIZED TODAY IN TERMS OF THE ORIENTATION OF THE AXIS OF ROTATION, RELATIVE TO THE WINDSTREAM. HORIZONTAL-AXIS, VERTICAL-AXIS, AND CROSS-WIND HORIZONTAL AXIS ROTORS ARE DESCRIBED.

1979-0219 KILAR L A, CHOWANIEC C R
TECHNICAL AND ECONOMIC ASSESSMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, VANCOUVER, BC, JULY 15-20, 1979. PREPRINT. NEW YORK, IEEE, PAPER A 79 454-0, 1979. 6 P.

THIS PAPER PRESENTS THE PRINCIPAL RESULTS OF A COMPREHENSIVE ASSESSMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS. CONCEPTUAL DESIGNS AND ASSOCIATED COSTS ARE GIVEN FOR THE MAJOR COMPONENTS OF MULTI-UNIT INSTALLATIONS. ON-SHORE ENERGY COSTS ARE DEVELOPED IN TERMS OF CONTROLLING ENVIRONMENTAL PARAMETERS, DISTANCE FROM SHORE, AND EQUIPMENT TYPE.

1979-0220 KLIMAS P C
DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES.
NTIS, 1979. 12 P.
SAND-79-0997C, CONF-790501-2

THE OBJECTIVE OF THE DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES IS TO DEVELOP AND TRANSFER THE NECESSARY INFORMATION ASSOCIATED WITH VERTICAL AXIS WIND TURBINES (VAWTS) TO ALLOW COMMERCIAL COMPANIES THE OPPORTUNITY TO DEVELOP, MANUFACTURE AND SELL VAWTS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, TESTING AND SYSTEMS ANALYSES CAPABILITIES HAVE EVOLVED TO SUPPORT AND EVALUATE COMPLETE SYSTEMS DESIGNS, AND CONTRACTS HAVE BEEN LET WHICH ARE PLANNED TO RESULT IN THE COMPLETED INSTALLATION OF A LOW-COST 17M VAWT BY FEBRUARY 1981. A NUMBER OF POTENTIAL IMPROVEMENTS HAVE BEEN IDENTIFIED DURING THIS FIRST LEVEL DESIGN CYCLE WHICH MAY SUBSTANTIALLY LOWER FUTURE SYSTEM COSTS.

1979-0221 KLIMAS P C
DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 57-70.
SERI/TP-245-184, CONF-790501

THE OBJECTIVE OF THE DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES IS TO DEVELOP AND TRANSFER THE NECESSARY INFORMATION ASSOCIATED WITH VERTICAL AXIS WIND TURBINES (VAWTS) TO ALLOW COMMERCIAL COMPANIES THE OPPORTUNITY TO DEVELOP, MANUFACTURE AND SELL VAWTS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, TESTING AND SYSTEMS ANALYSES CAPABILITIES HAVE EVOLVED TO SUPPORT AND EVALUATE COMPLETE SYSTEMS DESIGNS, AND CONTRACTS HAVE BEEN LET WHICH ARE PLANNED TO RESULT IN THE COMPLETED INSTALLATION OF A LOW-COST 17M VAWT BY FEBRUARY 1981. A NUMBER OF POTENTIAL IMPROVEMENTS HAVE BEEN IDENTIFIED DURING THIS FIRST LEVEL DESIGN CYCLE WHICH MAY SUBSTANTIALLY LOWER FUTURE SYSTEM COSTS.

1979-0222 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 153-170.
SERI/TP-245-184, CONF-790501

TWO INNOVATIVE VORTEX EXTRACTION DEVICES--THE TORNADO WIND ENERGY SYSTEM (TWES) AND THE VORTEX AUGMENTOR CONCEPT (VAC)--ARE CRITICALLY EVALUATED TO PROVIDE A PRELIMINARY ASSESSMENT OF THEIR TECHNICAL AND ECONOMIC VIABILITY COMPARED TO CONVENTIONAL HORIZONTAL AXIS WIND ENERGY SYSTEMS.

1979-0223 CARTER J
INTRODUCTION TO SMALL-SCALE WIND POWER.
SOLAR AGE RESOURCE BOOK, MCPHILLIPS, M., ED. NEW YORK, EVEREST HOUSE, 1979. P. 79-84.

WIND ENERGY CONVERSION SYSTEMS FOR SMALL SCALE GENERATION OF ELECTRICITY AND WATER PUMPING ARE DISCUSSED. THE ECONOMICS, SIZING, LOAD ANALYSIS AND SITE SELECTION FOR WIND MACHINES ARE CONSIDERED.

1979-0224 LAITOS J, FEUERSTEIN R J
REGULATED UTILITIES AND SOLAR ENERGY: A LEGAL-ECONOMIC ANALYSIS OF THE MAJOR ISSUES AFFECTING THE SOLAR COMMERCIALIZATION EFFORT.

NTIS, JUNE 1979. 131 P.
SERI/TR-62-255

THE REACTION OF PUBLIC UTILITIES TO THE ADDITION OF COMPETITIVE SOURCES OF ENERGY SUPPLIED BY SOLAR TECHNOLOGIES WILL HAVE A SIGNIFICANT IMPACT ON THE COMMERCIALIZATION OF SOLAR ENERGY. DECENTRALIZED APPLICATIONS OF SOLAR ENERGY NEED UTILITY-PRODUCED POWER TO BACK UP THE ENERGY PRODUCED BY SOLAR MEANS. THE COST AND AVAILABILITY OF THIS POWER WILL LARGELY DETERMINE THE ACCEPTANCE OF SOLAR ENERGY. THERE ARE THREE LEGAL ISSUES SURROUNDING THE ROLE OF UTILITIES IN THE SOLAR COMMERCIALIZATION EFFORT: (1) THE EXTENT TO WHICH SOLAR-POWERED UTILITIES MAY OWN, SELL, LEASE, FINANCE, OR SERVICE SOLAR DEVICES FOR UTILITY CUSTOMERS; (2) THE DEGREE TO WHICH SOLAR-POWERED UTILITIES MAY BE ABLE TO COMPETE WITH EXISTING UTILITIES; AND (3) THE DEGREE TO WHICH VARIOUS UTILITY RATE STRUCTURES WILL BE ALLOWED TO PENALIZE DECENTRALIZED SOLAR USERS.

1979-0225 LAWRENCE K A
REVIEW OF THE ENVIRONMENTAL EFFECTS AND BENEFITS OF SELECTED SOLAR ENERGY TECHNOLOGIES.
NTIS, MAY 1979. 18 P.
SERI/TP-53-114R

DATA ARE REVIEWED AND SUMMARIZED ON THE ENVIRONMENTAL EFFECTS OF THREE SOLAR ENERGY TECHNOLOGIES: PHOTOVOLTAIC CELLS, WIND ENERGY CONVERSION (WEC), AND THE SOLAR THERMAL CENTRAL RECEIVER. POTENTIAL EFFECTS ARE IDENTIFIED FOR EACH OF THE LIFE CYCLE PHASES: RESOURCE EXTRACTION AND COMPONENT MANUFACTURE, PLANT CONSTRUCTION, OPERATION AND DECOMMISSION. THE SOLAR ENERGY TECHNOLOGIES ARE ASSUMED TO BE DEPLOYED AS CENTRALIZED ENERGY PRODUCTION FACILITIES. THE TECHNOLOGIES EXAMINED ARE MATERIALS INTENSIVE COMPARED TO FOSSIL FUEL PLANTS WITH THE SAME POWER RATING. AS A RESULT, THE LIFE-CYCLE PHASE OF RESOURCE EXTRACTION AND COMPONENT PRODUCTION IS THE MOST ENVIRONMENTALLY HAZARDOUS.

1979-0226 LEONARD T M
USER'S MANUAL FOR THE COMPUTER CODE PAREP.
NTIS, APRIL 1979. 58 P.
SAND-79-0431

PAREP (PARAMETRIC REPRESENTATION), A COMPUTER CODE THAT USES NUMERICAL AND EMPIRICAL DATA TO ESTIMATE THE AERODYNAMIC PERFORMANCE OF DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES, IS DISCUSSED. BOTH PROGRAM THEORY AND USAGE ARE DESCRIBED FOR THE CODE. SAMPLE RUNS AND PROGRAM LISTINGS ARE PROVIDED.

1979-0227 LIEBLEIN S, LONDAHL D S, FURLONG D B, PEERY D J, DREIER M E
EVALUATION OF FEASIBILITY OF PRESTRESSED CONCRETE FOR USE IN WIND TURBINE BLADES.
NTIS, SEPTEMBER 1979. 120 P.
DOE/NASA/5906-79/1, NASA-CR-159725, TRS 104

A PRELIMINARY EVALUATION WAS CONDUCTED OF THE FEASIBILITY OF THE USE OF PRESTRESSED CONCRETE AS A MATERIAL FOR LOW-COST BLADES FOR WIND TURBINES. A BASELINE BLADE DESIGN WAS ACHIEVED FOR THE DOE/NASA MOD-0 100 KW EXPERIMENTAL WIND TURBINE THAT MET AERODYNAMIC AND STRUCTURAL REQUIREMENTS. CALCULATED BLADE WEIGHT AND COST WERE 4,900 LB. AND AROUND $18,000, COMPARED TO 2,000 LB. AND AROUND $200,000 FOR A MOD-0 ALUMINUM BLADE. SIGNIFICANT COST REDUCTIONS WERE INDICATED FOR VOLUME PRODUCTION. CASTING OF A MODEL BLADE SECTION SHOWED NO FABRICATION PROBLEMS. COUPLED DYNAMIC ANALYSIS REVEALED THAT ADVERSE ROTOR-TOWER INTERACTIONS CAN BE SIGNIFICANT WITH HEAVY ROTOR BLADES. DESIGN OPTIONS ARE DISCUSSED.

1979-0228 WOODBRIDGE D D
SOURCES AND POTENTIAL USES OF WAVE ENERGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 544-555.

THIS PAPER DISCUSSES THE FEASIBILITY OF THE DEVELOPMENT OF AN OCEAN SWELL AND WAVE ENERGY CONVERSION SYSTEM, COMBINING BOTH SOLAR AND WIND ENERGY WITH OCEAN WAVE ENERGY, FOR APPLICATIONS AS A POWER SOURCE AND RECREATIONAL FACILITY.

1979-0229 LINDLEY C A, MELTON W C
ELECTRIC UTILITY APPLICATION OF WIND ENERGY CONVERSION SYSTEMS ON THE ISLAND OF OAHU.
NTIS, FEBRUARY 23, 1979. 341 P.
ATR-78(7598)-2

THIS WIND ENERGY APPLICATION STUDY WAS PERFORMED BY THE AEROSPACE CORPORATION FOR THE WIND SYSTEMS BRANCH OF THE DEPARTMENT OF ENERGY. THE OBJECTIVE WAS TO IDENTIFY INTEGRATION PROBLEMS FOR A WIND ENERGY CONVERSION SYSTEM (WECS) PLACED INTO AN EXISTING CONVENTIONAL UTILITY SYSTEM. THE INTEGRATION PROBLEMS INCLUDED ENVIRONMENTAL, INSTITUTIONAL AND TECHNICAL ASPECTS AS WELL AS ECONOMIC MATTERS, BUT THE EMPHASIS WAS ON THE ECONOMICS OF WIND ENERGY. THE HAWAIIAN ELECTRIC COMPANY UTILITY SYSTEM ON THE ISLAND OF OAHU WAS SELECTED FOR THE STUDY BECAUSE OF THE VERY REAL POTENTIAL FOR WIND ENERGY ON THAT ISLAND, AND BECAUSE OF THE SIMPLICITY AFFORDED IN ANALYZING THAT ISOLATED UTILITY.

1979-0230 ADKINS D W, YOUNG M I
DYNAMIC RESPONSE OF POWER GENERATING WIND TURBINES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE 1979. P. 560-561.

A MODEL IS PRESENTED OF THE ROTATIONAL DYNAMICS OF A LARGE WIND TURBINE DRIVING SYNCHRONOUS AND NON-SYNCHRONOUS ELECTRIC GENERATORS. THE ROTOR IS ASSUMED RIGID WITH CONSTANT-CHORD BLADES AND IS MODELED BY AERODYNAMIC STRIP THEORY. THE LOADS INCLUDE A DC GENERATOR WITH EITHER FIELD CURRENT CONTROL OR BLADE PITCH CONTROL AND A SYNCHRONOUS ALTERNATOR WITH BLADE PITCH CONTROL. THESE MODELS ARE USED TO EVALUATE ROTATIONAL RESPONSE OF THE WIND TURBINE TO STEP-CHANGES IN WIND SPEED.

1979-0231 AFANASJEVS J, MASSMAN W J, OEHLKERS R A, HINTON B B, SUOMI V E
EXTENDED RECORD LENGTH OF ATMOSPHERIC DATA GATHERED VIA NIMBUS-6.
IEEE TRANS. GEOSCI. ELECTRON. GE-17(4): 308-313, OCTOBER 1979.

A LOW-POWER NONVOLATILE DATA MEMORY UNIT WAS DEVELOPED FOR FREE FLOATING BALLOONS IN THE TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE), DESIGNED TO INVESTIGATE THE METEOROLOGY OF THE UPPER TROPOSPHERE AND LOWER STRATOSPHERE IN THE SOUTHERN HEMISPHERE. BY MULTIPLE IDENTIFICATION CODES DATA RECORDS, SEVERAL HOURS LONG, WERE TRANSFERRED IN COMPRESSED FORM TO THE NIMBUS-6 SATELLITE FOR RETRANSMISSION TO GROUND STATIONS. EIGHT OF THESE UNITS WERE FLOWN ON CONSTANT DENSITY BALLOONS TO INVESTIGATE ATMOSPHERIC WAVE MOTIONS THROUGHOUT THE SOUTHERN HEMISPHERE. ONE RETURNED VALID DATA FOR TEN MONTHS. SIMILAR TECHNIQUES WERE USED WITH

OTHER TYPES OF OBSERVING PLATFORMS.

1979-0232 WIND POWER'S BOON TO MANKIND.
NEW SCI. 83(1170): 645, AUGUST 30, 1979.

THE NASA/DOE 2 MEGAWATT MACHINE AT BOONE, NORTH CAROLINA, IS DESCRIBED.

1979-0233 ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT, PHASE 2: COAL, HYDROELECTRIC, AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE.
NTIS, JANUARY 1979. 326 P.
RLO-1002-T2(V.3)

THE ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT IS PRESENTED IN THREE VOLUMES. THIS VOLUME, VOL. III, CONSIDERS ALTERNATIVE ENERGIES AND THE REGIONAL ASSESSMENT INVENTORY UPDATE. THE INTRODUCTORY CHAPTER, CHAPTER 12, EXAMINES THE HISTORICAL BACKGROUND, CURRENT TECHNOLOGICAL STATUS, ENVIRONMENTAL IMPACT, APPLICABILITY TO ALASKA, AND SITING CONSIDERATIONS FOR A NUMBER OF ALTERNATIVE SYSTEMS. ALL OF THE SYSTEMS CONSIDERED USE OR COULD USE RENEWABLE ENERGY RESOURCES. THE CHAPTERS THAT FOLLOW ARE ENTITLED: VERY SMALL HYDROPOWER (ABOUT 12 KW OR LESS FOR RURAL AND REMOTE VILLAGES); LOW-TEMPERATURE GEOTHERMAL SPACE HEATING; WIND; FUEL CELLS; SITING CRITERIA AND PRELIMINARY SCREENING OF COMMUNITIES FOR ALTERNATE ENERGY USE; WOOD RESIDUES; WASTE HEAT; AND REGIONAL ASSESSMENT INVENTORY UPDATE.

1979-0234 ALEXANDERSSON H
STATISTICAL ANALYSIS OF WIND, WIND PROFILES AND GUST RATIOS AT GRAENBY, UPPSALA.
NTIS, 1979. 73 P.
UUIM-55

A STATISTICAL ANALYSIS OF WIND DATA FROM UPPSALA, SWEDEN IS PRESENTED. MEASUREMENTS ARE OBTAINED FROM A 100 M METEOROLOGICAL TOWER AT GRAENBY SITUATED AT THE N E BOUNDARY-LINE OF THE CITY. THE DATA FROM THE PROFILE INSTRUMENTATION (8 LEVELS) ARE EXPLOITED. THE COLLECTION OF DATA IS PRIMARILY DIVIDED INTO 5 X 8 CLASSES WITH RESPECT TO STABILITY AND WIND DIRECTION AND SOME MEAN PROFILES ARE PRESENTED AND DISCUSSED. THE WEIBULL DISTRIBUTION AND THE CORRESPONDING ASYMPTOTIC EXTREME VALUE DISTRIBUTION HAVE BEEN USED TO DESCRIBE THE OBSERVED FREQUENCIES AND EXTEND THE RESULTS. THE IMPORTANT EXTENSION TO SHORT AVERAGING TIMES IS BRIEFLY ANALYSED AND DISCUSSED.

1979-0235 APPENDIX: MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT, VOLUME 2.
NTIS, MAY 1979. 425 P.
NASA-CR-159496, DOE/NASA/0058-79/2-V-2-APP, N80-18565/5

THE MOD-1 DETAIL DESIGN IS APPENDED. THE SUPPORTING ANALYSES PRESENTED INCLUDE A PARAMETRIC SYSTEM TRADE STUDY, A VERIFICATION OF THE COMPUTER CODES USED FOR ROTOR LOADS ANALYSIS, A METAL BLADE STUDY, AND A DEFINITION OF THE DESIGN LOADS AT EACH PRINCIPAL WIND TURBINE GENERATOR INTERFACE FOR CRITICAL LOADING CONDITIONS. SHIPPING AND ASSEMBLY REQUIREMENTS, COMPOSITE BLADE DEVELOPMENT, AND ELECTRICAL STABILITY ARE ALSO DISCUSSED.

1979-0236 ARMENCOIU R D, COJOCARU D
NEW FORMS OF ENERGY CONSIDERED AS USABLE IN RUMANIA IN THE (PLANNING) STAGE.
ENERGETICA 27(7-8): 330-334, JULY-AUGUST 1979. (IN RUMANIAN)

FOUR ENERGY SOURCES ARE CONSIDERED BRIEFLY. SOLAR ENERGY IS DISCUSSED FIRST, IN TERMS OF DIRECT OR INDIRECT UTILIZATION, THE LATTER REFERRING TO LIVING PLANT GROWTH AND SUBSEQUENT GAS PRODUCTION THEREFROM. A SCHEME IS MENTIONED CONSISTING OF SOLAR COLLECTORS FOR WATER HEATING, BACKED BY A FOSSIL FUEL HEATER FOR PEAK DEMANDS. SOME SOLAR ENERGY CONTOURS ARE MAPPED FOR THE COUNTRY. WIND ENERGY IS CONSIDERED ONLY VERY BRIEFLY. NEXT, GEOTHERMAL ENERGY IS DISCUSSED AND A SCHEME OF UTILIZATION IS SKETCHED. FINALLY, MENTION IS MADE OF BIO GAS.

1979-0237 ARMSTRONG J R C, LIPMAN N H, DUNN P D
A REVIEW OF THE U.S. WIND ENERGY PROGRAMME.
WIND ENG. 3(2): 75-106, 1979.

THIS PAPER DISCUSSES THE DEVELOPMENT OF THE U.S. WIND ENERGY PROGRAMME AND ITS UTILITY APPLICATION WITH REFERENCE TO THE MOD-1 AND MOD-2 MACHINES. CHARACTERISTICS OF SMALL WECS, WIND CHARACTERISTICS AND SITING, TECHNOLOGY DEVELOPMENT AND ADVANCED SYSTEMS ARE ALSO DESCRIBED. A COMPARISON OF U K ACTIVITIES WITH THE U.S. PROGRAMME IS PRESENTED.

1979-0238 ARMSTRONG M D, ARMSTRONG J E
COMMUNITY IMPEDIMENTS TO IMPLEMENTATION OF SOLAR ENERGY.
NTIS, NOVEMBER 1979. 112 P.
DOE/EV-0059

THE COMPLETE ARRAY OF INSTITUTIONAL PROBLEMS EXPECTED WHEN SOLAR TECHNOLOGIES ARE IMPLEMENTED ON A NATIONAL SCALE IS ASSEMBLED. THE FINDINGS OF THE STUDY ARE PRESENTED IN TWO FORMATS. FIRST, THE RESULTS ARE ORGANIZED BY THE TIME FRAMES OF DELAYS IN SOLAR IMPLEMENTATION CAUSED BY THE INHERENT DIFFICULTIES A NATIONAL ENERGY POLICY WOULD ENCOUNTER IN CHANGING THE WAY A GIVEN INSTITUTION RESPONDS TO SPECIFIC SOLAR TECHNOLOGIES. THE SECOND FORMAT CONSTITUTES A DESCRIPTION OF THE DIFFICULTIES AT THE COMMUNITY LEVEL, ASSOCIATED WITH IMPLEMENTING EACH SOLAR TECHNOLOGY.

1979-0239 BABB S M, JOHNSON G L
WIND INSTRUMENTATION WITH MICROPROCESSORS.
IECI '79. INDUSTRIAL AND CONTROL APPLICATIONS OF MICROPROCESSORS: PAPERS PRESENTED AT IECI '79, PHILADELPHIA, MARCH 19-21, 1979. NEW YORK, IEEE, 1979. P. 126-130.

THIS PAPER DESCRIBES INSTRUMENTATION TO MEASURE PERFORMANCE OF A SAVONIUS WIND TURBINE. PERFORMANCE ANALYSIS REQUIRES DATA HISTOGRAMS OF WIND, SPEED, TORQUE, AND POWER. THESE HISTOGRAMS ARE PRODUCED BY A KIM-1 MICROCOMPUTER AND A/D SYSTEM. LIGHTNING PROTECTION AND ANALOG AND DIGITAL SENSORS FOR WIND SPEED, DIRECTION, RPM, TORQUE, TEMPERATURE, PRESSURE, AND POWER ARE DESCRIBED.

1979-0240 BAKER R W, WHITNEY R L, HEWSON E W
A LOW LEVEL WIND MEASUREMENT TECHNIQUE FOR WIND TURBINE GENERATOR SITING.
WIND ENG. 3(2): 107-114, 1979.

LARGE WIND TURBINE GENERATORS TO BE CONSTRUCTED SOON WILL HAVE ROTORS AS GREAT AS 100 M IN DIAMETER. STRONG

AND PERSISTENT WINDS ARE NEEDED IF THESE AEROGENERATORS ARE TO BE COST EFFECTIVE. PRELIMINARY SITE SURVEYS IN MOUNTAINOUS TERRAIN TO LOCATE SUCH LARGE MACHINES REQUIRE INEXPENSIVE, PORTABLE AND REASONABLY ACCURATE METHODS FOR MEASURING WINDS AT HEIGHTS UP TO 100 M OR MORE ABOVE THE GROUND. OF THE VARIOUS METHODS AVAILABLE, THE RECENTLY DEVELOPED TETHERED AERODYNAMICALLY LIFTING ANEMOMETER (TALA) HAS BEEN TESTED AND FOUND TO BE THE MOST SATISFACTORY.

1979-0241 BARRON J, COLE W J
AN INTEGRATED ENERGY SYSTEM FOR THE ASPHALT GREEN YOUTH SPORTS AND ARTS CENTER AND THE FIREBOAT HOUSE.
NTIS, SEPTEMBER 1979. 103 P.
PB80-187826

THIS REPORT OUTLINES ENERGY CONSERVATION AND SOLAR ENERGY MEASURES FOR TWO OLD BUILDINGS IN NEW YORK CITY, DIFFERENT IN SCALE AND CHARACTER, BEING RECYCLED BY THE NEIGHBORHOOD COMMITTEE FOR THE ASPHALT GREEN INTO A COMMUNITY SPORTS AND ARTS CENTER AND AN ENVIRONMENTAL STUDIES CENTER. ENERGY CONSERVATION AND RENEWABLE ENERGY MEASURES THAT MINIMIZE LIFE CYCLE COSTS WERE INCORPORATED INTO THE APPROACH TAKEN FOR THE COMMERCIAL SCALE SPORTS AND ARTS CENTER.

1979-0242 BARTON R S, BOWLER C E J, PIWKO R J
CONTROL AND STABILIZATION OF THE DOE/NASA MOD-1 TWO MEGAWATT WIND TURBINE GENERATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 325-330.

THIS PAPER DESCRIBES THE CONTROLS DESIGN AND PERFORMANCE SIMULATION PROCESS AND SPECIALIZED DYNAMIC CONSIDERATIONS FOR THE DOE/NASA MOD 1 WIND TURBINE GENERATOR (WTG). IT SHOWS CONTROLS, STRUCTURAL AND UTILITY INTERFACE CONSIDERATIONS OF THE WIND TURBINE GENERATOR AND SHOWS HOW A WIND TURBINE GENERATOR CAN BE SUCCESSFULLY INTEGRATED WITH A SYNCHRONOUS POWER SYSTEM. DIFFERENCES WITH RESPECT TO FOSSIL OR HYDRO GENERATON AND THEIR IMPLICATIONS ARE VITAL TO LONG-TERM WTG RELIABILITY AND AVAILABILITY, AND ACCEPTANCE BY UTILITIES AND CONSUMERS.

1979-0243 BASE T E, RUSSELL L J
THE FLOW FIELD ABOUT A VERTICAL AXIS WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE 1979. P. 558-559.

THE FLOW FIELD ABOUT A STRAIGHT BLADED VERTICAL AXIS WIND TURBINE WAS INVESTIGATED USING A COMPUTED VORTEX MODEL. THE VORTEX MODEL PROVIDED IMPROVED ESTIMATES OF THE INFLOW FACTORS WHICH DETERMINES THE DEGREE OF SLOWING DOWN OF THE LOCAL FLOW THROUGH THE TURBINE AND IS IMPORTANT IN TURBINE PERFORMANCE CALCULATIONS. THE STUDY ALSO PRODUCED A MODEL OF THE LOCAL FLOW FIELD USED TO DETERMINE COHERENT FLOW STRUCTURES WHICH ARE DEVELOPED BY THE TURBINE BLADES. THESE COHERENT FLOW STRUCTURES COULD PERSIST DOWNSTREAM AND NOT ONLY BUFFET THE OTHER ROTOR BLADES BUT ALSO CONTRIBUTE SIGNIFICANTLY TO THE WAKE STRUCTURE OF THE TURBINE AND AFFECT ANY OTHER TURBINE POSITIONED FURTHER DOWNSTREAM. AN IMPORTANT ASPECT, CONCERNING THE DESIGN OF VERTICAL AXIS TURBINES, IS TO ESTIMATE THE EXTENT OF THE BLADE VIBRATIONS INDUCED BY FORCES DUE TO THE LOCAL TURBULENT FLOW.

1979-0244 BEST R W B
LIMITS TO WIND POWER.
ENERGY CONVERS. 19(2): 71-72, 1979.

SIMPLE FORMULAS ARE GIVEN FOR THE CHANGE IN WIND-POWER, FRICTIONAL STRESS AND VERTICAL ENERGY TRANSPORT IN THE ATMOSPHERIC BOUNDARY LAYER, CAUSED BY THE ERECTION OF WINDMILL ARRAYS. THE LIMIT TO WIND-POWER CONVERSION APPEARS TO BE AROUND 1 W/M**2 OF TERRAIN IN BOTH COASTAL AND INLAND AREAS.

1979-0245 BINDER G, FRITZSCHE A, VOLLAN A, DEKITSCH A, JOOS R
DEVELOPMENT OF A 5.5 M DIAMETER VERTICAL AXIS WIND TURBINE, PHASE 2.
NTIS, JULY 1979. 138 P.
BMFT-FB-T-79-04, N80-22859/6

THE DESIGN WORK FOR THE TURBINE, INCLUDING THE AERODYNAMIC AND STRUCTURAL DYNAMIC INVESTIGATIONS, WAS PERFORMED, AND THE WIND TURBINE BUILT AND TESTED IN A WIND TUNNEL. THE ROTOR DIAMETER OF 5.5 M IS NOT ONLY A SUITABLE SIZE FOR THE TESTS, BUT INDICATES THAT THE RESULTS WILL CONTRIBUTE TO THE EXPERIMENTAL DATA REQUIRED FOR THE DESIGN OF LARGE CONVERTERS. THE LAYOUT OF THE ROTOR, THE CONSTRUCTION METHODS AND CHOICE OF MATERIALS FAVOR SERIES PRODUCTION, APPLYING ADVANCED MASS PRODUCTION TECHNOLOGY, WITHOUT EXCLUDING THE MANUFACTURE IN DEVELOPING COUNTRIES. THE WIND TUNNEL TEST PERFORMED WITH THE TWO, THREE, AND FOUR BLADE VERSION OF THE DARRIEUS-ROTOR AND WITH SAVONIUS-ROTORS OF DIFFERENT HEIGHTS CONFIRMED THE AERODYNAMIC CALCULATIONS. POSSIBILITIES TO IMPROVE THE EFFICIENCY OF THE SAVONIUS-ROTOR AND TO SIMPLIFY SOME DETAILS CONCERNING DESIGN AND MANUFACTURE WERE EVALUATED.

1979-0246 BISHOP C J
SYSTEMS ANALYSIS AND TESTING (SAT) PROGRAM. PROGRESS REPORT, OCTOBER 1, 1978--MARCH 31, 1979.
NTIS, JULY 1979. 19 P.
SERI/PR-35-313

THIS DOCUMENT DESCRIBES SERI ACTIVITIES FOR THE SAT PROGRAM DURING OCTOBER 1, 1978-MARCH 31, 1979. THESE INCLUDE A REEVALUATION OF THERMOSIPHON HOT WATER SYSTEMS; A REVIEW OF EXISTING WIND MACHINE PERFORMANCE MODELS; A STUDY OF THE EFFECTS OF WIND TRANSIENTS, AND CONTROL SYSTEM AND LOAD MANAGEMENT ON ENERGY CAPTURE; A STUDY OF NEW CONCEPTS FOR SOLAR PONDS INVOLVING STRATIFIED PONDS; ESTABLISHMENT OF THE SERI COMPUTATIONAL METHODS CENTER; DISSEMINATION OF F-CHART; A REVIEW OF PHOTOVOLTAIC SYSTEMS ANALYSIS METHODS; DEVELOPMENT OF A DRAFT SAT PROGRAM PLAN, SAT MANAGEMENT PLAN, AND AN INTEGRATED SYSTEM TEST AND VALIDATION PLAN; AND TRANSFER OF TECHNICAL MANAGEMENT OF DOE CONTRACTS IN THE SAT PROGRAM.

1979-0247 BOGLE A W, MCMULLAN J T, MORGAN R, MURRAY R B
MODELLING OF A DOMESTIC WIND POWER SYSTEM INCLUDING STORAGE.
INT. J. ENERGY RES. 3(2): 113-127, APRIL-JUNE 1979.

A SIMULATION ANALYSIS IS PRESENTED OF DOMESTIC HEATING BY A WIND POWER SYSTEM INCLUDING STORAGE AT A LOCATION 54 DEGREES 39' N, 6 DEGREES 13' W (ALDERGROVE, NORTHERN IRELAND). A SIMPLE THEORETICAL MODEL IS CONSTRUCTED COMPRISING A HOUSE OF SPECIFIED DIMENSIONS AND HEAT LOSS CHARACTERISTICS, AN AEROGENERATOR AND A THERMAL STORE. THE DATA BASE USED IS A MAGNETIC TAPE OF HOURLY WIND SPEED AND AIR TEMPERATURE READINGS TAKEN AT ALDERGROVE METEOROLOGICAL STATION DURING 1949-1975. THE RESULTS SUGGEST A MEASURE OF OPTIMIZATION BETWEEN STORE CAPACITY AND GENERATOR RATING BASED ON TECHNICAL CONSIDERATIONS ALONE. A SIMPLE ECONOMIC OPTIMIZATION IS ALSO PRESENTED.

1979-0248 BOLTON H R, NICODEMOU V C
OPERATION OF SELF-EXCITED GENERATORS FOR WINDMILL APPLICATION.
INST. ELECTR. ENG. PROC. 126(9): 815-820, SEPTEMBER 1979.

THIS PAPER DEALS WITH THE OPERATION OF SELF-CONTROLLED WOUND-FIELD GENERATORS FOR SMALL-SCALE WIND-POWER APPLICATION IN WHICH THE OUTPUT IS CONNECTED IN PLAIN SHUNT OR SERIES. IT IS SHOWN THAT, WITH THIS CONFIGURATION, A FAIRLY GOOD NATURAL MATCH CAN BE OBTAINED BETWEEN THE POWER/SPEED CHARACTERISTICS OF THE GENERATOR AND THE WINDMILL, PARTICULARLY WHEN THE MAGNETIC CIRCUIT OF THE GENERATOR GOES FAIRLY HARD INTO SATURATION AT HIGHER SPEEDS AND FIELD CURRENTS.

1979-0249 BRAGG G M
WIND POWER.
SOLAR ENERGY CONVERSION. AN INTRODUCTORY COURSE, WATERLOO, ONTARIO, AUGUST 6-19, 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1245-1265.

THIS ARTICLE DESCRIBES THE FUNDAMENTALS OF WIND POWER UTILISATION WITH EMPHASIS ON THE INFORMATION NEEDED TO DECIDE ON THE BASIC GEOMETRY OF WIND POWER DEVICES AND TO DISCUSS THE AVAILABILITY OF WIND FOR POWER GENERATION. IT ALSO DISCUSSES BRIEFLY THE ECONOMICS AND SOCIAL ACCEPTANCE OF WIND POWER DEVICES AT THE PRESENT TIME.

1979-0250 BRAGG G M, SCHMIDT W L
PERFORMANCE MATCHING AND OPTIMIZATION OF WIND POWERED WATER PUMPING SYSTEMS.
ENERGY CONVERS. 19(1): 33-39, 1979.

A PROCEDURE IS PRESENTED WHICH ALLOWS OPTIMUM SELECTION OF PUMPS AND WINDMILLS FOR A GIVEN WATER PUMPING SITUATION. WHEN INFORMATION ON THE WIND, PUMP CHARACTERISTICS AND WINDMILL CHARACTERISTICS IS AVAILABLE, THE BEST PUMP AND WINDMILL FOR THE APPLICATION MAY BE SELECTED, AND THE DESIGN AND OFF-DESIGN PERFORMANCE OF THE COMPLETE SYSTEM MAY BE PREDICTED.

1979-0251 BUEHRING W A, HUB K A, HUBER C C, VANKUIKEN J C, GROS J G
RELIABILITY EFFECTS OF WIND INTEGRATION WITH A CONVENTIONAL ELECTRICAL UTILITY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 555-557.

THE POTENTIAL IMPACTS OF INCORPORATING WIND TURBINES, AS AN EXAMPLE OF AN INTERMITTENT SUPPLY OPTION, INTO A CONVENTIONAL ELECTRICAL GENERATING SYSTEM ARE EXAMINED. THE STUDY FOCUSES ON THE AMOUNT OF ELECTRICITY GENERATION REPLACED BY WIND, THE CONTRIBUTION OF THE WIND TURBINES TO THE GENERATING SYSTEM RELIABILITY, AND THE METHODS USED TO CALCULATE THESE BENEFITS. A SIMPLE COST MODEL WAS DEVELOPED TO ESTIMATE BREAKEVEN COSTS FOR WIND TURBINES BASED ON ENERGY AND CAPACITY DISPLACEMENT SAVINGS.

1979-0252 BUEHRING W A, HUB K A, HUBER C C, VANKUIKEN J C, GROS J G
RELIABILITY, ENERGY AND COST EFFECTS OF WIND INTEGRATION WITH CONVENTIONAL ELECTRICAL GENERATING SYSTEMS.
NTIS, 1979. 14 P.
CONF-791204-32

THE RESULTS FROM THIS STUDY DEMONSTRATE THE IMPORTANCE OF SYSTEM INTEGRATION ANALYSIS IN EVALUATING THE EFFECTS OF WIND POWERED GENERATION ON AN ELECTRIC UTILITY SYSTEM. FOR THE ASSUMED UTILITY AND WIND CONDITIONS IT HAS BEEN SHOWN THAT AN INTERMITTENT ENERGY SOURCE SUCH AS WIND CAN CONTRIBUTE TO OVERALL SYSTEM RELIABILITY. SINCE RELIABILITY INDICES ARE THE PRIMARY CRITERIA FOR UTILITY EXPANSION PLANNING, IT SHOULD BE POSSIBLE TO REDUCE CONVENTIONAL CAPACITY INSTALLATIONS IN RESPONSE TO THE RELIABILITY IMPROVEMENTS ASSOCIATED WITH WIND GENERATION. WITH BOTH ENERGY AND RELIABILITY BENEFITS IT APPEARS THAT THERE IS A REASONABLE POTENTIAL FOR WIND GENERATORS TO BE COMPETITIVE, IN LIMITED PENETRATIONS, WITH CONVENTIONAL CAPACITY.

1979-0253 BULLO P
WIND MOTORS AND ELECTRICAL GENERATORS.
ELETTRIFICAZIONE NO. 8: 355-361, AUGUST 1979. (IN ITALIAN)

THE GENERATION OF ELECTRICITY BY WIND POWER IS DISCUSSED, WIRING-TOPOLOGY IS REVIEWED WITH PHOTOGRAPHS OF SOME RECENT AMERICAN AND RUSSIAN INSTALLATIONS. THE MAIN TYPES OF ELECTRICAL GENERATORS ARE CONSIDERED, INCLUDING CONSTANT SPEED AND FREQUENCY, AND VARIABLE SPEED AND CONSTANT FREQUENCY. CRITICAL PARAMETERS OF BOTH SYSTEMS ARE REVIEWED. A PROJECT FOR LARGE SCALE WIND CONVERSION CENTRES IN ITALY IS OUTLINED. THE SELECTION OF SITES WITHIN THE PREDOMINANT WIND PATTERN IS DISCUSSED.

1979-0254 CADWALLADER E A, WESTBERG J E
WIND-POWERED PROCESSING. II.
CHEMTECH. 9(5): 310-314, MAY 1979.

THIS PAPER DISCUSSES THE APPLICATION OF WIND TURBINES TO TWO CHEMICAL PROCESSES, ELECTRODIALYSIS AND REVERSE OSMOSIS, FOR THE PURIFICATION OF BRACKISH WATER.

1979-0255 CROMACK D E
INVESTIGATION OF THE FEASIBILITY OF USING WIND POWER FOR SPACE HEATING IN COLDER CLIMATES. ANNUAL REPORT FOR THE PERIOD ENDING JUNE 30, 1978.
NTIS, OCTOBER 1979. 114 P.
DOE/DP/03533-T3

CURRENT RESEARCH SUPPORTING THE DEVELOPMENT OF SPACE AND HOT WATER HEATING BY MEANS OF THE COMBINED USE OF A WIND TURBINE AND SOLAR FLAT-PLATE COLLECTORS IS DESCRIBED IN THIS UMASS ANNUAL REPORT. A VARIETY OF RESEARCH ACTIVITIES RANGING FROM ECONOMIC STUDIES TO FLOW FIELD MEASUREMENT AND ANALYSIS ARE DISCUSSED IN DETAIL IN THIS REPORT. ALSO INCLUDED IS A LIST OF PUBLICATIONS TO DATE.

1979-0256 ERIKSSON J
SMALL POWER STATIONS FOR THE ELECTRIFICATION OF THINLY-POPULATED AREAS.
ERA 52(10): 32-35, 1979. (IN SWEDISH)

THERE ARE STILL ABOUT 400 ESTATES IN SWEDEN WHICH ARE OCCUPIED FOR THE WHOLE YEAR AND WHICH ARE NOT YET ELECTRIFIED. CONVENTIONAL ELECTRIFICATION IS EXPENSIVE AND ALTERNATIVE SOLUTIONS ARE NECESSARY. SMALL POWER STATIONS FOR SUCH THINLY-POPULATED AREAS HAVE BEEN INVESTIGATED; THESE INCLUDE WATER POWER, DIESEL-DRIVEN SETS, WIND-POWER GENERATORS, ETC.

1979-0257 NAGY G D
POWER SUPPLIES FOR ARCTIC RADIO REPEATER SYSTEMS.
NTIS, SEPTEMBER 1978. 50 P.

THIS FEASIBILITY STUDY ASSESSES VARIOUS LONG-LIVED, SELF-CONTAINED 30-WATT POWER SUPPLIES FOR AN ARCTIC RADIO REPEATER SYSTEM. THE STUDY INVOLVES A REVIEW OF THE STATE OF THE ART, AVAILABILITY AND COST OF FIVE CANDIDATE SYSTEMS: BATTERIES, FUEL CELLS, RADIOISOTOPIC THERMOELECTRIC GENERATORS, FUELED THERMOELECTRIC GENERATORS AND WINDMILL-BATTERY SYSTEMS. THE ABOVE FIVE CANDIDATES WERE ALSO ASSESSED AS STANDBY POWER UNITS. RELIABILITY, SERVICE AND MAINTENANCE REQUIREMENTS ARE CONSIDERED SINCE THE APPLICATION CALLS FOR ONE YEAR UNATTENDED OPERATION AND SERVICING BY LIGHT HELICOPTER ON A SINGLE ANNUAL FLIGHT FOR ALL SITES.

1979-0258 JI B
CHINA TAPS THE WIND TO PROVIDE POWER IN REMOTE AREAS.
ELECTR. REV. INT. 205(17): 51, NOVEMBER 2, 1979.

AN 18 KW WIND TURBINE-GENERATOR HAS BEEN OPERATING SUCCESSFULLY FOR THE PAST YEAR ON A CHINESE ISLAND AND IS THE PROTOTYPE FOR A STANDARDISED RANGE OF MEDIUM-SIZED WIND-DRIVEN GENERATORS TO MEET THE NEEDS FOR ELECTRICITY IN REMOTE AREAS.

1979-0259 KULLGREN T E, WIEDEMEIER D W, TINSLEY J T
USAF ACADEMY VERTICAL AXIS WIND TURBINE DEVELOPMENT PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, 247-253.

THE UNITED STATES AIR FORCE ACADEMY WIND ENERGY CONVERSION SYSTEM PROJECT HAS AS ONE OF ITS GOALS THE DESIGN, FABRICATION AND FIELD TESTING OF A SMALL VERTICAL AXIS WIND TURBINE FOR USE IN REMOTE AREAS. THIS DARRIEUS-TYPE MACHINE WITH TWO FIXED CURVED BLADES HAS A NUMBER OF UNIQUE FEATURES INCLUDING A DEGREE OF PORTABILITY AND EASE OF INSTALLATION, VARIABLE SPEED OPERATION BY ALTERNATOR FIELD CONTROL, A LIGHTNING PROTECTION SYSTEM, AND SEGMENTED STEEL BLADES. TURBINE DESIGN BEGAN IN THE SUMMER OF 1977 WITH INSTALLATION AND INITIAL TESTING OF THE PROTOTYPE FOLLOWING ONE YEAR LATER. AN IMPROVED TURBINE IS PRESENTLY IN FABRICATION WITH TESTING TO COMMENCE IN THE SPRING OF 1979.

1979-0260 MARTINEZ A M, CALDERA E, PUGA N, MANDUJANO M, SANTANDER F, FELIX A, SANCHEZ S, WONG A, VALVERDE S, MULAS P, CASTELLANOS A , ESCOBEDO M, RESTREPO I
INTEGRATED ENERGY SYSTEM FOR NON-ELECTRIFIED RURAL COMMUNITIES.
CHANGING ENERGY USE FUTURES. INTERNATIONAL CONFERENCE ON ENERGY USE MANAGEMENT, 2ND, LOS ANGELES, OCTOBER 22-26, 1979. NEW YORK, PERGAMON, 1979. VOL. 4, P. 1964-1973.

LOCAL RENEWABLE ENERGY RESOURCES MAY BE USED FOR PRODUCTIVE ACTIVITIES IN RURAL NON-ELECTRIFIED COMMUNITIES. BIOMASS, SOLAR, WIND AND MICROHYDRAULIC SYSTEMS CAN COMBINE TO FORM AN INTEGRATED ENERGY SYSTEM; ONLY TECHNOLOGIES THAT ARE NOT PROHIBITIVE BY THE COST OR TOO TECHNICALLY SOPHISTICATED FOR THEIR MAINTENANCE ARE CONSIDERED. AN IMPORTANT PART OF THE STUDIES RELATES TO THE SOCIOECONOMIC ASPECTS INVOLVED IN THE IMPLEMENTATION OF SUCH A SYSTEM. AN EXAMPLE OF A PROPOSED PILOT COMMUNITY IS PRESENTED.

1979-0261 STEWART T D
DEVELOPMENT OF AN 8 KW VERTICAL AXIS WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 121-131.

ALCOA'S PROGRAM TO DEVELOP AN 8 KW MACHINE FOR FARM AND RURAL RESIDENTIAL APPLICATION IS DESCRIBED.

1979-0262 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. PROGRESS REPORT, OCTOBER 1978--SEPTEMBER 1979.
NTIS, OCTOBER 1979. 141 P.
DOE/BP/01310-T1

IN 1975 THE BONNEVILLE POWER ADMINISTRATION (BPA) CONTRACTED WITH OREGON STATE UNIVERSITY (OSU) TO PERFORM A FEASIBILITY STUDY OF THE WIND POWER POTENTIAL IN A PORTION OF THE COLUMBIA RIVER GORGE. SINCE THAT INITIAL ASSESSMENT THE RESEARCH AT OSU HAS EXPANDED TO INVESTIGATE THE WIND POWER POTENTIAL IN THE REST OF THE BPA SERVICE AREA WHICH COVERS WASHINGTON, OREGON, IDAHO, WESTERN MONTANA, AND NORTHERN NEVADA. PREVIOUS BPA REPORTS 76-1, 77-2, AND 78-3 HAVE DOCUMENTED THE PROGRESS OF THIS RESEARCH. THE OBJECTIVES AND CONCLUSIONS OF THE RESEARCH DURING FY 79 ARE SUMMARIZED. THE DATA ANALYZED WERE FOR THE PERIOD JUNE 1978 THROUGH MAY 1979. THE DETAILS OF THE RESEARCH ARE CONTAINED IN THE REPORT.

1979-0263 ADAMS J A
A MAINE ROMANCE.
SOL. AGE 4(9): 6-9, SEPTEMBER 1979.

THE CONSTRUCTION OF A HOUSE ON THE COAST OF MAINE INCLUDED TERRACING OF THE BLUFF FOR EROSION CONTROL, INSTALLATION OF WATER SOLAR COLLECTORS FOR SPACE AND WATER HEATING, AND CONSTRUCTION OF A WIND TURBINE FOR ELECTRIC POWER GENERATION. A TOTAL OF 4,027 SQ. FT. OF HOUSE AREA IS HEATED BY A SYSTEM OF 10 COLLECTORS AND 4,000 GAL WATER STORAGE. INSULATION VALUES ARE R-19 IN THE WALLS, R-40 IN THE CEILING, R-26 IN THE FLOORS, AND R-14 IN THE BASEMENT. SOUTH-FACING WINDOWS PROVIDE ADDITIONAL HEAT GAIN. THE WIND TURBINE AND GENERATOR SYSTEM SUPPLIES ALTERNATING CURRENT TO THE HOUSE AND ALSO HEATS AUXILIARY WATER STORAGE WHEN NECESSARY. THE HOUSE, COLLECTORS, AND WIND TURBINE ARE DESIGNED TO SUPPLY 85% OF THE HEATING LOAD.

1979-0264 ADLER F
GRUMMAN 8 KW WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 106-120.
RFP-3014(VOL. 1)

GRUMMAN ENERGY SYSTEMS PARTICIPATION IN THE DEPARTMENT OF ENERGY'S 8 KW WIND TURBINE GENERATOR PROJECT HAS BEEN TO DESIGN A MACHINE CAPABLE OF MASS PRODUCTION RATES OF 1000 MACHINES PER YEAR AND BUILD ONE PROTOTYPE. DESIGN CHARACTERISTICS OF THE TURBINE ARE PRESENTED.

1979-0265 AHMADI G
AN OSCILLATORY WIND ENERGY CONVERTOR.
WIND ENG. 3(3): 207-215, 1979.

THE PRINCIPLE OF WIND ENERGY CONVERSION THROUGH THE OSCILLATION OF AN AERODYNAMICALLY UNSTABLE SYSTEM IS REVIEWED, AND A NONLINEAR THEORY PREDICTING THE POWER COEFFICIENT FOR SUCH A DEVICE IS DEVELOPED. THE TEST RESULTS FOR A SMALL MODEL ARE PRESENTED AND COMPARED WITH THE THEORETICAL PREDICTION, AND RELATIVELY GOOD AGREEMENT IS OBSERVED.

1979-0266 AI D K
ALCOA WIND TURBINES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 155-172.
NASA-CP-2106

THE ALCOA WIND ENERGY PROGRAM, INITIATED IN 1975, BEGAN WITH THE FABRICATION OF TURBINE BLADES, AND TWO YEARS LATER BROADENED ITS SCOPE TO THE DESIGN AND FABRICATION OF COMPLETE SYSTEMS OF DARRIEUS-TYPE VERTICAL-AXIS WIND TURBINES.

1979-0267 AKINS R E
WIND SYSTEM TEST PROCEDURES.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 233-246.
RFP-3014(VOL. 1)

A SUMMARY IS PRESENTED OF THE METHOD OF BINS, A TECHNIQUE FOR DETERMINING THE MEAN PERFORMANCE OF A WIND TURBINE IN A FIELD ENVIRONMENT. THIS PROCEDURE REPRESENTS WHAT MAY BE CONSIDERED A MINIMUM REQUIREMENT FOR FIELD TESTING. TECHNIQUES WHICH HAVE BEEN DEVELOPED TO CONSIDER MORE DETAILED ASPECTS OF PERFORMANCE ARE OUTLINED. THESE PROCEDURES REQUIRE A LARGER AMOUNT OF BOTH BUDGET AND TECHNICAL EXPERTISE THAN THE METHOD OF BINS. ANYONE INVOLVED IN TESTING SHOULD UNDERSTAND THE GOALS OF SUCH TESTING AND BE ABLE TO MAKE USE OF THE RESULTS EVEN IF THEY ARE NOT ABLE TO PERFORM CERTAIN ASPECTS OF THE TESTING AT THEIR OWN FACILITY. AREAS IN WHICH THE DEVELOPMENT OF TEST PROCEDURES ARE STILL UNDERWAY ARE SUMMARIZED.

1979-0268 ALDRED J
FIELD EVALUATION PROGRAM FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
SOLAR 79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 30-32.
CONF-790845-(SUPPL.)

THE DEPARTMENT OF ENERGY (DOE) HAS RECOGNIZED THE IMPORTANCE OF SMALL WIND SYSTEMS AND HAS INITIATED A NUMBER OF PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THEM. THE PROGRAMS INCLUDE THE ESTABLISHMENT OF A WIND SYSTEMS TEST CENTER TO PROVIDE A CAPABILITY FOR INTENSIVE LONG-TERM TESTING OF SWECS, AND A TECHNICAL MANAGEMENT ORGANIZATION CHARTERED TO FOSTER THE DEVELOPMENT OF NEW, LOW COST MACHINES, PROVIDE SUPPORT TO THE DEVELOPMENT OF INDUSTRY STANDARDS, AND TO DISSEMINATE TECHNICAL INFORMATION TO INDUSTRY AND TO THE GENERAL PUBLIC. IN ADDITION, A FIELD EVALUATION PROGRAM HAS BEEN DESIGNED AS A PART OF THIS PROGRAM TO ACCELERATE THE COMMERCIALIZATION PROCESS FOR SWECS. THE PROGRAM GOAL IS TO PROVIDE NEAR-TERM RESOLUTION OF EXISTING TECHNICAL AND INSTITUTIONAL CONSTRAINTS IN ORDER THAT WIND ENERGY CAN EFFECT MAXIMUM IMPACT ON THE NATION'S ENERGY NEEDS.

1979-0269 ALFREDSSON P H, DAHLBERG J A
A PRELIMINARY WIND TUNNEL STUDY OF WINDMILL WAKE DISPERSION IN VARIOUS FLOW CONDITIONS, PART 7.
NTIS, OCTOBER 12, 1979. 74 P.
FFA-AU-1499-PT-7, N80-28320/3

MEASUREMENTS OF THE WAKE DEVELOPMENT BEHIND A SMALL ROTATING MODEL OF A WIND TURBINE UNIT WERE CARRIED OUT. THE AMBIENT FLOW CONDITIONS WERE VARIED BY USING TURBULENCE GRIDS, A SIMULATED ATMOSPHERIC BOUNDARY LAYER, AND BY PLACING THE MODEL NEAR A SMOOTH WALL. MEAN VELOCITY AND TURBULENCE PROFILES FOR THE DIFFERENT FLOW CONDITIONS WERE ALSO CALCULATED. THE MEASUREMENTS WERE ALSO ANALYZED WITH RESPECT TO THE DECAY OF THE CENTER LINE VELOCITY DEFECT AND THE INFLOW OF MASS INTO THE WAKE. PHOTOGRAPHS OF THE VORTEX STRUCTURE BEHIND THE WIND TURBINE MODEL ARE PRESENTED.

1979-0270 ALLISON H J
RENEWABLE ENERGY SYSTEM FOR DEVELOPING COUNTRIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1475-1479.

THIS PAPER DESCRIBES AN ENERGY SYSTEM WHICH INTEGRATES SOLAR, WIND, AND BIOMASS RESOURCES IN A MANNER WHICH PRODUCES A MORE FLEXIBLE AND RELIABLE POWER SOURCE THAN COULD BE MADE AVAILABLE FROM SEPARATE USES OF THESE RENEWABLE RESOURCES. PROTOTYPE SYSTEMS BASED ON THE CONCEPTS DESCRIBED IN THIS PAPER ARE PLANNED FOR SRI LANKA, SENEGAL, AND MEXICO.

1979-0271 ALTERNATIVE ENERGY TECHNOLOGY.
ENERGY DIG. 8(4): 28-32, AUGUST 1979.

THIS PAPER CONSIDERS HOW, WITHIN THE NEXT 50 YEARS, THE UNITED KINGDOM COULD BALANCE ITS ENERGY DEMAND WITH CONSERVATION AND BY USING ALTERNATIVE ENERGY RESOURCES.

1979-0272 ALTERNATIVE RENEWABLE ENERGY PROGRAM: REPORT TO THE MONTANA LEGISLATURE.
NTIS, JANUARY 1979. 64 P.
PB80-214695

THE REPORT BEGINS WITH A HISTORY OF THE PROGRAM AND THE FUNCTION OF THOSE INVOLVED WITH THE REVIEWING AND GRANTING OF RENEWABLE ENERGY PROJECTS. IT POVIDES A DISCUSSION OF THE GRANTS AWARDED AND THE OPERATIONAL PROCEDURES OF THE PROGRAM. A BRIEF OVERVIEW OF PROGRAM ACTIVITY WITH THE RENEWABLE ENERGY SOURCES FOLLOWS. THE REPORT OUTLINES THE METHODS USED TO PROVIDE INFORMATION TO THE PUBLIC.

1979-0273 ANCONA D F
OVERVIEW OF FEDERAL WIND ENERGY PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 1-23.
NASA-CP-2106

A BRIEF OVERVIEW IS PRESENTED OF WHAT THE FEDERAL WIND PROGRAM IS TODAY, WHAT THE OBJECTIVES ARE, AND WHAT STRATEGIES ARE BEING FOLLOWED. SOME OF THE CHANGES IN THE PROGRAM STRUCTURE AND SOME OF THE ADDITIONS TO THE PROGRAM ARE ALSO INCLUDED. MENTION IS MADE OF UPCOMING ORGANIZATIONAL CHANGES, AND SOME BUDGET ITEMS ARE

COVERED, WITH PARTICULAR MENTION OF SOME RECENT SIGNIFICANT EVENTS REGARDING NEW APPROVALS.

1979-0274 ANCONA D F
OVERVIEW: DEPARTMENT OF ENERGY WIND ENERGY PROGRAM.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 3-43.
CONF-790352

THE DEPARTMENT OF ENERGY FEDERAL WIND PROGRAM IS DESCRIBED FOR BOTH LARGE TURBINES AND SMALL INNOVATIVE CONCEPTS. BUDGET INFORMATION IS ALSO INCLUDED.

1979-0275 ANDERSON M
APPROPRIATE TECHNOLOGY IN AFRICA.
SOL. AGE 4(5): 42-45, MAY 1979.

THE STUDY AND IMPLEMENTATION OF APPROPRIATE ENERGY TECHNOLOGY IN BOTSWANA, SWAZILAND, AND LESOTHO WAS CONDUCTED BY THE DOMESTIC TECHNOLOGY INSTITUTE AND THE INTER-CULTURE ASSOCIATES.

1979-0276 ARGYRIS J H, BRAUN K A
LASTWECHSELZAHLEN UND MATERIALWERTE FUER DIE AUSLEGUNG EINER WINDTURBINE SPEZIELLER NABENKONSTRUKTION. (LOAD CYCLE VALUES AND MATERIALS DATA USED FOR THE DESCRIPTION OF A WIND TURBINE FEATURING A SPECIAL HUB CONSTRUCTION.)
NTIS, JUNE 1979. 38 P.
N81-12627, ISD-260

FOR THE LAYOUT OF WINDMILL ROTOR BLADES MADE FROM DIFFERENT MATERIALS, ANALYSES OF MATERIALS DATA AND GEOMETRY WERE MADE. OF SPECIAL INTEREST ARE THE ADMISSIBLE STRESSES WHICH ARE DEPENDENT ON THE MATERIAL AS WELL AS KIND AND NUMBER OF LOADING CYCLES. THE NUMBER OF THESE LOADING CYCLES THOUGHT TO BE RELEVANT ARE DETERMINED. THE DECISIVE PARAMETERS ARE THE NUMBER OF STARTS AND THE TIME OF OPERATION. THE DEPENDENCE OF THESE PARAMETERS ON THE CUT-IN WIND VELOCITY, THE VERTICAL WIND GRADIENT, AND THE WIND CHARACTERISTICS IS DISCUSSED. WIND DATA COLLECTED IN NORTHERN GERMANY WERE USED IN CALCULATING ADMISSIBLE STRESSES. THE FATIGUE STRENGTHS ARE ALSO ESTIMATED IN TERMS OF THE ADMISSIBLE STRESSES DETERMINED. THE MATERIALS USED ARE WELL KNOWN GLASS FIBER AND CARBON FIBER REINFORCED PLASTICS.

1979-0277 ARGYRIS J H, BRAUN K A
STATISCHE UND DYNAMISCHE UNTERSUCHUNG VERSCHIEDENER TUERME FUER WINDTURBINEN. (STATIC AND DYNAMIC INVESTIGATIONS ON DIFFERENT TOWERS FOR WIND TURBINES.)
NTIS, JULY 1979. 122 P. (IN GERMAN)
N81-12628, ISD-261

THE STATIC LAYOUTS OF DIFFERENT TOWER DESIGNS ARE STUDIED IN TERMS OF GUST LOADS WHICH A TWO BLADED ROTOR (120 M DIAMETER) TRANSFERS TO A RIGID SUPPORT AS EXTERNAL LOADS. THE ROTOR BLADES ARE ASSUMED TO BE INELASTIC. EACH ONE HAS A FLAPPING HINGE AND A FLAP PITCH COUPLING. FIRST A CYLINDRICAL CANTILEVER STEEL TOWER IS DIMENSIONED SUCH THAT THE MAXIMAL LOADS ENLARGED BY A DYNAMIC MAGNIFICATION FACTOR PROVOKE TOLERABLE STRESSES AND DISPLACEMENTS. NEXT, BOTH A CANTILEVER AND GUYED TOWER STATIC LAYOUT ARE CONSIDERED AND A DYNAMIC RESPONSE CALCULATION FOR SEVERAL GUSTS IS PERFORMED USING FINITE ELEMENT METHODS. THE TOWER SYSTEM AND THE ROTOR SYSTEM ARE ASSUMED TO BE DYNAMICALLY DECOUPLED. THE GUYED TOWER PROVES TO BE SUPERIOR. FINALLY, A THEORETICAL TYPE OF TOWER IS STATICALLY CONCEIVED USING A GEOMETRICALLY NONLINEAR FINITE ELEMENT PROGRAM. THE KINEMATICS OF THREE TOWERS WITH DIFFERENT GUY ARRAYS ARE INVESTIGATED AND COMPARED.

1979-0278 ARGYRIS J H, KIRCHGAESSNER B
STABILITAET UND SCHWERKRAFTRESPONSE DER SCHLAG-SCHWENKBEWEGUNG EINES STARREN ROTORBLATTES MIT BLATTWINKELRUECKSTEUERUNG. (STABILITY AND DYNAMIC RESPONSE TO GRAVITATIONAL FORCES OF THE FLAPPING AND LEAD-LAG HINGES ON A RIGID ROTOR BLADE WITH THE LEADING-EDGE ANGLE OF ATTACK AND FLAPPING BEING COUPLED.)
NTIS, 1979. 53 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-244, N80-30949/5

THE COUPLED FLAPPING AND LEAD-LAG MOTION OF A SINGLE, RIGID ROTOR BLADE OF A WIND ENERGY CONVERTER WITH FLAPPING AND LEAD-LAG HINGES AS WELL AS A COUPLING OF THE ANGLE OF ATTACK WITH THE FLAPPING MOTION IS INVESTIGATED. THE EQUATIONS OF MOTION ARE DEVELOPED UNDER THE ASSUMPTION OF LINEARIZED QUASI-STATIONARY AERODYNAMIC FORCES. STATIC AND DYNAMIC STABILITY OF THE COUPLED FLAPPING AND LEAD-LAG MOTION ARE INVESTIGATED. THE EQUATIONS ARE INTEGRATED FOR DIFFERENT CASES UNDER CYCLIC GRAVITATIONAL FORCES TO GET AN ESTIMATE OF THE INFLUENCE OF FORCE TERMS AND OF THE ERROR FROM THE LINEARIZATION OF THE CONSERVATION EXPRESSIONS.

1979-0279 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B
DYNAMISCHE ANALYSE EINES ROTORBLATTES MIT SCHLAGFREIHEIT, SCHWENKFREIHEIT UND BLATTWINKELRUECKSTEUERUNG. (DYNAMIC ANALYSIS OF A ROTOR BLADE WITH LEAD-LAG FREEDOM, FLAPPING FREEDOM, AND VARIABLE-CONTROLLED BLADE PITCH ANGLE.)
NTIS, 1979. 95 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-258, N80-30950/3

THE DYNAMIC BEHAVIOR OF THE ROTOR BLADES OF A WIND ENERGY CONVERTER WITH FLAPPING AND LEAD-LAG HINGES AS WELL AS COUPLING OF FLAPPING AND BLADE PITCH IS INVESTIGATED. UNDER THE ASSUMPTION OF RIGID SUPPORT OF THE HUB AND OF CONSTANT ROTATIONAL SPEED, A LINEARIZED SYSTEM OF DIFFERENTIAL EQUATIONS OF MOTION IS DEVELOPED USING FINITE ELEMENT IDEALIZATION GIVEN LINEARIZED QUASI-STATIONARY AERODYNAMIC FORCES. FOR TWO ROTOR BLADE MODELS, WHICH DIFFER ONLY IN THEIR STIFFNESS IN THE LEAD-LAG DIRECTION, THE COMPLEX EIGENFREQUENCIES ARE CALCULATED. FURTHER, THE DYNAMIC RESPONSE OF THE ROTOR BLADES IS COMPUTED FOR CYCLIC GRAVITY LOADS AT RATED OPERATION, FOR A GUST, AND FOR THE CASE OF TOWER WAKE. FROM THE DEFORMATION OF THE STRUCTURE THE STRESSES AT SELECTED POINTS ALONG THE BLADE ARE DERIVED, WHILE FOR ONE VERSION OF THE ROTOR BLADE, TORQUE AND ROTOR THRUST ARE ALSO DETERMINED.

1979-0280 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B
STATISCHE UNTERSUCHUNG VON ROTORBLAETTERN UNTER EIGENGEWICHT UND IM STATIONAEREN BETRIEB. (STATIC INVESTIGATION OF ROTOR BLADES AT REST AND UNDER QUASI-STATIONARY LOADING.)
NTIS, 1979. 57 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-243, N80-30948/7

THE ROTOR BLADES OF A HORIZONTAL AXIS WIND ENERGY CONVERTER WHICH HAVE FLAP AND LEADING-LAG FREEDOM AS WELL AS A FLAP-PITCH COUPLING, WERE DIMENSIONED AND STUDIED UNDER BOTH NONOPERATING DEADWEIGHT AND QUASI-STATIONARY LOADING AT CONSTANT FORCES RATED OPERATION. WITH A SUITABLE MASS DISTRIBUTION IT IS POSSIBLE TO DRASTICALLY

REDUCE THE BLADE BENDING MOMENTS IN THE FLAP DIRECTION. MATERIALS WELL KNOWN IN AIRCRAFT CONSTRUCTION WERE CONSIDERED, AMONG WHICH CARBON FIBER REINFORCED PLASTIC IS SHOWN TO BE THE MOST SUITABLE. MOST OF THE BLADE MODELS WERE INVESTIGATED WITHOUT A LEAD-LAG HINGE. CONICAL OSCILLATION AT RATED OPERATION WAS ASSUMED FOR THE LAYOUT OF THESE ROTOR BLADES. IT IS REDUCED CONSIDERABLY FOR THE SAME BLADE MODELS WHEN LEAD-LAG FREEDOM IS INCORPORATED WHILE MAINTAINING SUFFICIENT CENTRIFUGAL STIFFNESS IN THE LAG DIRECTION.

1979-0281 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B, WALTHER R
STATISCHE UND DYNAMISCHE UNTERSUCHUNGEN AN EINEM WINDROTORMODELL. (STATIC AND DYNAMIC INVESTIGATIONS USING A WINDMILL MODEL.)
NTIS, JUNE 1979. 69 P. (IN GERMAN)
N81-12626, ISD-259

IN THE FRAMEWORK OF WIND ENERGY RESEARCH A SCALE MODEL OF A WIND ROTOR WAS CONSTRUCTED, THEN USED TO DEVELOP AND TEST A DATA ACQUISITION AND DATA TRANSMISSION SYSTEM. WITH THIS SYSTEM EXPERIMENTAL DATA ARE COLLECTED FROM THE OPERATING MODEL AND DISPLAYED ON A SCREEN. COMPARISON BETWEEN EXPERIMENTAL DATA AND COMPUTED RESULTS FOR THE MODEL WERE USED TO CHECK APPLIED STATIC AND DYNAMIC ANALYSES OF THE ROTOR MODEL. DURING THE DYNAMIC ANALYSIS A RESPONSE PROBLEM WITH VARIABLE STIFFNESS IN TIME WAS FOUND. FOR THIS CASE A SOLUTION METHOD INVOLVING SYSTEMS OF EQUATIONS IS DESCRIBED.

1979-0282 ZVARA J, DREES H M, NOLL R B
DEVELOPMENT OF A 1-KW HIGH RELIABILITY CYCLOTURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 6-12, 12.1-12.14.
RFP-3014(VOL.1)

ROCKWELL INTERNATIONAL, IN CONJUNCTION WITH THE DEPARTMENT OF ENERGY (DOE), HAS INITIATED PROGRAMS TO DEVELOP PROTOTYPE WIND MACHINES IN THE ONE-, EIGHT-, AND FORTY-KILOWATT (KW) RANGES. THE PROGRAM IS MANAGED FOR DOE BY ROCKWELL AT ITS WIND SYSTEMS TEST CENTER NEAR GOLDEN, COLORADO. THE PROGRAM FOR THE 1-2 KW SIZE WIND MACHINE IS DESCRIBED. PERFORMANCE REQUIREMENTS AND DESIGN CHARACTERISTICS ARE PRESENTED. THE CONTROL SYSTEM IS OUTLINED.

1979-0283 ASIN J
FACTORS AFFECTING U.S. SOLAR TRADE WITH BRAZIL.
SOLAR EXPORT ISSUES WORKSHOP, BETHESDA, MARYLAND, AUGUST 12, 1979. FINAL PROCEEDINGS. NTIS, OCTOBER 1979. P. C.25-C.27.
CONF-790890

THE FOLLOWING TOPICS ARE DISCUSSED: ENERGY BACKGROUND, SURVEYING ALTERNATIVE SOURCES OF ENERGY, IDENTIFYING SECTORS FOR POTENTIAL USE OF SOLAR/WIND TECHNOLOGIES, PRIMARY CONSIDERATION AFFECTING U.S EXPORTS TO BRAZIL, AND BY CONSIDERATIONS FOR U.S. COMPANIES.

1979-0284 AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS ASSESSMENT. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, DECEMBER 1979. 94 P.
SERI/TR-98003-3

THREE HORIZONTAL AXIS AUGMENTED SYSTEMS ARE CRITICALLY EXAMINED, AND THE TECHNICAL STATUS, PERFORMANCE CHARACTERISTICS, AND COST PROJECTIONS OF THESE SYSTEMS ARE EVALUATED. THE PURPOSE OF THE STUDY IS TO DETERMINE WHETHER THESE SYSTEMS HAVE THE POTENTIAL TO BE A COST EFFECTIVE ENERGY RESOURCE. THIS ASSESSMENT SHOULD PROVIDE GUIDANCE AND DIRECTION FOR FUTURE PROGRAMMATIC EFFORTS IN THE WEIS PROGRAM. ALTHOUGH IT IS NOT MEANT TO PROVIDE AN EXHAUSTIVE STUDY OF ALL ASPECTS OF THESE SYSTEMS, THE CURRENT STATUS OF HORIZONTAL AXIS AUGMENTED SYSTEMS HAS BEEN EXAMINED.

1979-0285 AWAY FROM OIL--BUT HOW?
BILD WISS. 16(10): 130-132, 135, 136, OCTOBER 1979. (IN GERMAN)

SCIENCE AND ECONOMY EXPERTS HAVE COME TOGETHER TO DISCUSS POSSIBLE WAYS AND METHODS OF AN ENERGY-SAVING UTILISATION OF ENERGY SOURCES AND OTHER WAYS OF ENERGY CONSERVATION. MAIN EMPHASIS HAS BEEN PLACED ON THE SUBJECTS OF SPACE HEATING AND TRAFFIC BECAUSE OF THE LARGE PORTION OF ENERGY CONSUMED IN THESE TWO FIELDS AS COMPARED TO TOTAL FINAL ENERGY CONSUMPTION. POSSIBLE METHODS OF USING OTHER PRIMARY ENERGY SOURCES INSTEAD OF OIL ARE CONSIDERED. THE RESULTS CAN BE SUMMARIZED IN THE OPINION THAT ALTHOUGH VARIOUS ATTEMPTS ARE CURRENTLY BEING MADE TO USE OTHER RENEWABLE ENERGY SOURCES, IT CANNOT BE SAID FOR SURE NOWADAYS THAT SUFFICIENT ENERGY SUPPLY IS GUARANTEED FOR THE RISING GENERATION.

1979-0286 BAHADORI M N
CONCEPTUAL DEVELOPMENT OF A SOLAR TOWN IN IRAN.
SOLAR ENERGY CONVERSION: AN INTRODUCTORY COURSE. NEW YORK, PERGAMON PRESS, 1979. P. 715-756.

SOLAR ENERGY, WIND, SKY RADIATION, DAILY TEMPERATURE RANGE, CITY ORGANIC WASTES AND WASTE WATER, AND ENERGY PLANTS MAY BE EMPLOYED TO MEET ALL THE ENERGY NEEDS OF A PURELY RESIDENTIAL TOWN. THE ENERGY REQUIREMENTS OF A RESIDENTIAL TOWN OF 4000 INHABITANTS ARE ESTIMATED. NO MAJOR CHANGE IN PEOPLE'S LIFE-STYLE, EXCEPT FOR LOW TEMPERATURE COOKING BY WATER VAPOR, IS INTRODUCED.

1979-0287 BAIN D
INTERIM RESULTS OF THE CALIFORNIA RESIDENTIAL SWECS MARKET STUDY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 145-154.
RFP-3014(VOL.2)

THIS PROJECT IS AN ASSESSMENT OF THE POTENTIAL MARKET IN CALIFORNIA FOR RESIDENTIAL WIND ENERGY SYSTEMS (SWECS) AND OF THE MANUFACTURING LABOR IMPACT IN PRODUCING THE REQUIRED NUMBER OF WIND TURBINE GENERATORS (WTGS). ESTIMATES WILL BE MADE AT 5 YEAR INTERVALS UP THROUGH 1995 AND THE RESULTS WILL HAVE THE FORMS OF MATRICES OF THE NUMBER OF POTENTIAL INSTALLATIONS BY MEAN WIND SPEED AND CUSTOMER DEMAND. THIS QUANTIFICATION OF THE SWECS MARKET OVER A RANGE OF REQUIREMENTS COULD GUIDE FUTURE DESIGN AND PRODUCTION ACTIVITIES. A CUSTOMER IS CLASSIFIED AS POTENTIAL IF THE NET PRESENT VALUE OF THE COSTS OF A WIND SYSTEM ARE LESS THAN OR EQUAL TO THE PROJECTED COSTS OF UTILITY SUPPLIED ELECTRICITY OVER THE SWECS LIFE. SINCE GENERAL INFLATION IS ALSO AN IMPORTANT FACTOR IN THE RELATIVE ECONOMICS, IT IS INCLUDED IN THE ANALYSIS IN ADDITION TO REAL ESCALATIONS IN UTILITY PRICES.

1979-0288 BALDWIN J D C
IMPROVED CONTROL STRATEGY FOR WIND-POWERED REFRIGERATED STORAGE OF APPLES. PH.D. THESIS.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, BLACKSBURG, VIRGINIA. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 80-7,330, 1979. 168 P.

THE NEED FOR AN IMPROVED CONTROL STATEGY FOR THE OPERATION OF A WIND-POWERED REFRIGERATION SYSTEM FOR THE STORAGE OF APPLES WAS INVESTIGATED. THE RESULTS ARE APPLICABLE TO OTHER SYSTEMS WHICH EMPLOY INTERMITTENTLY AVAILABLE POWER SOURCES, BATTERY AND THERMAL STORAGE, AND AN AUXILIARY, DIRECT CURRENT POWER SUPPLY. TESTS WERE CONDUCTED ON THE WIND-POWERED REFRIGERATION SYSTEM AT THE VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY HORTICULTURE RESEARCH FARM IN BLACKSBURG, VIRGINIA. TESTS WERE CONDUCTED ON THE INDIVIDUAL COMPONENTS OF THE SYSTEM. IN SITU WINDMILL PERFORMANCE WAS ALSO CONDUCTED.

1979-0289 BARNETT K M
SMALL WECS INTERCONNECTED WITH PUBLIC UTILITY ELECTRICITY WITH NO WECS ELECTRICITY PLACED INTO THE UTILITY GRID.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 61-65.
RFP-3014(VOL.2)

THIS PROJECT WAS ESTABLISHED TO DEMONSTRATE A WECS USING SEVERAL ASPECTS OF NEW WIND ENERGY TECHNOLOGY THAT WOULD BE APPLICABLE TO AN INDIVIDUAL HOME; AND ALSO TO DETERMINE THE CONDITIONS UNDER WHICH THE SYSTEM COULD BECOME COST COMPETITIVE. THE NEW TECHNOLOGY INCLUDES A VERTICAL AXIS WECS, AN OCTAHEDRON TOWER, A SYNCHRONOUS INVERTER, A DUMP CIRCUIT THAT DIVERTS EXCESS WECS ELECTRICITY TO OTHER USES IN THE HOME, AND THE USE OF WIND ENERGY TO ASSIST SOLAR ENERGY.

1979-0290 BARROWS R E
WTG ENERGY SYSTEMS' ROTOR: STEEL AT 80 FEET.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 285-292.
NASA-CP-2106

THE 80 FOOT DIAMETER ROTOR DESCRIBED HAS BEEN INSTALLED AND OPERATIONAL ON WTG ENERGY SYSTEMS' MP1-200 WIND TURBINE GENERATOR SYSTEM SINCE THE SUMMER OF 1977. THE MP1-200 WIND TURBINE IS INSTALLED AS PART OF THE ISLAND OF CUTTYHUNK'S ELECTRIC POWER UTILITY GRID SYSTEM. CUTTYHUNK ISLAND IS LOCATED APPROXIMATELY 14 MILES OFF THE COAST OF SOUTHERN MASSACHUSETTS. THE MP1-200 WIND TURBINE WAS DEVELOPED, FABRICATED AND INSTALLED BY WTG ENERGY SYSTEMS AS A PRODUCTION PROTOTYPE. THE MP1-200 IS A SYNCHRONOUS GENERATING SYSTEM RATED AT 200 KILOWATTS AT 29 MPH WIND VELOCITY. CONSTANT 60 HZ, 480 VAC CURRENT IS PRODUCED DIRECTLY FROM THE WIND TURBINE'S GENERATOR AT +-1% ACCURACY THROUGHOUT THE MACHINE'S OPERATING RANGE. A MICRO-PROCESSOR BASED CONTROL SYSTEM UTILIZING ELECTRICAL LOAD MODULATION IS UTILIZED TO MAINTAIN CONSTANT ROTOR SPEED.

1979-0291 WIND POWER SYSTEMS.
NTIS, NOVEMBER 1979. P. 6.1-6.32.
DOE/PE-3871-1

INFORMATION IS PRESENTED CONCERNING DIFFERENT TYPES OF WIND TURBINES; TURBINE COST AND OPERATING ECONOMICS; POWER GENERATION; ENERGY STORAGE; AND WIND POWER AVAILABILITY IN THE U.S.

1979-0292 BARTON J
NYSERDA 79 ANNUAL REPORT.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, 1979. 40 P.

DEVELOPMENT OF A BALANCED ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM GEARED TO THE PRESENT AND FUTURE ENERGY NEEDS OF NEW YORK STATE CONTINUES. ACCOMPLISHMENTS OF THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY INCLUDE FURTHERING THE USE OF INDIGENOUS AND RENEWABLE RESOURCES; AND REDUCING THE DETRIMENTAL IMPACTS OF ENERGY USE. TANGIBLE RESULTS OF THESE PROJECTS ARE HIGHLIGHTED IN THIS REPORT. INFORMATION ON ADMINISTRATIVE OFFICIALS, FACILITIES, AND FINANCIAL DATA OF THE ORGANIZATON IS PRESENTED.

1979-0293 BERGEY K H
THE LANCHESTER-BETZ LIMIT.
J. ENERGY 3(6): 382-384, NOVEMBER-DECEMBER 1979.

THE BETZ LIMIT DEFINES AN UPPER LIMIT TO THE AMOUNT OF ENERGY IN THE WIND THAT CAN BE CONVERTED TO USABLE POWER. IT IS THE MATHEMATICAL EXPRESSION OF A RELATIONSHIP THAT IS UNDERSTOOD INTUITIVELY FROM OBSERVATIONS OF FLUID FLOW. THE LIMIT CONCERNS THE MAXIMUM EFFICIENCY OF A WIND TURBINE AND THE DECREASE IN AIR-VELOCITY DUE TO THE TURBINE. BOTH BETZ'S AND LANCHESTER'S DERIVATIONS ARE SHOWN. BACKGROUND HISTORY ABOUT LANCHESTER IS GIVEN.

1979-0294 BOLLE T G
FINANCIAL PROBLEMS FACING THE MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, NOVEMBER 1979. 66 P.
DOE/DP/03533-T2

THE FINANCIAL BARRIERS FACED BY THE MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) ARE ASSESSED AND FOUND TO BE SIMILAR TO THOSE FACED BY OTHER START UP BUSINESSES. HOWEVER, THESE PROBLEMS ARE FOUND TO BE AGGRAVATED BY THE HIGH EXPECTATIONS FOR ACCELERATED SWECS INDUSTRY GROWTH IN THE FACE OF MODERATE GOVERNMENT SUPPORT AND LACK OF INVESTMENT CAPITAL. THE UNDERLYING CONDITIONS OF LIMITED SWECS ENTREPRENEUR BUSINESS EXPERIENCE, THE HIGHLY COMPETITIVE VENTURE CAPITAL MARKET, THE INABILITY OF EXISTING FINANCIAL INSTITUTIONS TO AID INFANT BUSINESSES AND PUBLIC UNAWARENESS OF SWECS ARE REVIEWED.

1979-0295 BORTZ S A, BUDENHOLZER R A, CARLSON R D, FIELDHOUSE I, KORNFELD J
NAVY-NEW HAMPSHIRE WIND ENERGY PROGRAM.
NTIS, NOVEMBER 1979. 251 P.
IITRI-M6052, AD-AO86506

THIS PROGRAM INVESTIGATED THE POTENTIAL OF THE MT. WASHINGTON, NEW HAMPSHIRE AREA FOR GENERATING ELECTRIC POWER FROM WIND ENERGY AS AN ALTERNATIVE TO FOSSIL FUELS. THE U.S. NAVAL SHIPYARD AT PORTSMOUTH, NEW HAMPSHIRE IS AMONG THOSE FACILITIES WHICH COULD BENEFIT INITIALLY FROM SUCCESSFUL WIND GENERATED POWER. IIT RESEARCH INSTITUTE (IITRI) SPECIALISTS PERFORMED THE FOLLOWING TASKS: (1) EVALUATION OF NEW HAMPSHIRE'S WIND ENERGY RESOURCES FOR POTENTIAL ELECTRIC POWER GENERATION USING METEOROLOGICAL, TOPOGRAPHICAL, BIOLOGICAL AND OTHER AVAILABLE INFORMATION, (2) ASSESSMENT OF THE ENVIRONMENTAL, SOCIAL, TECHNICAL, AND OTHER POSSIBLE BARRIERS TO THE DEVELOPMENT OF WIND ENERGY RESOURCES, AND (3) ECONOMIC EVALUATION OF INSTALLING ONE OR MORE WIND TURBINE-GENERATORS TO SUPPLY POWER EITHER DIRECTLY TO THE SHIPYARD OR TO LINES OF THE PUBLIC SERVICE COMPANY OF

NEW HAMPSHIRE WHICH SUPPLIES THE SHIPYARD.

1979-0296 BOWES M A, HOWES H E, PERLEY R
DEVELOPMENT OF A 40 KW HORIZONTAL AXIS WIND TURBINE GENERATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 142-158.
RFP-3014(VOL.1)

KAMAN AEROSPACE CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DESIGN, FABRICATE, AND TEST A HORIZONTAL AXIS WIND TURBINE GENERATOR CAPABLE OF PRODUCING 40 KW OF ELECTRICAL OR MECHANICAL OUTPUT POWER IN A 20 MPH WIND. AN OVERALL REVIEW OF THE PROGRAM TO DATE IS PRESENTED WITH MAJOR EMPHASIS ON THE WTG SYSTEM DESIGN AND ITS EVOLUTION. DESIGN DESCRIPTIONS OF BOTH THE ELECTRICAL AND MECHANICAL POWER PRODUCING SYSTEMS ARE PRESENTED, INCLUDING DESCRIPTIONS OF THE MAJOR SUBSYSTEMS AND COMPONENTS. THE EVOLUTION OF THE CURRENT DESIGN THROUGH TRADEOFF ANALYSES IS ALSO DISCUSSED. FINALLY, THE REMAINING PROGRAM TASKS ARE DESCRIBED.

1979-0297 BRONDYKE K J
ROLE OF ALUMINUM IN THE DEVELOPMENT OF MODERN VERTICAL AXIS WIND TURBINES.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 81-83.
CONF-790845

THE ALUMINUM COMPANY OF AMERICA BELIEVES THE WIND CAN BE TURNED INTO A COST-EFFECTIVE COURSE OF SUPPLEMENTAL POWER FOR THE U.S. A RECENT AGREEMENT WITH THE EUGENE WATER AND ELECTRIC BOARD (EWEB) TO BUILD THE LARGEST WIND TURBINE IN AMERICA ON THE OREGON COAST STRONGLY SUPPORTS ALCOA'S FAITH IN THE WIND AND IN ALUMINUM'S ROLE IN TRANSFORMING IT INTO USABLE ELECTRICITY. RESEARCH AND DEVELOPMENT HAVE PLAYED A MAJOR ROLE IN THE COMPANY'S WIND ENERGY PROGRAM, SO A BRIEF REVIEW OF ALCOA LABORATORIES IS PRESENTED.

1979-0298 BROWN R H
DESIGN AND UTILIZATION OF LOW-COST SOLAR COLLECTORS FOR AGRICULTURE.
ASAE AND CSAE CANADIAN SOCIETY OF AGRICULTURAL ENGINEERING SUMMER MEETING, WINNIPEG, CANADA, JUNE 24, 1979.
ASAE TECH. PAPER, 1979. P. 15.

SOLAR ENERGY OFFERS A VERY REAL OPPORTUNITY FOR PRACTICAL APPLICATIONS IN AGRICULTURAL SITUATIONS SUCH AS CROP DRYING, SPACE HEATING, WATER HEATING, AND PERHAPS SPACE AND PRODUCT COOLING AND SHAFT HORSEPOWER. THIS ENERGY MAY BY COLLECTED WITH LOW-COST SOLAR COLLECTORS, EXPENSIVE COLLECTORS, BIOMASS PRODUCTION FROM PLANTS AND WIND ENERGY SYSTEMS FOR WATER PUMPING OR GENERATION OF ELECTRICITY. THE COSTS OF SOLAR COLLECTORS, WHETHER INITIAL PURCHASE CONSTRUCTION OR UPKEEP, ARE SIGNIFICANT. THESE COSTS REPRESENT A MAJOR HURDLE SLOWING THE ACCEPTANCE AND AGRICULTURAL APPLICATIONS OF SOLAR ENERGY OTHER THAN IN PHOTOSYNTHETIC PROCESS. THE PAPER REPORTS ON LOW-COST SOLAR COLLECTORS FOR HEATING OF AIR ($.85-1.67/SQ FT) AND WATER (3.25/SQ FT), WHICH HAVE BEEN USED SUCCESSFULLY IN AGRICULTURAL APPLICATIONS. DESIGN DATA AND SYSTEM CONCEPTS INCLUDING WIND ENERGY AND BIOMASS BURNING ARE PRESENTED.

1979-0299 BUTTERFIELD S, SEXTON J
TOWER DYNAMICS ANALYSES AND TESTING.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 171-178.
RFP-3014(VOL.1)

SUPPORT TOWERS FOR WIND TURBINES AFFECT THE SYSTEM IN SEVERAL WAYS. THESE SUPPORT TOWERS CAN HAVE AFFECTS SUCH AS AERODYNAMIC INTERFERENCE, WHICH IS INTRODUCED AT THE BLADING (TOWER SHADOW), THE MOTION OF THE TURBINE ARISING FROM TOWER OSCILLATIONS, AND THE ADDITION OF A MASS/ELASTIC CONTRIBUTION THAT COULD PARTICIPATE IN MECHANICAL AND AEROELASTIC INSTABILITIES. MATCHING ROTORS AND TOWERS TO AVOID VIBRATION PROBLEMS REQUIRES ACCURATE PREDICTION OF TOWER VIBRATION FREQUENCIES AND MODES. AT PRESENT, THERE IS A VARIETY OF STRUCTURAL DYNAMICS MODELS, COVERING A WIDE RANGE OF COMPLEXITY, COST AND APPLICATION. THE QUESTIONS THAT RISE WHEN SEARCHING FOR THE APPROPRIATE CODE ARE THE ACCURACY OF THE APPROXIMATE CODE AND THE COST OF THE MORE COMPLEX CODES. IN AN ATTEMPT TO ANSWER THESE QUESTIONS AND PROVIDE THE SWECS INDUSTRY WITH VALUABLE DATA FOR WIDELY USED TOWERS, ROCKY FLATS HAS INITIATED A TOWER DYNAMICS SUPPORTING RESEARCH AND TECHNOLOGY (SRT) STUDY. THIS STUDY HAS TWO CLOSELY INTEGRATED WORK AREAS: (1) THE TOWER TESTING AREA AND (2) THE ANALYSIS CODE EVALUATION.

1979-0300 CADWALLADER E A, WESTBERG J E
WIND-POWERED PROCESSING. I.
CHEMTECH. 9(4): 254-259, APRIL 1979.

THIS PART OF A TWO-PART PAPER DESCRIBES ALL ASPECTS OF WIND TURBINES, HORIZONTAL AXIS AND VERTICAL AXIS TYPES, WITH GRAPHS OF THEIR PERFORMANCE UNDER VARYING WIND CONDITIONS. THE ADVANTAGES OF SUCH POWER SOURCES FOR REMOTE LOCATIONS AND INTERMITTENT BUT LONG PERIOD SERVICE IS EMPHASIZED, TOGETHER WITH AN AMORTIZATION OF COSTS. A MAP OF THE ANNUAL AVAILABLE WINDPOWER OVER THE USA IS INCLUDED.

1979-0301 CAMPBELL J S
COMMERCIAL, OR USABLE, SIZE CAMPBELL CHINESE TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 687-690.

THIS PAPER DESCRIBES THE DESIGN AND OPERATION OF A THREE-SAIL VERTICAL AXIS CHINESE-TYPE WINDMILL FOR COMMERCIAL APPLICATON.

1979-0302 CARROLL D P, KRAUSE P C
SECURITY ASSESSMENT OF POWER SYSTEMS INCLUDING ENERGY STORAGE AND WITH THE INTEGRATION OF WIND ENERGY.
PROGRESS REPORT, JULY 1-SEPTEMBER 30, 1979.
NTIS, OCTOBER 1979. 5 P.
COO-4206-10

THE PROGRESS OF THE FIRST THREE TASKS OF THE WIND ENERGY PART OF THE CONTRACT IS DISCUSSED. EMPHASIS IS ON THE MODELING OF THE WIND AND THE DETAILED COMPUTER REPRESENTATIONS OF THREE CANDIDATE WIND SYSTEMS; NAMELY, MOD-1, MOD-2 AND THE SHACKLE MACHINE. ONCE THE DETAILED COMPUTER REPRESENTATIONS OF THESE WIND SYSTEMS HAVE BEEN DEVELOPED THE NEXT STEP IS TO BEGIN WORK ON THE REDUCED ORDER MODELS TO BE USED IN TRANSIENT STABILITY PROGRAMS.

1979-0303 CASHMAN T
WINDMILLS FOR AGRICULTURE--THEIR EFFECTIVE USES AND THEIR PRACTICAL LIMITS.
CHANGING ENERGY USE FUTURES. INTERNATIONAL CONFERENCE ON ENERGY USE MANAGEMENT, 2ND, LOS ANGELES, OCTOBER 22-26, 1979. NEW YORK, PERGAMON, 1979. VOL. 4, P. 1741-1747.

TWO MAJOR STUDIES HAVE INDICATED THAT UP TO A MILLION WIND-POWERED GENERATORS OF ELECTRICITY COULD BE USED COST-EFFECTIVELY ON AMERICAN FARMS IN THE NEXT 15 YEARS. ADDITIONAL ECONOMIC USES OF WIND ENERGY CAN BE FOUND THROUGH DIVERSE STRATEGIES TO OVERCOME THE INHERENT DISADVANTAGE OF WIND AS AN INTERMITTENT RESOURCE.

1979-0304 CASKEY B C
SOLAR MECHANICAL ENERGY STORAGE PROGRAM OVERVIEW AND SYSTEMS ANALYSIS RESULTS.
NTIS, 1979. 6 P.
CONF-790854-1, SAND-79-1642C

THE CURRENT STATUS OF THE SOLAR MECHANICAL ENERGY STORAGE PROGRAM IS DESCRIBED, ALONG WITH THE REMAINING ACTIVITIES BEFORE LAWRENCE LIVERMORE LABORATORY ASSUMES PROGRAM RESPONSIBILITY IN OCTOBER 1979. CONTRACTOR RESULTS ARE PRESENTED IN OTHER PAPERS; PRELIMINARY SYSTEM ANALYSES RESULTS FOR RESIDENTIAL FLYWHEEL ENERGY STORAGE SYSTEMS (FESS) ARE PRESENTED. VARIOUS PHASES OF THE PROGRAM HAVE ADDRESSED SMALL-TO-INTERMEDIATE APPLICATIONS OF PHOTOVOLTAIC/WIND ENERGY STORAGE UTILIZING FLYWHEELS, COMPRESSED AIR AND LOW HEAD UNDERGROUND PUMPED HYDRO TECHNOLOGIES.

1979-0305 CATALOGUE OF WASHINGTON STATE MODEL SOLAR PROGRAMS.
OLYMPIA, WASHINGTON, WASHINGTON STATE ENERGY OFFICE, SEPTEMBER 1979. 58 P.
WAOENG-79-5

THE PROGRAMS INCLUDED ARE EDUCATIONAL PROGRAMS, COMMUNITY DEVELOPMENT EFFORTS, FARM EFFORTS, LEGISLATIVE EFFORTS, FINANCING PROGRAMS, AND COMMERCIAL AND BUSINESS PROGRAMS.

1979-0306 CERMINARA J
INSTALLATION AND TEST EXPERIENCE WITH A 200-KW WIND TURBINE-GENERATOR.
AM. POWER CONF. PROC. 41: 515-517, 1979.

IN MARCH 1977, AFTER COMPETITIVE BIDDING, NASA AWARDED TO WESTINGHOUSE ELECTRIC CORPORATION, SPECIAL SERVICES DIVISION, A CONTRACT TO FURNISH TWO TOWERS AND INSTALL A NASA-FURNISHED WIND TURBINE-GENERATOR (WTG) KNOWN AS THE MOD-0A, WHICH WAS A 200-KW RATED MACHINE AND AN UPGRADED VERSION OF THE MOD-0. UNDER THE SAME CONTRACT, WESTINGHOUSE ALSO ASSEMBLED AND TESTED A SECOND WTG MOD-0A WHICH WAS INSTALLED BY WESTINGHOUSE IN CULEBRA ISLAND, PUERTO RICO. THE PAPER DESCRIBES THE MOST DIFFICULT PHASE OF THE WORK ENCOUNTERED ON THE PROJECT.

1979-0307 CHATEL B
SOME SOLAR ENERGY PROGRAMMES IN THE UNITED NATIONS SYSTEM.
SOL. ENERGY 23(3): 263-269, 1979.

THE REPORT OUTLINES RECENT ACTIVITIES IN THE UNITED NATIONS SYSTEM CONCERNING SOLAR AND WIND ENERGY APPLICATIONS, PARTICULARLY FOR THE BENEFIT OF DEVELOPING COUNTRIES. SUMMARIES ARE PROVIDED OF SOME OF THE MAIN PROGRAMS UNDERTAKEN IN THE FIELD OF SOLAR ENERGY BY A NUMBER OF AGENCIES AND BODIES OF THE UNITED NATIONS SYSTEM.

1979-0308 CHEN J
THE EFFECT OF LATENT HEAT FROM MOIST AIR ON THE VORTEX IN A TORNADO-TYPE WIND ENERGY GENERATOR SYSTEM.
J. IND. AERODYN. 5(1-2): 53-60, OCTOBER 1979.

A LOCAL-SIMILARITY METHOD IS PRESENTED FOR THE EQUATIONS THAT DESCRIBE A VORTEX, WHICH IS GENERATED BY A STATIONARY TOWER WITH A PARTLY OPENING TOP, DIRECTED BY VERTICAL VANES, AND WHICH IS AFFECTED BY THE LATENT HEAT OF CONDENSATION FROM MOIST AIR WHICH CREATES A BUOYANT FORCE.

1979-0309 CHENEY M C
DEVELOPMENT OF AN 8 KW WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I: DESIGN AND ANALYSIS. VOLUME I. EXECUTIVE SUMMARY.
NTIS, JUNE 25, 1979. 8 P.
DOE/DP/03533-T1(VOL. 1)

THE COMPOSITE BEARINGLESS WIND TURBINE WAS DEVELOPED AT THE UNITED TECHNOLOGIES RESEARCH CENTER FOLLOWING MANY YEARS OF BEARINGLESS ROTOR RESEARCH AND DEVELOPMENT FOR HELICOPTER APPLICATIONS. THE CURRENT 8 KW CONTRACT WAS BEGUN IN OCTOBER 1977 WITH DELIVERY OF THE PROTOTYPE SCHEDULED FOR NOVEMBER 1979. THE CONTRACT CONSISTS OF TWO PHASES. PHASE I ENCOMPASSES THE COMPLETE DESIGN OF THE SYSTEM AND SUPPORTING ANALYTICAL AND EXPERIMENTAL STUDIES. THE PHASE I FINAL REPORT HAS BEEN COMPLETED, AND THIS EXECUTIVE SUMMARY HIGHLIGHTS THE PRINCIPAL FINDINGS DESCRIBED IN THAT REPORT.

1979-0310 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
WIND ENG. 3(3): 187-196, 1979.

WIND ENERGY RESEARCH AND DEVELOPMENT WORK AT LINCOLN COLLEGE, CANTERBURY, NEW ZEALAND THAT COVERS A WIDE RANGE OF RELATED ACTIVITIES INCLUDING WIND-ENERGY SURVEYING AND RESOURCE ASSESSMENT, WIND-ENVIRONMENT AMELIORATION AND WIND-POWER UTILIZATION IS DESCRIBED. THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND IS PROVIDING A CLEARER PICTURE OF COMPLEX LOCAL WIND FLOWS AND THE SURVEY RESULTS ARE USED IN LONG-TERM ENERGY PLANNING FOR THE FUTURE.

1979-0311 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
N.Z. ENERGY J. 52(12): 176-178, DECEMBER 25, 1979.

THIS PAPER REVIEWS THE RESEARCH AND DEVELOPMENT CURRENTLY UNDER WAY IN THE DEPARTMENT OF AGRICULTURAL ENGINEERING AT LINCOLN COLLEGE AIMED AT QUANTIFYING SOME OF THE VARIABLES SUCH AS WIND ENERGY AVAILABILITY, CONVERSION EQUIPMENT COST AND COMPETITIVENESS WITH CONVENTIONAL FORMS OF ENERGY IN AN EFFORT TO PROVIDE FIRM INFORMATION ON WHICH DECISIONS CONCERNED WITH WIND-POWER UTILISATION CAN BE BASED.

1979-0312 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
CANTERBURY, NEW ZEALAND, LINCOLN COLLEGE, WMN-4, JUNE 1979.

1979-0313 WINEMILLER J R, SULLIVAN T L, SIZEMORE R L, YEE S T
DESIGN, FABRICATION, AND INITIAL TEST OF A FIXTURE FOR REDUCING THE NATURAL FREQUENCY OF THE MOD-0 WIND TURBINE TOWER.

NTIS, JULY 1979. 21 P.
NASA-TM-79200, DOE/NASA/1028-79/24

OPERATION OF THE MOD-0 WIND TURBINE WITH A TOWER FIRST BENDING FREQUENCY LESS THAN TWICE THE ROTOR SPEED WAS DESIRED. THIS WOULD PROVIDE AN OPPORTUNITY TO STUDY SYSTEM DYNAMICS FOR A SOFT TOWER AS WELL AS PROVIDE DATA FOR THE SYSTEM PASSING THROUGH RESONANCE. THE METHOD SELECTED TO REDUCE THE FREQUENCY WAS TO PLACE THE ORIGINAL MOD-0 TOWER ON A SET OF SPRINGS. THE FIXTURE FABRICATED TO DO THIS WAS DESIGNED SO THAT THE SPRING STIFFNESS COULD BE VARIED IN THE FIELD TO PROVIDE A RANGE OF TOWER FREQUENCIES. DESIGN REQUIREMENTS AND FIXTURE FABRICATION DETAILS ARE GIVEN. ACTUAL OPERATION OF THE MOD-0 WITH THE SOFTENING FIXTURE SHOWED THAT THE DESIRED TOWER NATURAL FREQUENCIES WERE OBTAINED. ONLY MODERATE FIXTURE DEFLECTIONS WERE OBSERVED WHEN THE SYSTEM PASSED THROUGH RESONANCE.

1979-0314 CHRISTENSEN D L
SOLAR ENERGY FOR BUILDINGS HANDBOOK.
NTIS, OCTOBER 1979. 268 P.
ORO-5362-T1

THIS HANDBOOK CONTAINS PRESENTATION MATERIALS AND SUPPORTING TEXT SUITABLE FOR PRESENTATIONS, EDUCATION, SHORT COURSES, ETC., FOR GENERAL AUDIENCES, AS WELL AS GOVERNMENT OFFICIALS AND MEMBERS OF THE BUILDING TRADE. THE FOLLOWING ARE DISCUSSED: CONSERVATION, SOLAR ENERGY, ECONOMICS, OBSTRUCTIONS, AND THE FUTURE.

1979-0315 CLARK E F, DE WINTER F
PROCEEDINGS OF THE WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
NTIS, JUNE 1979. 463 P.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979.
CONF-790352

PAPERS ARE PRESENTED CONCERNING WIND ENERGY TECHNOLOGY; WIND GENERATION VALUE IN ELECTRIC UTILITY SYSTEMS; LARGE WIND TURBINE GENERATOR OPERATION AND STATUS; AND NETWORK INTERACTION ANALYSES.

1979-0316 CLIFTON W W
FLUID CURRENT MOTOR.
U.S. PATENT NO. 4,142,832, MARCH 6, 1979. 12 P.

A FLUID CURRENT MOTOR IS DESCRIBED WHICH HAS A ROTABLE SHAFT, A PLURALITY OF ROTOR ARMS RIGIDLY MOUNTED TO AND EXTENDING RADIALLY OUTWARDLY FROM THE SHAFT AND A PLURALITY OF PAIRS OF SUPERPOSED ROTOR PANELS WHICH PAIRS ARE PIVOTALLY MOUNTED RESPECTIVELY TO EACH ROTOR ARM. IT MAY BE IMPROVED BY PROVIDING A RIGID CONNECTOR BETWEEN EACH PAIR OF PANELS MOVEABLY CONNECTING A LEADING PORTION OF ONE ROTOR PANEL IN EACH PAIR TO A TRAILING PORTION OF THE SECOND ROTOR PANEL IN EACH PAIR SUCH THAT THE ROTOR PANELS IN EACH PAIR OF ROTOR PANELS WILL COACTINGLY PIVOT BETWEEN RESISTING AND NON-RESISTING POSITIONS IN RESPONSE TO A FLUID CURRENT.

1979-0317 COLEMAN C, HUNNICUTT W
ROTOR AND CONTROL SYSTEM DESIGN FOR THE 8 KW 10 METER DIAMETER DOE/WINDWORKS WECS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 65-77.
RFP-3014(VOL.1)

THE FINAL ROTOR DESIGN, AS DEVELOPED IN PHASE I OF THE 8 KW WECS DEVELOPMENT PROGRAM BEING RUN BY ROCKY FLATS WIND DIVISION FOR DOE IS DESCRIBED. THE ROTOR IS 10 M (32.8 FT) IN DIAMETER WITH THREE BLADES. IT OPERATES IN A DOWNWIND CONFIGURATION USING POSITIVE PITCHING OF THE BLADES FOR OVERSPEED CONTROL. THIS PITCHING DECREASES THE ANGLE OF ATTACK OF THE BLADES. THE BLADES ARE FREE-FLAPPING, BEING HINGED AT THE ROOT, ALLOWING MOVEMENT IN THE OUT-OF-PLANE DIRECTION.

1979-0318 CONNELL J R
WIND CHARACTERISTICS FOR DESIGN OF WIND TURBINES: RESEARCH IN THE USA.
NTIS, DECEMBER 1, 1979. 22 P.
CONF-7990128-1, PNL-SA-7967

THE PACIFIC NORTHWEST LABORATORY (PNL) OF THE UNITED STATES DEPARTMENT OF ENERGY HAS THE PRIMARY RESPONSIBILITY FOR PROVIDING INFORMATION ON WIND CHARACTERISTICS FOR DESIGN AND FOR EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS). THE OBJECTIVES OF THE WHOLE PROGRAM ARE, BROADLY, TO DEVELOP TECHNICAL WIND INFORMATION WHICH IS RELEVANT TO THE DESIGN OF WECS, TO DETERMINE SUITABLE METHODS OF MEASURING AND ANALYZING THE WIND FOR EVALUATING WECS PERFORMANCE, AND TO COMMUNICATE THE INFORMATION USEFULLY TO WECS DESIGNERS.

1979-0319 COONLEY D R
WIND: MAKING IT WORK FOR YOU.
PHILADELPHIA, PENNSYLVANIA, THE FRANKLIN INSTITUTE PRESS, 1979. 99 P.

VARIOUS APPLICATIONS OF WIND POWER AND BUILDING DESIGNS INCORPORATING THE USE OF WIND ARE PRESENTED. THE CHARACTERISTIC MOVEMENTS OF THE WIND AND THE TERMINOLOGY USED IN MEASURING WIND ENERGY ARE REVIEWED PRIOR TO A DISCUSSION OF PASSIVE AND ACTIVE WIND ENERGY SYSTEMS. THE IMPORTANCE OF WIND IN AGRICULTURE, ECOSYSTEMS, CLIMATE, OCEAN CURRENTS, AND TRANSPORTATION IS ALSO REVIEWED. WIND BEHAVIOR DATA CAN BE USED TO PLAN PROTECTION FOR BUILDINGS, GARDENS AND CROPS. ACTIVE SYSTEMS INCORPORATING AUTOMATIC AND SPECIALIZED CONTROL SYSTEMS ARE OFTEN UTILIZED FOR PUMPING WATER, MILLING, GENERATING ELECTRICITY, AND MECHANICAL DRIVE SYSTEMS. WIND EQUIPMENT, SYSTEMS, AND DESIGNS ARE DETAILED AND DIAGRAMMED. VARIOUS BUILDING DESIGNS UTILIZING WIND ENERGY ARE ILLUSTRATED AND RECOMMENDATIONS FOR DESIGNING AND CONSTRUCTING WIND SYSTEMS ARE PROVIDED. PASSIVE AND ACTIVE WIND DESIGNS, PROJECTS AND EXPERIMENTAL SYSTEMS, AND A HISTORY OF WIND USE ARE INCLUDED IN APPENDICES.

1979-0320 CORCORAN W
OVERVIEW: DEPARTMENT OF ENERGY.
DOE/SOLAR EXPORT OPPORTUNITIES WORKSHOP, ATLANTA, GEORGIA, JANUARY 8, 1979. NTIS, APRIL 1979. P. 19-23.

A GENERAL NATIONAL PLAN FOR THE ACCELERATION OF THE COMMERCIALIZATION OF SOLAR ENERGY WITHIN THE DOE INVOLVES PROGRAMS ON HOT WATER, PASSIVE, INDUSTRIAL PROCESS HEAT, PHOTOVOLTAICS, WOOD, AND WIND. AN OVERVIEW OF THE U.S. GOVERNMENT INTERESTS AND ACTIVITIES IN STIMULATING TECHNOLOGIES THAT ARE READY FOR THE MARKETPLACE AND THOSE WHERE COOPERATIVE RESEARCH PROGRAMS ARE MUTUALLY BENEFICIAL INCLUDE SOLAR THERMAL SYSTEMS, PHOTOVOLTAICS, WIND ENERGY CONVERSION, BIOMASS, OCEAN THERMAL, AND LOWHEAD HYDRO. INTERNATIONAL ACTIVITIES ARE EMPHASIZED AND THESE INCLUDE COMMERCIALIZATION, TECHNICAL COOPERATION, AND COOPERATION WITH DEVELOPING COUNTRIES. THREE SLIDES ARE USED: SCOPE OF FEDERAL INTEREST, MULTI-NATIONAL ORGANIZATIONS, DEPARTMENT OF ENERGY'S INTERNATIONAL

SOLAR ENERGY ROLE TO ILLUSTRATE THE PRESENTATION.

1979-0321 COX M, ARMSTRONG P R
A STATISTICAL MODEL FOR ASSESSING THE RISK OF HAIL DAMAGE TO ANY GROUND INSTALLATION. TECHNICAL REPORT, JUNE 1978-MARCH 1979.
NTIS, SEPTEMBER 1979. 114 P.
ALO-4291-1

THIS REPORT DESCRIBES A STATISTICAL MODEL WHICH HAS BEEN DEVELOPED TO DETERMINE THE RISK OF DAMAGE BY LARGE HAIL TO ANY GROUND INSTALLATION (SUCH AS A SOLAR FLAT PLATE COLLECTOR). THE MODEL IS BASED ON DATA FOR THE NUMBER OF HAILDAYS PER YEAR, HAILSTONE SIZE DISTRIBUTION, AND STORM SEVERITY (EXPRESSED IN NUMBER OF HAILSTONES PER SQUARE METER PER STORM). OTHER THAN PARAMETERS DERIVED FROM THE RAW METEOROLOGICAL DATA AVAILABLE, THE PARAMETERS OF THE MODEL ARE THE NUMBER OF YEARS OF SURFACE EXPOSURE AND THE EXPOSURE AREA SIZE. THE END RESULT IS THE PROBABILITY OF A HAILSTONE OF A GIVEN SIZE STRIKING A GIVEN SURFACE AREA IN A GIVEN NUMBER OF YEARS. THE "MAXIMUM PROBABLE HAILSTONE SIZE" IS USED AS A CONVENIENT INDEX OF HAIL RISK.

1979-0322 COXON L
ALTERNATE ENERGY INSTALLATIONS ON THE JORDON COLLEGE CAMPUS.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 3RD, TUCSON, ARIZONA, JANUARY 23-25, 1979. SILVER SPRING, MARYLAND, INFORMATION TRANSFER, INC., 1979. P. 290-293.

JORDAN COLLEGE HAS CONSTRUCTED SEVEN ALTERNATE ENERGY DEMONSTRATION UNITS, SOME OF WHICH CONTRIBUTE GREATLY TO REDUCING ENERGY EXPENSES. SOLAR HEATED AIR AND WATER ARE UTILIZED FOR THE HEATING OF SPACE AND DOMESTIC HOT WATER, BOTH SEPARATELY AND JOINTLY. A WIND ENERGY CONVERSION SYSTEM, ONE OF THE LATEST INSTALLATIONS, IS PROVIDING POWER FOR THE NEW SOLAR GREENHOUSE; A PHOTOVOLTAIC DEMONSTRATION UNIT AND A CONCENTRATOR SYSTEM FOR HEATING AND COOLING ARE IN THE PLANNING STAGES.

1979-0323 CRAFOORD C
INTERACTION IN LIMITED ARRAYS OF WINDMILLS: REVIEW OF EARLIER RESULTS FROM A SIMPLE MODEL AND A PRESENTATION OF THE CAPABILITIES OF A DYNAMIC PBL MODEL.
NTIS, MARCH 27, 1979. 57 P.
DM-26, N80-11631/2

THE PROBLEM OF HOW CLOSELY PACKED AN ARRAY OF WINDMILLS CAN BE ERECTED WITHOUT UNDULY INTERFERING WITH EACH OTHER IS CONSIDERED. A GENERAL TECHNICAL BACKGROUND FOR THE BEHAVIOR OF A SINGLE WINDMILL IN A HONOGENEOUS FLOW, TOGETHER WITH A LIST OF IMPORTANT PARAMETERS FOR THE GENERAL PERFORMANCE OF A GROUP, IS GIVEN. EARLIER RESULTS FOR NEUTRAL STRATIFICATION ARE REVIEWED AND PRESENTED IN A SLIGHTLY DIFFERENT MANNER MORE FULLY ILLUSTRATING THE TRADE-OFF BETWEEN WINDMILL DENSITY AND MEAN EFFICIENCY AS FUNCTION OF GROUP SIZE. THE ANALOGY BETWEEN PLUMES AND WAKES AS A BASIS FOR A MODEL FORMULATION IS REVIEWED. PRELIMINARY RESULTS INDICATE A VARIATION IN MEAN EFFICIENCY OF 13% FOR A GROUP WITH 80 UNITS, WHICH MAY CORRESPOND TO A FACTOR OF 2.5 IN AREA COVERAGE. A DYNAMIC ONE DIMENSIONAL PLANETARY BOUNDARY LAYER MODEL IS PRESENTED AND REDESIGNED FOR SIMULATION EXPERIMENTS. USING IT, THE REGENERATION OF THE WIND PROFILES BEHIND A WINDMILL UNIT IS STUDIED FOR DIFFERENT AMBIENT CONDITIONS. PRELIMINARY RESULTS INDICATE A VARIATION OF UP TO A FACTOR OF 9 IN THE RATE OF REGENERATION OF THE PROFILES. HOW THIS DATA MIGHT BE CONSIDERED IN A STATISTICAL ANALYSIS IS DISCUSSED.

1979-0324 CRAIG A G
FABRICATION OF EXTRUDED VERTICAL AXIS TURBINE BLADES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 193-204.
NASA-CP-2106

AN IMPORTANT COMPONENT OF THE MODERN DARRIEUS TYPE VERTICAL AXIS WIND TURBINE IS THE EXTRUDED ALUMINUM BLADE. THIS IS MADE POSSIBLE BY THE REQUIREMENT THAT THEY BE HOLLOW, OF CONSTANT AIRFOIL SHAPE CROSS SECTION, AND BE CAPABLE OF BEING BENT INTO A NEAR-TROPOSKEIN SHAPE ABOUT THE FLATWISE AXIS. THEY SHOULD BE LIGHT WEIGHT, STRONG, AND NEED A MINIMUM OF MAINTENANCE. THESE CHARACTERISTICS DESCRIBE SOME IMPORTANT ATTRIBUTES OF ALUMINUM ALLOY EXTRUSIONS.

1979-0325 CROMACK D E
SYSTEM DESIGN PROBLEMS AND DEVELOPMENT OF WIND FURNACE I.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 159-165.
RFP-3014(VOL.1)

THE DESIGN CONCEPT OF THE UMASS WIND FURNACE HEATING SYSTEM IS DESCRIBED. THE PROBLEMS ENCOUNTERED DURING THE DEVELOPMENT AND OPERATION ARE DISCUSSED. ALSO PRESENTED ARE CONCEPTS FOR REDESIGN THAT WOULD BE INCORPORATED IF A SECOND GENERATION MACHINE WERE TO BE BUILT. BASIC AND ESSENTIAL DESIGN REQUIREMENTS ARE ALSO INCLUDED, AS ARE COST CONSIDERATIONS.

1979-0326 CUBITT L J
REDESIGN OF WINDMILL TOWERS--A COST REDUCTION STUDY.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2272-2276.

THE MOST EXPENSIVE ELEMENT IN THE FARM TYPE WINDMILL SYSTEM, NAMELY THE TOWER, IS REDESIGNED. THE PAPER SHOWS THAT GUYED STEEL POLES, AND REINFORCED CONCRETE POLES ARE SIGNIFICANTLY CHEAPER THAN THE COMMONLY-USED 4 OR 3 POSTED TOWER.

1979-0327 CUNTZE R, ZAUN J
CALCULATION OF THE NATURAL FREQUENCIES OF THE BRACED GROWIAN TOWER WITH DEAD HEAD MASS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 197-214.
JUEL-SPEZ-28

THE NATURAL FREQUENCIES OF THE BRACED GROWIAN STEEL AND CONCRETE TOWER WERE DETERMINED. IN THE CALCULATION THE MAIN ASSUMPTION TO TREAT THE MACHINE HOUSE AND THE ROTOR AS A DEAD MASS WAS MADE. THE FEM MODEL CONSISTED OF THE TOWER-BAR ELEMENT-STRUCTURE AND THE ROPE-CABLE STRUCTURES. ALL SUBSTRUCTURES WERE ELASTICALLY BOUND TO THE SOIL. THE PRESTRESSING OF TOWER AND CABLES WAS TAKEN INTO ACCOUNT. THE CALCULATION PROCEDURE AND THE MECHANICS AND NUMERICAL DIFFICULTIES WERE DISCUSSED. PARAMETRIC INVESTIGATIONS WERE UNDERTAKEN TO GET AN IDEA OF THE SENSITIVITIES OF SOME MAIN PARAMETERS. A COMPARISON OF THE STEEL AND THE CONCRETE TOWER NATURAL

FREQUENCY RESULTS ARE GIVEN AT THE END OF THE LECTURE.

1979-0328 DA-JUN Y
AN ANALYSIS FOR AERODYNAMIC PERFORMANCE OF THE VERTICAL AXIS "PHI" TYPE ROTOR WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 766-769.

THIS PAPER PRESENTS A MULTI-STREAM-SHEET COMPUTING MODEL FOR THE ANALYSIS OF THE AERODYNAMIC PERFORMANCE OF THE DARRIEUS WIND TURBINE (VERTICAL AXIS PHI-TYPE). THE MODEL CONSIDERS BOTH AERODYNAMIC PERFORMANCE OF THE AEROFOIL AND THE SHEAR EFFECTS OF THE WIND.

1979-0329 DAS S C
SIMPLIFIED MODELS OF LARGE-WIND-TURBINE OPEN-TRUSS TOWER.
ENVIRONMENTAL FORCES ON ENGINEERING STRUCTURES: PROCEEDINGS OF THE FIRST INTERNATIONAL CONFERENCE, LONDON, JULY 1979. NEW YORK, WILEY, HALSTEAD PRESS, 1979. P. 151-164.

THE PURPOSE OF THE INVESTIGATION DESCRIBED WAS TO DEVELOP A METHOD FOR QUICKLY MODELING A WIND TURBINE TOWER STRUCTURE AND THE COMBINED SYSTEM AS A SYSTEM OF MASSES AND SPRINGS TO STUDY THE DYNAMIC CHARACTERISTICS OF THE TOWER STRUCTURE ALONE AND THE COMBINED SYSTEM INVOLVING NACELLE AND ROTOR BLADES. IN THE MATHEMATICAL MODEL OF THE TOWER STRUCTURE AND THE COMBINED SYSTEM, THE MASS OR MASS MOMENT OF INERTIA OF THE SYSTEM ARE SEPARATED FROM THE ELASTIC PROPERTIES AND EQUIVALENT CONCENTRATED MASSES ARE PLACED AT THE CHOSEN NODE POINTS TO REPRESENT THE INERTIA FORCES IN THE DIRECTION OF THE ASSUMED ELEMENT DEGREES OF FREEDOM. THE EXPRESSIONS FOR THE FLEXURAL AND TORSIONAL FLEXIBILITY AND/OR STIFFNESS CO-EFFICIENTS HAVE BEEN DEVELOPED IN TERMS OF THE SEGMENTAL DIMENSIONS AND THE ELASTIC PROPERTIES OF THE TOWER STRUCTURE.

1979-0330 DAS S C, LINSCOTT B S
WIND TOWER FREE VIBRATION USING LUMPED MASS MODELS.
CONFERENCE ON ELECTRONIC COMPUTATION, 7TH, ST. LOUIS, AUGUST 6-8, 1979. NEW YORK, ASCE, 1979. P. 206-218.

AN APPROXIMATE METHOD IS PRESENTED TO CALCULATE THE BENDING AND TORSION FREQUENCIES OF A TYPICAL TOWER STRUCTURE FOR A WIND TURBINE. THE TOWER STRUCTURE IS MODELED AS A SYSTEM OF MASSES AND SPRINGS. THESE SIMPLIFIED LUMPED-MASS MODELS LEAD TO A SET OF ORDINARY DIFFERENTIAL EQUATIONS INVOLVING MATRICES IN TERMS OF MASS, MASS MOMENTS OF INERTIA, STRUCTURAL STIFFNESS OR STRUCTURAL FLEXIBILITY. ALL FREQUENCIES AND MODE SHAPES OF THE STRUCTURAL MODELS HAVE BEEN OBTAINED BY DIRECT INPUT OF THE MASS OR MASS MOMENT OF INERTIA AND STIFFNESS/FLEXIBILITY MATRICES IN THE PROBLEM ORIENTED COMPUTER PROGRAM SUCH AS STRUDL II OR NASTRAN. THE FREQUENCIES FROM THE IDEALIZED STRUCTURAL MODELS COMPARE CLOSELY WITH THOSE DETERMINED BY EXPERIMENT AND THOSE PREDICTED BY USING THE DETAILED FINITE ELEMENT NASTRAN REPRESENTATION. THE SIMPLIFIED STRUCTURAL MODELS DEVELOPED CAN ALSO BE USED TO COMPUTE TOWER FUNDAMENTAL FREQUENCIES WITH THE AID OF A POCKET-TYPE CALCULATOR USING DUNKERLEY'S EQUATION.

1979-0331 DAVISON G N
BOEING MOD-2 WIND TURBINE SYSTEM ROTOR.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 343-354.
NASA-CP-2106

THE DESIGN DETAILS, SIGNIFICANCE OF FATIGUE STRENGTH, DESIGN DEVELOPMENT TEST RESULTS, AND CONCLUSIONS OF THE PRELIMINARY DESIGN EFFORTS FOR THE MOD-2 ROTOR ARE PRESENTED.

1979-0332 DEBONTRIDDER J, VANDENPUT A, GEYSEN W
BASISPRINCIPES VOOR DE EKONOMISCH VERANTWOORDE KONSTRUKTIE VAN EEN WINDMOLEN. (BASIS PRINCIPLES FOR THE ECONOMICALLY JUSTIFIABLE DESIGN OF WINDMILLS.)
INGENIEURSBLAD 48(8): 69-74, AUGUST 1979. (IN DUTCH)

MATHEMATICAL FORMULAS ARE DESCRIBED WHICH GOVERN ECONOMICAL UTILIZATION OF WIND POWER AND A REVIEW IS PRESENTED OF THE KNOWN WINDMILL TYPES. IT IS CONCLUDED THAT ONLY THE HIGH-SPEED SCREW AND THE DARRIEUS ROTOR PROVIDE AN ECONOMICAL SOLUTION.

1979-0333 DE CARVALHO H G, DO AMARANTE O A C, KOIKE B M
DEVELOPMENT OF WIND ENERGY CONVERTERS TO POWER MICROWAVE RELAY STATIONS UNDER BRAZILIAN METEOROLOGICAL CONDITIONS.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 453-456.

METEOROLOGICAL CONDITIONS IN BRAZIL ARE DESCRIBED. GOALS AND PRESENT STAGE OF THE RESEARCH PROGRAM AND DEVELOPMENT OF WIND ENERGY CONVERTERS IN THE 5 TO 11 METERS ROTOR DIAMETER RANGE ARE DISCUSSED. THE INTEGRATION OF WIND ENERGY CONVERTERS WITH CONVENTIONAL OR SOLAR POWERED SOURCES IS CONSIDERED. ASPECTS OF ELECTRICAL ENERGY STORAGE ARE EXAMINED. FINALLY RELIABILITY PARAMETERS ARE CONSIDERED.

1979-0334 DEKITSCH A, FRITZSCHE A , MUELLER W, WELTE D
DEVELOPMENT OF WIND ENERGY CONVERTERS WITH VERTICAL ROTATIONAL AXIS.
DORNIER-POST NO. 2: 28-30, 1979. (IN GERMAN)

1979-0335 DEMEO E A
EPRI WIND ENERGY ACTIVITIES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 44-49.
CONF-790352

THE EPRI WIND ENERGY PROGRAM IS DESCRIBED CONCERNING THE IDENTIFYING AND ASSESSING OF PROSPECTIVE ROLES FOR WIND GENERATION IN ELECTRIC UTILITY SYSTEMS AND THE ASSESSING OF REQUIREMENTS THAT UTILITY OPERATION WILL PLACE ON WIND HARDWARE.

1979-0336 WINDMILL IRRIGATION SYSTEM.
SUNWORLD 3(4): 102-104. 1979.

TWO IRRIGATION PROJECTS IN PERU ARE DESCRIBED.

1979-0337 DESHMUKH R G, RAMAKUMAR R
MODELING AND SIMULATION OF WECS ASSISTED UTILITY SYSTEMS.

PITTSBURGH CONFERENCE ON MODELING AND SIMULATION, 10TH, APRIL 25-27, 1979. PITTSBURGH, INSTRUMENT SOCIETY OF AMERICA, 1979. PT. 3, P. 927-933.

A PROBABILISTIC MODEL IS DISCUSSED FOR WIND-ELECTRIC CONVERSION SYSTEMS (WECS) AND IT IS EMPLOYED IN A SIMULATION STUDY TO ASSESS THE RELIABILITY AND CAPACITY CREDIT ASPECTS OF WECS OPERATING IN PARALLEL WITH A CONVENTIONAL UTILITY GRID, FEEDING A COMMON LOAD. THE MAJOR PARAMETERS INVOLVED AND THEIR INFLUENCE ARE STUDIED BY SIMULATION TECHNIQUES FOR A TYPICAL WECS LOCATED IN THE SITE "KAHUKU UPPER" ON THE HAWAIIAN ISLAND OF OAHU. WIND SPEED DATA OVER A TWO-YEAR PERIOD COLLECTED BY THE UNIVERSITY OF HAWAII AT MANOA FORM THE BASIS OF THIS STUDY.

1979-0338 DESHMUKH R G
PROBABILISTIC STUDY OF WIND-ELECTRIC CONVERSION SYSTEMS FROM THE POINT OF VIEW OF RELIABILITY AND CAPACITY CREDIT.
OKLAHOMA STATE UNIVERSITY, STILLWATER, OKLAHOMA. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, 1979. ORDER NO. 79-28,197. 167 P.

THE EXPECTED ENTRY OF WIND-ELECTRIC CONVERSION SYSTEMS (WECS) INTO THE UTILITY GRIDS IN THE NEAR FUTURE BRINGS INTO FOCUS THE NEED TO ACCESS THE RELIABILITY OF WIND ASSISTED UTILITY SYSTEMS. IN PARTICULAR, THE INFLUENCE OF MAJOR PARAMETERS SUCH AS WIND REGIME, GENERATION MIX (PENETRATION), LOAD DEMAND AND THE LIKE IS OF INTEREST. THIS REQUIRES THE DEVELOPMENT OF APPROPRIATE PROBABILISTIC MODELS FOR WECS COMMENSURATE WITH THE MODELS OF OTHER COMPONENTS USED IN CONVENTIONAL POWER SYSTEMS, AND INTEGRATION OF THESE MODELS WITH THE MODELS OF OTHER POWER SYSTEM COMPONENTS TO EVALUATE THE RELIABILITY OF WECS ASSISTED UTILITY SYSTEMS WITH THE AID OF A SUITABLE LOAD MODEL.

1979-0339 DEWINKEL C C
WIND ENERGY CONVERSION SYSTEMS IN THE SERVICE AREA OF THE WISCONSIN POWER AND LIGHT COMPANY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 45-60.
RFP-3014(VOL.2)

A DISCUSSION OF THE WIND ENERGY RESOURCE OF WISCONSIN IS GIVEN. SOME CHARACTERISTICS OF THE WISCONSIN POWER AND LIGHT COMPANY ARE REVIEWED, PARTICULARLY SELECTED LOAD AND ENERGY FORECAST DATA WHICH INDICATE THE POTENTIAL OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). THE DEVELOPMENT OF ANALYTICAL TOOLS TO ANALYZE ALTERNATIVE TECHNOLOGIES AND LOAD AND ENERGY MANAGEMENT SCHEMES IS DESCRIBED. FINALLY, WISCONSIN POWER AND LIGHT'S PRESENT WIND ENERGY PROGRAM IS DISCUSSED.

1979-0340 DIESENDORF M, FULFORD G
OPTIMAL VALUE OF THE RATED SPEED OF A WIND GENERATOR.
WIND ENG. 3(1): 62-68, 1979.

SOUTH AUSTRALIAN WINDSPEED DATA ARE MODELED WITH THE WEIBULL DISTRIBUTION, WHILE THE RESPONSE (POWER DENSITY OUTPUT) OF A WIND GENERATOR, BETWEEN ITS STARTING SPEED V//S AND RATED SPEED V//R, IS CHOSEN TO BE THE SUM OF A CUBIC FUNCTION OF WINDSPEED V AND A CONSTANT TERM. AN EXPRESSION IS DERIVED FOR THE VALUE OF THE PARAMETER V//R/VBAR) MAX, WHICH YIELDS THE MAXIMUM OF THE ANNUAL ENERGY PRODUCTION. ATTENTION IS DRAWN TO THE IMPORTANT ROLE OF THE STARTING SPEED OF THE WIND GENERATOR, WHICH DETERMINES, TOGETHER WITH V//R, WHETHER THERE IS A MAXIMUM ANNUAL ENERGY PRODUCTION AND, IF SO, WHERE IN PARAMETER SPACE THE MAXIMUM IS TO BE FOUND.

1979-0341 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
HEAT. VENT. ENG. J. AIR COND. 53(615): 14-15, FEBRUARY 1979.

THE CHANGING TREND IN THE UNITED STATES FROM STUDIES AND ESTIMATES TO ACTUAL EXPERIMENTS IS DESCRIBED. ALSO CONSIDERED ARE THE U.S. WIND ENERGY BUDGET, THE MOD-0 WIND TURBINE SYSTEM, THE POTENTIAL FOR TELEVISION BROADCAST INTERFERENCE, AND INTERNATIONAL RESEARCH COOPERATION.

1979-0342 DIVONE L V, BLAUNSTEIN R, GROS J, INGBERMAN A K, RICE W L R
COMMERCIALIZATION STRATEGY REPORT FOR LARGE WIND SYSTEMS.
NTIS, 1979. 41 P.
TID-28843(DRAFT)

THE COMMERCIALIZATION OF WIND TURBINES IS ANALYZED CONCERNING TECHNICAL READINESS; MARKET AND ECONOMIC ASPECTS; ENVIRONMENTAL IMPACTS; INSTITUTIONAL ACCEPTANCE; BENEFIT ANALYSIS; AND COMMERCIALIZATION DEVELOPMENT STRATEGY.

1979-0343 DODGE D M, STAFFORD J V
SMALL WIND TURBINE SYSTEMS 1979. A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. VOLUME 1: R AND D REQUIREMENTS.
NTIS, 1979. 299 P.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979.
RFP-3014(VOL.1)

1979-0344 YPERLAAN G J
FREQUENCY DISTRIBUTIONS OF THE WIND VELOCITY AND THE WIND ENERGY OF THE LIGHTSHIPS TERSCHELLINGERBANK, TEXEL, GOEREE AND NOORDHINDER. (FREKWENTIEVERDELINGEN VAN DE WINDSNELHEID EN DE WINDENERGIE VAN DE LICHTSCHEPEN TERSCHELLINGERBANK, TEXEL, GOEREE EN NOORDHINDER.)
NTIS, 1979. 92 P. (IN DUTCH)
KNMI-V-309, N80-18650/5

TABLES OF WIND VELOCITY AND WIND ENERGY ARE PRESENTED, PREPARED FROM DATA TAKEN AT FOUR COASTAL LIGHTSHIPS OFF THE COAST OF THE NETHERLANDS FOR USE IN STUDYING THE FEASIBILITY OF WIND POWER. DATA WAS ALSO TAKEN AT SHORE STATIONS, BUT DIFFERENCES IN COLLECTION METHODS MAKE IT DIFFICULT TO COMPARE THE DATA SETS.

1979-0345 DODGE D M, STAFFORD J V
SMALL WIND TURBINE SYSTEMS 1979. A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. VOLUME 2: UTILITY INTERFACE/INSTITUTIONAL ISSUES.
NTIS, 1979. 224 P.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979.
RFP-3014(VOL.2)

1979-0346 DOMAN G S
SYSTEM CONFIGURATION IMPROVEMENT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 384-395.
NASA-CP-2106

THE DESIGN OF A WIND TURBINE GENERATOR IS A VERY COMPLEX PROCESS BECAUSE OF THE MANY (AND OFTEN CONFLICTING) CHOICES AND CONSIDERATIONS INVOLVED. AS A CONSEQUENCE, THE DETERMINATION OF A SUPERIOR SYSTEM CAN BEST BE ACHIEVED FROM INTENSIVE STUDIES AND PROBINGS THAT REFLECT THE TRULY PERTINENT GOVERNING FACTORS. A DISCUSSION OF SUCH A PROCESS IN TERMS OF WORD CHARTS AND ASSOCIATED FIGURES IS PRESENTED.

1979-0347 DONHAM R E
EVALUATION OF AN OPERATING MOD-0A 200 KW WIND TURBINE BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 239-265.
NASA-CP-2106

THE MOD-0A WIND TURBINE BLADES, MANUFACTURED BY LOCKHEED AIRCRAFT SERVICE COMPANY (LAS), ONTARIO, CALIFORNIA, ARE NOW OPERATING IN CLAYTON, NEW MEXICO. THESE BLADES, ROTATED FOR THE FIRST TIME ON NOVEMBER 30, 1977, ESTABLISHED THE MOD-0A AS THE FIRST WIND-DRIVEN GENERATOR IN 35 YEARS TO BE CONTINUALLY TIED INTO AN ELECTRICAL POWER SYSTEM THAT SERVICES A COMMUNITY. TWO ADDITIONAL SETS OF MOD-0A BLADES HAVE BECOME OPERATIONAL ON THE ISLAND OF CULEBRA, PUERTO RICO, AND BLOCK ISLAND, RHODE ISLAND. BLADE DESIGN FOLLOWS THAT OF THE MOD-0 WIND TURBINE BUILT FOR NASA. THE MOD-0A WIND TURBINE BLADES ARE GEOMETRICALLY THE SAME AS THE MOD-0 BLADES. STRUCTURAL MODIFICATIONS RECOMMENDED BY LOCKHEED TO EXTEND THE FATIGUE LIFE OF THE MOD-0 BLADES AND NASA'S EXPERIENCE WITH THE MOD-0 UNIT INFLUENCED THE DESIGN OF THE MOD-0A TURBINE BLADE STRUCTURE; SO DID COST AND SCHEDULE CONSTRAINTS.

1979-0348 DOUGLAS R R
BOEING MOD-2: WIND TURBINE SYSTEM RATED AT 2.5 MW.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 61-78.
NASA-CP-2106

THE MOD-2 PROJECT IS AN APPROXIMATE 36 MONTH PROGRAM FOR THE DEVELOPMENT, DESIGN, FABRICATION, INSTALLATION, AND CHECK-OUT OF A WIND TURBINE SYSTEM (WTS) OPTIMIZED FOR COMMERCIAL PRODUCTION OF POWER INTO A UTILITY GRID. SIMILAR TO THE MOD-0 AND MOD-1 PROGRAMS, MOD-2 IS MANAGED BY NASA-LERC. CONTRARY TO THOSE PROGRAMS, THE PRIMARY OBJECTIVE OF THE END HARDWARE IS FOR DIRECT AND EFFICIENT COMMERCIAL APPLICATION, RATHER THAN FOR RESEARCH AND DEVELOPMENT. THE PROGRAM HAS BEEN STRUCTURED TO ACHIEVE THIS DESIRED COMMERCIAL OBJECTIVE BY A SUBSTANTIAL CONCEPT SELECTION EFFORT, COMPARATIVELY FEW FIRM REQUIREMENTS IMPOSED ON THE CONTRACTOR, AND ENCOURAGEMENT OF COMMERCIAL PRACTICE APPLICATION. A SUMMARY DESCRIPTION OF MOD-2 DEVELOPMENT AND OF THE RESULTING SYSTEM HARDWARE IS PRESENTED.

1979-0349 DRAKE W, CLEWS H
DEVELOPMENT OF A 2 KW HIGH-RELIABILITY WIND TURBINE GENERATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 13-30.
RFP-3014(VOL.1)

ENERTECH CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DEVELOP AND FABRICATE PROTOTYPES FOR TESTING OF A 2 KW HIGH-RELIABILITY WIND TURBINE GENERATOR. THE MACHINE IS TO BE CAPABLE OF PRODUCING 2 KW OF ELECTRICAL POWER IN A 9 METER/SECOND (20 MILE/H) WIND, AND SHOULD REQUIRE NOT MORE THAN ONE MAN-DAY OF SERVICE PER YEAR. THE DESIGN CHARACTERISTICS AND OPERATING ECONOMICS ARE PRESENTED.

1979-0350 DREES H M
SELF-STARTING WINDMILL ENERGY CONVERSION SYSTEM.
U.S. PATENT NO. 4,180,367, DECEMBER 25, 1979. 14 P.

A WIND TURBINE APPARATUS IS DESCRIBED IN WHICH A PLURALITY OF WIND RESPONSIVE ELEMENTS ARE MOVABLY MOUNTED, SUCH AS BY BEING PIVOTALLY MOUNTED, ON A MOVABLE MEANS WHICH PRODUCES ROTARY MOTION. THE POSITIONS OF THE WIND RESPONSIVE ELEMENTS ARE ARRANGED TO PROVIDE A DRAG FORCE ON AT LEAST ONE OF THE ELEMENTS IN RESPONSE TO THE WIND WHEN THE SPEED OF ROTARY MOTION IS BELOW A PREDETERMINED LEVEL SO AS TO PRODUCE A STARTING FORCE TO INITIATE AND MAINTAIN THE ROTARY MOTION. WHEN THE SPEED OF THE ROTARY MOTION EXCEEDS SUCH PREDETERMINED LEVEL THE POSITIONS OF SUCH WIND RESPONSIVE ELEMENTS ARE SUCH THAT A LIFT FORCE IS PROVIDED THEREON IN RESPONSE TO THE WIND SO THAT THE ROTARY MOTION CAN ACHIEVE SPEEDS WHICH ARE CONSIDERABLY HIGHER THAN THOSE ACHIEVED BY THE STARTING FORCE.

1979-0351 DUTTON J A, PANOFSKY H A, LARKO D, SHIRER H N, STONE G, VILARDO M
STATISTICS OF WIND FLUCTUATIONS OVER COMPLEX TERRAIN. FINAL REPORT.
NTIS, OCTOBER 1979. 157 P.
DOE/ET/20560-1

THIS REPORT DEALS WITH THE PROPERTIES OF RELATIVE TURBULENCE INTENSITIES, TURBULENT SPECTRA AND FREQUENCY DISTRIBUTIONS OVER UNIFORM AND COMPLEX TERRAIN.

1979-0352 DUWE W D
40 KW GIROMILL PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 132-141.
RFP-3014(VOL.1)

ROCKWELL INTERNATIONAL HAS AWARDED THE MCDONNELL AIRCRAFT COMPANY A CONTRACT TO DESIGN, BUILD, AND DELIVER A 40 KW VERTICAL AXIS WINDMILL CALLED A GIROMILL. WORK BEGAN IN SEPTEMBER 1978. DELIVERY TO ROCKY FLATS IS SCHEDULED TOWARD THE END OF 1979. IN ORDER TO ACCOMPLISH THIS PROGRAM, A TEAMING ARRANGEMENT HAS BEEN MADE WITH THE VALLEY PUMP DIVISION OF VALLEY INDUSTRIES. VALLEY WILL PARTICIPATE IN THE DESIGN, WILL FABRICATE MOST OF THE PARTS, AND, IF THE MACHINE IS SUCCESSFUL, WILL MANUFACTURE THE GIROMILL.

1979-0353 YEN J T, DECARLO J, ZYWAN W
RECENT DEVELOPMENTS OF THE TORNADO-TYPE WIND ENERGY SYSTEM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 137-152.
SERI/TP-245-184, CONF-790501

RECENT DEVELOPMENTS IN TORNADO-TYPE WIND ENERGY SYSTEM WILL BE PRESENTED IN THIS PAPER INCLUDING THE FINDINGS THAT (A) THE VANES OF THE VORTEX COLLECTING TOWER CAN BE PERMANENTLY FIXED AND OPENED TO WINDS FROM ALL DIRECTIONS, (B) DATA MEASURED FROM SMALL MODELS WITH FIXED-VANES GIVE A CURRENT LEVEL OF PERFORMANCE OF AROUND 0.10 FOR THE POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA, (C) FIXED-VANE TOWER DESIGN YIELDS MAJOR REDUCTIONS IN TOWER COSTS AND SIGNIFICANT REDUCTIONS IN CAPITAL COSTS AGAINST SOME DEGRADATION IN PERFORMANCE DUE TO SOME LEAKAGE OF WIND ENERGY FROM THE FIXED-VANES, (D) EMPLOYING A REASONABLE SYSTEM COST OF $100/SQ. M. ($10/SQ. FT.) OF TOWER SURFACE AREA SHOWS THAT AT MASS PRODUCTION OF FULL-SCALE UNITS, THE TORNADO-TYPE WIND ENERGY SYSTEM WOULD YIELD A CAPITAL COST OF $300 TO $500/KW INSTALLED AND AN ENERGY COST OF 2 TO 4 CENTS/KWH, AND HENCE (E) EVEN BASED ON CURRENT LEVEL OF PERFORMANCE MEASURED FROM SMALL MODELS, FULL-SCALE TORNADO-TYPE WIND ENERGY SYSTEM IS SEEN TO BE COST COMPETITIVE AGAINST THE CONVENTIONAL MODS 0A, 1 AND 2 WIND MACHINES.

1979-0354 EDRIS A-A
TRANSIENT ANALYSIS OF A WIND DRIVEN SYNCHRONOUS GENERATOR.
CHALMERS TEK. HOGSK. DOKTORSAVH. NO. 92, MARCH 1979. 157 P.

THIS PAPER PRESENTS A MATHEMATICAL STATE-SPACE MODEL FOR DIGITAL COMPUTER STUDIES OF THE TRANSIENT BEHAVIOR OF A WIND DRIVEN SYNCHRONOUS GENERATOR. THE PAPER IS DIVIDED INTO TWO PARTS. PART I DEALS WITH THE ANALYSIS FOR AN OPEN-LOOP WIND-ELECTRIC ENERGY CONVERSION PLANT. A WIND TURBINE IS MECHANICALLY COUPLED, THROUGH A GEAR-BOX, TO A SYNCHRONOUS GENERATOR CONNECTED TO A LARGE UTILITY NETWORK. PART II DEALS WITH THE ANALYSIS FOR A CLOSED-LOOP PLANT. THE MODEL DEVELOPED IS USED TO STUDY THE INFLUENCE OF INTRODUCING A SUPPLEMENTAL INPUT SIGNAL TO THE GENERATOR EXCITATION VOLTAGE ON THE DYNAMIC RESPONSE CHARACTERISTICS OF THE PLANT.

1979-0355 EGGWERTZ S, CARLSSON I, GUSTAFSSON A, LUNDEMO C, MONTGOMERIE B
SAFETY OF WIND ENERGY CONVERSION SYSTEMS (WECS): PRELIMINARY STUDY.
NTIS, NOVEMBER 16, 1979. 136 P.
FFA-HU-2126, N80-28933/3

A SAFETY STUDY TO PROVIDE INFORMATION ON THE RISKS INHERENT IN A WIND ENERGY CONVERSION SYSTEM (WECS) TO THE GENERAL PUBLIC IN THE SURROUNDING AREA AS WELL AS TO THE OPERATOR PERSONNEL IS PRESENTED. LAND BASED LARGE SCALE TURBINE SYSTEMS WITH HORIZONTAL AXES SITUATED IN SPARSELY POPULATED AREAS ARE CONSIDERED. THE STUDY IS INTENDED TO SERVE AS A PRELIMINARY MANUAL FOR SAFETY ANALYSIS OF WECS. AN OVERALL DESCRIPTION OF THE SYSTEM, STATISTICAL INFORMATION CONCERNING LOADS AND STRENGTH PROPERTIES OF MATERIALS CONSIDERED, AND A DISCUSSION OF GEOMETRICAL TOLERANCES ARE INCLUDED.

1979-0356 ELLIOTT D L, BARCHET W R
NORTHWEST REGIONAL WIND ENERGY ASSESSMENT.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 15-18.
CONF-790845

THE WIND ENERGY RESOURCE OF THE UNITED STATES AND ITS TERRITORIES MUST BE DESCRIBED IN ADEQUATE DETAIL TO MEET THE NEEDS OF A VARIETY OF USERS. TO MEET THESE NEEDS, THE WIND CHARACTERISTIC PROGRAM ELEMENT, MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY (PNL), DEVELOPED, APPLIED AND TESTED TECHNIQUES USING EXISTING WIND INFORMATION TO ASSESS THE WIND ENERGY POTENTIAL OF THE NORTHWEST REGION. THIS ASSESSMENT INCLUDED IDAHO, MONTANA, OREGON, WASHINGTON AND WYOMING.

1979-0357 ENVIRONMENTAL ASSESSMENT: INSTALLATION AND FIELD TESTING OF A LARGE EXPERIMENTAL WIND TURBINE GENERATOR SYSTEM NEAR KAHUKA POINT ON THE ISLAND OF OAHU, HAWAII.
NTIS, DECEMBER 1979. 56 P.
DOE/EA-0097

THE DEPARTMENT OF ENERGY (DOE) HAS PREPARED AN ENVIRONMENTAL ASSESSMENT (EA) ON THE PROPOSED MOD-0A WIND TURBINE FIELD TEST AND EVALUATION NEAR KAHUKA POINT ON THE ISLAND OF OAHU, HAWAII. BASED ON THE FINDINGS OF THE EA, WHICH IS AVAILABLE TO THE PUBLIC ON REQUEST, DOE HAS DETERMINED THAT THE PROPOSED ACTION DOES NOT CONSTITUTE A MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT WITHIN THE MEANING OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA), 42 USC 4321 ET SEQ. THEREFORE AN ENVIRONMENTAL IMPACT STATEMENT IS NOT REQUIRED.

1979-0358 ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
NTIS, OCTOBER 1979. 149 P
PNL-3074

A PRACTICAL METHOD HAS BEEN DEVELOPED AND APPLIED TO THE PROBLEM OF DETERMINING WIND CHARACTERISTICS AT CANDIDATE WIND ENERGY CONVERSION SITES WHERE THERE ARE NO AVAILABLE HISTORICAL DATA. THE METHOD USES A MASS CONSISTENT WIND FLOW MODEL (CALLED COMPLEX) TO INTERPOLATE BETWEEN STATIONS WHERE WIND DATA ARE AVAILABLE. THE COMPLEX MODEL INCORPORATES THE EFFECTS OF TERRAIN FEATURES AND AIRFLOW. THE KEY TO THE PRACTICAL APPLICATION OF COMPLEX TO THE DERIVATION OF WIND STATISTICS IS THE MODEL'S LINEARITY. THIS ALLOWS THE INPUT DATA SETS TO BE RESOLVED INTO ORTHODONAL COMPONENTS ALONG THE SET OF EIGENVECTORS OF THE COVARIANCE MATRIX.

1979-0359 FABIAN O
STRATEGY FOR AEROELASTIC ANALYSIS OF WECS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 95-104.
JUEL-SPEZ-28

WITHIN THE FINITE ELEMENT METHOD, THE ROTOR BLADES ARE USUALLY MODELLED BY BEAM ELEMENTS BELONGING TO A CO-ORDINATE SYSTEM CO-ROTATING WITH THE ROTOR HUB. IN THE CASE OF A FLEXIBLE TOWER, HOWEVER, THIS ROTATING SYSTEM IS BOTH PITCHED AND YAWED. THE INCLUSION OF THESE ADDITIONAL MOTIONS IN THE VIBRATION ANALYSIS CONSTITUTES A SEVERE PROBLEM. THE PROPOSITION PRESENTED CONCERNS A PURELY INERTIAL FORMULATION OF THE VIBRATION PROBLEM AVOIDING THIS DIFFICULTY.

1979-0360 FALICOFF W, KOIDE G, TAKAHASHI P
SOLAR/WIND HANDBOOK FOR HAWAII--ENERGY APPLICATIONS FOR HAWAII, THE PACIFIC BASIN AND SITES WORLDWIDE WITH SIMILAR CLIMATIC CONDITIONS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2301-2305.

A NUMBER OF GENERAL HANDBOOKS, LOCAL METEOROLOGICAL DATA SETS, MANUFACTURERS' SPECIFICATIONS, USDOE INFORMATION CIRCULARS AND ASSORTED BOOKS AND REPORTS ARE AVAILABLE ON WIND AND SOLAR ENERGY. THE "SOLAR/WIND HANDBOOK FOR

HAWAII" IS THE VERY FIRST PUBLICATION TO CONDENSE THE WEALTH OF HISTORICAL AND CONTEMPORARY INFORMATION, BOTH REGIONALIZED AND UNIVERSAL, INTO ONE SOLAR AND WIND ENERGY APPLICATIONS VOLUME.

1979-0361 FALICOFF W, KOIDE G, TAKAHASHI P
SOLAR/WIND HANDBOOK FOR HAWAII: TECHNICAL APPLICATIONS FOR HAWAII, THE PACIFIC BASIN AND SITES WORLDWIDE WITH SIMILAR CLIMATIC CONDITIONS.
NTIS, MAY 1979. 647 P.
UCRL-15053

THE TECHNIQUES ARE PRESENTED FOR USING SOLAR ENERGY AND WIND POWER IN APPLICATIONS SUCH AS DOMESTIC HOT WATER PRODUCTION, SPACE COOLING, PROCESS HEATING, AND POWER GENERATION. THE FINDINGS AND INFORMATION ARE BASED UPON CONDITIONS IN HAWAII, BUT CAN APPLY TO LOCATIONS WITH SIMILAR ENVIRONMENTS SUCH AS THE ENTIRE PACIFIC AREA.

1979-0362 FELLHAUER C A
SPECIAL STUDIES TASK AREA OF THE ROCKY FLATS SMALL WIND ENERGY SYSTEMS GROUP.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 94-98.
RFP-3014(VOL.2)

THE ROCKY FLATS WIND SYSTEMS GROUP CONVENED REPRESENTATIVES OF THE SWECS INDUSTRY IN HYANNIS, MASSACHUSETTS AFTER THE AMERICAN WIND ENERGY ASSOCIATION CONFERENCE IN THE FALL OF 1978 TO SOLICIT SUGGESTIONS FOR THE SPECIAL STUDIES TASK AREA. THE NUMEROUS SUGGESTIONS COVERED MARKETING, COST ANALYSIS, UTILITY INTERFACE, FINANCING ISSUES, PRODUCT LIABILITY ISSUES AND A MISSION ANALYSIS. THE SUGGESTIONS WERE INTEGRATED AND PRIORITIZED IN ACCORDANCE WITH A METHODOLOGY DEVELOPED BY MR. M.E. NIGHTENGALE, MANAGER, INSTITUTIONAL ISSUES. THE ANALYSIS RESULTED IN 11 STUDIES THAT WILL PROGRESS THROUGH VARIOUS PHASES FROM STARTUP TO COMPLETION IN FY 1979. THESE STUDIES WERE INTEGRATED INTO THE SPECIAL STUDIES TASK AREA, AS A PART OF THE INSTITUTIONAL ISSUES PROGRAM AT ROCKY FLATS.

1979-0363 FERRELL G C, THORN W R, AGNELLO M, SMITH D
THE APPLICATION OF SMALL WIND ENERGY CONVERSION SYSTEMS TO THE TELECOMMUNICATIONS INDUSTRY.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 438-444.

THE RECENT TESTING OF WIND-ELECTRIC SYSTEMS UNDER HARSH ATMOSPHERIC CONDITIONS HAS PROVEN AND DOCUMENTED A HIGH LEVEL OF REQUIRED PERFORMANCE. SMALL WIND SYSTEMS ARE NOW CAPABLE OF REMOTE, UNATTENDED, AND NEAR MAINTENANCE FREE OPERATION, PERFORMANCE CHARACTERISTICS WHICH ARE WELL SUITED TO APPLICATIONS IN THE TELECOMMUNICATIONS INDUSTRY.

1979-0364 FERTIS D G, ROSS R S
LOW COST WIND GENERATOR URETHANE ROTORS.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2, 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-D, 6 P.

THE PURPOSE OF THE RESEARCH PRESENTED IN THIS PAPER WAS TO EXECUTE A FEASIBILITY STUDY TO DETERMINE IF IT IS POSSIBLE TO REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTOR BLADES BY MAKING THEM OF CAST URETHANE.

1979-0365 FERTIS D G, ROSS R S
LOW COST WIND GENERATOR URETHANE ROTORS.
J. ELASTOMERS PLAST. 11(4): 253-268, OCTOBER 1979.

THIS PAPER DESCRIBES A RESEARCH PROGRAM WHICH WAS UNDERTAKEN TO EXECUTE A FEASIBILITY STUDY TO DETERMINE IF IT IS POSSIBLE TO REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTOR BLADES BY MAKING THEM OF CAST URETHANE. PRELIMINARY INVESTIGATIONS BY NASA HAVE SHOWN THAT LARGE SIZE WINDMILLS CAN PROVIDE SIGNIFICANT AMOUNTS OF ENERGY TO TAKE CARE OF FUTURE NEEDS. THE COST OF INSTALLATION OF SUCH LARGE SIZE WINDMILLS CAN BE REDUCED CONSIDERABLY IF LOW COST ROTOR BLADES ARE USED.

1979-0366 FEUERSTEIN R J
UTILITY RATES AND SERVICE POLICIES AS POTENTIAL BARRIERS TO THE MARKET PENETRATION OF DECENTRALIZED SOLAR TECHNOLOGIES.
NTIS, AUGUST 1979. 131 P.
SERI/TR-62-274

AT PRESENT, ECONOMIC AND INSTITUTIONAL CONCERNS DICTATE THAT DECENTRALIZED SOLAR TECHNOLOGIES GENERALLY REQUIRE AN AUXILIARY ENERGY SOURCE TO ASSURE CONTINUOUS SERVICE THROUGH PERIODS OF ADVERSE WEATHER. UTILITY RATES AND SERVICE POLICIES REGARDING AUXILIARY ENERGY SERVICE HAVE A SIGNIFICANT IMPACT UPON SOLAR SYSTEM ECONOMICS, AND THUS THE COMMERCIALIZATION OF SOLAR ENERGY. THE SCOPE OF THIS PAPER EVALUATES THREE BASIC ISSUES: (1) WHETHER A UTILITY CAN REFUSE TO PROVIDE AUXILIARY SERVICE TO SOLAR USERS, (2) WHETHER A UTILITY CAN CHARGE HIGHER OR LOWER THAN TRADITIONAL RATES FOR AUXILIARY SERVICE, AND (3) WHETHER A UTILITY CAN REFUSE TO PURCHASE EXCESS POWER GENERATED BY SMALL POWER PRODUCERS UTILIZING ELECTRICITY-PRODUCING SOLAR TECHNOLOGIES.

1979-0367 FINCH T
INSTITUTIONAL BARRIERS TO URBAN SWECS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 142-144.
RFP-3014(VOL.2)

THE FEASIBILITY OF SITING SMALL WIND TURBINES IN URBAN AREAS IS DESCRIBED. ECONOMIC CONSIDERATIONS AND INTERFACING REQUIREMENTS ARE DISCUSSED. AN EXAMPLE OF A SMALL WIND TURBINE LOCATED IN NEW YORK CITY IS PRESENTED.

1979-0368 FISHER E D, BELLAIRE M I
WIND TO HEAT CONVERTOR. TECHNICAL PROGRESS REPORT.
NTIS, DECEMBER 28, 1979. 20 P.
DOE/R5/10120-T1

THE PURPOSE OF THIS PROJECT IS TO DEMONSTRATE A WIND DRIVEN MACHINE WHICH CONVERTS WIND ENERGY TO HEAT THROUGH THE ACTION OF THE IMPELLOR OF THE WINDMILL, DRIVING THROUGH SUITABLE SHAFTING AND GEARING, A ROTARY HYDRAULIC BRAKE WHICH ABSORBS THE POWER BY CONVERTING THE MECHANICAL ENERGY INTO HEAT IN THE WORKING FLUID. RESISTANCE IS CREATED EXCLUSIVELY BY FLUID FRICTION AND AGITATION OF THE FLUID CIRCULATED BETWEEN THE VANED MEMBERS OF THE CONVERTOR. THIS PROJECT INCLUDES THE EFFORT TO DESIGN, PURCHASE COMPONENT PARTS AND MATERIALS, CONSTRUCT,

ASSEMBLE, ERECT THE PROTOTYPE MODEL, AND EVALUATE ITS PERFORMANCE UNDER THE PREVAILING WIND CONDITIONS AT THE SELECTED SITE.

1979-0369 FLUID BATTERY STORES "CHEAP" ELECTRICITY.
ELECTR. WORLD 192(2): 43-44, JULY 15, 1979.

A UNIQUE ENERGY STORAGE SYSTEM, CALLED REDOX, DEVELOPED AT NASA'S LEWIS RESEARCH CENTER, UNDER A PROGRAM JOINTLY FUNDED BY DOE AND NASA, GIVES PROMISE OF MAJOR COST REDUCTIONS IN STORING ELECTRICAL ENERGY, AS WELL AS LONG-TERM RELIABILITY AND MINIMAL ENVIRONMENTAL IMPACT. (REDOX IS AN ACRONYM FOR REDUCTION OXIDATION). FOR UTILITIES THE NEW NASA SYSTEM COULD BE SCALED UP IN THE NEXT SEVERAL YEARS, DEPENDING ON FUNDING, TO PROVIDE AN EFFICIENT MEANS OF LOAD LEVELING--THE STORAGE OF THOUSANDS OF KWH DURING LOW DEMAND PERIODS FOR LATER PEAK USE. MORE IMMEDIATELY, REDOX SYSTEMS IN THE KILOWATT RANGE COULD HELP TO SPEED THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN AN IMPORTANT CONSIDERATION.

1979-0370 FOREMAN K M, GILBERT B L
TECHNICAL DEVELOPMENT OF THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 121-136.
SERI/TP-245-184, CONF-790501

AN ATTRACTIVE ADVANCED WIND ENERGY CONCEPT IS THE DIFFUSER AUGMENTED WIND TURBINE (DAWT). THIS APPROACH EFFECTIVELY INCREASES THE CONCENTRATION OF NATURALLY DIFFUSE WIND ENERGY BY INDUCING GREATLY AUGMENTED MASS FLOW RATE THROUGH THE WIND TURBINE THAN IN CONVENTIONAL ARRANGEMENTS. THE TECHNICAL CHALLENGE HAS BEEN TO DEVELOP VERY COMPACT DIFFUSERS THAT WILL MINIMIZE THE EQUIPMENT COST AND COMPLICATION ACCOMPANYING THE POWER AUGMENTATION CAPABILITY.

1979-0371 WORLD'S LARGEST WINDMILL IS COMMISSIONED.
INT. POWER GENERATION 2(6): 39-41, SEPTEMBER 1979.

THE WORLD'S LARGEST WINDMILL, IN NORTH CAROLINA, USA, WAS COMMISSIONED IN JULY, 1979. DESIGNATED THE MOD-1 EXPERIMENTAL WIND TURBINE GENERATOR, IT IS INTERCONNECTED WITH THE BLUE RIDGE MEMBERSHIP CORPORATION UTILITY GRID SYSTEM.

1979-0372 FOREMAN K M, GILBERT B L
TECHNICAL DEVELOPMENT OF THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) CONCEPT.
WIND ENG. 3(3): 153-166, 1979.

THE AUTHORS DESCRIBE A PHASED THREE-YEAR INVESTIGATION, INVOLVING THREE TEST FACILITIES AND BASED UPON THE USE OF BOTH MULTIBLADED TURBINES AND OF SCREENS TO SIMULATE TURBINE PRESSURE DROP THAT HAS LED TO THE DEVELOPMENT OF SEVERAL COMPACT DIFFUSER DESIGNS THAT APPEAR TECHNICALLY AND ECONOMICALLY ATTRACTIVE. MODEL TESTS WITH A NONOPTIMIZED DAWT CONFIGURATION HAVE DEMONSTRATED POWER AUGMENTATION FOR A GIVEN TURBINE DIAMETER AND WIND SPEED BY A FACTOR OF ABOUT 3.5 COMPARED WITH AN CONVENTIONAL SYSTEM.

1979-0373 FRAENKEL P L
THE ITDG INTERNATIONAL WINDPUMP PROGRAMME: ENGINEERING DESIGN CONSIDERATIONS USED IN DEVELOPING A WINDPUMP SYSTEM FOR SMALL-SCALE MANUFACTURE AND USE IN UNDERDEVELOPED ARID OR SEMI-ARID REGIONS.
INDIAN ACAD. SCI. PROC. C2(1): 83-105, MARCH 1979.

SOME OF THE REASONS WHY WINDPUMPS HAVE NOT READILY FOUND WIDESPREAD APPLICATION IN THE LESS DEVELOPED ARID REGIONS, DESPITE THE FACT THAT THEY HAVE BEEN WIDELY AND SUCCESSFULLY APPLIED IN THE UNITED STATES AND AUSTRALIA, ARE DISCUSSED, IN THE CONTEXT OF THE LONDON-BASED INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP'S (ITDG) INVESTIGATIVE WORK AND FIELD EXPERIENCE WITH WINDPUMPS. ITDG'S INTERNATIONAL WINDPUMPS DEVELOPMENT PROGRAMME WHICH IS INTENDED TO OVERCOME SOME OF THE PREVIOUS SHORTCOMINGS OF WINDPUMPS WHEN APPLIED IN UNDER-DEVELOPED REGIONS IS DESCRIBED. AN ACCOUNT IS GIVEN OF THE ENGINEERING APPROACH CHOSEN IN DESIGNING THE ITDG WINDPUMP PROTOTYPE FOR DEVELOPMENT OF METHODS FOR REDUCING THE COST OR INCREASING THE OUTPUT OF MACHINES OF THIS KIND.

1979-0374 FRAENKEL P L
THE INTERMEDIATE TECHNOLOGY WIND-PUMP DEVELOPMENT PROGRAMME.
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 3-1 TO 3-4.

THE OBJECTIVES OF THE WIND PUMP DEVELOPMENT PROGRAMME ARE TO PRODUCE A DESIGN SUITABLE FOR LOW VOLUME ECONOMIC PRODUCTION IN DEVELOPING COUNTRIES FROM WIDELY AVAILABLE STANDARD STEEL SECTIONS. THE SYSTEM SHOULD ALSO BE ADAPTABLE THROUGH MINOR MODIFICATIONS FOR EITHER HIGH-VOLUME LOW-HEAD PUMPING OR THE MORE TRADITIONAL LOW-VOLUME HIGH-HEAD BORE-HOLE PUMPING FUNCTION. THE PRESENT STATUS OF THE PROGRAMME IS DESCRIBED.

1979-0375 FREDERICK W A, MILLER J A, PFLUGER J E
FULLY INTERCONNECTED WIND SYSTEM.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 297-309.
CONF-790352

IN NOVEMBER OF 1977 THE PENNSYLVANIA POWER AND LIGHT COMPANY DECIDED TO INSTALL A WIND TURBINE GENERATOR (WTG) THAT HAD A FULL THREE PHASE CONNECTION TO THE ELECTRICAL DISTRIBUTION SYSTEM. ENERGY DEVELOPMENT COMPANY WAS IN THE PROCESS OF INSTALLING TWO MACHINES JUST WEST OF ALLENTOWN (DORNEY PARK). THEIR READY AVAILABILITY AND SIMPLE DESIGN MADE THEM A NATURAL SUPPLIER FOR THE PP AND L PROJECT. THE MACHINE CHOSEN FOR INSTALLATION WAS EDC'S MODEL 445, A 45 KW, FOUR-BLADED MACHINE WITH 45-FOOT-DIAMETER ROTOR AND 40-FOOT TOWER. THE GENERATOR WAS THREE PHASE AC. THE UNIT HAS A BRAKE THAT CAN BE OPERATED MANUALLY OR AUTOMATICALLY; IN THE LATTER MODE IT WILL SHUT THE MACHINE DOWN AT 35 MPH. THE UNIT IS DESIGNED TO SURVIVE GUSTS OF UP TO 120 MPH. THE INSTALLATION WAS SUPERVISED BY T. MEHRKAM, ENERGY DEVELOPMENT COMPANY, 179 E. RD. NO. 2, HAMBURG, PENNSYLVANIA 19526.

1979-0376 FRERKING M
A SOLAR HEATED COMMERCIAL GREENHOUSE.
SOL. GREENHOUSE DIG. 2(2): 32-33, APRIL-MAY 1979.

A COMMERCIAL SOLAR GREENHOUSE IN DEWEY, AZ, WAS CONSTRUCTED AT A COST OF ABOUT $13/SQ. FT. AND WILL RECEIVE ABOUT 85% OF ITS HEATING LOAD FROM SOLAR ENERGY. THE 2,100 SQ. FT. GREENHOUSE INCORPORATES A 12-IN.-THICK CONCRETE BLOCK WALL FOR DIRECT SOLAR GAIN, A ROCK STORAGE FLOOR, 5 FANS FOR STORING HEAT, AND PIPE FRAME COVERED WITH FLAT FIBERGLASS GLAZING AND CORRUGATED LASCOLITE. COOLING IS PROVIDED BY 5 WIND TURBINES AND 100 SQ. FT. OF DOORS AND AN AXIAL FAN.

1979-0377 FROST W, NOWAK D K
SUMMARY OF GUIDELINES FOR SITING WIND TURBINE GENERATORS RELATIVE TO SMALL-SCALE, TWO-DIMENSIONAL TERRAIN FEATURES. FINAL REPORT.
NTIS, MARCH 1979. P. 395.
RLO-2443-77/1

A SUMMARY OF A DETAILED USERS' MANUAL ON SITING WIND TURBINE GENERATORS (WTG'S) RELATIVE TO SMALL-SCALE, TWO-DIMENSIONAL, TERRAIN FEATURES IS GIVEN. THE TERRAIN FEATURES CONSIDERED ARE ONE OR MORE SURFACE ROUGHNESS CHANGES ON OTHERWISE FLAT TERRAIN, SHELTERBELTS OR WINDBREAKS, AND BLUFF AND SMOOTH CONTOURED HILLS. ESTIMATES ARE GIVEN OF THE PREFERRED WTG LOCATION RELATIVE TO THESE TERRAIN FEATURES AND OF THE RESULTING DEGRADATION IN AVAILABLE WIND POWER DUE TO LOCATING THE WTG OTHER THAN AT THE PREFERRED SITE.

1979-0378 FRY C M, HISE H W
WIND DRIVEN, HIGH ALTITUDE POWER APPARATUS.
U.S. PATENT NO. 4,165,468, AUGUST 21, 1979. 10 P.

WIND DRIVEN ROTORS ARE AFFIXED ALONG THE LENGTH OF A FLEXIBLE POWER SHAFT, AND THE SHAFT IS SUSPENDED AT A GREAT HEIGHT ABOVE THE EARTH BY MEANS OF A SWIVEL. THE LOWERMOST END OF THE SHAFT IS CONNECTED TO ROTATE A GROUND SUPPORTED ENERGY CONVERSION DEVICE. THE WINDS ALOFT IMPART ROTATIONAL MOTION INTO THE WIND ROTORS, WHEREUPON THE ROTATIONAL ENERGY OF THE SHAFT IS CONVERTED INTO ELECTRICAL POWER OR OTHER FORM OF POWER BY THE CONVERSION DEVICE. THE SWIVEL ALLOWS THE ROTATING SHAFT TO BE AFFIXED TO A NONROTATING SUSPENSION DEVICE. THE SUSPENSION DEVICE IS GROUND SUPPORTED AND INCLUDES A MEMBER HAVING OPPOSED ENDS ANCHORED TO THE TOP OF TWO TOWERS OR TWO SPACED APART MOUNTAINS, WITH THE GENERATOR BEING PLACED THEREBETWEEN.

1979-0379 FUNKHOUSER D
ESTIMATES OF THE COSTS OF RENEWABLE ENERGY TECHNOLOGIES FOR NEW YORK STATE.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, JULY 1979. 485 P.
NYSERDA-79-7

THE FINDINGS OF URBAN SYSTEMS RESEARCH AND ENGINEERING ON THE COSTS OF RENEWABLE ENERGY TECHNOLOGIES IN NEW YORK STATE ARE SUMMARIZED. THE INPUT WILL BE USED BY THE FIRST NEW YORK STATE ENERGY MASTER PLAN AND WILL ASSIST THE STATE ENERGY OFFICE IN DETERMINING THE APPROPRIATE ROLE AND LIKELY LEVEL OF MARKET PENETRATION FOR RENEWABLE ENERGY TECHNOLOGIES THROUGH 1995. THE COSTS ASSOCIATED WITH INDIVIDUAL RENEWABLE ENERGY TECHNOLOGIES ARE IDENTIFIED AND LIFE CYCLE COSTS ARE PRESENTED FOR MOST RENEWABLE ENERGY TECHNOLOGIES.

1979-0380 FURNESS R
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1979 SURVEY.
NTIS, DECEMBER 1979. 217 P.
EPRI-ER-1299-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. IT CONTAINS BRIEF DESCRIPTIONS OF 735 PROJECTS BEING CONDUCTED BY 180 UTILITY COMPANIES. ALSO INCLUDED ARE AN INDEX OF PROJECTS BY CATEGORY, A STATISTICAL SUMMARY, A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATE, AND A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS.

1979-0381 GALLUP R B, TROMMERSHAUSEN W E
BRINGING IN THE WIND.
PUBLIC POWER 37(5): 14-19, SEPTEMBER 1979.

WITH A GROWING POPULATION AND SHIFTS FROM OTHER FORMS OF ENERGY TO ELECTRIC POWER EXPANDING ELECTRIC UTILITY LOADS, THE POTENTIAL FOR HARNESSING WIND POWER IS INCREASINGLY ATTRACTIVE. EARLY EFFORTS TO FIND ACCEPTABLE ENERGY-STORAGE METHODS HAVE GIVEN WAY TO DESIGNS OF WIND-POWERED GENERATORS THAT WILL MAXIMIZE OVERALL POWER GENERATION. WIND POWER RESEARCH PROJECTS RANGE FROM THE ALREADY COMMERCIALLY AVAILABLE 200-KILOVOLT (KV) RANGE TO THE 2,000-KV UNIT BEING TESTED IN BOONE, NC. BECAUSE ECONOMIES OF SCALE MAY NOT BE APPLICABLE TO WIND SYSTEMS, THE RECOMMENDED APROACHES ARE FOR A LARGE NUMBER OF WIDELY SCATTERED WINDMILLS AND FOR THE CONSTRUCTION OF LARGE ARRAYS ON ENERGY FARMS. NEW CONCEPTS OF UTILITY RATE STRUCTURES WILL BE NEEDED TO ACCOUNT FOR THE ADVANTAGES OF INTEGRATING WIND SYSTEMS WITH OTHER ENERGY SOURCES.

1979-0382 GARFINKEL P
THE NEW ALCHEMISTS: THEY HAVE TRIED THE FUTURE AND IT WORKS...OR DOES IT?
NATL. WILDLIFE 17(3): 4-11, APRIL-MAY 1979.

THE 12-ACRE CAPE COD FARM DESIGNED AND OPERATED BY THE NEW ALCHEMY INSTITUTE UTILIZES SOLAR ENERGY, WIND POWER, AQUACULTURE, AND INTENSIVE AGRICULTURE TO MAINTAIN THE SELF-SUFFICIENT EXPERIMENTAL COMMUNITY.

1979-0383 GENERATING TECHNOLOGY ASSESSMENT. PHASE I WORK PLAN, TAST 1 REPORT.
NTIS, OCTOBER 15, 1979. 78 P.
DOE/EIA/10480-T1

A PLAN OF WORK OUTLINING INFORMATION TO ASSESS ELECTRIC GENERATING TECHNOLOGIES IS PRESENTED. PROJECTIONS ARE MADE OF REALISTIC AND UNDERSTANDABLE ENGINEERING AND COST ASSESSMENTS OF NONNUCLEAR ELECTRICAL GENERATING TECHNOLOGIES.

1979-0384 GEORGI H
DYNAMIC DAMPING INVESTIGATIONS ON COMPOSITES.
AGARD CONF. PROC. NO. 277. DAMPING EFFECTS IN AEROSPACE STRUCTURES, 48TH MEETING OF AGARD STRUCTURES AND MATERIALS PANEL, WILLIAMSBURG, VA., APRIL 2-3, 1979. NTIS, 1979. P. 9-1 TO 9-20.
AD-A080451/8, AGARD-CP-277

CHARACTERISTIC REGULARITIES AND DATA FROM A SERIES OF DAMPING MEASUREMENTS ON FIBER REINFORCED COMPOSITE MATERIALS AND STRUCTURES ARE PRESENTED. EXPERIMENTS WERE CARRIED OUT MAINLY ON NATURAL FREQUENCIES OF LATERAL VIBRATIONS IN FREE DECAY AND FORCED EXCITATION. TESTS INCLUDED COMPOSITE MATERIAL (WITH REINFORCEMENT BY BORON-, CARBON-, GLASS- AND SYNTHETIC FIBERS), STRUCTURAL COMPONENTS (SANDWICH AND I-BEAMS); COMPOSITE STRUCTURES (WIND BOX, ROTOR BLADES). EXPERIMENTAL PARAMETERS CONSIDERED WERE: AMPLITUDE, TEMPERATURE, VIBRATION MODE, FREQUENCY, AIR PRESSURE, ASPECT RATIO, FIBER ORIENTATION.

1979-0385 GEWEHR H W
LARGE, LOW COST COMPOSITE WIND TURBINE BLADES.

LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS 1979. P. 209-234.
NASA-CP-2106

VARIOUS STUDIES HAVE SHOWN THAT THE COST OF ENERGY DECREASES WITH INCREASING ROTOR SIZE IN WIND TURBINE GENERATOR SYSTEMS, AND THAT THE COST OF THE ROTOR IS A MAJOR CONTRIBUTION TO INITIAL PROCUREMENT AND ANNUAL OPERATING COSTS. IN AN EFFORT TO REDUCE ROTOR COST, NASA LEWIS RESEARCH CENTER, WITH DEPARTMENT OF ENERGY FUNDING, INITIATED A PROGRAM TO DEVELOP A LARGE, LOW COST WIND TURBINE BLADE REPRESENTATIVE OF A DESIGN FOR A 300 FT-DIAMETER WIND GENERATOR SYSTEM. THE DESIGN, ANALYSIS, AND TEST RESULTS OF THAT PROGRAM ARE PRESENTED. FABRICATION OF TWO COMPOSITE BLADES FOR THE MOD-1 200 FT-DIAMETER WIND TURBINE IS DESCRIBED. STRUCTURAL COMPOSITES INDUSTRIES, INC., AZUSA, CALIFORNIA, FABRICATED THE SPAR FOR THE 150 BLADE.

1979-0386 GILBERT L J, TRIEZENBERG D M
LEWIS RESEARCH CENTER STUDIES OF MULTIPLE LARGE WIND TURBINE GENERATORS ON A UTILITY NETWORK.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 388-402.
CONF-790352

THE WIND ENERGY PROJECT OFFICE OF NASA-LEWIS HAS UNDERTAKEN A MULTI-FACETED PROGRAM TO STUDY THE ANTICIPATED PERFORMANCE OF A WIND TURBINE GENERATOR FARM ON AN ELECTRIC UTILITY NETWORK. BOTH IN-HOUSE AND CONTRACTOR RESOURCES ARE BEING USED. PRELIMINARY RESULTS OF AN IN-HOUSE SIMULATION OF TWO MOD-2 SYSTEMS TIED TO AN INFINITE BUS INDICATE FAVORABLE SYSTEM PERFORMANCE.

1979-0387 GILBERT L J, TRIEZENBERG D M
SIMULATION STUDIES OF MULTIPLE LARGE WIND TURBINE GENERATORS ON A UTILITY NETWORK.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 375-384.
NASA-CP-2106

THE WIND ENERGY PROJECT OFFICE OF NASA-LEWIS HAS UNDERTAKEN, AS PART OF THE DEPARTMENT OF ENERGY WIND PROGRAM, A MULTI-FACETED PROJECT TO STUDY THE ANTICIPATED PERFORMANCE OF A CLUSTER OF WIND TURBINE GENERATORS ON AN ELECTRIC UTILITY NETWORK. BOTH IN-HOUSE AND CONTRACTOR RESOURCES ARE BEING USED. PRELIMINARY RESULTS OF AN IN-HOUSE SIMULATION OF TWO MOD-2 SYSTEMS TIED TO AN INFINITE BUS INDICATE FAVORABLE SYSTEM PERFORMANCE.

1979-0388 GILHAUS A
STATIONARY FLYWHEEL ENERGY ACCUMULATORS FOR INDUSTRIAL UNDERTAKINGS.
ENERGY. MEETING ON INDUSTRIAL PROCESSES--ENERGY CONSERVATION R AND D, BRUSSELS, NOVEMBER 23-24, 1978. PROCEEDINGS. LUXEMBOURG, COMM. EUROPEAN COMMUNITIES, 1979. P. 577-592.

THE AIM OF THIS SYSTEMS STUDY IS TO FIND OUT INDUSTRIAL APPLICATIONS OF STATIONARY FLYWHEEL ENERGY ACCUMULATORS AND TO DETERMINE THE ECONOMIC VALUE FOR THE INDIVIDUAL CONSUMER (E.G. INDUSTRIAL UNDERTAKING). THE EFFECTS ON THE PUBLIC POWER SUPPLY GRID ARE ALSO EXAMINED. THE RESULTS INDICATE THAT AN ADVANTAGEOUS APPLICATION OF THE FLYWHEEL ENERGY STORAGE UNITS CAN ONLY BE EXPECTED WHEN OTHER BENEFITS ARE COMBINED WITH THE REDUCTION OF ENERGY COSTS, FOR EXAMPLE A GAIN IN RELIABILITY, PERFORMANCE OR REDUCED INVESTMENTS FOR OTHER NECESSARY DEVICES. THE COMBINATION OF A FLYHWEEL ENERGY ACCUMULATOR WITH A WIND-POWER-PLANT SEEMS TO BE PROMISING.

1979-0389 GILLOIS J
WIND POWER STATION.
GERMAN (FRG) PATENT NO. 2,732,192/A/, JANUARY 25, 1979. 13 P. (IN GERMAN)

THE PATENT IS BASED ON THE IDEA OF USING A RING OF BLADES SIMILAR TO THAT OF THE OVERSHOT WATERWHEEL FOR CONVERTING WIND ENERGY INTO ENERGY OF ROTATION. THE WIND FLOWS INTO THE OPEN FRONT OF A WIND TRAP OF RECTANGULAR CROSSECTION WHICH CAN BE ADJUSTED IN THE WIND DIRECTION IN WHICH A LEADING SURFACE RUNNING AT AN ANGLE FROM BELOW UPWARDS, REDUCES THE CROSSECTION FOR AIR FLOW TO LESS THAN ONE HALF. BEHIND THE REMAINING SLIT SHAPED OUTFLOW OPENING FOR THE AIR FLOW THE BLADEWHEEL HAS AN AXIS OF ROTATION AT AN ANGLE TO THE WIND DIRECTION, WHICH THE WIND ONLY IMPINGES ON WHEN OVERSHOT AND WHICH IS THUS MADE TO ROTATE.

1979-0390 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD-0A 200 KW WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 215-245. ALSO: ENERGY TECHNOL. 6: 961-981, 1979.
CONF-790352

THE MOD-0A 200 KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE LEWIS RESEARCH CENTER OF THE NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY. THE PROJECT IS A PART OF THE FEDERAL WIND ENERGY PROGRAM AND IS DESIGNED TO OBTAIN EARLY WIND TURBINE OPERATION AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. ON MARCH 6, 1978 THE MOD-0A WIND TURBINE WAS TURNED OVER TO THE TOWN OF CLAYTON LIGHT AND WATER PLANT, CLAYTON, NM, FOR UTILITY OPERATION AND ON DECEMBER 31, 1978, THE MACHINE HAD COMPLETED TEN MONTHS OF UTILITY OPERATION. THIS PAPER DESCRIBES THE MACHINE AND DOCUMENTS THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM.

1979-0391 GOH T N, NATHAN G K
NEW APPROACH FOR WIND SPEED CHARACTERIZATION FOR WIND ENERGY STUDIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2267-2271.

THIS PAPER DESCRIBES AN INVESTIGATION OF THE CHARACTERISTICS OF WIND SPEEDS RECORDED AT SIX METEOROLOGICAL STATIONS IN SINGAPORE. THE STUDY ILLUSTRATES THE EXTRACTION OF INFORMATION FROM WIND DATA THROUGH THE USE OF APPROPRIATE METHODS OF TIME SERIES ANALYSIS AND MODELING.

1979-0392 GOH T N, NATHAN G K
A STATISTICAL METHODOLOGY FOR STUDY OF WIND CHARACTERISITCS FROM A CLOSE ARRAY OF STATIONS.
WIND ENG. 3(3): 197-206, 1979.

THIS PAPER DESCRIBES AN APPROACH IN WIND SPEED ANALYSIS WHICH ENTAILS SYSTEMATIC EXTRACTION OF STATISTICAL CHARACTERISTICS FROM MEASURED METEOROLOGICAL DATA THROUGH THE USE OF SUITABLE TECHNIQUES OF TIME SERIES ANALYSIS. THIS IS ILLUSTRATED BY A CASE STUDY, IN WHICH DATA COLLECTED SIMULTANEOUSLY AT SIX STATIONS WITHIN A SPARSELY UNDULATED TERRAIN OF APPROXIMATELY 700 SQ KM ARE ANALYZED. CONSISTENCY OF WIND CHARACTERISTICS IN THIS AREA IS EXAMINED THROUGH VARIOUS MATHEMATICAL MODELS IN THE TIME DOMAIN THAT ARE CAPABLE OF REFLECTING THE DYNAMIC NATURE OF WIND DATA IN BOTH TIME AND SPACE. THE METHODOLOGY PROVIDES ANALYTICAL TOOLS FOR USE IN THE

SELECTION OF WIND POWER STATION SITES, WHICH OFTEN DEPENDS ON AN UNDERSTANDING OF THE ADEQUACY OF INTERPOLATING AND EXTRAPOLATING EXISTING DATA BEYOND LOCATIONS OF DATA SOURCES.

1979-0393 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. APPENDIX 1. WIND POWER SITE SURVEY REPORT.
NTIS, OCTOBER 1979. 102 P.
DOE/BP/01310-T1(APP.1)

RESULTS ARE PRESENTED FOR WIND SURVEY FIELD TRIPS TO NORTHWEST WASHINGTON, SOUTHERN OREGON COAST, CENTRAL COLUMBIA RIVER GORGE, COLUMBIA HILLS, GOODNOE HILLS, AND HORSE HEAVEN HILLS.

1979-0394 GOODALE B A
APPLICATIONS OF INTERMEDIATE SIZE WIND TURBINES.
ENERGY ENGINEERING TECHNOLOGY. WORLD ENERGY ENGINEERS CONGRESS, ATLANTA, GEORGIA, OCTOBER 31, 1978. ATLANTA, GEORGIA, FAIRMONT PRESS, 1979. P. 163-166.

THE OBJECT OF DOE'S WIND ENERGY PROGRAMS IS TO DEVELOP MACHINES WHICH WILL PROVIDE POWER AT COMPETITIVE PRICES AND TO COMMERCIALIZE THESE MACHINES AS SOON AS POSSIBLE. KAMAN INTENDS TO DO JUST THIS, STARTING WITH THE 40 KW MACHINE AND EXPANDING TO A PRODUCT LINE OF VARIOUS INTERMEDIATE SIZE MACHINES. MARKET POTENTIAL FOR INTERMEDIATE SIZE WIND TURBINES IS ANALYZED.

1979-0395 GOUGEON M, ZUTECK M
USE OF WOOD FOR WIND TURBINE BLADE CONSTRUCTION.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 298-308.
NASA-CP-2106

SEVERAL CONSTRUCTION CONCEPTS WERE CONSIDERED AND EVALUATED. A MONOCOQUE D SECTION FORMING THE LEADING EDGE, AND A BUILT-UP TRAILING EDGE SECTION WAS THE SELECTED METHOD OF CONSTRUCTION. THE REQUIRED THICKNESS TO ACHIEVE THE NECESSARY STRUCTURAL PROPERTIES IN THE D WAS EXAMINED FOR BOTH A LAMINATED VENEER AND BONDED SAWN STOCH FABRICATION TECHNIQUE. BOTH OF THESE TECHNIQUES WERE ULTIMATELY JUDGED TO BE FEASIBLE, WITH THE COMPARATIVE FABRICATION ADVANTAGES DETERMINED BY BLADE SIZE AND SPECIAL EPOXY AND WOOD STOCK HANDLING TECHNIQUES, RATHER THAN BY THE RESULTANT PHYSICAL PROPERTIES OF THE FINISHED NOSE.

1979-0396 GOVINDA RAJU S P, NARASIMHA R
A LOW-COST WATER PUMPING WINDMILL USING A SAIL TYPE SAVONIUS ROTOR.
INDIAN ACAD. SCI. PROC. C2(1): 67-82, MARCH 1979.

A WATER PUMPING WINDMILL WHICH CAN BE BUILT LARGELY WITH MATERIALS AND SKILLS AVAILABLE IN RURAL AREAS HAS BEEN DESIGNED AND FABRICATED. THE WINDMILL USES A SAVONIUS ROTOR AND INCORPORATES A NOVEL SAIL-TYPE CONSTRUCTION. THE PUMP IS OF A POSITIVE DISPLACEMENT TYPE USING THE CASING OF A PNEUMATIC TYPE FOR THE PUMPING CHAMBER TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

1979-0397 GOVINDA RAJU S P, NARASIMHA R
LOW-COST WATER PUMPING WINDMILL USING A SAIL-TYPE SAVONIUS ROTOR. REPORT 79 FM 2.
NTIS, JANUARY 1979. 107 P.
NP-24145

A WATER PUMPING WINDMILL WHICH CAN BE BUILT LARGELY USING MATERIALS AND SKILLS AVAILABLE IN RURAL AREAS HAS BEEN DESIGNED AND FABRICATED. THE WINDMILL USES A SAVONIUS ROTOR AND INCORPORATES A NOVEL SAIL-TYPE CONSTRUCTION. THE PUMP IS OF POSITIVE DISPLACEMENT TYPE USING THE CASING OF A PNEUMATIC TYPE FOR THE PUMPING CHAMBER. TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

1979-0398 GOVINDA RAJU S P, SUNDARAM P
PERFORMANCE CHARACTERISTICS OF SAIL-TYPE HORIZONTAL AXIS WIND ROTORS.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 327-442.
CONF-791229

HORIZONTAL AXIS SAIL-TYPE WIND ROTORS ARE SIMPLE TO CONSTRUCT AND HAVE A GOOD STARTING TORQUE AND EFFICIENCY. THUS, THEY APPEAR TO BE VERY SUITABLE FOR WIND-PUMPS FOR USE IN RURAL AREAS. HOWEVER, DETAILED PERFORMANCE DATA ON SUCH ROTORS, NECESSARY FOR OPTIMAL DESIGN, IS NOT AVAILABLE. TO FILL THIS GAP, TESTS WERE CONDUCTED ON ROTORS OF ABOUT 1.25 M DIAMETER EMPLOYING SIX SAILS OF BOTH TRIANGULAR AND NEARLY RECTANGULAR SHAPE. ATTENTION WAS GIVEN TO THE RIGGING OF THE SAILS TO OBTAIN OPTIMAL PERFORMANCE. BASED ON THESE TESTS, IT IS CONCLUDED THAT SAIL TYPE ROTORS WITH TRIANGULAR SAILS CAN GIVE A POWER COEFFICIENT OF ABOUT 0.3. ROTORS WITH RECTANGULAR SAILS GIVE A POWER COEFFICIENT OF OVER 0.33. IN ADDITION, THEY HAVE A STARTING TORQUE ABOUT TWICE THAT OF ROTORS WITH TRIANGULAR SAILS AND HENCE APPEAR TO BE WELL SUITED FOR APPLICATIONS DEMANDING HIGH STARTING TORQUE.

1979-0399 GRANNEMANN W W
VARIABLE SPEED CONSTANT FREQUENCY VOLTAGE GENERATOR (ALTERNATOR).
NTIS, JULY 1979. 46 P.
NMEI-44, PB80-141286

THE OBJECTIVE ACHIEVED WAS CONSTRUCTING THE FIRST PROTOTYPE ALTERNATOR WITH DIGITAL CONTROL OF ITS OUTPUT FREQUENCY FOR A VARIABLE SHAFT SPEED, SUCH AS A WIND MACHINE WOULD HAVE. THE FIRST MACHINE IS A TWO-POLE ALTERNATOR WITH POWER REMOVED FROM THE ROTOR THROUGH SLIP RINGS. THE ROTATING FIELD IN THE STATIONARY COILS OF THE STATOR IS CONTROLLED BY THE MICRO-CIRCUITS. LATER, ALTERNATORS MAY WELL HAVE THE CONTROL CIRCUITS AND ROTATING FIELD IN THE ROTOR WHICH WOULD BE A SIGNIFICANT IMPROVEMENT SINCE POWER WOULD NOT NEED TO BE REMOVED THROUGH SLIP RINGS. EXCEPT FOR THE POWER AMPLIFIERS WHICH DRIVE THE STATOR WINDINGS, THE CONTROL AND THE COMPARISON CIRCUITRY IS CONSTRUCTED WITH AVAILABLE LOW COST, LOW POWER INTEGRATED CIRCUITS (IC'S).

1979-0400 GREGORY S E, SCHURIG A K
APPARATUS AND METHOD OF GENERATING ELECTRICITY FROM WIND ENERGY.
U.S. PATENT NO. 4,146,800, MARCH 27, 1979. 16 P.

THE INVENTION RELATES TO APPARATUS FOR AND METHOD OF GENERATING ELECTRICITY FROM WIND ENERGY. THE METHOD COMPRISES OPERATIONS CORRESPONDING TO THE MEANS, VIZ., PRODUCING AN ELECTROSTATIC FIELD IN THE OPEN THROUGH WHICH WIND CAN BLOW, GENERATING CHARGED PARTICLES TO BE ENTRAINED IN AND CARRIED BY THE WIND AGAINST THE

DIRECTION OF MOVEMENT IMPOSED ON THE PARTICLES BY THE FIELD, RESULTING IN AN INCREASE OF THE CHARGED PARTICLES AND MAKING THE INCREASED POTENTIAL AVAILABLE FOR UTILIZATION.

1979-0401 GROSSMAN W C
ENERGY CONVERSION SYSTEM USING WINDMILL.
U.S. PATENT NO. 4,137,015, JANUARY 30, 1979. 6 P.

A SYSTEM IS DESCRIBED FOR RECOVERING THE ENERGY FROM ATMOSPHERIC WIND WHEREIN A WINDMILL OPERATES A COMPRESSOR FOR COMPRESSING AIR WHICH IS STORED IN ONE OR MORE TANKS. THE COMPRESSED AIR IS USED TO DRIVE A PRIME MOVER COUPLED BY GEAR MEANS TO AN ELECTRICAL GENERATOR OR OTHER WORK-PRODUCING APPARATUS. THE PRIME MOVER IS OPERATED BY HYDRAULIC FLUID RESPONSIVE TO THE APPLICATION OF THE COMPRESSED AIR TO FLUID TANKS BY VALVE MEANS RESPONSIVE TO THE OPERATION OF THE PRIME MOVER. THE COMPRESSOR HAS A UNIQUE MEANS FOR LUBRICATING THE SAME. ALTERNATIVELY, THE PRIME MOVER CAN BE OPERATED BY CONVENTIONAL WATER PRESSURE DURING PERIODS OF LITTLE OR NO WIND.

1979-0402 GROWIAN WINDMILL WILL PRODUCE 3MW.
INT. POWER GENERATION 2(6): 21-23, SEPTEMBER 1979.

THE GROWIAN PLANT WAS DESIGNED WITH REFERENCE TO A PLANT SITE IN THE NORTH GERMAN COASTAL AREA. A TWO-BLADED ROTOR MOUNTED ON A TOWER IS ROTATED BY THE ACTION OF THE WIND AND TRANSFERS ITS POWER VIA A GEARBOX TO A GENERATOR. THE ELECTRICAL ENERGY THUS OBTAINED IS THEN FED DIRECTLY INTO THE EXISTING SUPPLY NETWORK. THE DESIGN OF THE PLANT PERMITS LONG-TERM OPTIMUM EXPLOITATION OF WIND ENERGY THROUGH THE USE OF ADVANCED, PROVEN ENGINEERING TECHNIQUES.

1979-0403 GUILD D H
WIND ENERGY CENTRAL STATION POWER GENERATION IN THE SOUTHWEST AND SOUTHEAST.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 158-169.
CONF-790352

THE INFORMATION PRESENTED IS ABSTRACTED FROM TWO MUCH BROADER STUDIES. THE FIRST STUDY TO BE REFERENCED FORMS THE BASIS FOR MOST OF THE INFORMATION TO BE PRESENTED AND IS ENTITLED, "THE SOUTHWEST PROJECT." THIS STUDY WAS UNDERTAKEN BY STONE AND WEBSTER. A STATE POWER AUTHORITY AND 12 ELECTRIC UTILITIES IN THE SOUTHWEST TO INVESTIGATE WAYS TO ACCELERATE THE COMMERCIALIZATION OF SOLAR ELECTRIC GENERATING PLANTS AND THEIR EXPECTED MARKET PENETRATION INTO THE ELECTRIC UTILITY NETWORK OF THE SOUTHWESTERN UNITED STATES THROUGH THE YEAR 2000. THE SOUTHEAST REGIONAL ASSESSMENT STUDY, LIKE THE SOUTHWEST PROJECT, FOCUSED ON SOLAR ELECTRICAL POWER GENERATION. IT WAS DIFFERENT FROM THE SOUTHWEST STUDY, HOWEVER, IN THAT CONTRACTURAL REQUIREMENTS PLACED EQUAL EMPHASIS ON CENTRAL STATION AND ON-SITE POWER GENERATION. THE STATED OBJECTIVE OF THE SOUTHEAST STUDY WAS TO IDENTIFY AND EVALUATE OPPORTUNITIES FOR DEMONSTRATION AND LARGE SCALE DEPLOYMENT OF SOLAR ELECTRIC CENTRAL STATIONS AND ON-SITE SOLAR ELECTRIC FACILITIES THROUGH THE YEAR 2000.

1979-0404 HABOECK A, SCHMALZL F
POWER SUPPLIES FOR TELECOMMUNICATIONS IN REMOTE AREAS.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 30-37.

REPEATER STATIONS IN TELECOMMUNICATION NETWORKS ARE OFTEN LOCATED IN UNPOPULATED AREAS WITHOUT A DEVELOPED INFRASTRUCTURE OR A PUBLIC POWER SUPPLY. DC POWER MUST BE SUPPLIED BY ELECTRIC POWER GENERATING EQUIPMENT AT EACH STATION. IN ADDITION TO THE WELL ESTABLISHED MEANS OF GENERATION, NEW METHODS ARE FINDING INCREASING APPLICATION. PHOTOVOLTAIC, WIND ENERGY, AND FUEL CELL SYSTEMS ARE DESCRIBED, AND THEIR SUITABILITY FOR USE FOR TELECOMMUNICATIONS IS DISCUSSED.

1979-0405 HALL O P, KUNZ G E
EMERGING ENERGY TECHNOLOGIES FOR INDUSTRIAL APPLICATIONS.
AIPE NEWSL. 6(2): 6-10, SUMMER 1979.

IT APPEARS THAT CONSERVATION REPRESENTS THE QUICKEST AND CHEAPEST APPROACH FOR REDUCING FOREIGN OIL IMPORTS. THE STATUS OF SEVEN EMERGING ENERGY TECHNOLOGIES WHICH HOLD PROMISE FOR DIRECT INDUSTRIAL APPLICATIONS IS DISCUSSED. THEY ARE: ATMOSPHERIC FLUIDIZED BED COMBUSTION, MAGNETOHYDRODYNAMICS, FUEL CELLS, SOLAR THERMAL ELECTRIC, WIND, WASTE HEAT MACHINES, AND ENERGY STORAGE. MOST OF THE TECHNOLOGIES POSSESS THE POTENTIAL FOR ON-SITE COGENERATION. IT USES FUEL MORE EFFICIENTLY THAN IN THE INDEPENDENT GENERATION OF POWER AND HEAT. COAL-BASED COGENERATION APPEARS ATTRACTIVE IN CONCERT WITH THE DEVELOPMENT OF ENERGY PARKS WHERE INDUSTRIAL PLANTS WITH VARYING ENERGY DEMANDS ARE CLUSTERED.

1979-0406 HANES D G
TAX LEGISLATION AFFECTING ENERGY.
ENERGY USERS, 1979: A COMPREHENSIVE ANALYSIS OF THE NATIONAL ENERGY ACT. VOLUME 4. ENERGY USERS LAW SEMINAR, WASHINGTON, D.C., JAUNARY 11, 1979. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1979. P. 126-137.

NEW TAX REVISIONS THAT RELATE TO ENERGY WERE PASSED IN TWO SEPARATE BILLS: THE REVENUE ACT AND THE ENERGY TAX ACT. BOTH WILL BE REFLECTED IN REVISED EDITIONS OF THE INTERNAL REVENUE CODE. AFTER REVIEWING THE INVESTMENT TAX CREDITS OF THESE TWO ACTS, MISCELLANEOUS PROVISIONS ARE DISCUSSED. THESE ARE COVERED IN SUBJECTS ENTITLED: GEOTHERMAL AND GEOPRESSURIZED GAS AND TRANSPORTATION TAX PROVISIONS. RESIDENTIAL ENERGY TAX CREDITS ARE DISCUSSED IN THE FOLLOWING: INSULATION AND ENERGY-CONSERVING COMPONENTS AND RENEWABLE ENERGY SOURCE PROPERTY.

1979-0407 HANKS D J
NEW ENERGY SOURCE IS WRITTEN ON THE WIND.
SPECIF. ENG. 42(2): 60-62, AUGUST 1979.

AN INEXHAUSTIBLE ENERGY SOURCE THAT IS FAST GAINING ATTENTION OF GOVERNMENT AND PRIVATE ENTERPRISE ALIKE IS WIND POWER. MODERN TECHNOLOGY AND THE GROWING NEEDS FOR NEW ENERGY SOURCES CAN BRING WIND POWER BACK INTO WIDESPREAD USE. THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS AND ENABLE THE EARLIEST POSSIBLE COMMERCIALIZATION OF WIND POWER.

1979-0408 HANLEY J
WIND WHEEL APPARATUS FOR USE WITH A HYDRO-ELECTRIC DAM.
U.S. PATENT NO. 4,166,222, AUGUST 28, 1979.

DISCLOSED HEREIN IS AN APPARATUS FOR FASHIONING A WIND WHEEL APPARATUS THAT UTILIZES THE WHEAT FIELD PRINCIPLE IN ASSOCIATION WITH A POWER GENERATING STATION TO PROVIDE BACK PUMPING IN A DAM ENVIRONMENT TO PROVIDE A

GREATER EFFICIENCY. A DOUBLE ARRAY OF WIND WHEELS IS DISPOSED IN A MATRIX ON THE HORIZONTAL PLANE ORIENTED TO ADDRESS THE ANGLE OF ATTACK OF THE WIND REGARDLESS OF WIND DIRECTION AND IS FURTHER PROVIDED WITH MEANS TO DEVELOP ELECTRICAL CURRENT THEREFROM TO BE USED IN MOTIVATING PUMPING MEANS FOR RETURNING WATER THAT HAS GENERATED ELECTRICITY DUE TO POTENTIAL ENERGY BACK INTO A RESERVOIR AS A POTENTIAL ENERGY. BECAUSE OF ITS LOW COST AND ABUNDANCE THIS ENERGY TO INDUSTRIES OR MUNICIPALITIES ENGAGED IN PROCESSING AND PUMPING LARGE QUANTITIES OF OCEAN WATER TO ANY DESIRABLE ELEVATION.

1979-0409 HANSEN A C
RANDOM DATA ANALYSIS IN WTG TESTING.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 221-232.
RFP-3014(VOL.1)

SOME OF THE EFFORTS UNDERWAY AND PRELIMINARY FINDINGS OF THE STUDY OF TURBULENCE EFFECTS IN PERFORMANCE TESTING ARE DESCRIBED. MORE SPECIFICALLY, THREE RANDOM DATA ANALYSIS METHODS IN USE AT THE WIND SYSTEMS TEST CENTER ARE DISCUSSED.

1979-0410 HARDELL R, LJUNGSTROM O
OFF-SHORE BASED WIND TURBINE SYSTEMS (OS-WTS) FOR SWEDEN--A SYSTEM CONCEPT STUDY.
WIND ENG. 3(1): 23-51, 1979.

OFF-SHORE SITING SURVEYS ALONG SWEDEN'S COASTS, UTILIZING DEPTHS LESS THAN 30 M, SHOW AVAILABILITY OF 5000 KM**2 AREAS, WITH LIKELY POTENTIAL FOR 3300 KM**2 IN GOOD WIND AREAS SUITABLE FOR WTS-INSTALLATION. IN TYPICAL CASES, WHEN MOVING A WTS SITE FROM A NEAR-SHORE, OR GOOD COASTAL, LAND AREA TO AN OFF-SHORE LOCATION, 10-20 KM, THE MEDIAN WIND INCREASES FROM 8.5 TO 9.5 M/S (H=100 M) AND THE SPECIFIC ENERGY OUTPUT (PER TURBINE DISC AREA) INCREASES BY 40%. DESIGN AND INSTALLATION OF OS-WTS ALLOWS THE FREEDOM OF USING MUCH LARGER UNIT SIZES THAN ON LAND, ASSEMBLED COMPLETE AND TOWED TO SITES, WITH OPTIONS OF RELOCATION. THIS SHOULD ENHANCE ENERGY ECONOMY, SYSTEM FLEXIBILITY, AND OUTPUT PER AVAILABLE GROUP STATION AREA. EXAMPLES OF HORIZONTAL- AND VERTICAL-AXIS TURBINES OF 7-14 MW UNIT CAPACITY ARE GIVEN, WITH ASSOCIATED COST ESTIMATES AND PROSPECTS OF MUCH BIGGER SECOND-GENERATION DESIGNS OF 20-30 MW UNITS.

1979-0411 HARDELL R, OLSSON C, LJUNG L
OFF-SHORE WIND POWER PLANTS.
NTIS, 1979. 192 P. (IN SWEDISH)
NE-25173

INFORMATION IS PRESENTED CONCERNING THE OFFSHORE WIND POWER AVAILABILITY IN THE BALTIC SEA; THE ECONOMICS, SPECIFICATIONS, AND ENVIRONMENTAL CONSIDERATIONS FOR LARGE OFFSHORE WIND POWER PLANTS.

1979-0412 HARKARE W P, GOVINDAN K P, VAIDYA V H, MAJEETHIA K M, GOHIL H M
DESALTING BY ELECTRODIALYSIS USING WIND POWER.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 448-453.
CONF-791229

DESALINATION OF WATER BY ELECTRODIALYSIS IS AN ESTABLISHED PRACTICE ESPECIALLY FOR BRACKISH WATERS. ELECTRICAL ENERGY IS THE DRIVING FORCE AND THE ENERGY REQUIREMENT FOR THIS PROCESS IS OF A LOW ORDER. IN THE PRESENT INVESTIGATION AN ATTEMPT HAS BEEN MADE TO USE THE WIND POWER FOR THE GENERATION OF ELECTRICITY AND USE IT FOR ELECTRODIALYSIS WITHOUT AN ENERGY STORAGE SYSTEM. THE POTENTIAL OF THE PROCESS FOR THE DESALINATION OF BRACKISH WATER FOR DRINKING PURPOSE OF ALL SMALL COMMUNITIES IN ISOLATED AREAS WHERE ELECTRIC POWER SUPPLY IS NOT AVAILABLE HAS BEEN DISCUSSED. THE VIABILITY AND ECONOMICS OF THE PROCESS FOR USE IN SMALL COMMUNITIES HAVE BEEN WORKED OUT. COMPARISON OF DESALINATION BY ELECTRODIALYSIS USING SOLAR POWER AND WIND POWER AS SOURCES OF ELECTRICAL ENERGY HAS BEEN PRESENTED GIVING WEIGHTAGE TO ECONOMIC CONSIDERATION

1979-0413 HARNER K I, KOS J M, PATRICK J P
WIND TURBINE GENERATOR PITCH CONTROL SYSTEM.
U.S. PATENT NO. 4,160,170, JULY 3, 1979. 24 P.

WIND ENERGY IS USED TO DRIVE A WIND TURBINE, WHICH IS IN TURN CONNECTED TO AN ELECTRICAL GENERATOR TO PRODUCE ELECTRICAL POWER. THE PITCH ANGLE OF THE WIND TURBINE BLADES IS CONTROLLED IN A CLOSED LOOP MANNER TO MAINTAIN EITHER A CONSTANT GENERATOR SPEED FOR ISOLATED POWER GENERATING STATIONS OR WHEN THE GENERATOR IS SYNCHRONIZED TO THE LOAD, OR CONSTANT GENERATOR OUTPUT POWER OR SHAFT TORQUE WHEN THE GENERATOR IS CONNECTED TO AN ELECTRICAL GRID. OPEN LOOP ACCELERATION AND DECELERATION SCHEDULES ARE PROVIDED TO MINIMIZE BLADE STRESS AND SHAFT TORQUE VARIATIONS DURING START UP AND SHUTDOWN TRANSIENTS, LIMITING BLADE ANGLE EXCURSIONS AS A FUNCTION OF WIND VELOCITY AND SPEED. THE SCHEDULES MAY BE IMPLEMENTED EITHER ELECTRONICALLY OR BY A SUITABLY PROGRAMMED DIGITAL COMPUTER.

1979-0414 HASBROUCK T M
COST OF ENERGY EVALUATION.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 397-402.
NASA-CP-2106

THE COST OF ENERGY OF A WIND TURBINE GENERATOR SYSTEM CONTAINS THE THREE-ELEMENTS OF CAPITAL COST, OPERATION AND MAINTENANCE COST, AND ENERGY CAPTURE. EVALUATING THE DESIGN PARAMETERS OF A WIND POWER PLANT UTILIZING THESE COST FACTORS IS PRESENTED.

1979-0415 HASLETT J, KELLEDY E
ASSESSMENT OF ACTUAL WIND POWER AVAILABILITY IN IRELAND.
INT. J. ENERGY RES. 3(4): 333-348, OCTOBER-DECEMBER 1979.

DATA ON ACTUAL WIND ENERGY AVAILABILITY IN IRELAND ARE SPARSE. THIS IS BECAUSE (A) RELATIVELY LITTLE DATA ON WIND SPEEDS HAVE BEEN COLLECTED IN IRELAND AT SITES OF INTEREST FOR WIND EXPLOITATION, AND (B) SUCH DATA NEED IN ANY CASE BE INTEGRATED WITH THE CHARACTERISTICS OF ACTUAL WINDMILLS WHICH RESPOND MORE EFFICIENTLY TO CERTAIN WIND SPEED THAN TO OTHERS. THE AUTHORS DESCRIBE A METHODOLOGY FOR PERFORMING SUCH AN INTEGRATION, AND OFFER TABLES OF SPECIFIC OUTPUT FOR WINDMILLS OF DIFFERENT CHARACTERISTICS LOCATED AT DIFFERENT SITES IN IRELAND. THE VARIATIONS IN THIS SPECIFIC OUTPUT ARE DISCUSSED.

1979-0416 HAYES D
SOLAR POSSIBILITIES.

ENERGY 4(5): 761-768, OCTOBER 1979. (SPECIAL ISSUE: RENEWABLE ENERGY PROSPECTS, PROCEEDINGS OF A CONFERENCE ON NON-FOSSIL FUEL AND NON-NUCLEAR FUEL ENERGY STRATEGIES, HONOLULU, JANUARY 9-12, 1979).

THIS PAPER DISCUSSES THE UTILISATION OF SOLAR-BASED RENEWABLE ENERGY RESOURCES, INCLUDING SOLAR HEATING, WIND POWER, HYDRO-POWER, PHOTOVOLTAICS AND BIO-ENERGY IN ORDER TO EFFECT A WORLD-WIDE ENERGY TRANSITION FROM OIL-BASED RESOURCES.

1979-0417 HEAD W
GREENHOUSE AQUACULTURE.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 336-339.
CONF-790845

A 350 SQUARE FOOT SOLAR GREENHOUSE HAS BEEN BUILT IN EUGENE, OREGON, TO TEST TWO METHODS OF GROWING FISH IN THE WATER HEAT STORAGE TANKS. THE FISH ARE RAISED IN TWO 1,700 GALLON CONCRETE TANKS AND THE WATER IS KEPT HEALTHY BY WINDMILL AERATION AND BIOLOGICAL FILTRATION. ONE TANK USES A TRICKLING FILTER AND THE OTHER AN AIR-LIFT FILTER. FROM JUNE 1978 TO JULY 1979 THE AVERAGE MONTHLY WATER TEMPERATURE IN THE TANKS RANGED FROM A HIGH OF 84 DEGREES F TO A LOW OF 67 DEGREES F. THE AVERAGE MONTHLY GREENHOUSE AIR TEMPERATURE RANGED FROM A HIGH OF 89 DEGREES F TO A LOW OF 72 DEGREES F. MIRROR CARP AND TWO SPECIES OF TILAPIA WERE RAISED. EACH TANK WAS HARVESTED SEVEN TIMES FOR A TOTAL YIELD OF 167 LBS 9 OZ. TWENTY-FIVE PERCENT MORE POUNDS OF FISH HAVE BEEN HARVESTED FROM THE TRICKLING FILTER TANK THAN THE AIR-LIFT TANK.

1979-0418 HELLHAKE G P
ADVANCED ENERGY PROGRAMS.
DOE-SOLAR EXPORT OPPORTUNITIES WORKSHOP, ATLANTA, GEORGIA, JANUARY 8, 1979. NTIS, APRIL 1979. P. 155-166.
SERI/TP-49-186

IN ORDER TO DISCUSS THE GENERAL ELECTRIC ADVANCED ENERGY PROGRAMS, SLIDES WERE USED. COMPANY COMPONENTS CONSIST OF THE R AND D CENTER, STUDY CENTER, AND PRODUCT AND ADVANCED ENERGY DEPARTMENTS. ADVANCED ENERGY PROGRAMS INCLUDE SOLAR, WIND, PHOTOVOLTAIC, AND NUCLEAR. INTERNATIONAL ACTIVITIES IN THE ADVANCED ENERGY DEPARTMENT INCLUDE ACTIVITIES IN SPAIN, WESTERN EUROPE, AND THE MIDEAST.

1979-0419 HERBERT F P, OTTENHEIMER J
PANEMONE WINDMILL.
U.S. PATENT NO. 4,142,822, MARCH 6, 1979. 6 P.

A WINDMILL WITH A VERTICAL-AXIS ROTOR IS DESCRIBED WHICH HAS THRUST VANES SURROUNDED BY A STATIONARY CAGE HAVING GUIDE VANES TO CHANNEL THE WINDSTREAM TO THE ROTOR. IN THE PREFERRED EMBODIMENT THE ROTOR IS A FLOW-THROUGH TYPE WITH AIRFOIL VANES.

1979-0420 HERNANDEZ E, BEST G
PASSIVE AIR CONDITIONING OF STABLES IN TROPICAL HOT HUMID CLIMATES.
NATIONAL PASSIVE SOLAR CONFERENCE, 3RD, SAN JOSE, CALIFORNIA, JANUARY 11-13, 1979. PROCEEDINGS. PASSIVE SOLAR TAKES OFF. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC., 1979. P. 330-338. AVAILABLE: NEW YORK, UNIPUB.

DUE TO THE STRONG DEPENDENCE OF MILK PRODUCTION ON THE TEMPERATURE-HUMIDITY INDEX, A NATURAL VENTILATION SYSTEM IS PROPOSED TO ACHIEVE THE SUITABLE THERMAL COMFORT CONDITIONS FOR CATTLE IN HOT HUMID CLIMATES. THE PASSIVE DESIGN CONSISTS OF A SOLAR ROOF AIR COLLECTOR WHICH BY THERMOSYPHON EFFECT ALLOWS THE ENTRANCE AND CIRCULATION OF FRESH AIR INTO THE STABLE PRODUCING THE APPROPRIATE NUMBER OF AIR CHANGES PER HOUR NEEDED TO EVACUATE THE HEAT RELEASED BY THE COWS IN THEIR METABOLIC ACTIVITY. ROOF WIND TURBINES ARE SUGGESTED FOR NOCTURNAL VENTILATION AND TO OPERATE TOGETHER WITH THE SOLAR ROOF WHEN INSOLATION CONDITIONS ARE RELATIVELY WEAK DUE TO THE DIFFUSE NATURE OF GLOBAL RADIATION IN THIS TYPE OF CLIMATE. A PROTOTYPE HAS BEEN DESIGNED FOR THE CLIMATOLOGICAL CHARACTERISTICS OF VERACRUZ, MEXICO.

1979-0421 HERTER E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,745,862/A/, APRIL 19, 1979. 16 P. (IN GERMAN)

THE CLAIM CONCERNS A WIND TURBINE TO DRIVE MACHINES WITH A ROTOR WHICH CAN ROTATE AROUND A VERTICAL AXIS AND HAVING AT LEAST TWO ROTOR BLADES. THE ROTOR BLADES MUST BE TURNED LIKE SAILS INTO THE CORRECT ANGLE BETWEEN FORWARD MOVEMENT AND DIRECTION OF THE WIND. PAIRS OF ROPES ARE USED FOR THIS PURPOSE, WHICH ARE FIXED TO THE ROTOR BLADE. THE PAIR OF ROPES CAN BE TAKEN INSIDE A HOLLOW SUPPORTING BRACKET FOR THE ROTOR BLADE, WHILE THE ECCENTRIC CONTROL IS SITUATED INSIDE A HOLLOW ROTOR HUB.

1979-0422 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. FINAL REPORT, JUNE 15, 1978-JUNE 14, 1979.
NTIS, JUNE 1979. 50 P.
RLO/2227-T24-79/1

TO USE WIND ENERGY THE RESOURCE MUST FIRST BE IDENTIFIED. THIS REPORT DESCRIBES TECHNIQUES FOR USING TWO WIDELY DISTRIBUTED SPECIES OF CONIFEROUS TREES--DOUGLAS-FIR AND PONDEROSA PINE--AS AIDS IN WIND-POWER PROSPECTING. THE REPORT DESCRIBES THE NEED FOR THE RESEARCH, THE EFFECTS OF WIND ON TREES, DEVELOPMENT OF THE INDICES OF WIND DEFORMATION AND CALIBRATION OF THESE INDICES TO THE MEAN ANNUAL WIND SPEED. RESULTS UP TO THIS TIME INDICATE TREES CAN BE USED TO ESTIMATE MEAN ANNUAL WIND SPEED AND THESE ESTIMATES, ALTHOUGH SUBJECT TO SOME UNCERTAINTY (ABOUT +- 20%), ARE SUFFICIENTLY SENSITIVE TO BE USED AS AN INITIAL CRITERION FOR RANKING POTENTIAL SITES IN TERMS OF WIND-POWER POTENTIAL PRIOR TO INSTRUMENTATION WITH ANEMOMETERS.

1979-0423 HIESTER T R
SITING MANUAL/SHORT COURSE FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 75-78.
CONF-790845

IMPROPER SITING THAT CAUSES LESS-THAN-EXPECTED ENERGY OUTPUT IS A COMMON CAUSE OF DISSATISFACTION AMONG SMALL WIND MACHINE USERS. TO ASSIST IN PROPER SITING, THE PACIFIC NORTHWEST LABORATORY (PNL), AS PART OF THE FEDERAL WIND ENERGY PROGRAM, PREPARES INFORMATION, SUCH AS A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS (WEGLEY ET AL., 1978). THIS HANDBOOK IS DESIGNED FOR THE LAYMAN INTERESTED IN WIND ENERGY CONVERSION. A SHORT COURSE IS BEING DEVELOPED TO PREPARE EXTENSION AGENTS, DEALERS' REPRESENTATIVES, ETC. TO HELP USERS SITE THEIR MACHINES. A SECOND SHORT COURSE IS ALSO BEING DEVELOPED TO PROVIDE WECS CONSUMERS WITH PERTINENT INFORMATION ON SITING WIND MACHINES.

1979-0424 HIGASHI K K, CARR M J, BROTSKY V K
DUNLITE-MODEL 81/002550 WIND TURBINE GENERATOR. FAILURE ANALYSIS.
NTIS, JUNE 1, 1979. 22 P.
RFP-3028-3533/79-12

OPTICAL AND SCANNING ELECTRON MICROSCOPE EXAMINATIONS OF A FAILED BLADE FROM A DUNLITE WIND TURBINE GENERATOR WERE MADE TO DETERMINE THE MODE OF FAILURE. THE FAILURE WAS A FATIGUE FAILURE WHICH BEGAN ON THE FLAT OR UPWIND SIDE OF THE BLADE. THE MODE OF LOADING THIS AREA WAS REVERSED BENDING ABOUT AN AXIS PERPENDICULAR TO THE LONG AXIS OF THE BLADE AND IN THE PLANE OF THE SHEET. THE FATIGUE CRACK PROPAGATED AROUND THE BLADE UNTIL THE BLADE FINALLY FAILED BY DUCTILE OVERLOAD PROCESSES.

1979-0425 HIGASHI K K
DUNLITE MODEL 81/002550. PERFORMANCE REPORT.
NTIS, JULY 1979. 12 P.
RFP-3026/3533/79-6

THIS REPORT IS DESIGNED TO PROVIDE DATA WHICH GIVE AN ACCURATE PICTURE OF THE PERFORMANCE OF THE DUNLITE MODEL 81/002550 UNDER CONDITIONS OF NORMAL USE. EVERY EFFORT HAS BEEN MADE TO ENSURE THAT THE DATA PROVIDED IN THIS REPORT ARE ACCURATE. THE CALIBRATION OF ALL INSTRUMENTS IS CONTINUOUSLY MAINTAINED. THE TESTS FOR THE DUNLITE WIND SYSTEM ARE DESIGNED TO DETERMINE THE POWER CURVE UNDER VARIOUS LOAD (APPLICATION) CONFIGURATIONS AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). INTERFACE WITH ENERTECH CORPORATION OCCURRED ONLY WHEN REPLACEMENT PARTS WERE REQUIRED. THE MANUFACTURER HAS BEEN PROVIDED WITH MONTHLY PRELIMINARY DATA REPORTS FROM ROCKY FLATS.

1979-0426 HIGASHI K K
ALTOS-MODEL 8B WIND TURBINE GENERATOR. PERFORMANCE REPORT.
NTIS, JULY 1979. 13 P.
RFP-3033/3533/79-4

THIS INTERIM REPORT IS DESIGNED TO PROVIDE PRELIMINARY DATA ON THE PERFORMANCE OF THE ALTOS, MODEL 8B, UNDER CONDITIONS TO WHICH IT IS LIKELY TO BE SUBJECTED WHILE IN NORMAL USE. ALL INSTRUMENTS USED DURING THE TESTING OF THE ALTOS WERE MAINTAINED IN CALIBRATION AND IN ACCORDANCE WITH ROCKY FLATS CALIBRATION PROCEDURES. THE DATA PROVIDED IN THIS REPORT ARE ACCURATE WITHIN THE CALIBRATION SPECIFICATIONS. THE TESTS FOR THE ALTOS WIND SYSTEM ARE DESIGNED TO DEVELOP POWER CURVES UNDER VARIOUS LOAD CONFIGURATIONS AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). CONTACT WITH ALTOS CORPORATION CONCERNING MACHINE PERFORMANCE AND REPAIRS HAS BEEN ACCOMPLISHED WITH RELATIVE EASE. RESPONSE TIMES HAVE BEEN GOOD, AND SYSTEM MODIFICATIONS HAVE BEEN ACCOMPLISHED IN A TIMELY MANNER. THE MANUFACTURER HAS BEEN PROVIDED WITH MONTHLY PRELIMINARY DATA REPORTS.

1979-0427 HIGASHI K K, CARR M J
ALTOS-MODEL 8B WIND TURBINE GENERATOR. FAILURE ANALYSIS.
NTIS, JUNE 18, 1979. 20 P.
RFP-3035/3533-79/10

A BRITTLE FAILURE OF A HUB ON AN ALTOS WIND TURBINE GENERATOR TESTED AT THE ROCKY FLATS SMALL WIND SYSTEM TEST CENTER WAS CAUSED BY THE COMBINATION OF A POOR QUALITY (POROUS) CASTING AND A SHARP CORNER IN A MACHINED KEYWAY.

1979-0428 HIGASHI K K
SENCENBAUGH: MODEL 1000-14 WIND TURBINE GENERATOR. PERFORMANCE REPORT.
NTIS, JULY 1979. 14 P.
RFP-3034/3533/79-5

DATA IS PROVIDED WHICH GIVES AN ACCURATE PICTURE OF THE PERFORMANCE OF THE SENCENBAUGH MODEL 1000-14 UNDER CONDITIONS APPROXIMATING NORMAL USE. EVERY EFFORT HAS BEEN MADE TO ENSURE THAT THE DATA PROVIDED ARE ACCURATE. THE CALIBRATION OF ALL INSTRUMENTS IS CONTINUOUSLY MAINTAINED. THE TESTS FOR THE SENCENBAUGH MODEL 1000-14 WIND SYSTEM ARE DESIGNED TO DEVELOP A POWER CURVE FOR A KNOWN LOAD (APPLICATION) AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). THE SENCENBAUGH HAS BEEN TESTED UNDER A VARIETY OF TAIL ASSEMBLY ADJUSTMENT MODES. THESE ADJUSTMENTS WERE POSSIBLE ON ALL EARLY MODELS OF THE SYSTEM. PERFORMANCE DATA WERE COLLECTED FOR THE VARIOUS ADJUSTMENTS, AND SOME OF THESE DATA ARE PRESENTED. HOWEVER NEWER MODELS OF THE SENCENBAUGH NO LONGER PERMIT THESE ADJUSTMENTS.

1979-0429 HOA S V
VIBRATION OF A ROTATING BEAM WITH TIP MASS.
J. SOUND VIB. 67(3): 369-381, DECEMBER 8, 1979.

THE VIBRATION FREQUENCY OF A ROTATING BEAM WITH TIP MASS IS INVESTIGATED. THE FINITE ELEMENT METHOD IS USED, A THIRD ORDER POLYNOMIAL BEING ASSUMED FOR THE VARIATION OF THE LATERAL DISPLACEMENT. THE EFFECTS OF THE ROOT RADIUS, THE SETTING ANGLE AND THE TIP MASS ARE INCORPORATED INTO THE FINITE ELEMENT MODEL. THE RESULTS ARE COMPARED WITH RESULTS FROM PREVIOUS AUTHORS UTILIZING MYKLESTAD AND EXTENDED GALERKIN METHODS. THE RESULTS SHOW THAT THE SETTING ANGLE HAS A SIGNIFICANT EFFECT ON THE FIRST MODE FREQUENCIES BUT NOT ON THE HIGH FREQUENCIES. THE TIP MASS TENDS TO DEPRESS THE FREQUENCIES AT LOW SPEEDS OF ROTATING BUT IT TENDS TO INCREASE THE FREQUENCIES AT HIGH SPEEDS OF ROTATION. THE RESULTS OF THIS WORK HAVE APPLICATIONS IN WIND TURBINE ROTORS, HELICOPTER ROTORS, ETC., AND THE METHOD USED HERE CAN BE EXTENDED TO INVESTIGATE THE VIBRATION FREQUENCY OF FLEXIBLE BLADE AUTO COOLING FANS.

1979-0430 HOFFMANN I
SOLADATA VERZEICHNIS '79. SOLARTECHNIK-MARKETFUEHRER. (SOLADATA CATALOGUE 79. SOLAR TECHNOLOGY-MARKET GUIDE.)
KARLSRUHE, GERMANY, F.R., C.F. MUELLER, 1979. 100 P. (IN GERMAN)

THE FIRM CATALOGUE COMPRISES THE PRODUCERS OF SOLAR PLANTS AND THEIR ACCESSORIES. TECHNICAL DETAILS OF THE PRODUCTS ARE GIVEN. THE FOLLOWING PARTICULAR FIELDS ARE MENTIONED: 1) SOLAR COLLECTORS, 2) SOLAR COLLECTOR COMPONENTS, 3) STORAGES, 4) STORAGE COMPONENTS, 5) SOLAR PLANTS, 6) HEAT PUMPS, 7) WIND ENERGY PLANTS, 8) SOLAR CELLS AND GENERATORS, 9) SOLAR ABSORPTION REFRIGERATORS, 10) ELECTRONICS FOR MEASUREMENT AND CONTROL, 11) SUNDRIES, 12) ACCESSORIES, AND 13) INNOVATIONS/LICENCES.

1979-0431 HOHENEMSER K H, SWIFT A H P, PETERS D A
DEFINITIVE GENERIC STUDY FOR SAILWING WIND ENERGY SYSTEMS. NON-TECHNICAL SUMMARY REPORT. FINAL REPORT.
NTIS, OCTOBER 1979. 247 P.

SERI/TR-8003-02, SERI/SP-8003-01, SERI/TR-98003-05

INFORMATION IS PRESENTED CONCERNING THE AERODYNAMICS OF SAILWINGS; TESTS WITH SAILWING MODEL ROTORS; PERFORMANCE AND INITIAL COST OPTIMIZATION OF SAILWING WIND MACHINES; STRUCTURAL INTEGRITY AND DURABILITY OF ROTARY SAILWINGS, DYNAMICS OF SAILWING WIND MACHINES; CONFIGURATIONS OF SAILWING MACHINES; POTENTIAL IMPROVEMENTS OF ROTARY SAILWINGS; AND COST EFFECTIVENESS OF SAILWING WIND MACHINES.

1979-0432 HOHENEMSER K H
SAILWING WIND ENERGY SYSTEMS ASSESSMENT.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, MAY 1979. NTIS, DECEMBER 1979. P. 283-294.
SERI/TP-245-184

THE SAILWING WINDMILL WAS CONCEIVED BY T.E. SWEENEY AT PRINCETON UNIVERSITY. PERFORMANCE MEASUREMENTS WERE MADE WITH SAILWING WIND ROTOR MODELS ON A MOVING TEST BED. A 7.6 METER (25 FT.) DIAMETER MACHINE WAS BUILT BY GRUMMAN ENERGY SYSTEMS AND IS PRESENTLY TURNING ESSENTIALLY WITHOUT POWER EXTRACTION AT A SITE ADMINISTERED BY PRINCETON UNIVERSITY. IT IS ESTIMATED THAT THE COST OF ENERGY FROM THIS WINDMILL IS COMPARABLE TO THAT OF GOOD CONVENTIONAL WIND MACHINES OF ITS SIZE, NAMELY 0.09 TO 0.12 $/KWH FOR LOW QUANTITY PRODUCTION AND 0.06 TO 0.07 $/KWH FOR ADVANCED VERSIONS IN HIGH QUANTITY PRODUCTION. THE SAILWING ROTOR HAS FOUR TIMES THE BLADE AREA OF A CONVENTIONAL WINDMILL WITH FIBERGLASS BLADES WITHOUT AN INCREASE IN BLADE WEIGHT OR BLADE COST.

1979-0433 HOLLANDSWORTH R P, ADAMS G B
ROLE OF MICROCOMPUTERS IN SECONDARY BATTERY DEVELOPMENT AND TESTING.
NTIS, DECEMBER 11, 1979. 138 P.
LMSC-D-631058, UCRL-15171

THE DEVELOPMENT AND APPLICATION OF A LOW-COST DEDICATED MICROCOMPUTER SYSTEM TO SECONDARY BATTERY DEVELOPMENT AND TESTING ARE DESCRIBED. AN OVERVIEW OF COMPUTERS, HARDWARE, AND SOFTWARE IS GIVEN, AND THE PARTICULAR APPLICATION DISCUSSED IS THE ZINC/FERRICYANIDE HYBRID REDOX BATTERY. HOWEVER, MODIFICATIONS ARE EXAMINED WHICH THEN ENABLE ITS USE IN OTHER SECONDARY BATTERY TEST PROGRAMS. THE SYSTEM IS CAPABLE OF CONTROLLING THE CHARGE AND DISCHARGE CYCLES OF SIX OR MORE SECONDARY BATTERIES BASED UPON FIVE OR MORE OPERATOR-DETERMINED CELL PARAMETERS, AND COMPUTING AT THE END OF EACH CYCLE THE VOLTAIC, COULOMBIC, AND ENERGY-CONVERSION EFFICIENCIES FOR EACH CELL. THE SYSTEM DESCRIBED FULFILLS THE OBJECTIVE OF ENABLING ONE PERSON TO CONTROL, COLLECT, AND INTERPRET CYCLIC DATA FROM MANY CELLS WITH A MINIMUM OF EFFORT.

1979-0434 HOWE R R
WIND OPERATED POWER GENERATING APPARATUS.
U.S. PATENT NO. 4,179,007, DECEMBER 18, 1979. 6 P.

A WIND OPERATED ELECTRICAL POWER GENERATING DEVICE MOUNTED ON A SELF-PROPELLED VEHICLE COMPRISES A WIND ROTATED ROTOR MOUNTED ON A FLYWHEEL AND AT LEAST ONE GENERATOR WHICH IS POWERED BY THE ROTATING FLYWHEEL. THE OPERATIVE CONNECTION BETWEEN THE GENERATOR AND FLYWHEEL, IN THE PREFERRED EMBODIMENT, COMPRISES A WHEEL MOUNTED ON THE GENERATOR SHAFT AND TRACKING WITHIN A CONTINOUS GROOVED CHANNEL FORMED IN THE INNER OR OUTER PERIPHERY OF THE FLYWHEEL.

1979-0435 HUANG C H, FICHTL G H
GUST-RISE EXCEEDANCE STATISTICS FOR WIND TURBINE DESIGN.
NTIS, JULY 1979. 36 P.
PNL-2530

WHEN DESIGNING A WIND MACHINE, THE NUMBER OF LARGE AMPLITUDE GUSTS FOR THE DESIGN-LIFE EXPOSURE OF A WIND MACHINE SHOULD BE ESTIMATED, BECAUSE VELOCITY CHANGE CONTROLS THE ACCELERATION RATE OF A ROTOR. SINCE THE RECORD LENGTH OF DATA IS INSUFFICIENT, THE THEORETICAL STUDY OF GUST RISE MAY SHED SOME LIGHT ON THE EMPIRICAL FORMULATION IN WHICH SOME IMPORTANT PARAMETERS MAY HAVE BEEN IGNORED. FICHTL DEVELOPED AN EQUATION BASED ON RICE'S THEORY (1944, 1945), WHICH ESTIMATES THE TOTAL NUMBER OF CROSSINGS WITH POSITIVE SLOPE PER UNIT OF TIME THAT EXCEEDS A PRESCRIBED LEVEL OF VELOCITY CHANGE. THE ANALYTICAL REPRESENTATION OF FICHTL'S FORMULATION IS PRESENTED, AND USEFUL RESULTS OF THE VELOCITY CHANGE FOR THE DESIGN LIFE OF A WIND ENERGY CONVERSION SYSTEM (WECS) ARE INCLUDED.

1979-0436 WORLD ENERGY DATA SYSTEM (WENDS). VOLUME VI. INTERNATIONAL AGREEMENT PROFILES.
NTIS, JUNE 1979. 202 P.
ANL-PMS-79-2(V.6)

THE WORLD ENERGY DATA SYSTEM CONTAINS ORGANIZED DATA ON THOSE COUNTRIES AND INTERNATIONAL ORGANIZATIONS THAT MAY HAVE CRITICAL IMPACT ON WORLD ENERGY. THE INTERNATIONAL AGREEMENT PROFILES IN WENDS ARE ALL ENERGY-RELATED AND ARE ORGANIZED BY ENERGY TECHNOLOGY. THESE ARE: COAL; CONSERVATION; FUSION; GEOTHERMAL; NUCLEAR FISSION; OIL, GAS AND SHALE; SOLAR, WIND AND OCEAN THERMAL; AND OTHER (COOPERATION IN ELECTRICAL POWER EQUIPMENT ACQUISITION, ENERGY, ENERGY RESEARCH, ETC.). THE AGREEMENT PROFILES ARE ACCESSIBLE BY ENERGY TECHNOLOGY AND ALPHABETICALLY BY COUNTRY.

1979-0437 HUEBNER R
WIND POWER PLANTS. THE NECESSITY TO DEVELOP NEW AND INEXHAUSTIBLE ENERGY SOURCES.
ELEKTR. ENERG. TECH. 24(3): 104-107, APRIL 1979. (IN GERMAN)

AFTER A BRIEF OUTLINE OF ADVANTAGES AND DRAWBACKS AND THE HISTORY OF WIND POWER PLANTS SO FAR, THE CONDITIONS FOR THE CONSTRUCTION OF LARGE WIND POWER PLANTS ARE ASSESSED, THE HONNEF AND ECKERT WIND POWER PLANTS ARE DESCRIBED--AS WELL AS TESTS WITH OTHER LARGE WIND POWER PLANTS--AND EXAMPLES ARE GIVEN OF SMALL AND MEDIUM-SIZED WIND POWER PLANTS.

1979-0438 HUGOSSON S
SPECIFICATION, SITING AND SELECTION OF LARGE WECS PROTOTYPES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 89-102.
NASA-CP-2106

THE SWEDISH WIND ENERGY PROGRAMME WAS STARTED IN 1974 WITH PRELIMINARY FEASIBILITY STUDIES. THESE INDICATED THAT WIND POWER COULD BECOME AN ECONOMIC REALITY IN SWEDEN, AND THAT THE TECHNICAL PROBLEMS WOULD NOT BE UNSURMOUNTABLE. THIS LED TO A DECISION BY NE IN 1975 TO DESIGN AND INSTALL A WIND POWER RESEARCH UNIT TO STUDY THE TECHNICAL PROBLEMS ASSOCIATED WITH WIND POWER AT A SEMI-SCALE LEVEL. THE CONTRACT FOR THIS UNIT WAS GIVEN TO SAAB-SCANIA CO. THE UNIT WAS OPERATIVE IN APRIL 1977, UNDERWENT DELIVERY TESTS AND DEBUGGING DURING 1977

AND BEGAN GIVING TEST DATA FOR THE ALUMINIUM BLADE/RIGID HUB COMBINATION LATE IN 1977. THAT COMBINATION ACCUMULATED 846 HOURS OF OPERATION BEFORE THE HUB WAS CHANGED IN MAY 1978. THE COMBINATION ALUMINIUM BLADE/FLAPPING HUB IS NOW OPERATIVE, ACCUMULATING ABOUT 1200 HOURS IN EARLY APRIL 1977, TOTAL HOURS OF OPERATION NOW BEING ABOVE 2000. ROTOR BLADES WILL BE CHANGED INTO A GRP-SET IN MAY 1979, AND LATE IN 1979 INTO A CRP + GRP-SET WITH INCREASED DIAMETER (24 M).

1979-0439 HULTGREN L S
TORSIONAL OSCILLATIONS OF THE ROTOR DISC FOR HORIZONTAL AXIS WIND TURBINES WITH HINGED OR TEETERED BLADES. PART 12.
NTIS, AUGUST 23, 1979. 39 P.
FFA-TN-AU-1499-PT-12, N80-21881/1

THE COUPLING OF TORSIONAL OSCILLATIONS OF THE ROTOR DISC AND THE BLADE MOTIONS WAS ANALYZED FOR HORIZONTAL AXIS WIND TURBINE HINGED OR TEETERED BLADES. THE BLADES AND THE TOWER WERE ASSUMED TO BE PERFECTLY RIGID. THE VIBRATIONAL ANALYSIS WAS LINEAR AND THE ANTISYMMETRIC BLADE FLAPPING MOTION WAS FOUND TO BE DECOUPLED. EXPRESSIONS FOR THE EIGENFREQUENCIES OF THE SYSTEM WERE OBTAINED.

1979-0440 HULTGREN L S, DUGUNDJI J
DYNAMICS OF A FLEXIBLE ROTOR-TOWER SYSTEM.
NTIS, AUGUST 1979. 99 P.
ASRL-TR-194-1, FFA-AU-1499, N80-23862/9

THE DYNAMICS OF A HORIZONTAL AXIS WIND TURBINE WERE ANALYZED. BOTH THE BLADES AND THE TOWER ARE TAKEN TO BE FLEXIBLE. THE ANALYSIS IS LINEAR AND MODAL. FOR A THREE-BLADED ROTOR, NUMERICAL RESULTS WERE OBTAINED FOR FREE VIBRATIONS AND FORCED OSCILLATIONS DUE TO STATIC UNBALANCE. ANALYTICAL SOLUTIONS WERE CONSTRUCTED FOR FORCED VIBRATIONS DUE TO GRAVITY AND WIND SHEAR.

1979-0441 HURWOOD D L
ELEVENTH STREET AND BRONX FRONTIER: URBAN PIONEERING WITH WIND POWER.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 565-567.

WIND ENERGY IS BEING APPLIED TO ELECTRICITY GENERATION AT TWO LOCATIONS IN NEW YORK CITY. THESE SMALL-SCALE SYSTEMS ARE PIONEERING EFFORTS CONTRASTING WITH LARGE WIND TURBINES IN THAT THEY ARE LOCATED IN AN URBAN SETTING, SEEK TO EXPLOIT RELATIVELY LOW-VELOCITY WINDS, AND REPRESENT INITIATIVES BY NEIGHBORHOOD ASSOCIATIONS AND COMMUNITY GROUPS RATHER THAN BY GOVERNMENT OR UTILITIES. HOWEVER, THEY DRAW FINANCIAL ASSISTANCE FROM GOVERNMENT, AND INTERFACE WITH THE ELECTRIC UTILITY SERVING THE AREA. FOR THESE AND OTHER REASONS THE PROJECTS RAISE QUESTIONS OF ENERGY TECHNOLOGY, FINANCE AND POLICY, AND THUS ASSUME IMPORTANCE EXCEEDING THEIR TINY SIZE IN CAPACITY AND ENERGY SUPPLY.

1979-0442 HUTTER U
WIND ENERGY CONVERTOR.
GERMAN (FRG) PATENT NO. 2,855,026/C/, JANUARY 18, 1979. 12 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND ENERGY CONVERTOR, I.E. A WIND POWER MACHINE, WITH A ROTOR WITH AIR FLOWING OVER IT AND TWO BLADES WHICH CAN ROTATE AROUND THEIR LONGITUDINAL AXIS. THE BEARINGS FOR THE ROTOR SHAFT CAN ROTATE AROUND ITS VERTICAL AXIS IN ORDER TO BE ABLE TO TURN THE ROTOR INTO THE WIND. IT IS THE PURPOSE OF THE INVENTION TO REDUCE THE TURBULENCE RESULTING FROM DIFFERENT INCOMING AIR VELOCITIES NEAR THE ROTOR SURFACE.

1979-0443 ICERMAN L, MYERS K, SWIFT A
POTENTIAL OF COMBINED WIND-SOLAR ENERGY CONVERSION SYSTEM FOR ELECTRIC UTILITY CAPACITY DISPLACEMENT.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 399-406.

AN HOURLY COMPUTER SIMULATION MODEL IS DEVELOPED TO EVALUATE THE PERFORMANCE OF COMMERCIAL-SCALE COMBINED WIND-SOLAR SYSTEMS AND TO MAKE COMPARISONS WITH SIMULATED PERFORMANCE DATA FOR SOLAR-ONLY SYSTEMS. A MAJOR FEATURE OF THE MODEL IS THE CAPABILITY TO CONDUCT A FIRST-ORDER ASSESSMENT OF THE POTENTIAL FOR ELECTRIC UTILITY CAPACITY DISPLACEMENT BY THE INTRODUCTION OF COMBINED WIND-SOLAR SYSTEMS.

1979-0444 INHABER H
IS SOLAR POWER MORE DANGEROUS THAN NUCLEAR?
INT. AT. ENERGY AGENCY BULL. 21(1): 11-17, 1979.

AN ANALYSIS OF THE RISKS INVOLVED IN THE PRODUCTION AND GENERATION OF CONVENTIONAL AND NONCONVENTIONAL TYPES OF ENERGY WAS PERFORMED. THE RISK ACCOUNTING CONSIDERS THE NET ENERGY OUTPUT AND THE DEATHS, INJURIES, AND DISEASES ASSOCIATED WITH THE PRODUCTION OF THE ENERGY SOURCE. INITIAL AND INTERMEDIATE STAGES OF ENERGY PRODUCTION ARE CONSIDERED AS WELL AS FINAL STAGES. THE CALCULATION OF TOTAL RISK PER ENERGY OUTPUT INDICATED THAT NATURAL GAS AND NUCLEAR POWER HAD LESS TOTAL RISK THAN OTHER CONVENTIONAL AND RENEWABLE ENERGY SOURCES. MATERIAL AND CONSTRUCTION TIME REQUIREMENTS ARE GREATER FOR NON-CONVENTIONAL SYSTEMS THAN FOR CONVENTIONAL SYSTEMS. THE OVERALL RISK IS DIVIDED INTO THE CATEGORIES OF OCCUPATIONAL AND PUBLIC RISK. NATURAL GAS HAS THE LOWEST OCCUPATIONAL RISK WHILE METHANOL PRODUCTION HAS THE HIGHEST, NATURAL GAS HAS THE LOWEST PUBLIC RISK WHILE COAL HAS THE HIGHEST.

1979-0445 INHABER H
RISK WITH ENERGY FROM CONVENTIONAL AND NONCONVENTIONAL SOURCES.
SCIENCE 203: 718-723, FEBRUARY 23, 1979.

RISK TO HUMAN HEALTH WAS COMPARED FOR FIVE CONVENTIONAL AND SIX NONCONVENTIONAL ENERGY SYSTEMS. THE ENTIRE CYCLE FOR PRODUCING ENERGY WAS CONSIDERED, NOT JUST PART. THE MOST IMPORTANT CONCLUSION DRAWN IS THAT THE RISK TO HUMAN HEALTH FROM NONCONVENTIONAL SOURCES CAN BE AS HIGH AS, OR EVEN HIGHER THAN, THAT OF CONVENTIONAL SOURCES. THIS RESULT IS PRODUCED ONLY WHEN THE RISK PER UNIT ENERGY IS CONSIDERED, RATHER THAN THE RISK PER SOLAR PANEL OR WINDMILL. THE RISK FOR NONCONVENTIONAL ENERGY SOURCES DERIVES FROM THE LARGE AMOUNT OF MATERIAL AND LABOR NEEDED, ALONG WITH THEIR BACKUP AND STORAGE REQUIREMENTS.

1979-0446 INTEGRATED COMMUNITY ENERGY PLAN FOR RIVERSIDE, CALIFORNIA. PHASE I. FINAL REPORT.
NTIS, JANUARY 1979. 338 P.
DOE/TIC-10117

THIS APPENDIX TO THE FEASIBILITY STUDY OF AN INTEGRATED ENERGY PLAN FOR THE CITY OF RIVERSIDE, CONTAINS INFORMATION ON ALTERNATIVE ENERGY SUPPLIES, INCLUDING COAL, SOLAR, GEOTHERMAL, NUCLEAR, BIOMASS, WIND, AND

HYDROGEN ENERGY SOURCES IN CALIFORNIA; PURCHASED FUEL PRICES, AN ANALYSIS OF VARIOUS OPTIONS FOR AN INTEGRATED COMMUNITY ENERGY SYSTEM (ICES), AND AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF AN ICES; LEGAL AND INSTITUTIONAL ASPECTS OF ICES; ENVIRONMENTAL QUALITY REGULATIONS; PUBLIC OPINION AND COMMUNITY INVOLVEMENT ACTIVITIES; AND RESULTS OF AN INFRARED PHOTOGRAPHIC SURVEY OF RIVERSIDE.

1979-0447 ISSHIKI N, TAKEUCHI M, NIKAI I, KAMOSHIDA J, AKUTA T
DEVELOPMENT OF CDE (CONCENTRATION DIFFERENCE ENERGY) SYSTEM AND ENGINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, CAT. NO. 79CH1477-9, 1979. P. 1998-2003.

THIS SYSTEM OFFERS A KIND OF GENERAL METHOD OF ENERGY CONVERSION, STORAGE AND UTILIZATION OF THERMAL AND MECHANICAL ENERGY OF ALTERNATIVE RESOURCES AS SOLAR, OCEANIC HEAT AND WIND POWER USING CYCLIC CHANGE OF CONCENTRATION OF SOLVENT IN ANY SOLUTIONS. THE AQUEOUS SOLUTION OF MIXTURE OF CACL2, AND LICL IS SELECTED HERE AS THE MOST SUITABLE SOLUTION, AND NICKEL COPPER ALLOY, OF LOW NICKEL CONTENT, IS SELECTED TO BE THE BEST MATERIAL AGAINST THE ABOVE SOLUTION. A MANNED TRY-WHEEL CDE CAR IS DRIVEN FOR MORE THAN 15 MINUTES, AND 1 KW CDE ENGINE IS EXPERIMENTED SUCCESSFULLY.

1979-0448 JESCH L F, WALTON D
PERFORMANCE MODELING OF THE VERTICAL AXIS WIND TURBINE.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2277-2281.

THE AERODYNAMIC PERFORMANCE OF THE VERTICAL AXIS WIND TURBINE (VAWT) USING TROPOSKIEN SHAPED BLADES IS ANALYZED. THE EFFECTS OF BLADE NUMBERS, BLADE GEOMETRY, CHORD LENGTH, ROTOR SOLIDITY AND PARASITIC DRAG ON PERFORMANCE ARE INVESTIGATED SINGLY AND IN COMBINATIONS. A FEATURE OF THE COMPUTER MODEL IS THAT IT CONSIDERS THE EFFECT OF VARIABLE REYNOLDS NUMBER ON PERFORMANCE.

1979-0449 JOHANSON E E, GOLDENBLATT M K
WIND ENERGY SYSTEMS APPLICATIONS TO REGIONAL UTILITIES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 127-154.
CONF-790352

THE PRIME THRUST OF THE WORK WAS TO DEVELOP A GENERIC PLANNING PROCESS THAT ANY UTILITY COULD USE TO DETERMINE THE FEASIBILITY OF UTILIZING WECS AS PART OF THEIR FUTURE MIX OF EQUIPMENT. WHILE THIS IS PRIMARILY AN ECONOMIC PROCESS, OTHER QUESTIONS DEALING WITH WECS AVAILABILITY, CAPACITY CREDIT, OPERATING RESERVE, PERFORMANCE OF WECS ARRAYS, ETC., HAD TO BE ADDRESSED. SINCE THE MATURE PRODUCT COST OF WECS IS UNCERTAIN AT THIS TIME, THE APPROACH USED WAS TO ESTABLISH THE WORTH, OR VALUE, OF WECS BY ADDING THEM TO THE UTILITY MIX AT ZERO COST AND DETERMINING WHAT SAVINGS THE UTILITY WOULD REALIZE FROM ITS CONVENTIONAL SOURCES, DUE TO THE PRESENCE OF THE WECS. THESE SAVINGS COULD THEN BE USED TO ESTABLISH WHAT THE UTILITY COULD PAY FOR THE WECS, AND BREAK EVEN.

1979-0450 JOHANSSON T B
SOLAR SWEDEN.
BULL. AT. SCI. 35(8): 19-22, OCTOBER 1979.

THE POSSIBLE TRANSITION FROM FOSSIL FUELS TO RENEWABLE RESOURCES BY THE YEAR 2015 IN SWEDEN IS DISCUSSED. THE ALTERNATIVE SOURCES OF FUELS CONSIDERED HIGHLY FEASIBLE FOR SWEDEN AND THEIR USAGE PERCENTAGES BY 2015 INCLUDE: FORESTS (46%), MARINE BIOMASS (3%), FOREST WASTES (12%), HYDRO POWER (12%), WIND POWER (5%), SOLAR CELLS (9%), AND SOLAR HEATING (13%). IN 1976, OIL PROVIDED 72% OF SWEDEN'S ENERGY REQUIREMENTS. THE FEASIBILITY STUDY DISCUSSES THE RATE OF INTRODUCTION, THE ECONOMIC ASPECTS OF THE PROPOSED ENERGY SYSTEM, AND OPPOSING INTERESTS IN LAND USE POLICIES.

1979-0451 JOHN V I
OPERATIONAL CHARACTERISTICS OF AN AC COMMUTATOR GENERATOR FOR WIND POWER CONVERSION.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2262-2266.

A THREE PHASE COMMUTATOR MOTOR OF THE SCHRAGE TYPE IS USED IN THE GENERATING MODE TO PRODUCE CONSTANT VOLTAGE, CONSTANT FREQUENCY POWER OUTPUT. A DIGITALLY OPERATED AUTOMATIC CONTROL SYSTEM IS USED TO ASSURE GENERATOR OPERATION FOR A WIDE RANGE OF SPEEDS.

1979-0452 JUSTUS C G, MIKHAIL A S
COMPUTER MODEL FOR LARGE ARRAYS OF WIND TURBINES. FINAL REPORT.
NTIS, MAY 1979. 46 P.
DOE/ET/20355-79/4

A SYNTHESIS OF THE EARLIER STUDIES OF WIND AND POWER DISTRIBUTIONS FOR LARGE ARRAYS OF WIND TURBINES IS FORMULATED IN A COMPUTER MODEL PROGRAM. THE PROGRAM CAN BE RUN WITH INTERACTIVE (COMPUTER TERMINAL) OR BATCH INPUT (CARD FILES, ETC.). BASED ON A GENERIC WIND TURBINE POWER MODEL, INPUT CHARACTERISTICS AT A SINGLE REPRESENTATIVE SITE, AND DATA SPECIFYING THE SIZE OF THE ARRAY TO BE SIMULATED, THE PROGRAM COMPUTES WIND SPEED AND WIND POWER OUTPUT STATISTICS FOR THE MODEL ARRAY.

1979-0453 KAHN E
COMPATIBILITY OF WIND AND SOLAR TECHNOLOGY WITH CONVENTIONAL ENERGY SYSTEMS.
ANNU. REV. ENERGY 4: 313-352, 1979.

NEW TOOLS ARE NEEDED FOR MAKING ENGINEERING ECONOMICS ANALYSES TO DETERMINE THE COMPATIBILITY OF RANDOMLY AVAILABLE WIND AND SOLAR ENERGY WITH CONVENTIONAL ENERGY SYSTEMS, SPECIFICALLY ELECTRIC UTILITIES. PRESENT ANALYTIC TOOLS CAN BE APPLIED TO IMMEDIATE ISSUES, SUCH AS ELECTRIC BACKUP FOR SOLAR HEATING, TO SOME OF THE ENGINEERING CONSTRAINTS, AND TO SEPARATE ISSUES INTO SHORT-TERM ISSUES OF RESOURCE ASSESSMENT AND APPROPRIATE SCALE AND LONG-TERM ISSUES OF STRUCTURAL OPTIMALITY. COMPATIBILITY ANALYSIS SHOULD FIRST ADDRESS FINANCIAL RISK, FOLLOWED BY RELIABILITY CRITERIA AND REGULATORY STRUCTURE AS MORE RESEARCH IS DONE.

1979-0454 KANT M, BERNA M, VIDONI E
WIND ENERGY CONVERSION SYSTEM WITH ELECTROMAGNETIC STABILIZER.
INST. ELECTR. ENG. PROC. 126(11): 1201-1203, NOVEMBER 1979.

THE DEVELOPMENT OF A NOVEL MEDIUM-POWER (LESS THAN 50 KW) WECS IS OUTLINED. THIS DEVICE, COMPOSED OF A CONSTANT-PITCH RIGID ROTOR AND A DOUBLE-STAGE GENERATOR, USES A PARTICULAR ELECTROMAGNETIC BRAKING TO ASSURE

SPEED STABILIZATION.

1979-0455 KATZENBERG R
REVIEW OF THE SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 155-158.
RFP-3014(VOL.2)

THE PURPOSE OF THE PRESENTATION IS TO DISCUSS THE NATIONAL PROGRAM FOR THE SOLAR HEATING AND COOLING OF BUILDINGS WHICH THE AWEA IS REVIEWING, UNDER CONTRACT TO ROCKWELL-INTERNATIONAL, ROCKY FLATS DIVISION. THE PURPOSE OF THIS PROJECT IS TO REVIEW THE SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM, TO IDENTIFY THE MANAGEMENT, TECHNICAL, INSTITUTIONAL AND FINANCIAL ISSUES ENCOUNTERED. THESE ISSUES ARE ANALYZED FOR THEIR APPLICABILITY TO DESIGNING A WIND ENERGY DEMONSTRATION PROGRAM.

1979-0456 KAWAMOTO H
A PRIMARY POWER SUPPLY SYSTEM FOR COMMUNICATIONS USING A DARRIEUS WIND TURBINE.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 445-452.

SYSTEM DESIGN METHODS OF PRIMARY POWER SUPPLY SYSTEMS USING A WIND TURBINE ARE GIVEN AND COMPARED WITH VARIOUS PRIMARY POWER SUPPLY SYSTEMS. THEN, A DESIGN METHOD FOR SPOILER FLAPS IN THE DARRIEUS WIND TURBINE IS GIVEN. LASTLY THE TESTED POWER SUPPLY SYSTEM, USING A WIND TURBINE AND A DIESEL GENERATOR, IS INTRODUCED.

1979-0457 KAWAMOTO H
PRIMARY POWER SUPPLY SYSTEM FOR COMMUNICATIONS USING A VERTICAL-AXIS WIND TURBINE.
DENSHI TOKYO NO 15: 120-121, 1979.

IMPROVEMENTS IN COMMUNICATION EQUIPMENT THROUGH SOLID STATE CONSTRUCTION HAVE REDUCED POWER CONSUMPTION IN MICROWAVE REPEATER STATIONS TO ABOUT 100 W, THUS MAKING SOLAR BATTERIES AND SMALL WIND TURBINES PRACTICAL AS THE POWER SUPPLY FOR REPEATER STATIONS. A PRIMARY POWER SUPPLY SYSTEM USING A VERTICAL-AXIS WIND TURBINE IS DESCRIBED.

1979-0458 KELLN K, FLUDE E
THE ANSWERS ARE BLOWING IN THE WIND AT SASKATCHEWAN TEL (WIND GENERATOR).
TELEPHONY 197(25): 32-33, 36, 38, 133, DECEMBER 17, 1979.

THE SASKATCHEWAN TELECOMMUNICATIONS INSTALLATION MARKS THE BEGINNING OF A ONE YEAR FIELD TRIAL, IN WHICH A C SYSTEM LICUS VERTICAL AXIS WIND GENERATOR WILL BE EVALUATED. SOME OF THE RESULTS ARE DISCUSSED.

1979-0459 KENNELL E
EXPERIENCE WITH SMALL WECS IN WESTERN WASHINGTON.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 79-80.
CONF-790845

THE QUALITATIVE ASPECTS OF WIND ENERGY CONVERSION GAINED THROUGH SIX YEARS OF WIND RESOURCE EVALUATION, SWECS DESIGN, APPLICATION AND MAINTENANCE IN THE STATE OF WASHINGTON ARE DISCUSSED.

1979-0460 KENTFIELD J A C
THE CHARACTERISTICS OF TWO, SIMPLE, AUTOMATIC SPEED-CONTROL DEVICES FOR HORIZONTAL AXIS WIND-TURBINES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 674-676.

THE NEED FOR SPEED-CONTROL DEVICES, TO PREVENT ROTOR OVERSPEEDING IN STRONG WINDS, IS EXAMINED AND THE FEATURES OF CLASSICAL BLADE-FEATHERING SYSTEMS FOR HORIZONTAL AXIS WIND-TURBINES ARE REVIEWED BRIEFLY. IT IS EXPLAINED THAT BLADE FEATHERING TENDS TO BECOME COMPLICATED AND COSTLY WHEN APPLIED TO MEDIUM AND LOW SPEED MACHINES BECAUSE OF THE LARGE NUMBER OF ROTOR BLADES INVOLVED AND SECONDLY BECAUSE OF THE LOSS OF ROTOR RIGIDITY ASSOCIATED WITH SUCH AN ARRANGEMENT. IT IS ALSO EXPLAINED THAT MEDIUM AND LOW SPEED MACHINES FIND APPLICATION FOR SUCH TASKS AS THE DIRECT DRIVE OF WATER PUMPS ETC.

1979-0461 KIEBLING F
AEROELASTIC MODELING OF THE COUPLED WIND TURBINE ROTOR/TOWER SYSTEM.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 161-179.
JUEL-SPEZ-28

VIBRATION AND AEROELASTIC STABILITY ANALYSES OF WIND TURBINES GENERALLY CANNOT NEGLECT THE INTERACTION BETWEEN ROTOR AND TOWER. SO AT LEAST FINALLY AN AEROELASTIC MODEL OF THE COMPLETE SYSTEM MUST BE CONSIDERED. THE DERIVATION OF THE CORRESPONDING EQUATIONS OF MOTION IS DESCRIBED TOGETHER WITH THE MORE IMPORTANT PARAMETERS OF THE WIND TURBINE SYSTEM.

1979-0462 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF A MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME I. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, JUNE 14, 1979. 59 P.
WASH-2330-78/4(VOL.1)

INFORMATION IS PRESENTED CONCERNING METEOROLOGICAL AND OCEANOGRAPHIC SURVEYS OF THE US OFFSHORE; APPARATUS DESIGNS AND COSTS; AND OWECS SYSTEM ECONOMICS.

1979-0463 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME II. APPARATUS DESIGNS AND COSTS. FINAL REPORT.
NTIS, JUNE 14, 1979. 310 P.
WASH-2330-78/4(VOL.2)

PARAMETRIC DESIGNS AND COMPANION COST FUNCTIONS ARE PRESENTED FOR EACH MAJOR COMPONENT OF AN OFFSHORE WIND ENERGY CONVERSION SYSTEM (OWECS). THESE ARE (1) THE SUPPORT PLATFORMS, (2) THE WIND TURBINE GENERATOR (WTG) PLANTS, AND (3) THE ELECTRICAL ENERGY COLLECTION AND TRANSMISSION SYSTEM INCLUDING (4) SUBSTATIONS. A BACKUP HYDROGEN ENERGY DELIVERY SYSTEM FOR EXTREMELY REMOTE OR DEEP WATER SITES WAS ALSO EVALUATED. COSTS ARE

PRESENTED FOR FABRICATING, TRANSPORTING, INSTALLING, OPERATING, AND MAINTAINING EACH OF THESE COMPONENTS.

1979-0464 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME IV. METEOROLOGICAL AND OCEANOGRAPHIC SURVEYS. FINAL REPORT.
NTIS, JUNE 14, 1979. 344 P.
WASH-2330-78/4(VOL.4)

THE RESULTS ARE PRESENTED OF A SURVEY OF THE METEOROLOGY AND OCEANOGRAPHY OF THE UNITED STATES OFFSHORE AS THEY PERTAIN TO THE DESIGN, COST, EMPLACEMENT, OPERATION AND MAINTENANCE OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (OWECS). THIS REPORT IS INTENDED TO DEFINE THE ENVIRONMENT IN WHICH OWECS ARE TO BE CONSIDERED.

1979-0465 KIRCHHOFF R H
MEASUREMENTS OF THE WIND FIELD INTERACTION WITH THE UMASS 25 KW WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 179-188.
RFP-3014(VOL.1)

THE FIELD INSTRUMENTATION, DATA ACQUISITION SYSTEM, DATA PROCESSING METHODS, AND THE RESULTS OF TEST ON THE UMASS 25 KW WIND TURBINE ARE DESCRIBED. THE OBJECTIVE IS TO DETERMINE THE NATURE OF THE DYNAMIC INTERACTION BETWEEN THE FLUCTUATING WIND VELOCITY FIELD AND THE INSTANTANEOUS POWER GENERATED. RESULTS ARE PRESENTED IN TERMS OF THE MEASURED STATISTICAL PROPERTIES OF THE WIND FIELD AND THE TRANSFER FUNCTION OF THE WIND TURBINE.

1979-0466 KLEIN W E
MODIFIED AEROSPACE RELIABILITY AND QUALITY ASSURANCE METHOD FOR WIND TURBINES.
NTIS, 1979. 8 P.
DOE/NASA/20370-79/18, NASA-TM-79284

THE SAFETY, RELIABILITY AND QUALITY ASSURANCE (SR AND QA) APPROACH DEVELOPED FOR THE FIRST LARGE WIND TURBINE GENERATOR PROJECT, MOD-0A, IS DESCRIBED. THE SR AND QA APPRAOCH TO BE USED HAD TO ASSURE THAT THE MACHINE WOULD NOT BE HAZARDOUS TO THE PUBLIC OR OPERATING PERSONNEL, WOULD OPERATE UNATTENDED ON A UTILITY GRID, WOULD DEMONSTRATE RELIABLE OPERATION AND WOULD HELP ESTABLISH THE QUALITY ASSURANCE AND MAINTAINABILITY REQUIREMENTS FOR FUTURE WIND TURBINE PROJECTS. SINCE THE ULTIMATE OBJECTIVE OF THE WIND ENERGY PROGRAM IS TO PROVIDE WIND POWER AT A COST COMPETITIVE WITH OTHER ENERGY SOURCES, THE FINAL SR AND QA ACTIVITIES WERE TO BE ACCOMPLISHED AT A MINIMUM OF COST AND MANPOWER. THE FINAL APPROACH CONSISTED OF A MODIFIED FAILURE MODES AND EFFECTS ANALYSIS (FMEA) DURING THE DESIGN PHASE, MINIMAL HARDWARE INSPECTIONS DURING PARTS FABRICATION, AND THREE SIMPLE DOCUMENTS TO CONTROL ACTIVITIES DURING MACHINE CONSTRUCTION AND OPERATION.

1979-0467 KOBYLARZ T, AL-SHEHRI A
THE APPLICATION OF WIND ENERGY TO A SYSTEM WITH AN INHERENT ENERGY STORAGE MEDIUM.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 312-318.

WIND ENERGY COULD BE UTILIZED BY SYSTEMS HAVING AN INHERENT STORAGE MEDIUM. ONE SUCH SYSTEM IS A CHLORINE AND CAUSTIC SODA PRODUCTION FACILITY FROM THE ELECTROLYSIS OF BRINE. BY USING WIND SPEED DATA FOR DHAHRAN, SAUDI ARABIA, AND PUBLISHED DATA FOR THE SYSTEM COMPONENTS, YIELDS OF CHEMICALS AND POWER ARE PREDICTED.

1979-0468 KORBER F, THIELE H A
LARGE WIND ENERGY CONVERTER: GROWIAN 3 MW.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 121-131.
NASA-CP-2106

THE LARGE WIND ENERGY CONVERTER GROWIAN HAS THE FUNCTION OF PRODUCING ELECTRICAL ENERGY FROM THE NATURAL MOVEMENTS OF THE WIND. A TWO-BLADE ROTOR MOUNTED ON THE TOWER IS ROTATED BY THE ACTION OF WIND AND TRANSFERS ITS POWER VIA A GEARBOX TO A GENERATOR. THE ELECTRICAL ENERGY THUS OBTAINED IS THEN FED DIRECTLY INTO THE EXISTING SUPPLY NETWORK. THE PLANT WAS DESIGNED WITH REFERENCE TO A PLANT SITE IN THE NORTH GERMAN COASTAL AREA. THE DESIGN OFTHE PLANT PERMITS A LONG-TERM OPTIMAL EXPLOITATION OF WIND ENERGY THROUGH THE USE OF ADVANCED, PROVEN ENGINEERING TECHNIQUES.

1979-0469 KOENRAADS A J T M, OFFRINGA J J, DE ZEEUW W J, SCHELLENS F J C
SOME ASPECTS OF THE DUTCH NATIONAL RESEARCH PROGRAMME FOR WIND ENERGY.
J. "A" 20(3): 151-159, JULY 1979.

A PROJECT PREPARATION GROUP FOR WIND ENERGY WAS SET UP IN JANUARY 1975 TO FORMULATE A PROPOSAL FOR A NATIONAL WIND ENERGY RESEARCH PROGRAMME. THE AUTHORS DISCUSS THIS PROGRAMME WHICH SHOULD LEAD WITHIN 5 YEARS TO A DECISION WHETHER THE DUTCH ENERGY SUPPLY SYSTEM COULD BE STRENGTHENED APPRECIABLY BY THE APPLICATION OF WIND ENERGY.

1979-0470 KORNREICH T R, KOTTLER R J
ENVIRONMENTAL ISSUES ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 95-108.
CONF-790352

THE DEVELOPMENT AND COMMERCIALIZATION OF WIND TURBINE SYSTEMS PRESENT A NUMBER OF ENVIRONMENTAL PROBLEMS THAT MUST BE SOLVED BEFORE WIDESPREAD IMPLEMENTATION OF THESE SYSTEMS CAN OCCUR. THE MAJOR AREAS THAT HAVE BEEN INVESTIGATED INCLUDE: INTERFERENCE WITH ELECTROMAGNETIC TRANSMISSIONS (AIR NAVIGATION SYSTEMS, MICROWAVE COMMUNICATIONS LINKS, RADIO AND TELEVISION BROADCAST); SOUND INTENSITY; SAFETY; SITING PROBLEMS; ECOLOGICAL CONCERNS; PUBLIC ACCEPTANCE; AND LEGAL AND INSTITUTIONAL ISSUES. EACH OF THESE POTENTIAL PROBLEM AREAS IS DISCUSSED. THE COMPLETED AND ACTIVE RESEARCH PROJECTS IN EACH AREA ARE IDENTIFIED. AN OVERVIEW OF THE CURRENT STATUS OF ENVIRONMENTAL BARRIERS TO THE COMMERCIALIZATION OF LARGE SCALE WIND TURBINE SYSTEMS IS PRESENTED.

1979-0471 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
AIAA J. 17(12): 1381-1389, DECEMBER 1979.

COUPLED FLAP-TORSION EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE (HAWT) BLADE HAVE BEEN FORMULATED. THE ANALYSIS NEGLECTS BLADE-TOWER COUPLING. THE FINAL NONLINEAR EQUATIONS HAVE PERIODIC COEFFICIENTS. A NEW AND CONVENIENT METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION,

REQUIRED FOR THE STABILITY ANALYSIS, HAS BEEN IMPLEMENTED AND FOUND TO BE COMPUTATIONALLY EFFICIENT. STEADY-STATE RESPONSE AND STABILITY BOUNDARIES FOR AN EXISTING (TYPICAL) HAWT BLADE ARE PRESENTED.

1979-0472 KOVACS I
DYNAMIC DESIGN OF A MEDIUM STIFF WIND ENERGY TOWER.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 191-196.
JUEL-SPEZ-28

AS A RULE, WIND ENERGY TOWERS ARE DESIGNED FOR HIGH EIGENFREQUENCIES, WHICH CAN BE OBTAINED ONLY THROUGH HIGH STIFFNESSES. AGAINST THIS, A DESIGN CONCEPT WITH ONLY MEDIUM STIFFNESSES IS PRESENTED. THE FIRST EIGENFREQUENCIES OF THE TOWER ARE DESIGNED TO LIE BETWEEN THE LOWER ROTOR FREQUENCY AND THE HIGHER BLADE-PASSAGE FREQUENCY. THEREBY ALL SENSITIVE SYSTEM RESONANCES CAN BE ISOLATED. THE FREQUENCY BANDS IN WHICH THE EIGENFREQUENCIES OF THE TOWER CANNOT BE EXCITED ARE EXTREMELY NARROW. THEREFORE THE TOWERS MUST BE PREPARED FOR A SUPPLEMENTARY TUNING FOR CASES IF THEIR ACTUAL EIGENFREQUENCIES DEVIATE FROM THE PREDETERMINED VALUES. THE CABLE-STAYED MASTS AS PROPOSED HAVE DIFFERENT ADVANTAGES FOR WIND ENERGY TOWERS. AMONG OTHERS, THEY ARE MOST SUITABLE FOR THE MEDIUM STIFFNESS CONCEPT AND THEIR ACTUAL EIGENFREQUENCIES CAN BE EASILY TUNED AFTERWARDS.

1979-0473 KOVARIK T J, PIPHER C, HURST J
WIND ENERGY.
NORTHBROOK, ILL., DOMUS BOOKS, 1979. 128 P.

1979-0474 KRAUSE P C
ANALYSIS AND SIMULATION OF WIND ENERGY SYSTEMS.
NTIS, NOVEMBER 1979. 60 P.
NASA-CR-162538, N80-14487/6

USING A WIND FLUCTUATION MODEL, SIMULATION RESULTS OF THE MECHANICAL AND ELECTRICAL SYSTEMS WERE OBTAINED FOR THE MOD-2 WIND TURBINE GENERATOR SYSTEM. THE DYNAMIC PERFORMANCE OF THE MOD-2 WAS STUDIED DURING WIND GUSTS OF THE 1-COS FORM FROM A CONSTANT WIND VELOCITY. IF THESE ARE THE TYPE OF WIND FLUCTUATIONS TO WHICH THE WIND SYSTEMS WILL BE SUBJECTED TO, THEN THE DESIGN OF THE MOD-2 APPEARS ADEQUATE. THERE WAS ONE EXCEPTION TO THIS; WITH A RATE LIMIT INCORPORATED IN THE PITCH CONTROLLER, AN INSTABILITY OCCURRED DURING A 'DOWN' GUST WHICH CAUSED CONTINUOUS, UNBOUNDED SWITCHING BETWEEN THE HIGH AND LOW MODES. THIS IS A CONTROL DESIGN PROBLEM WHICH APPEARS TO BE CORRECTABLE.

1979-0475 KRONER W M
BARRIERS TO THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS IN URBAN SETTINGS.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, DECEMBER 1979. 174 P.
NYSERDA-79-5

URBAN AREAS IN THE NORTHEAST REGION OF THE UNITED STATES, AND SPECIFICALLY, THOSE IN NEW YORK STATE ARE UNIQUE IN MANY RESPECTS AND TEND NOT TO MATCH URBAN CHARACTERISTICS IN OTHER AREAS OF THE COUNTRY. THE INSTALLATION OF WECS IN THESE URBAN AREAS COULD CREATE TECHNICAL, COMMUNITY, ECONOMIC, INDUSTRIAL, LEGAL AND OWNERSHIP RELATED PROBLEMS WHICH, IN TURN, COULD CONSTITUTE A SERIES OF BARRIERS PREVENTING OR DISCOURAGING THE IMPLEMENTATION OR USE OF WECS. A STUDY OF THESE BARRIERS IS PRESENTED.

1979-0476 KUECKEN J A
HOW TO MAKE HOME ELECTRICITY FROM WIND, WATER & SUNSHINE.
BLUE RIDGE SUMMIT, PENNSYLVANIA, TAB BOOKS, 1979.

1979-0477 KUSSMANN A, MOLLY J, MUSER D
COMPOSITE ROTOR BLADES FOR LARGE WIND ENERGY INSTALLATIONS.
DFVLR-NACHR. 40-44, JUNE 1979. TRANSL.: NTIS, APRIL 1980. 14 P.
NASA-TM-75822, N80-31881/9

THE DESIGN OF LARGE WIND POWER SYSTEMS IN GERMANY IS REVIEWED WITH ATTENTION GIVEN TO ELABORATION OF THE TOTAL WIND ENERGY SYSTEM, AERODYNAMIC DESIGN OF THE ROTOR BLADE, AND WIND LOADING EFFECTS. PARTICULAR CONSIDERATION IS GIVEN TO THE DEVELOPMENT OF COMPOSITE GLASS FIBER/PLASTIC OR CARBON FIBER/PLASTIC ROTOR BLADES FOR SUCH INSTALLATIONS.

1979-0478 LAITNER S
IOWA SOLAR APPLICATIONS: HOLDING AT THE DO-IT-YOURSELF LEVEL.
DES MOINES, IOWA, IOWA SOLAR OFFICE, 1979. 84 P.
IOWA SOLAR OPERATIONAL RESULTS CONFERENCE, 1ST ANNUAL, CEDAR RAPIDS, IOWA, JUNE 21, 1979.

A SERIES OF 10 CASE STUDIES OF REPRESENTATIVE SOLAR TECHNOLOGIES OPERATING IN IOWA IS PRESENTED. THE FOLLOWING ARE INCLUDED: A SOLAR HEATED BANK USING SALT STORAGE, AN AGRICULTURAL WASTE DIGESTION SYSTEM PRODUCING BOTH FUEL AND FERTILIZER, AND INTEGRATED SOLAR/WOOD HEATING SYSTEM VIRTUALLY FREE OF UTILITY BILLS, A SOLAR GRAIN DRYER DESIGNED BY AN IOWA LEGISLATOR, A SOLAR WATER HEATING AND WOOD-FUEL OIL SPACE HEATING SYSTEM, AN UNDERGROUND HOME WITH SOLAR ATRIUM, A SOLAR-HEATED UPHOLSTERY SHOP, A SOLAR-HEATED SCHOOL AND GRAIN DRYER, AND A FARM THAT NEVER SWITCHED FROM WINDPOWER TO ELECTRIC UTILITIES.

1979-0479 LAMB C S J
CONNECTING NEW ENERGY SOURCES TO SUPPLY SYSTEMS.
HONG KONG ENG. 7(6): 7-11, JUNE 1979.

THIS PAPER DESCRIBES METHODS OF COUPLING MAGNETOHYDRODYNAMIC GENERATORS TO A GRID VIA A PARALLEL-CONNECTED ROTARY MOTOR AND THYRISTOR-BASED OR INDUCED-EMF COMMUTATION. OTHER SOURCES CONSIDERED INCLUDE SOLAR ENERGY SYSTEMS, WIND GENERATORS AND FUEL CELLS.

1979-0480 LANDAHL M T
MOMENTUM THEORY ANALYSIS OF UNCONVENTIONAL WIND EXTRACTION SCHEMES, PART 10.
NTIS, OCTOBER 12, 1979. 23 P.
ASRL-TR-194-2-PT-10, FFA-AU-1499-PT-10, N80-28932/5

A MOMENTUM THEORY ANALYSIS WAS CARRIED OUT FOR IDEALIZED WIND ENERGY EXTRACTION DEVICES UNDER THE ASSUMPTION OF UNIFORM WAKE VELOCITY. THE WIND ENERGY EXTRACTION PROBLEM WAS ANALYZED ON THE BASIS OF SOME SIMPLE IDEALIZED FLOW MODELS WHICH DEMONSTRATE THAT THE "BERTZ LIMIT" CAN BE EXCEEDED WITH THE AID OF SOME UNCONVENTIONAL

EXTRACTION SCHEMES.

1979-0481 LANGHAM R, WILLIAM F L
OPTIMAL DESIGN METHODOLOGY FOR A WIND POWER SYSTEM.
MATH PROGRAM STUDY NO. 11: 135-149, OCTOBER 1979.

THE MAIN PROBLEM WITH THE UTILIZATION OF WIND POWER IS THAT IT IS MORE EXPENSIVE THAN CONVENTIONAL ENERGY PRODUCTION SYSTEMS. HOWEVER, DUE TO THE ESCALATING COST OF FOSSIL FUELS AND THE REDUCTION OF WIND ENERGY COSTS AS A RESULT OF OPTIMUM SYSTEM DESIGN AND MASS PRODUCTION, WIND POWER MAY BECOME A VIABLE ALTERNATIVE IN THE FUTURE. THE OBJECTIVE OF THIS PAPER IS TO PRESENT A DESIGN METHODOLOGY FOR DETERMINING THE OPTIMAL DESIGN PARAMETERS OF A WIND POWER SYSTEM.

1979-0482 LARSON D L, SANDS C D, DUTT G R
SOLAR AND WIND POWERED PUMPING WITH WATER HARVESTING.
ASAE PAPER 79-2574, 1979. 9 P.

THIS PAPER REPORTS ON THE DEVELOPMENT OF A SOLAR AND WIND POWERED SYSTEM TO PUMP WATER FROM WATER HARVESTING STORAGE RESERVOIRS TO AN IRRIGATION STORAGE TANK. IRRIGATION IS VIA GRAVITY ON DEMAND. THE WIND POWERED PUMP AND WATER DELIVERY SYSTEM PERFORM SATISFACTORILY, BUT THE EXPERIMENTAL SOLAR POWERED PUMPING UNIT HAS EXPERIENCED A SERIES OF MECHANICAL PROBLEMS.

1979-0483 LAUER H, MACHENS U
A 15 KW WIND POWER PLANT COUPLED TO THE SUPPLY NETWORK.
ELEKTROTECH. Z. 100(21): 1203-1205, OCTOBER 1979. (IN GERMAN)

THIS ARTICLE DESCRIBES A 15 KW WIND POWER PLANT CONSISTING OF A 3-ARMED, HIGH-SPEED, 15 M DIAMETER ROTOR WITH WEIGHT-BALANCED AEROFOILS COUPLED TO TWO 3-PHASE INDUCTION MOTORS. THE LARGER OF THESE (15 KW AT 1500 RPM) OPERATES AT HIGH WIND SPEEDS, WHILE THE SMALLER (5.5 KW AT 1000 RPM) COMES INTO ACTION IN LIGHT WINDS. THE ELECTRICAL CONTROL GEAR AND CAPACITATIVE EXCITATION ARE DESCRIBED, AS IS EXPERIENCE IN SERVICE OBTAINED SINCE 1978.

1979-0484 COROTIS R B
SIMULATION OF CORRELATED WIND SPEEDS FOR SITES AND ARRAYS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2257-2261.

THE HORIZONTAL WIND SPEED COMPONENTS AT A SITE ARE OFTEN MODELLED AS INDEPENDENT, IDENTICALLY DISTRIBUTED, ZERO-MEAN, GAUSSIAN RANDOM VARIABLES. THE EFFECTS OF UNEQUAL VARIANCES AND OF CORRELATED COMPONENTS ARE INVESTIGATED AND SEEN TO NOT SUBSTANTIALLY ALTER THE BASIC RAYLEIGH FORM OF THE SPEED DISTRIBUTION. TEMPORAL CORRELATION AND ARRAY CONSIDERATIONS ARE DISCUSSED BRIEFLY. DATA WITH VARIOUS AVERAGING TIMES AND SAMPLING RATES ARE USED TO COMPARE WIND CHARACTERISTICS WITH THOSE FOUND FROM NATIONAL WEATHER SERVICE DATA. SPECIFICALLY, SAMPLING RATE DOES NOT SIGNIFICANTLY AFFECT VARIANCES AND AUTOCORRELATIONS, WHILE THE LATTER IS VERY SENSITIVE TO AVERAGING TIME.

1979-0485 LEWIN L, BAER C A, PRYOR D V, PARKINSON B W, WINN C B
RAPAD: REAL-TIME ACCURATE PERFORMANCE ANALYSIS OF DATA.
ASME PAPER 79-WA/SOL-1, 1979. 7 P.

AN INNOVATIVE METHOD FOR THE REAL-TIME ESTIMATION OF GENERIC PERFORMANCE CHARACTERISTICS BASED ON RECURSIVE LEAST SQUARES FILTERING IS DEVELOPED. AFTER PRESENTING THE THEORETICAL BASIS FOR THE ALGORITHM, ITS USE ILLUSTRATED BY APPLYING IT BY COMPUTER SIMULATION TO A WIND ENERGY CONVERSION SYSTEM (WECS) WHOSE TRUE PERFORMANCE CHARACTERISTICS ARE ASSUMED KNOWN. IT IS SHOWN THAT GOOD AGREEMENT BETWEEN ESTIMATED AND TRUE PERFORMANCE IS OBTAINABLE WITH AS LITTLE AS 1000 DATA SAMPLINGS USING A REALISTIC LEVEL OF INSTRUMENTATION NOISE.

1979-0486 LIEBLEIN S
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS.
NTIS, 1979. 464 P.
CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, APRIL 24, 1979.
CONF-7904111, NASA-CP-2106

29 PAPERS WERE PRESENTED CONCERNING THE DEVELOPMENT STATUS OF LARGE WIND TURBINES, AND WIND TURBINE BLADE DESIGN CHARACTERISTICS AND OPERATING EXPERIENCE.

1979-0487 LINDLEY C A, MELTON W C
ELECTRIC UTILITY APPLICATION OF WIND ENERGY CONVERSION SYSTEMS ON THE ISLAND OF OAHU. VOL. 1.
NTIS, FEBRUARY 23, 1979. 48 P.
ATR-78(7598)-1

THE OBJECTIVE OF THIS STUDY WAS TO ASSESS THE POTENTIAL FOR THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (A FIELD OF INTERCONNECTED WTGS DENOTED IN THIS REPORT BY THE ACRONYM WECS) IN A SPECIFIC UTILITY CONTEXT TO GAIN ADVANCE INFORMATION CONCERNING THEIR ECONOMIC FEASIBILITY; THEIR OPTIONAL PROBLEMS; THE CRITERIA AND PROCEDURES FOR SITE SELECTION; ENVIRONMENTAL IMPACTS; LEGAL, SOCIAL, AND OTHER PROBLEMS; AND THE BALANCE OF COST AND BENEFITS FROM THE POINT OF VIEW OF THE CONSUMER AND THE UTILITY. THIS STUDY ADDRESSES THE CIRCUMSTANCES OF THE HAWAIIAN ELECTRIC COMPANY OPERATIONS ON THE ISLAND OF OAHU.

1979-0488 YORK W L
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES, 1978 SURVEY.
NTIS, MAY 1979. 195 P.
EPRI-ER-966-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS OF 600 PROJECTS BEING CONDUCTED BY 165 UTILITY COMPANIES ARE GIVEN. ALSO INCLUDED ARE A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATES, AND A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS.

1979-0489 LINDLEY C A
ELECTRIC UTILITY APPLICATION OF WECS IN AN ISLAND LOCATION.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA,

MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 171-187.
CONF-790352

THE RESULTS REPORTED WERE OBTAINED AS PART OF A DOE WIND OFFICE CONTRACT STUDY INTENDED TO ASSESS THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS (WECS) FOR APPLICATION ON OAHU. THE DOE RESULTS WERE INTENDED TO BE VERY GENERAL, AS A GUIDE TO DOE'S FUTURE DESIGN AND APPLICATION PLANNING FOR WECS. THE STUDY WAS SUPPORTED BY SUBCONTRACTS WITH THE UNIVERSITY OF HAWAII (UOH) AND THE HAWAIIAN ELECTRIC COMPANY (HECO), AND BY UNCONTRACTED ASSISTANCE FROM THE HAWAII DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT (DPED), ALL OF WHOM PROVIDED SIGNIFICANT INPUT DATA AND BACKGROUND.

1979-0490 LINSCOTT B S
BLADE DESIGN AND OPERATING EXPERIENCE ON THE MOD-0A 200 KW WIND TURBINE AT CLAYTON, NEW MEXICO.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 225-238.
NASA-CP-2106

A 200 KW WIND TURBINE CALLED MOD-0A IS LOCATED IN CLAYTON, NEW MEXICO. THE MOD-0A WIND TURBINE BLADE IS A 60 FOOT LONG ALUMINUM STRUCTURE, SIMILAR IN APPEARANCE TO AN AIRPLANE WING, THAT WEIGHS 2360 LBS. THE BLADES, SN-1004 AND SN-1005, ACCUMULATED OVER 3000 HOURS OF OPERATING TIME BETWEEN NOVEMBER 1977 AND APRIL 1979. SIGNS OF BLADE STRUCTURAL DAMAGE WERE FIRST OBSERVED AFTER 400 HOURS OF WIND TURBINE OPERATION. THE BLADES WERE REMOVED FROM THE WIND TURBINE FOR REPAIRS IN JUNE 1978. REPAIRS WERE COMPLETED AND THE BLADES WERE INSTALLED ON THE WIND TURBINE FOR RENEWED OPERATION IN SEPTEMBER 1978. DETAILS OF THE BLADE DESIGN, LOADS, COST, STRUCTURAL DAMAGE AND THE BLADE REPAIR ARE DISCUSSED.

1979-0491 LIPPERT J
WIND ROTOR AUTOMATIC AIR BRAKE.
U.S. PATENT NO. 4,180,372, DECEMBER 25, 1979. 8 P.

A SPRING-LOADED PIVOTING END PLATE IS DESCRIBED THAT IS HINGED SUCH THAT IT IS DEPLOYED BY CENTRIFUGAL FORCE INTO THE AIR-STREAM TO THEREBY ACT AS AN AERODYNAMIC BRAKE FOR WIND TURBINES IN OVERSPEED CONDITIONS. THE BRAKE HAS A STATIONARY PORTION FIXED ON THE TIP OF THE TURBINE ROTOR AND A PIVOTING PORTION HINGED FOR MOVEMENT WITH RESPECT TO THE FIXED PORTION. THE LONGITUDINAL CENTERLINE OF THE BRAKE COINCIDES WITH THE CHORD LINE OF THE TURBINE BLADE AND THE PIVOTING MOVEMENT IS ABOUT A HINGE AXIS THAT IS NORMAL TO THE ROTATIONAL PLANE OF THE TURBINE. THE PLANFORM OF THE BRAKE HAS A LOW ASPECT RATIO SHAPE WITH THE RATIO OF THE FORE AND AFT CHORDWISE LENGTH TO THE WIDTH BEING ONE OR GREATER. THE EDGES OF THE BRAKE IN THE NORMAL RUNNING CONDITION EXTEND BEYOND THE CONTOUR OF THE TURBINE BLADE TO SERVE AS AN END PLATE SUCH THAT THE AERODYNAMIC EFFICIENCY OF THE BLADE IS IMPROVED THEREBY. 13 CLAIMS.

1979-0492 LISSAMAN P B S
ENERGY EFFECTIVENESS OF ARBITRARY ARRAYS OF WIND TURBINES.
J. ENERGY 3(6): 323-328, NOVEMBER-DECEMBER 1979.

DETERMINATION OF POWER DEGRADATION DUE TO INTERFERENCE BETWEEN WIND TURBINES IN AN ARRAY IS OF IMPORTANCE IN THE ENGINEERING AND ECONOMIC PLANNING OF WIND FARMS. A COMPUTER MODEL FOR AN ARBITRARY ARRAY OF TURBINES IS DESCRIBED.

1979-0493 LISSAMAN P B S, HIBBS B, WALKER S N, ZAMBRANO T
DEFINITIVE GENERIC STUDY OF AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, APRIL 1979. 75 P.
SERI/TR-98003-1

A METHOD OF INCREASING THE POWER OUTPUT OF A WIND TURBINE IS TO ADD AN AUGMENTOR SYSTEM WHICH WILL ACT LIKE A CONVERGING DUCT TO INCREASE THE VELOCITY AT THE TURBINE DISK AND THUS INCREASE THE ENERGY FLUX THROUGH THE POWER EXTRACTION DEVICE. THE COST-EFFECTIVENESS OF SUCH SYSTEMS DEPENDS UPON THE TRADE-OFF BETWEEN THE ADDITIONAL ENERGY OUTPUT AND THE ADDED COST OF THE AUGMENTOR SYSTEM. THE REPORT STUDIES THE COST-EFFECTIVENESS OF THREE DIFFERENT TYPES OF AUGMENTORS.

1979-0494 LISSAMAN P B S, WILSON R E, THRESHER R W, WALKER S N
DEFINITIVE GENERIC STUDY FOR THE EFFECT OF HIGH LIFT AIRFOILS ON WIND TURBINE EFFECTIVENESS. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, MAY 1979. 93 P.
SERI/TR-98003-2

THE PURPOSE OF THIS PROJECT WAS TO STUDY THE EFFECT OF HIGH LIFT AIRFOILS ON THE COST-EFFECTIVENESS OF HAWT AND VAWT (HORIZONTAL AND VERTICAL AXIS WIND TURBINE) MACHINES. THE SCOPE INVOLVED FIRST STUDYING MODERN TWO-DIMENSIONAL AIRFOILS, AND DEVELOPING A GENERALIZED FORMULATION FOR THEIR PERFORMANCE IN TERMS OF LIFT, DRAG, AND THICKNESS AT APPROPRIATE REYNOLDS NUMBERS.

1979-0495 LISSAMAN P B S, WILSON R E, THRESHER R W, WALKER S N
DEFINITIVE GENERIC STUDY FOR THE EFFECT OF HIGH LIFT AIRFOILS ON WIND TURBINE COST EFFECTIVENESS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 301-314.
SERI/TP-245-184, CONF-790501

THE EFFECT OF HIGH LIFT DEVICES ON THE SYSTEM COST-EFFECTIVENESS OF WIND TURBINES WAS STUDIED FOR THE CASE OF BOTH HORIZONTAL AXIS AND VERTICAL AXIS MACHINES. A COMPREHENSIVE REVIEW OF THE VARIOUS TYPES OF HIGH LIFT AIRFOIL SECTIONS WAS PERFORMED WITH RESPECT TO GENERALIZED AERODYNAMIC PERFORMANCE AND STRUCTURAL CONSIDERATIONS. AIRFOILS HAVING PROMISE INCLUDED HIGH LIFT INCIPIENT SEPARATION SECTIONS, SYMMETRICAL HIGH LIFT AIRFOILS, AND EXTRA THICK DESIGNS.

1979-0496 LISSAMAN P B S, HIBBS B, WALKER S N, ZAMBRANO T G
A DEFINITIVE GENERIC STUDY OF AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 201-216.
SERI/TP-245-184, CONF-790501

AUGMENTOR SYSTEMS ARE INTENDED TO INCREASE THE ENERGY FLUX THROUGH A CONVENTIONAL WIND POWER EXTRACTION MACHINE ABOVE THAT ASSOCIATED WITH THE FREE-FLOW CONDITION. THE ULTIMATE COST-EFFECTIVENESS OF SUCH AUGMENTED SYSTEMS DEPENDS UPON THE TRADE-OFF BETWEEN ANY RESULTING INCREASE IN ENERGY OUTPUT AND THE ADDED COSTS ASSOCIATED WITH THE INSTALLATION OF THE AUGMENTORS THEMSELVES. TWO BASIC DESIGN CONSIDERATIONS ARE COMMON TO THE INSTALLATION AND OPERATION OF ALL AUGMENTORS. THESE ARE THE INCREASED FLOW SPEED (MASS FLUX) THROUGH THE POWER EXTRACTION DEVICE, AND THE AERODYNAMIC FORCE ON THE AUGMENTOR. TWO FUNDAMENTAL TYPES OF AUGMENTORS WERE CONSIDERED:

DYNAMIC, AND PASSIVE.

1979-0497 LITTLER J G F
THE AUTARKIC HOUSE (SOLAR ENERGY UTILISATION).
ELECTRON. POWER 25(7): 489-493. JULY 1979.

BY SYSTEMATICALLY INTRODUCING THE PRINCIPLES OF ENERGY CONSERVATION AND RECOVERY, AND THE USE OF SOLAR AND WIND POWER, ENERGY INDEPENDENT HOUSES CAN BE BUILT, EVEN IN CLOUDY BRITAIN. IN FACT, A CAMBRIDGE TEAM HAVE DESIGNED A HOUSE THAT WOULD BE COMPLETELY INDEPENDENT OF ALL MAIN SERVICES.

1979-0498 LOIS L
WIND ENERGY CONVERSION IN THE MW RANGE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 672-673.

THIS PAPER SUGGESTS THAT CERTAIN WIND PATTERNS ABOVE THE CONTINENTAL U.S. ARE PARTICULARLY SUITED FOR ELECTRIC POWER GENERATION USING WIND POWER PLANTS IN THE MW(E) RANGE. THE AUTHOR DESCRIBES A SYSTEM SPECIFICALLY DESIGNED FOR SUCH A PLANT AND PRESENTS CALCULATIONS TO SHOW THAT SUCH A SYSTEM IS WITHIN THE RANGE OF EXISTING TECHNOLOGY.

1979-0499 LOTH J L
TILTING WING OVERSPEED CONTROL FOR VERTICAL AXIS WIND TURBINES.
J. ENERGY 3(6): 375-377, NOVEMBER-DECEMBER 1979.

A SPEED CONTROL TECHNIQUE IS DESCRIBED FOR STRAIGHT BLADES WHICH ARE HINGED TO TILT IN THE PLANE PERPENDICULAR TO THE RADIAL ARM.

1979-0500 LOTKER M, SHAW R W, ADOLFSON W F, BERNARDI R P
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 99-141.
RFP-3014(VOL.2)

THE PURPOSE OF THIS ASSESSMENT OF ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION IS TO: PROVIDE THE ANALYST WITH A SET OF TOOLS BY WHICH HE CAN ASSESS THE QUANTITATIVE IMPACT OF A WIDE VARIETY OF ECONOMIC INCENTIVES ON WECS USER ECONOMICS AND ON THE GOVERNMENT; AND UTILIZE THE TECHNIQUES DEVELOPED IN ORDER TO ANALYZE VARIOUS INCENTIVES AND PROVIDE RECOMMENDATIONS TO THE DEPARTMENT OF ENERGY (DOE) CONCERNING THE EFFECTIVENESS OF OPTIONS.

1979-0501 LOWE J E
THE MOD-2 WIND TURBINE.
AM. NUCL. SOC. TRANS. 33: 21-22, 1979.

THE MOD-2 IS A 300-FT-DIAM, 2.5 MW WIND TURBINE SYSTEM. THE OBJECTIVE OF THE PROGRAM IS TO DESIGN, FABRICATE, INSTALL, CHECK OUT, AND DELIVER A MEGAWATT-SIZE WIND TURBINE WHICH WILL BE ECONOMICALLY COMPETITIVE WITH CONVENTIONAL POWER GENERATING EQUIPMENT OPERATING IN UTILITY NETWORKS. SINCE THE START OF THE PROGRAM THE CONCEPTUAL, PRELIMINARY, AND DETAIL DESIGN PHASES HAVE BEEN COMPLETED AND FABRICATION HAS STARTED. INITIAL ROTATION WILL TAKE PLACE IN MID-1980.

1979-0502 LOWE J E, ENGLE W W
MOD-2 WIND TURBINE--STATUS AND OUTLOOK.
ENERGY TECHNOLOGY CONFERENCE, 6TH, WASHINGTON, D.C., FEBRUARY 26-28, 1979. ENERGY TECHNOLOGY VI: ACHIEVEMENTS IN PERSPECTIVE. WASHINGTON, D.C., GOVERNMENT INSTITUTES, 1979. P. 982-991.

A DESCRIPTION IS GIVEN OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION.

1979-0503 LOWE J E, ENGLE W W
MOD-2 WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 318-331.
CONF-790352

A DESCRIPTION IS PRESENTED OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION IS DISCUSSED.

1979-0504 LUDWIG D
DYNAMICS OF WIND TURBINE ROTOR BLADES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 139-159.
JUEL-SPEZ-28

BASED ON THE EIGENANALYSIS OF WIND TURBINE ROTOR BLADES STABILITY AND RESPONSE CHARACTERISTICS CAN BE DETERMINED. THE STRUCTURE IS MODELED BY FINITE BEAM ELEMENTS, WHICH ARE SPECIALLY DEVELOPED FOR ROTATING BLADES. THE P-K METHOD WAS USED TO DETERMINE THE FLUTTER STABILITY. FINALLY, THE PROBLEM OF DISCRETE GUST LOADING IS CONSIDERED.

1979-0505 LUMSDAINE E, TAG I
500 GALLONS PER DAY HYBRID DESALINATION PLANT USING WIND/SOLAR ENERGY.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1512-1516.

AN ANALYSIS OF A MODULAR WIND/SOLAR DISTILLATION PLANT IS PRESENTED. THE DESIGN IS BASED ON A CONSTANT YEAR-ROUND DEMAND OF 500 GALLONS PER DAY. IN ARID AREAS WHERE WIND POWER IS AVAILABLE, COST ANALYSIS SHOWS THAT THE HYBRID SYSTEM IS ECONOMICALLY FEASIBLE COMPARED WITH ELECTRICITY WHICH COULD ONLY BE GENERATED FROM A CONVENTIONAL SOURCE SUCH AS A DIESEL ENGINE.

1979-0506 LUNDSAGER P, ASKEGAARD V, BJERREGAARD E
MEASUREMENTS OF PERFORMANCE AND STRUCTURAL RESPONSE OF THE DANISH 200 KW GEDSER WINDMILL.

IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 51-94.
JUEL-SPEZ-28

STATIC AND DYNAMIC MEASUREMENTS BEING PERFORMED ON THE 20 YEAR OLD DANISH GEDSER WINDMILL AS A PART OF THE DANISH GOVERNMENT AND UTILITY SPONSORED WIND POWER PROGRAM ARE DESCRIBED. THE DESIGN OF THE MILL, WHICH IN SEVERAL POINTS DIFFERS ESSENTIALLY FROM MOST MODERN DESIGNS, IS STILL OF INTEREST SINCE THE MILL HAS BEEN IN OPERATION DURING A 10 YEAR PERIOD WITHOUT MAJOR MECHANICAL TROUBLES. THE MAIN OBJECTIVES OF THE MEASUREMENTS ARE THE DETERMINATION OF THE POWER CURVE, THE STRUCTURAL RESPONSE ESPECIALLY OF THE ROTOR AND THE POWER QUALITY, BUT THE INSTRUMENTATION LAY-OUT ALSO AIMS AT OBTAINING RESULTS WHICH SHOULD BE USEFUL IN THE VERIFICATION OF MODELS FOR WINDMILL ANALYSIS.

1979-0507 LUNDSAGER P, CHRISTENSEN C J
INVESTIGATIONS OF STRUCTURAL DYNAMICS ON THE GEDSER WTG AND ON NEW DANISH WIND TURBINES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 1-49.
JUEL-SPEZ-28

A SURVEY IS GIVEN ON ACTIVITIES OF RISOE NATIONAL LABORATORY RELATED TO STRUCTURAL DYNAMICS OF LARGE WTG'S. SINCE ONLY A FEW OF THE ACTIVITIES HAVE YET BEEN COMPLETED, THE PRESENTATION IS A REVIEW OF STATUS, PRELIMINARY CONCLUSIONS AND EXPERIENCE. THE TOPICS DEALT WITH IN THE PRESENTATION ARE: ANALYSIS OF PROTOTYPE WTG ROTORS; ANALYSIS OF THE GEDSER WTG ROTOR; AND MEASUREMENTS ON THE GEDSER WTG. INVESTIGATIONS BEING MADE OF THE POWER TRAIN OSCILLATIONS IN THE GEDSER WTG ARE DEALT WITH IN SOME DETAIL.

1979-0508 LUNDSAGER P
MEASUREMENT SYSTEM USED AT THE GEDSER WINDMILL. PURPOSE, PERFORMANCE AND EXPERIENCE.
RISO NATL. LAB. REP. RISO-M-2197, DECEMBER 1979. 38 P.
RISO-M-2197

THE PAPER SUMMARIZES THE EXPERIENCE GATHERED WITH THE MEASUREMENT SYSTEM USED IN A SERIES OF MEASUREMENTS MADE ON THE GEDSER WINDMILL DURING THE PERIOD OCT. 1977-APR. 1979. THE LAYOUT OF THE SYSTEM AND THE MEASUREMENT PROCEDURES USED ARE DESCRIBED, AND THE PERFORMANCE OF THE SYSTEM IS EVALUATED.

1979-0509 LYNETTE R, POORE R
MOD-2 FAILURE MODE AND EFFECTS ANALYSIS.
NTIS, JULY 1979. 300 P.
DOE/NASA/0002-79/1, NASA-CR-159632, N79-30415

THE REPORT CONTAINS THE RESULTS OF A FAILURE MODE AND EFFECTS ANALYSIS OF THE MOD-2 WIND TURBINE. THIS WORK WAS PERFORMED BY THE BOEING ENGINEERING AND CONSTRUCTION COMPANY, A DIVISION OF THE BOEING COMPANY, AS A PART OF CONTRACT DEN 3-2 TO DESIGN AND BUILD THREE 300 FOOT DIAMETER, 2500 KWE, WIND TURBINES.

1979-0510 MASEC SETS UTILITY SWECS STUDIES.
WIND ENERGY REP.: 12, OCTOBER 1979.

1979-0511 MW-SCALE TURBINE FOR MEDICINE BOW.
WIND POWER DIG. NO. 17: 16-17, FALL 1979.

1979-0512 MCCONNELL R D
GIROMILL OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 319-334.
SERI/TP-245-184, CONF-790501

THE GIROMILL IS A VERTICAL AXIS WIND TURBINE HAVING STRAIGHT AIRFOILS WHOSE ANGLES OF ATTACK ARE CONTROLLED SO AS TO MAXIMIZE WIND ENERGY CONVERSION. EACH AIRFOIL IS ROCKED DURING A REVOLUTION IN ORDER TO MAINTAIN A CONSTANT POSITIVE ANGLE OF ATTACK OVER ONE HALF REVOLUTION AND A CONSTANT NEGATIVE VALUE OVER THE OTHER HALF REVOLUTION. THIS PAPER PRESENTS AN EVALUATION OF THE GIROMILL CONCEPT IN TERMS OF SOME WIND ENERGY RULES-OF-THUMB.

1979-0513 MCEVILY A J
FRETTING AND FATIGUE IN WIND ENERGY SYSTEMS.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP. DENVER, COLORADO, DECEMBER 18, 1979. NTIS, OCTOBER 1979. VOL. 2, PT. 2, P. 587-597.
SERI/TP-31-248(VOL.2)(PT.2)

THE SUCCESSFUL DESIGN OF A WIND ENERGY SYSTEM MUST TAKE INTO ACCOUNT THE FRETTING AND FATIGUE RESISTANCE OF THE MATERIALS UTILIZED. IN ORDER TO ILLUSTRATE THE NATURE OF THE DESIGN PROCEDURE AND THE TYPES OF MATERIALS INVOLVED, A PARTICULAR EXAMPLE WILL BE USED, NAMELY THE 150 FT WIND TURBINE BLADES DESIGNED AND FABRICATED BY THE KAMAN AEROSPACE CORPORATION FOR THE NASA LEWIS RESEARCH CENTER.

1979-0514 MCEWEN L B, SWAIN J W
INDUSTRIAL COMPRESSED AIR APPLICATIONS FOR SOLAR ENERGY CONVERSION/STORAGE DEVICES.
MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 303-308.
CONF-790854

THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE FEASIBILITY OF UTILIZING SOLAR ENERGY DEVICES AND COMPRESSED AIR ENERGY STORAGE TO SUPPLY POWER FOR INDUSTRIAL COMPRESSED AIR SYSTEMS. THE FULFILLMENT OF THIS EFFORT ENTAILED THE INDUSTRIAL COMPRESSED AIR CAPACITY, THE AMOUNT OF PLANT AIR NORMALLY USED, AND THE ENERGY REQUIRED TO PRODUCE THIS AIR. THE RESULTS PROVIDED A PERSPECTIVE FOR THE POTENTIAL ENERGY SAVINGS THAT MIGHT ACCRUE FROM SUBSEQUENT WORK.

1979-0515 MCGOWAN J G, MANWELL J F
ECONOMIC POTENTIAL OF RESIDENTIAL HEATING APPLICATIONS FOR WIND HEATING SYSTEMS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 159-174.
RFP-3014(VOL.2)

THE INITIAL RESULTS ARE PRESENTED OF AN ECONOMICS BASED STUDY TO DETERMINE THE FEASIBILITY OF USING WIND POWER FOR RESIDENTIAL HEATING APPLICATIONS FOR VARIOUS LOCATIONS AND WIND REGIMES IN THE UNITED STATES. THE WORK IS BASED ON ONGOING ANALYTICAL AND EXPERIMENTAL WORK CARRIED OUT AT THE UNIVERSITY OF MASSACHUSETTS/AMHERST. IN ADDITION TO SPECIALIZED CAPITAL COSTS AND LIFE CYCLE ECONOMICS REQUIRED FOR WIND HEATING SYSTEMS, A KEY INPUT TO THE ANALYSIS IS THE DETERMINATION OF THE FRACTION OF ENERGY THAT CAN BE SUPPLIED FROM THE WIND TURBINE COMPONENT. THE RESULTS PRESENTED IN THIS WORK ARE BASED ON THE USE OF DETAILED AND SIMPLIFIED WIND HEATING SIMULATION MODELS THAT ALLOW THE CALCULATION OF THE PERCENTAGE OF HEATING ENERGY SUPPLIED FROM THE WIND WITH A MINIMUM OF DESIGN SITE VARIABLES.

1979-0516 MCLENDON B D, ALLISON J M, RICE C E
TOTAL ENERGY MANAGEMENT SYSTEM.
ASAE PAPER 79-3001. 1979. 15 P.

A CONCEPTUAL MODEL OF AN ENERGY MANAGEMENT SYSTEM THAT PRIMARILY UTILIZES RENEWABLE ENERGY RESOURCES IS EVALUATED FOR A POULTRY PRODUCTION SYSTEM. IT IS SHOWN THAT A THERMAL STORAGE SYSTEM USING SOLAR ENERGY, WIND ENERGY, OFF-PEAK ELECTRICAL ENERGY AND DIRECT BIOMASS COMBUSTION CAN PROVIDE AN ECONOMICAL ALTERNATIVE TO LIQUIFIED PETROLEUM GAS.

1979-0517 MCPHILLIPS M, ANDERSON B
THE SOLAR AGE RESOURCE BOOK.
NEW YORK, EVEREST HOUSE, 1979. 242 P.

A SERIES OF ARTICLES ON A VARIETY OF ASPECTS OF SOLAR ENERGY UTILIZATION ACCOMPANIES BUYERS GUIDES TO WOOD STOVES, WIND PRODUCTS AND SOLAR ENERGY PRODUCTS. THE ARTICLES DISCUSS MICROCLIMATE, VARIOUS SOLAR HEATING DESIGNS, AND STORAGE DESIGNS, SOLAR ENERGY EDUCATION, REQUIRED CALCULATIONS, GLAZING MATERIALS, SOLAR WATER HEATING, AND PHOTOVOLTAICS. THE BUYER'S GUIDE SECTION INCLUDES PURCHASING INFORMATION ON ALL THE COMPONENTS OF SOLAR ENERGY SYSTEMS, WIND POWER, AND WOOD STOVES.

1979-0518 MA F S
DISTRIBUTION PLANNING PERSPECTIVE ON THE INTERCONNECTION OF SMALL WIND SYSTEMS WITH AN ELECTRIC UTILITY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 34-44.
RFP-3014(VOL.2)

SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) INTERCONNECTED WITH A UTILITY GRID MAY SIGNIFICANTLY AFFECT THE NEED FOR TRANSMISSION AND DISTRIBUTION SYSTEMS INVESTMENT. THE STUDY OF THE INTERCONNECTION IMPACT ON UTILITY SYSTEMS IS NOT ONLY IMPORTANT TO THE UTILITY PLANNERS AND OPERATORS BUT ALSO CRUCIAL TO THE DEVELOPMENT OF EQUITABLE RATE STRUCTURES FOR SWECS USERS WHO MAY REQUIRE UTILITY BACKUP POWER. THE INTEGRATION PROBLEMS AND ISSUES FROM A DISTRIBUTION PLANNING PERSPECTIVE ARE DESCRIBED. A METHODOLOGY WAS DEVELOPED AND APPLIED ON DISTRIBUTION SYSTEMS IN AN EARLIER STUDY TO EVALUATE THE IMPACT OF DISPERSED STORAGE AND GENERATION (DSG) ON DISTRIBUTION SYSTEM PLANNING AND OPERATIONS.

1979-0519 MACHENS U
MEASUREMENTS ON A 15-KW WIND POWER INSTALLATION.
BRENNST.-WAERME-KRAFT 31(11): 437-440, NOVEMBER 1979. (IN GERMAN)

THE BW 150 INSTALLATION WHICH IS COUNTED IN THE SMALL WIND POWER INSTALLATIONS RANGE PRODUCES THE ELECTRICAL ENERGY WITH ASYNCHRONOUS GENERATORS AND SUPPLIES IT INTO THE GRID, WHEN WIND CONDITIONS ARE SUFFICIENT. THE FAST ROTOR WITH THREE WINGS ON HORIZONTAL AXIS AND 15 M WING CIRCLE DIAMETER HAS BEEN INVESTIGATED IN AN EXTENSIVE MEASUREMENT PROGRAM. THE ARTICLE DESCRIBES THE WIND POWER INSTALLATION, THE METER EQUIPMENT AND FIRST MEASURING RESULTS AFTER 300 HOURS OPERATION.

1979-0520 MACKLIS S L, OPLINGER J L
ASSESSMENT OF WIND ENERGY SYSTEMS IN A UTILITY FRAMEWORK.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 319-324.

THIS PAPER EXAMINES THE TECHNICAL AND ECONOMIC ASPECTS OF THE APPLICATION OF WIND ENERGY SYSTEMS IN A UTILITY GRID. EMPHASIS IS PLACED ON WIND CHARACTERISATION FOR SPECIFIC SITES, CHARACTERISATION OF OPTIMIZED WIND TURBINES FOR SPECIFIC SITES, THE INTERFACE WITH THE UTILITY IN TERMS OF MATCHING LOAD AND WIND AVAILABLE ENERGY PROFILES, AND THE TECHNICAL AND ECONOMIC ANALYSIS OF THE UTILITY SYSTEM INCORPORATING VARIOUS PERCENTAGES OF WIND ENERGY. RESULTS ARE SHOWN IN TERMS OF FUEL SAVINGS AND ECONOMIC BENEFIT FOR THE DIFFERENT UTILITIES AND WIND REGIMES.

1979-0521 MAHRT L, HEALD R C
ANALYSIS OF STRONG NOCTURNAL SHEARS FOR WIND MACHINE DESIGN. PROGRESS REPORT.
NTIS, DECEMBER 1979. 64 P.
DOE/ET/23116-79-1

ANALYSIS OF DATA AT WANGARA AND SEVERAL SITES OVER THE PLAINS REGIONS OF THE U.S. INDICATES THAT WIND SPEEDS AND SHEARS IN THE NOCTURNAL BOUNDARY LAYER ARE CONSIDERABLY GREATER THAN EARLIER ESTIMATES FROM SURFACE OBSERVATIONS AND FROM USE OF THE CONVENTIONAL POWER LAW. A NEW FORMAT FOR REPRESENTATION OF STATISTICS OF THE VERTICAL STRUCTURE OF WINDS IS DEVELOPED AND FOUND TO SUCCESSFULLY DESCRIBE MEAN PROFILES FOR THE VARIOUS STABILITY CLASSES. DATA IS ALSO ANALYZED TO DETERMINE THE PHYSICAL CAUSES OF THE STRONG NOCTURNAL ACCELERATIONS AND ATTENDANT LOW-LEVEL JET.

1979-0522 MANSOUR W M, HIRATE M H
DESIGN AND PERFORMANCE OF BICYCLE WIND TURBINE ROTORS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 308-311.

A NEW ARRANGEMENT OF THE SPOKES IS PRESENTED AND COMPARED WITH THE CURRENTLY AVAILABLE BICYCLE ROTORS. THE NEW ARRANGEMENT ALLEVIATES THE PROBLEMS EXISTING IN THE PRESENT DESIGN. A STRESS AND AERODYNAMIC ASSESSMENT IS FULLY DEVELOPED FOR THE NEW CONFIGURATION. THE BICYCLE ROTOR IS TO OPERATE ON A VERTICAL-AXIS MACHINE. THE WIND-DEFLECTOR IS DESIGNED AND TESTED IN THE WIND TUNNEL. SAMPLE RESULTS ARE PRESENTED WITH AN OVERALL ASSESSMENT OF THE PERFORMANCE. QUALITATIVE TUFT-TESTS SHOWS THE EXISTENCE OF A BACK FLOW WHICH ENHANCES THE PERFORMANCE.

1979-0523 MANSURE A J
FEASIBILITY STUDY OF A SMALL PUMPED AQUIFER STORAGE SYSTEM FOR SOLAR AND WIND ENERGY.

MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 295-302.
CONF-790854

THE TECHNICAL AND ECONOMIC FEASIBILITY OF STORING SURPLUS SOLAR AND WIND ENERGY IN RURAL LOCATIONS IS BEING INVESTIGATED FOR A SMALL HYDRO-MECHANICAL SYSTEM THAT PUMPS WATER FROM A SUBSURFACE AQUIFER TO A SURFACE RESERVOIR AND THEN RECOVERS THE ENERGY BY ALLOWING THE WATER TO RETURN TO THE AQUIFER. AN ANALYSIS OF RURAL USER ENERGY DEMANDS, INSTITUTIONAL AND LEGAL ISSUES, AND AQUIFER CHARACTERIZATION HAS BEEN COMPLETED.

1979-0524 MANWELL J F, MCGOWAN J G
DESIGN PROCEDURE FOR WIND POWERED HEATING SYSTEMS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2296-2300.

THIS PAPER PRESENTS A GENERALIZED DESIGN PROCEDURE FOR THE MONTH-BY-MONTH PREDICTION OF PERFORMANCE OF WIND POWERED RESIDENTIAL HEATING SYSTEMS. IN ITS INITIAL FORM, THE TECHNIQUE IS RESTRICTED TO THE SIMULATION OF RESIDENTIAL HEATING SYSTEMS USING CONVENTIONAL HORIZONTAL AXIS WIND TURBINES THAT DISSIPATE THEIR OUTPUT INTO WATER BASED THERMAL STORAGE SYSTEMS (VIA ELECTRICAL RESISTANCE HEATERS OR FLUID DISSIPATION DEVICES).

1979-0525 MARKS A M
WIND/ELECTRIC POWER TRANSDUCTION USING CHARGED AEROSOLS UNDER VARIOUS ATMOSPHERIC CONDITIONS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 103-118.
SERI/TP-245-184, CONF-790501

EXPERIMENTAL DATA IS PRESENTED ON TWO METHODS OF PRODUCING A CHARGED AEROSOL UNDER ATMOSPHERIC CONDITIONS. A FIRST CHARGING METHOD UTILIZED A WATER JET IN AN ELECTRIC FIELD, ISSUING FROM A SMALL ORIFICE AND IMPACTED BY AN AIR JET ISSUING FROM ANOTHER SMALL ORIFICE. A SECOND PREFERRED CHARGING METHOD UTILIZED A WATER JET ONLY IN AN ELECTRIC FIELD. A CHARGED AEROSOL WAS PRODUCED IN A WIND TUNNEL USING THE FIRST METHOD AND MEASUREMENTS WERE TAKEN. THE ELECTRIC EFFICIENCY WAS 75 TO 97% WITH ATMOSPHERIC RELATIVE HUMIDITIES OF 25 TO 95% AND AIR TEMPERATURES OF 20 TO 40 DEGREES C, AT WIND SPEEDS OF 2.5 TO 15 M/S. THESE RESULTS DEMONSTRATE THE FEASIBILITY OF THE TRANSDUCTION OF WIND POWER TO ELECTRIC POWER USING A CHARGED AEROSOL.

1979-0526 MARLATT W E, TIERNEY P, MEILKE P, BAER M, CHILDS J
ASSESSMENT OF THE APPLICABILITY OF THE NATIONAL FIRE WEATHER DATA LIBRARY TO WIND ENERGY ANALYSES. FINAL REPORT.
NTIS, MAY 1979. 115 P.
PNL-2538

THE SPECIFIC SCOPE OF WORK FOR THIS EFFORT FOLLOWED THIS SEQUENCE: REVIEW OF THE FIRE WEATHER LIBRARY FOR STATIONS WITH USABLE RECORDS; DEVELOPMENT OF STATISTICAL SUMMARIES FOR SELECTED INDIVIDUAL STATIONS; SCREEN SUMMARIES FOR COMMON WINDY AREAS; DEVELOP STATISTICAL COMPARISONS OF FIRE WEATHER OBSERVATIONS PER DAY; DEVELOP FREQUENCY SPECTRA OF WIND PERIODS ABOVE THRESHOLD VALUES; AND ESTIMATE SEASONAL AND GEOGRAPHIC DISTRIBUTIONS OF WIND ENERGY. FOLLOWING DISCUSSIONS WITH THE PNL, EFFORTS FOR OBJECTIVE FOUR, THE COMPARISON OF ONE OBSERVATION PER DAY TO MULTIPLE OBSERVATIONS FOR THE SAME STATION, WERE DEFERRED UNTIL THE RESULTS FROM A SIMILAR STUDY AT NORTHWESTERN UNIVERSITY WERE AVAILABLE.

1979-0527 MARRS R W, GAYLORD D R
GUIDE TO THE INTERPRETATION OF WINDFLOW CHARACTERISTICS FROM EOLIAN LANDFORMS.
NTIS, APRIL 1979. 48 P.
RLO-2343-79/2

THIS GUIDE TO INTERPRETING EOLIAN LANDFORMS SUMMARIZES TECHNIQUES USED IN INTERPRETING WIND PATTERNS FROM EOLIAN FEATURES WHICH CAN BE REMOTELY IDENTIFIED AND MAPPED. THEY INCLUDE: INTERPRETATION OF WIND DIRECTION, WIND ENERGY, AND WIND VELOCITY FROM SAND DUNES AND DUNE FIELDS; INTERPRETATION OF WIND DIRECTION AND WIND VELOCITY FROM PLAYAS; AND INTERPRETATION OF WIND DIRECTION AND RELATIVE WIND VELOCITY FROM SCOUR STREAKS, DUST AND SMOKE PLUMES, VEGETATION STREAKS, AND SNOWDRIFTS.

1979-0528 MARSH W D, OPLINGER J L, DEMEO E A
A VALUE ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
AM. POWER CONF. PROC. 41: 507-514, 1979.

THIS PAPER IS BASED ON AN ELECTRIC POWER RESEARCH INSTITUTE RESEARCH PROJECT (RP740-1), BEGUN IN JULY OF 1976. THE INTENT OF THE STUDY WAS TO CONSIDER WIND POWER FROM THE PERSPECTIVE OF THE ELECTRIC UTILITY INDUSTRY, AND TO INVESTIGATE ITS POTENTIAL FOR BECOMING ULTIMATELY A VIABLE ADJUNCT TO CONVENTIONAL ELECTRIC POWER SOURCES. ONLY UTILITY OWNERSHIP AND CONTROL OF FACILITIES WAS ANALYZED. THE STUDY WAS CONDUCTED IN TWO PHASES: FIRST, A CONSIDERATION OF MANY WIND TURBINE-GENERATOR (WTG) TYPES LEADING TO FIVE CANDIDATE MACHINES STUDIED IN DETAIL IN ONE UTILITY SITE; SECOND, THE EXTENSION OF THE STUDY TO TWO ADDITIONAL UTILITIES AND THREE SITES USING TWO OF THE FIVE CANDIDATE WTGS AS REFERENCE DESIGN. THE SPECIFIC STUDY OBJECTIVES ARE DETAILED.

1979-0529 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS. VOL. 1: SUMMARY REPORT; VOL. 2: FINAL REPORT; VOL. 3: APPENDIXES.
SCHENECTADY, N.Y., GENERAL ELECTRIC (FOR ELECTRICAL POWER RESEARCH INSTITUTE), JANUARY 1979. ALSO: VOL.2, NTIS, JANUARY 1979. 339 P. VOL.3, NTIS, JANUARY 1979. 95 P.
EPRI-ER-978(V.1-3)

CONVENTIONAL UTILITY LOSS-OF-LOAD PROBABILITY AND PRODUCTION SIMULATION METHODS WERE USED, TOGETHER WITH A WIND TURBINE GENERATOR (WTG) PERFORMANCE MODEL DEVELOPED FOR THE STUDY. EVALUATIONS WERE BASED ON COMPARISON OF TOTAL UTILITY GENERATION SYSTEM COSTS WITH AND WITHOUT WIND PLANTS, AND WERE EXPRESSED IN TERMS OF WIND POWER PLANT VALUE AND COSTS. ENERGY VALUE IS PREDOMINANT. IN SOME FAVORABLE CONDITIONS OF WIND REGIME, UTILITY CHARACTERISTICS, AND ECONOMIC FRAMEWORK, IT IS ALONE SUFFICIENT TO OVERCOME ESTIMATED COST. THE VALUE OF WIND POWER PLANTS IS WIDELY VARIABLE. IT DEPENDS UPON WIND REGIME, WTG DESIGN, UTILITY SYSTEM CHARACTERISTICS, AND ECONOMIC FACTORS. THE EXISTENCE OF SYSTEM ENERGY STORAGE HAS LITTLE EFFECT ON WIND POWER PLANT VALUE. OF THE GENERIC MACHINE DESIGNS IN STUDY, THE LARGE (1500-2000 KW), HORIZONTAL AXIS, CONSTANT SPEED WTG IN A CENTRAL STATION CONFIGURATION APPEARED TO HAVE THE MOST POTENTIAL FOR VIABILITY IN ELECTRIC UTILITY SYSTEMS.

1979-0530 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 110-124.

CONF-790352

A BRIEF REPORT IS PRESENTED FOR THE PROCEDURES AND RESULTS OF A STUDY PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE UNDER CONTRACT RP740-1. THE MAJOR OBJECTIVE WAS TO DEVELOP A METHODOLOGY FOR STUDYING THE PERFORMANCE AND ECONOMIC REQUIREMENTS OF WIND PLANTS WHEN APPLIED TO ELECTRIC UTILITY POWER SYSTEMS. THE METHODOLOGY WAS THEN EXERCISED IN SEVERAL ACTUAL UTILITY SYSTEMS TO CONFIRM AND DEMONSTRATE ITS CAPABILITY. THIS STUDY HAS DEMONSTRATED THAT ESTABLISHED UTILITY GENERATION PLANNING METHODS CAN SUCCESSFULLY BE ADAPTED TO THE STUDY OF WIND POWER PLANTS. THE PROPER CRITERION FOR COMPARISON OF GENERATING UNITS IS TOTAL UTILITY SYSTEM COSTS, RECOGNIZING UNIT OPERATING FLEXIBILITY.

1979-0531 MARTIN P, BALMA M, CROOKS G
A FEASIBILITY STUDY OF WINDPOWER FOR THE NEW ENGLAND AREA.
NTIS, OCTOBER 1979. 244 P.
AD-A076614

SRI INTERNATIONAL EXAMINED THE APPLICABILITY OF LARGE-SCALE WINDPOWER ELECTRICITY GENERATING SYSTEMS (WEGS) AS AN ALTERNATIVE SOURCE OF ENERGY FOR THE NEW ENGLAND STATES IN GENERAL AND FOR THE U.S. NAVY PORTSMOUTH SHIPYARD AT KITTERY, MAINE, IN PARTICULAR. THE BOEING MOD 2 WIND MACHINE WAS SELECTED AS REPRESENTATIVE OF CURRENT TECHNOLOGY IN THE APPROPRIATE SIZE RANGE OF 2.5 MEGAWATTS (MW) RATED CAPACITY. PARAMETRIC ECONOMIC ANALYSES LED TO THE CONCLUSION THAT WEGS ELECTRICITY CAN BE AT ECONOMIC PARITY WITH THE INCREMENTAL ELECTRICITY FROM CONVENTIONAL GENERATORS USING OIL OR GAS WITHOUT ANY ALLOWANCE FOR A CAPACITY CREDIT, PROVIDED THAT THE ANNUAL UTILIZATION FACTOR FOR THE WEGS IS AT LEAST 50%. SUCH UTILIZATION APPEARS TO BE ACHIEVABLE AT ELEVATIONS BETWEEN 620 AND 1,240 M (2,000 AND 3,000 FT). ABOUT ONE-EIGHTH OF THE 35,500 SQ KILOMETERS OF AIR SPACE REVIEWED IN NEW HAMPSHIRE IS AT SUCH ELEVATIONS. NONUTILITY FINANCING AND CAPITALIZATION CAN HALVE THE COSTS OF WEGS ELECTRICITY. NONUTILITY OWNERSHIP OF WEGS IS ENCOURAGED BY RECENT STATE AND FEDERAL LEGISLATION. THE PRIMARY POTENTIAL WEGS ENVIRONMENTAL IMPACT, INTERFERENCE WITH TELEVISION RECEPTION, CAN BE MITIGATED BY INSTALLATION OF CABLE TV SERVICES.

1979-0532 MARWITZ J D, GILKEY K B
CATALOG OF AVAILABLE WIND DATA IN IDAHO, MONTANA AND WYOMING.
NTIS, FEBRUARY 1979. 42 P.
RLO-2343-79/1

A CATALOG OF AVAILABLE WIND DATA HAS BEEN ASSEMBLED FOR THE STATES OF IDAHO, MONTANA AND WYOMING. HOWEVER, THIS DATA SUMMARY DOES NOT INCLUDE THOSE DATA WHICH ARE IN THE NATIONAL CLIMATIC CENTER ARCHIVES NOR DOES IT INCLUDE THOSE WIND DATA COLLECTED BY THE U.S. FOREST SERVICE. SINCE 1970, APPROXIMATELY 100 NEW SURFACE ANEMOMETERS AND 12 TO 15 INSTRUMENTED TOWERS HAVE BEEN OPERATED FOR VARIOUS LENGTHS OF TIME. MOST OF THESE DATA ARE AVAILABLE FROM AREAS OF HIGH WIND AND AREAS WITH SIGNIFICANT NUMBERS OF EOLIAN FEATURES. ONLY A MINIMUM AMOUNT OF THESE DATA HAS BEEN ANALYZED AND THEN ONLY FOR SINGLE STATION CLIMATOLOGY.

1979-0533 MAUMUS J P
NEW ENERGIES IN TELECOMMUNICATIONS. AEROSOLEC STATION (SOLAR-WIND POWER).
PHOTOVOLTAIC SOLAR ENERGY CONFERENCE, 2D, BERLIN, APRIL 23-26, 1979. DORDRECHT, NETHERLANDS, D. REIDEL PUBL. CO., 1979. P. 1081-1086.

THIS PAPER DESCRIBES THE OPERATING PRINCIPLES AND COST ESTIMATES OF THE COMBINED SOLAR-WIND POWER STATION AEROSOLEC, DESIGNED FOR POWERING REMOTE MICROWAVE RELAY STATIONS.

1979-0534 MAUREL A
DESALINATION AND NOVEL ENERGY SOURCES.
DESALINATION 31(1-3): 489-499, OCTOBER 1979. (IN FRENCH)

THIS ARTICLE INVESTIGATES THE FEASIBILITY OF USING SOLAR OR WIND POWER FOR DESALINATION PLANTS USING THE REVERSE OSMOSIS PROCESS. TWO EXPERIMENTAL INSTALLATIONS ARE DESCRIBED. ONE HAS A CAPACITY OF 2.5 CU. METRES PER HOUR PRODUCTION FROM BRACKISH WATER AND UTILISES A SOLAR POWERED PUMP OF 2.5 KW. THE OTHER HAS A CAPACITY OF 0.5 CU. METRES PER HOUR FROM SEA WATER, AND USES A WIND POWERED PUMP WITH A 4 KW. MOTOR.

1979-0535 MAYER D J
DEVELOPMENT OF STANDARDS FOR PROFESSIONAL PRACTICE IN THE WIND INDUSTRY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 175-180.
RFP-3014(VOL.2)

AT PRESENT, THERE ARE FOUR GROUPS DIRECTLY OR INDIRECTLY INVOLVED IN ESTABLISHING STANDARDS FOR SMALL WIND SYSTEMS. IN ADDITION TO STATE AND FEDERAL AGENCIES, THERE IS THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), AND THE AMERICAN WIND ENERGY ASSOCIATION (AWEA). EACH BRINGS UNIQUE CHARACTERISTICS TO THE STANDARDS DEVELOPMENT PROCESS AND, WHILE THEIR RELATIONSHIP IS STILL EVOLVING, IT PROMISES TO BE COMPREHENSIVE AND MUTUALLY SUPPORTIVE.

1979-0536 MAYS I D, HOLMES B A
COMMERCIAL DEVELOPMENT OF THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INT. POWER GENERATION 2(6): 33-37, SEPTEMBER 1979.

WINDMILLS WERE ONCE A COMMON SIGHT ON LANDSCAPES THROUGHOUT THE WORLD. THE DAWN OF THE 20TH CENTURY WITH CHEAP FOSSIL FUELS, COAL AND OIL, TOGETHER WITH THE EXPANSION OF THE ELECTRICITY NETWORK BROUGHT A NEW WAY OF LIFE AND WINDMILLS DECLINED. WITH THE ENERGY CRISIS, HOWEVER, THERE HAS BEEN A RAPID INCREASE IN INTEREST IN RENEWABLE SOURCES OF ENERGY--SUN, WIND AND WAVES. THE U.K. FIRM OF P.I. SPECIALIST ENGINEERS HAS TAKEN A CONSIDERABLE INITIATIVE BY PRODUCING THE FIRST COMMERCIAL VARIABLE GEOMETRY VERTICAL AXIS WIND TURBINE (VGVAW) IN THE WORLD.

1979-0537 MEHRKAM 2 MW TO BE ERECTED IN PENNSYLVANIA.
WIND ENERGY REP.: 1, 7-10, DECEMBER 1979

1979-0538 MEIER R W, MERSON T J
TECHNOLOGY ASSESSMENT OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 1979. 48 P.
LA-8044-TASE, DOE/EV-0103

ENVIRONMENTAL DATA FOR WIND ENERGY CONVERSION SYSTEMS (WECS) HAVE BEEN GENERATED IN SUPPORT OF THE TECHNOLOGY

ASSESSMENT OF SOLAR ENERGY (TASE) PROGRAM. TWO CANDIDATES HAVE BEEN CHOSEN TO CHARACTERIZE THE WECS THAT MIGHT BE DEPLOYED IF THIS TECHNOLOGY MAKES A SIGNIFICANT CONTRIBUTION TO THE NATIONAL ENERGY REQUIREMENTS. ONE WECS IS A LARGE MACHINE OF 1.5-MW-RATED CAPACITY THAT CAN BE USED BY UTILITIES. THE OTHER WECS IS A SMALL MACHINE THAT IS CHARACTERISTIC OF UNITS THAT MIGHT BE USED TO MEET RESIDENTIAL OR SMALL BUSINESS ENERGY REQUIREMENTS. ENERGY STORAGE SYSTEMS ARE DISCUSSED FOR EACH MACHINE TO ADDRESS THE INTERMITTENT NATURE OF WIND POWER. MANY TYPES OF WECSS ARE BEING STUDIED AND A BRIEF REVIEW OF THE TECHNOLOGY IS INCLUDED TO GIVE BACKGROUND FOR CHOOSING HORIZONTAL AXIS DESIGNS FOR THIS STUDY. COST ESTIMATES HAVE BEEN MADE FOR BOTH LARGE AND SMALL SYSTEMS AS REQUIRED FOR INPUT TO THE STRATEGIC ENVIRONMENTAL ASSESSMENT SIMULATION (SEAS) COMPUTER PROGRAM. MATERIAL REQUIREMENTS, BASED ON CURRENT GENERATION WECSS, ARE DISCUSSED AND A GENERAL DISCUSSION OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH WECS DEPLOYMENT IS PRESENTED.

1979-0539 MENZIES R W, MATHUR R M
ALTERNATOR DESIGNS FOR DIRECT COUPLING TO VERTICAL AXIS WIND TURBINES.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXPOSITION, TORONTO, OCTOBER 2-4, 1979. CONFERENCE DIGEST. NEW YORK, IEEE, 1979. P. 32-33.

THE AUTHOR EXAMINES THE DESIRABLE PERFORMANCE SPECIFICATIONS OF DIRECT-DRIVE ALTERNATORS SUITABLE FOR MEETING DIVERSE LOAD REQUIREMENTS AND COMPARES ADAPTATIONS OF SEVERAL CONVENTIONAL ALTERNATORS WITH SEVERAL NOVEL DESIGNS.

1979-0540 MEYERER W, PAPROCKI S
GRAPHITE-ALUMINUM COMPOSITE TECHNOLOGY.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP, DENVER, COLORADO, DECEMBER 18, 1978. NTIS, OCTOBER 1979. VOL. 2, PT. 2, P. 599-612.
SERI/TP-31-248(VOL.2)(PT.2)

CONVENTIONAL AND ADVANCED FIBER-REINFORCED-NONMETAL MATRIX COMPOSITES ARE, AT PRESENT, HIGHLY COMPETITIVE WITH METAL-MATRIX COMPOSITES (MMCS) FROM THE STANDPOINTS OF DESIGN, CONFIDENCE, AND COST. THE SPECIFIC PROPERTIES OF TENSILE STRESS AND ELASTIC MODULUS OF CERTAIN FIBER-REINFORCED EPOXY COMPOSITES ARE EXTREMELY HIGH AND CAN BE EASILY UTILIZED IN APPLICATIONS IN WHICH AMBIENT TEMPERATURES PREVAIL AND IN ENVIRONMENTS OF LIMITED SEVERITY. METAL-MATRIX-COMPOSITE TECHNOLOGY IS PRESENTLY AT A POINT THAT IS COMPARABLE TO THE EARLY 1960S DEVELOPMENT OF NONMETALS COMPOSITES. IT IS IN ITS INFANCY, BUT IT IS RAPIDLY EMERGING FROM THAT STAGE AND DESERVES ATTENTION AS COMPLEMENTARY TECHNOLOGY. THE FACT OF ITS BEING COMPLEMENTARY IS OF GREAT IMPORTANCE. METAL-MATRIX-COMPOSITE TECHNOLOGY IS AN OFFSHOOT OF THE SAME DEVELOPMENT THAT PRODUCED GRAPHITE-EPOXY COMPOSITES AND IN THE FUTURE, MAY VERY WELL CARRY COMPOSITES INTO APPLICATIONS NOT FEASIBLE FOR PLASTICS.

1979-0541 MIKHAIL A S, JUSTUS C G
ANALYTICAL STUDIES OF WIND TURBINE TURNING CHARACTERISTICS.
NTIS, JUNE 1979. 26 P.
RLO-2439-79/3

DATA FROM 14 SITES WERE ARRANGED IN TIME-SERIES FORMAT FOR WIND SPEED AND DIRECTION. THE SITES WERE CHOSEN BASED ON THE AVAILABILITY OF HOURLY OBSERVATIONS AND SUITABILITY OF THE SITES FOR WIND ENERGY APPLICATIONS (HIGH WIND REGIMES). THE HOURLY TURNS OF THE WIND WERE SUMMED VECTORIALLY (CYCLONIC, OR COUNTERCLOCKWISE, TURNING DEFINED AS POSITIVE). MONTHLY AND ANNUAL CUMULATIVE TURNS AT EACH SITE WERE COMPUTED. TO SIMULATE THE PERFORMANCE OF ACTUAL WIND TURBINES, THRESHOLD WIND SPEED VALUES OF 0, 1, 2, 3, 4, 5, AND 6 M/S WERE CHOSEN. A THRESHOLD WIND SPEED IS DEFINED AS WIND SPEED BELOW WHICH THE WIND TURBINE IS NOT EXPECTED TO TURN WITH THE WIND.

1979-0542 MIKHAIL A S, JUSTUS C G
HEIGHT PROJECTION METHODS AND SENSITIVITY STUDY. TECHNICAL REPORT.
ATLANTA, GEORGIA, GEORGIA INSTITUTE OF TECHNOLOGY, 1979. 91 P. ALSO: NTIS, JUNE 1979. 91 P.
RLO/2439-79/2, DOE/ET/20355-T1

A BRIEF DESCRIPTION IS GIVEN OF THE DIFFERENT TECHNIQUES FOR HEIGHT PROJECTION OF WIND SPEED THAT HAVE BEEN DEVELOPED AT GEORGIA TECH. ONE OF THESE TECHNIQUES, THE SIMILARITY MODEL, IS BASED ON MONIN-OBUKHOV SIMILARITY THEORY. OTHER MODELS EXAMINED ARE THE EMPIRICAL VELOCITY-DEPENDENT POWER LAW MODEL (POWER LAW MODEL) AND THE SEMI-EMPIRICAL MODIFIED VELOCITY-DEPENDENT POWER LAW MODEL (MODIFIED POWER LAW MODEL). A DETAILED DESCRIPTION OF THE METHODOLOGIES IS GIVEN AND EXAMPLE APPLICATIONS ARE ILLUSTRATED, WITH ALL THE NECESSARY INPUT PARAMETERS TO THE MODELS.

1979-0543 MILLER D L
ESTIMATING THE WIND'S POTENTIAL FOR SMALL SCALE ENERGY GENERATION USING AVAILABLE LOCAL CLIMATOLOGICAL DATA.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 669-671.

1979-0544 MILLNER A R
FLYWHEELS FOR ENERGY STORAGE.
TECHNOL. REV. 82(2): 32-40, NOVEMBER 1979.

THE USE OF FLYWHEELS TO STORE SOLAR AND WINDPOWER ENERGY DURING OFF-PEAK PERIODS IS COMPATIBLE WITH THE CYCLICAL NATURE OF ELECTRIC POWER DEMAND. THE STORED ENERGY CAN BE DRAWN AS NEEDED AND ALLOW UTILITIES TO SHAVE THEIR PEAK DEMANDS. NONGRID-FLYWHEEL APPLICATIONS ARE APPROPRIATE FOR DEVELOPING COUNTRIES AND AS A WAY TO INTRODUCE AND COMMERCIALIZE SOLAR AND WIND SYSTEMS. THE USE OF CHEAP MATERIALS FOR STATIONARY DESIGNS IMPROVES THE ECONOMICS OF THESE APPLICATIONS. DESIGNS, MATERIALS, AND CONSTRUCTION DETAILS OF FLYWHEELS ARE GIVEN, USING SCHEMATIC AND BREAK-AWAY DIAGRAMS. THE LIFE-CYCLE COSTS FOR RESIDENTIAL USE OF FLYWHEELS ARE ESTIMATED FOR 1980 AND 1985 AND ARE SHOWN TO COMPARE FAVORABLY WITH THE COST OF BATTERY SYSTEMS.

1979-0545 MILLER R H
ON THE WEATHERVANING OF WIND TURBINES.
J. ENERGY 3(5): 319-320, SEPTEMBER-OCTOBER 1979.

THE ARTICLE DISCUSSES THE STATIC STABILITY CHARACTERISTICS OF HORIZONTAL-AXIS WIND TURBINES FREE TO PIVOT ABOUT A VERTICAL AXIS. THE STATIC STABILITY DETERMINES WHETHER THE WIND TURBINE WILL WEATHERVANE (HEAD INTO THE DIRECTION OF THE AMBIENT WIND) WHEN FREELY PIVOTED.

1979-0546 MINARDI J E, LAWSON M O, WATTENDORF F L
THIRD ANNUAL PROGRESS REPORT ON THE ELECTROFLUID DYNAMIC WIND GENERATOR. FINAL REPORT, SEPTEMBER 15, 1977 - SEPTEMBER 30, 1978.
NTIS, MAY 1979. 74 P.

THIS REPORT COVERS WORK DONE PRIMARILY DURING THE THIRD YEAR OF THE RESEARCH PROGRAM TITLED "ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATORS." THE OBJECTIVE OF THE PROGRAM IS TO CONDUCT RESEARCH LEADING TO THE DEVELOPMENT OF EFD WIND DRIVEN GENERATORS. IN SUCH GENERATORS, THE WIND BLOWS THROUGH SUITABLY ORIENTED ARRAYS OF ELECTRODES, TRANSPORTS CHARGED PARTICLES AGAINST AN ELECTRICAL POTENTIAL GRADIENT, AND THEREBY GENERATES ELECTRICAL POWER DIRECTLY WITHOUT MOVING PARTS. THIS CONCEPT PROMIS[illegible] A SIMPLER, LESS EXPENSIVE SYSTEM, FREE OF FRONTAL AREA AND VELOCITY LIMITATIONS OF CONVENTIONAL ROTATING WECS. FOR THE EFD WIND DRIVEN GENERATOR, THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE CAN BE REALIZED.

1979-0547 MINARDI J E, LAWSON M O
ELECTROFLUID (EFD) WIND DRIVEN GENERATOR.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 89-102.
SERI/TP-245-184, CONF-790501

THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING 300-400 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE AND FAR LARGER POWERS THAN FROM CONVENTIONAL SYSTEMS CAN BE REALIZED. ANALYSES PREDICT FAVORABLE PERFORMANCE CHARACTERISTICS FOR EFD WIND GENERATORS; HOWEVER, SPECIFIC EXPERIMENTAL DATA HAVE BEEN LACKING. RESEARCH AREAS PRESENTLY BEING EMPHASIZED ARE DISCUSSED AND PERFORMANCE OF EXPERIMENTAL ARRAYS UNDER TEST IN AN EIFFEL-TYPE WIND TUNNEL ARE ALSO DISCUSSED.

1979-0548 MOBERG E
EVALUATION OF THE WORK WITHIN THE FIELD OF WIND ENERGY.
NTIS, MARCH 1979. 111 P. (IN SWEDISH)

A CAREFUL ANALYSIS OF THE WORK GOING ON DURING 1975 TO 1978 WITHIN THE FIELD CONCERNING THE INTRODUCTION OF WIND ENERGY IN SWEDEN IS MADE SUGGESTIONS FOR THE PLANNING AND PERFORMANCE OF FUTURE WORK IN THIS FIELD ARE ALSO GIVEN.

1979-0549 MOD 1 WIND TURBINE GENERATOR FAILURE MODES AND EFFECTS ANALYSIS.
NTIS, FEBRUARY 1979. 99 P.
NASA-CR-159494, DOE/NASA/0058-79/1

A FAILURES MODES AND EFFECTS ANALYSIS (FMEA) WAS PERFORMED FOR THE MOD 1 WIND TURBINE GENERATOR. THE ANALYSIS WAS DIRECTED PRIMARILY AT IDENTIFYING THOSE CRITICAL FAILURE MODES THAT WOULD BE HAZARDOUS TO LIFE OR WOULD RESULT IN MAJOR DAMAGE TO THE SYSTEM. EACH SUBSYSTEM WAS APPROACHED FROM THE TOP DOWN, AND BROKEN DOWN TO SUCCESSIVE LOWER LEVELS WHERE IT APPEARED THAT THE CRITACALITY OF THE FAILURE MODE WARRANTED MORE DETAIL ANALYSIS. THE RESULTS WERE REVIEWED BY KNOWLEDGEABLE SPECIALISTS FROM OUTSIDE THE MOD 1 PROGRAM, AND CORRECTIVE ACTION TAKEN WHENEVER RECOMMENDED.

1979-0550 MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT.
NTIS, MARCH 1979. 320 P.
DOE/NASA/0058-79/2 - VOL. I, NASA-CR-159495

THE MOD 1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN IN TABLE 1-1. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN. ALTHOUGH THIS REPORT PLACES EMPHASIS ON A DESCRIPTION OF THE DESIGN AS IT FINALLY EVOLVED, IT ALSO TRACES THE STEPS THROUGH WHICH THE DESIGN PROGRESSED IN ORDER TO UNDERSTAND THE MAJOR DESIGN DECISIONS.

1979-0551 MOD 1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT: EXECUTIVE SUMMARY.
NTIS, MAY 1979. 61 P.
NASA-CR-159497, DOE/NASA/0058-79/3

THE MOD 1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN. ALTHOUGH THIS REPORT PLACES EMPHASIS ON A DESCRIPTION OF THE DESIGN AS IT FINALLY EVOLVED, IT ALSO TRACES THE STEPS THROUGH WHICH THE DESIGN PROGRESSED IN ORDER TO UNDERSTAND THE MAJOR DESIGN DECISIONS.

1979-0552 MOD-2 WIND TURBINE SYSTEM CONCEPT AND PRELIMINARY DESIGN REPORT. VOLUME 2: DETAILED REPORT.
NTIS, JULY 1979. 269 P.
NASA-CR-159609, DOE/NASA-0002-80/2(VOL.2), N80-26775/0

THE CONFIGURATION DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM (WTS) IS DOCUMENTED. THE MOD-2 WTS PROJECT IS A CONTINUATION OF DOE PROGRAMS TO DEVELOP AND ACHIEVE EARLY COMMERCIALIZATION OF WIND ENERGY. THE MOD-2 IS DESIGN OPTIMIZED FOR COMMERCIAL PRODUCTION RATES WHICH, IN MULTIUNIT INSTALLATIONS, WILL BE INTEGRATED INTO A UTILITY POWER GRID AND ACHIEVE A COST OF ELECTRICITY AT LESS THAN FOUR CENTS PER KILOWATT HOUR.

1979-0553 MOD-2 WIND TURBINE SYSTEM CONCEPT AND PRELIMINARY DESIGN REPORT. VOLUME 1. EXECUTIVE SUMMARY.
NTIS, JULY 1979. 27 P.
DOE/NASA/0002-80/2, NASA-CR-159609

THE CONFIGURATION DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM IS PRESENTED. THE MOD-2 IS DESIGN OPTIMIZED FOR COMMERCIAL PRODUCTION RATES WHICH, IN MULTIUNIT INSTALLATIONS, WILL BE INTEGRATED INTO A UTILITY POWER GRID AND ACHIEVE A COST OF ELECTRICITY AT LESS THAN 4 CENTS PER KILOWATT HOUR.

1979-0554 MODARRESS D
RURAL ELECTRIFICATION: A CASE STUDY FOR WIND ENERGY IN IRAN.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 684-686.

1979-0555 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. WIND STATISTICS SUMMARIES FOR THE WIND POWER DATA STATIONS.

NTIS, OCTOBER 1979. 79 P.
DOE/BP/01310-T1(APP.2)

DATA ARE PRESENTED FROM WIND MONITORING STATIONS LOCATED IN WASHINGTON AND OREGON.

1979-0556 MOMENT R L
NEW DEVELOPMENTS IN WIND SYSTEMS TECHNOLOGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES. 2ND, MIAMI BEACH, F ORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 551-5_4.

THIS PAPER DESCRIBES THE DESIGN CRITERIA AND DEVELOPMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS. DESIGN DETAILS, GENERAL APPLICATIONS AND REQUIREMENTS ARE PRESENTED ON THE 1-2 KW, 8 KW AND 40 KW SYSTEMS.

1979-0557 MOMENT R L
NEW DEVELOPMENTS IN WIND SYSTEMS TECHNOLOGY.
NTIS, 1979. 22 P.
CONF-791204-20, RFP-3000

THIS PAPER DESCRIBES THE DEVELOPMENT PROGRAMS FOR U.S. WIND TURBINES UNDER 100 KW OUTPUT.

1979-0558 MOURNING P, GLENN B, RUBIN S A, SHOEMAKER F F, SOTO R
TECHNICAL INFORMATION DISSEMINATION PLAN FOR THE U.S. DEPARTMENT OF ENERGY, ETS/SOLAR DIVISIONS.
NTIS, JANUARY 1979. 74 P.
SERI/SP-69-071

A PLAN FOR A TECHNICAL INFORMATION DISSEMINATION (TID) PROGRAM FOR THE U.S. DEPARTMENT OF ENERGY ETS/DIVISION OF RESOURCE MANAGEMENT IS PRESENTED. THIS PLAN'S PURPOSE IS TO BUILD THE MOST EFFECTIVE INFORMATION TRANSFER MECHANISMS POSSIBLE TO SUPPORT THE EARLIEST APPROPRIATE COMMERCIALIZATION OF SOLAR RESEARCH AND DEVELOPMENT (R AND D) RESULTS IN FIVE TECHNOLOGIES: PHOTOVOLTAICS, SOLAR THERMAL POWER, BIOMASS, OCEAN THERMAL ENERGY CONVERSION, AND WIND ENERGY CONVERSION.

1979-0559 MYSELS K J
WIND DRIVEN POWER APPARATUS.
U.S. PATENT NO. 4,164,382, AUGUST 14, 1979. 10 P.

A WIND DRIVEN POWER APPARATUS FOR CONVERTING WIND TO MECHANICAL ENERGY IS DISCLOSED WHICH INCLUDES A FIXED AXIS TURBINE SUPPORTED CENTRALLY OF A FIXED AIR GUIDE DEFINING A PLURALITY OF HORIZONTAL AIR PASSAGES DISPOSED CIRCUMFERENTIALLY OF THE TURBINE AND EACH BEING ADAPTED TO RECEIVE AN AIR STREAM THEREIN COMING FROM A LIMITED RANGE OF WIND DIRECTIONS AND EFFECT ACCELERATED AIR FLOW TOWARD THE TURBINE. IN ONE EMBODIMENT, AN AIR GUIDE BLOCK IS DISPOSED CIRCUMFERENTIALLY OF THE TURBINE AND IS ROTATABLE ABOUT THE AXIS OF THE TURBINE TO DIRECT ACCELERATED AIR FLOW TO THE TURBINE FROM THE WINDWARDLY FACING ONES OF THE AIR PASSAGES, WHILE IN ALTERNATIVE EMBODIMENTS MEANS ARE PROVIDED FOR SELECTIVELY CLOSING OFF THE AIR PASSAGES SO THAT ACCELERATED AIR FLOW FROM SELECTED AIR PASSAGES IS DIRECTED TO THE TURBINE.

1979-0560 NARAYANAN M A B
TWIN TURBINE VORTEX WIND MILL.
NTIS, AUGUST 1979. 8 P.
NP-24105

THE TWIN TURBINE VORTEX WIND MILL CONSISTS OF A PAIR OF MULTIBLADED ROTORS PLACED AT THE ENDS OF A HOLLOW CYLINDRICAL CAGE WHICH IS SPECIALLY DESIGNED TO PRODUCE VORTEX MOTION. BOTH THE TURBINES ARE COUPLED TO A SINGLE VERTICAL SHAFT FROM WHICH ROTARY MECHANICAL POWER COULD BE EXTRACTED. ON ACCOUNT OF THE REASONABLY HIGH ROTATIONAL SPEED, THIS WIND MILL IS SUITABLE FOR DIRECT GENERATION OF ELECTRICITY.

1979-0561 NEAL D
WIND FLOW AND STRUCTURE OVER GEBBIES PASS, NEW ZEALAND: A COMPARISON BETWEEN A WIND TUNNEL SIMULATION AND FIELD MEASUREMENTS. VOLUMES 1 AND 2. PH.D THESIS.
CHRISTCHURCH, NEW ZEALAND. UNIVERSITY OF CANTERBURY. DECEMBER 1979. VOLUME 1-249 P. VOLUME 2-263 P.

PRESENTED HERE ARE THE RESULTS OF A STUDY TO SHOW THE VALIDITY OF USING WIND TUNNEL MODELLING TO PREDICT THE WIND FLOW OVER A COMPLEX TERRAIN SITUATION. A WIND TUNNEL TRAVERSING SYSTEM WHICH IS PARTICULARLY SUITABLE FOR FLOW MEASUREMENTS OVER TOPOGRAPHICAL MODELS IS DESCRIBED. THE MODEL WAS TESTED IN THREE FORMS OF CONSTRUCTION; TERRACED, CONTOURED, AND WITH SHELTERBELTS AND SCRUB AREAS ADDED. THE RESULTS OF THE WIND TUNNEL TESTS ARE PRESENTED IN THE FORM OF ISOTACH AND ISOTURB CONTOURS FOR LATERAL AND LONGITUDINAL CROSS SECTIONS THROUGH THE MODELS.

1979-0562 NELLUMS R O, WORSTELL M H
TEST RESULTS OF THE DOE-SANDIA 17 METER VAWT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 173-184.
NASA-CP-2106

THE DOE-SANDIA 17 METER WIND TURBINE BEGAN COLLECTING OPERATIONAL DATA ON MARCH 29, 1977. SINCE THEN, OPERATION HAS BEEN CONDUCTED ON A VARIETY OF ROTOR AND DRIVE TRAIN CONFIGURATIONS. THE PRESENT LOG OF OVER 530 HOURS IS AN IMPORTANT MEANS OF VALIDATING THEORETICAL CALCULATIONS AND PROVIDING OPERATING EXPERIENCE. THIS REPORT WILL CONTAIN A BRIEF REVIEW OF THE TEST PROGRAM FOLLOWED BY A PRESENTATION OF THE PERFORMANCE RESULTS AND THEIR SIGNIFICANCE. THEN, IN ORDER TO PROVIDE THE READER WITH AN APPRECIATION OF THE 17 METER OPERATING EXPERIENCE, THIS REPORT WILL CLOSE WITH A DISCUSSION OF THE OPERATIONAL DIFFICULTIES OCCURRING SINCE THE FIRST TURN 2 YEARS AGO.

1979-0563 NEW FLUID BATTERY PROMISES CHEAPER ELECTRICITY STORAGE.
PUBLIC UTIL. FORTN. 103(9): 65-66, 68, APRIL 26, 1979.

THE REDOX ENERGY STORAGE SYSTEM PROMISES MAJOR COST REDUCTIONS IN THE STORING OF ELECTRICAL ENERGY AS WELL AS LONG-TERM RELIABILITY AND MINIMAL ENVIRONMENTAL IMPACT. THE NEW NASA SYSTEM COULD BE SCALED UP IN THE NEXT SEVERAL YEARS, DEPENDING ON FUNDING, TO PROVIDE ELECTRICAL POWER COMPANIES WITH AN EFFICIENT MEANS OF LOAD LEVELING--THE STORING OF THOUSANDS OF KWH OF ENERGY DURING LOW DEMAND PERIODS FOR USE LATER DURING PERIODS OF MAXIMUM POWER CONSUMPTION. MORE IMMEDIATELY, REDOX SYSTEMS IN THE KILOWATT RANGE COULD HELP TO SPEED THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN AN IMPORTANT CONSIDERATION SINCE STORAGE IS NECESSARY FOR THE TIMES THE SUN IS NOT SHINING AND THE WIND IS NOT

BLOWING.

1979-0564 NGUYEN D V
COMPARATIVE PERFORMANCE MEASUREMENTS ON A SAVONIUS ROTOR WITH ANCILLARY SURFACES.
WIND ENG. 3(2): 115-120, 1979. (IN FRENCH AND ENGLISH)

IN AN ATTEMPT TO IMPROVE THE PERFORMANCE OF THE CONVENTIONAL SAVONIUS ROTOR, A MODEL ROTOR WAS FITTED WITH ANCILLARY SURFACES OF AEROFOIL AND "UMBRELLA" FORM TO PRODUCE SIX ALTERNATIVE CONFIGURATIONS. WIND TUNNEL TESTS ON THE MODELS SHOWED THE PERFORMANCE TO BE IMPROVED IN ONLY ONE CASE; IN THE OTHER UNITS TESTED THE DRAG EFFECT OF THE ANCILLARY SURFACES APPEARED TO PREDOMINATE OVER ANY POSSIBLE FLOW IMPROVEMENT.

1979-0565 NIBE WINDMILLS NEAR COMPLETION.
INT. POWER GENERATION 2(6): 15-19, SEPTEMBER 1979.

THE DANISH WIND POWER PROGRAMME WILL DEVELOP LARGE-SCALE ELECTRICITY-PRODUCING WIND POWER PLANTS. ATTENTION IS BEING PAID TO FINDING PRACTICAL SOLUTIONS TO THE TECHNICAL PROBLEMS INVOLVED. IT IS HOPED THAT THE PRESENT PROGRAMME WILL LEAD TO FURTHER ADVANCED STUDIES INTO TECHNOLOGICAL, ECONOMIC AND ENVIRONMENTAL ASPECTS.

1979-0566 NIGHTENGALE M E
DOE FIELD EVALUATION PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 11-15.
RFP-3014(VOL.2)

THE DEPARTMENT OF ENERGY (DOE) HAS RECOGNIZED THE IMPORTANCE OF SMALL WIND SYSTEMS AND HAS INITIATED A NUMBER OF PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THEM. A FIELD EVALUATION PROGRAM HAS BEEN DESIGNED AS A PART OF THIS PROGRAM TO ACCELERATE THE COMMERCIALIZATION PROCESS FOR SWECS. THE PROGRAM GOAL IS TO PROVIDE NEAR-TERM RESOLUTION OF EXISTING TECHNICAL AND INSTITUTIONAL CONSTRAINTS IN ORDER THAT WIND ENERGY CAN EFFECT MAXIMUM IMPACT ON THE NATION'S ENERGY NEEDS. THE OVER-ALL OBJECTIVE OF THE FIELD EVALUATION PROGRAM IS TO ADVANCE THE FEDERAL WIND PROGRAM EFFORTS TO IDENTIFY AND REMOVE THESE BARRIERS. STIMULATION TO THE VARIOUS SEGMENTS OF THE SWECS INDUSTRY WILL ALSO BE AN IMPORTANT BENEFIT OF THE PROGRAM.

1979-0567 NILBERG R H
WINDMOTOR AS A WINDBREAK.
U.S. PATENT NO. 4,175,910, NOVEMBER 27, 1979. 4 P.

THIS INVENTION RELATES TO A WINDMOTOR AS A WINDBREAK FENCE. THE WINDMOTOR SERVES AS A SHELTER FROM THE WIND BY CONVERTING PART OF THE WIND ENERGY INTO USEFUL ENERGY AND PART OF IT INTO WHIRLING MOVEMENTS. THE WINDMOTOR LOOKS SIMILAR TO A CONVEYOR AS USED FOR A SKIER'S CHAIRLIFT. THE CHAIRLIFT HAS ONE CLOSED CABLE, WITH CHAIRS ATTACHED, RUNNING FROM THE ONE END TO THE OTHER END OF THE LIFT. THE CONVEYOR TYPE WINDMOTOR HAS ADDITIONALLY ANOTHER CABLE RUNNING AT A LOWER LEVEL PARALLEL TO THE UPPER CABLE. BOTH CABLES RUN AT THE SAME VELOCITY IN THE SAME DIRECTION OVER A PAIR OF WHEELS AT EACH END OF THE WINDMOTOR. UPPER AND LOWER CABLES, ON WINDSIDE AND LEESIDE, ARE INTERCONNECTED BY A NUMBER OF VANES IN SUCH A MANNER THAT THE WIND BLOWING ON THESE VANES WILL FORCE THE WINDSIDE CABLES WITH THE VANES TO MOVE IN ONE DIRECTION AND THE LEESIDE CABLES WITH THE VANES IN THE OPPOSITE DIRECTION, WHEREBY GENERATING A ROTATIONAL MOVEMENT OF THE WHEELS.

1979-0568 NORTON J H
DEVELOPMENT AND TESTING OF A VARIABLE AXIS ROTOR CONTROL SYSTEM WITH 5 METER ROTOR AND DIRECT-DRIVE ALTERNATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 31-64.
RFP-3014(VOL.1)

THE PURPOSE OF THE 1-2 KW HIGH RELIABILITY RFP ISSUED IN MAY OF 1977 WAS TO DEVELOP A SMALL WIND SYSTEM CAPABLE OF PROVIDING RELIABLE LOW VOLTAGE (24V) DC POWER IN REMOTE AND EXTREME ENVIRONMENTS AT A COST COMPETITIVE WITH CURRENT SOURCES AVAILABLE TO COMMERCIAL USERS (E.G., THERMO-ELECTRIC PROPANE GENERATORS). A THREE-BLADE, HORIZONTAL AXIS, DIRECT-DRIVE SYSTEM WITH FIXED PITCH BLADES IS DESCRIBED. ROTATIONAL SPEED IS CONTROLLED BY PITCHING THE ROTOR TIP PATH FROM THE VERTICAL TO THE HORIZONTAL PLANE. THE DEVELOPMENT OF THIS DESIGN INCLUDES THREE MAJOR AREAS REQUIRING EXTENSIVE ANALYSIS AND TESTING: THE ROTOR, THE DIRECT-DRIVE GENERATOR, AND THE VARIABLE AXIS ROTOR CONTROL SYSTEM, OR VARCS. DESIGN CHARACTERISTICS AND TEST RESULTS ARE INCLUDED.

1979-0569 NOUN R J
PRODUCT LIABILITY INSURANCE FOR WECS.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH, WASHINGTON, D.C., OCTOBER 28, 1979. NTIS, OCTOBER 1979. 6 P.
SERI/TP-354-466

PRELIMINARY FINDINGS FROM A SAMPLING OF MANUFACTURERS INDICATE THAT PRODUCT LIABILITY INSURANCE FOR WECS IS STILL DIFFICULT TO OBTAIN IN MANY CASES. ABOUT HALF OF THE 21 WECS MANUFACTURERS CONTACTED DO NOT HAVE PRODUCT LIABILITY INSURANCE AT THIS TIME. ABOUT ONE MANUFACTURER IN THREE WHO HAS ATTEMPTED TO OBTAIN INSURANCE HAS BEEN REJECTED BY AT LEAST ONE INSURANCE COMPANY. IN SOME INSTANCES, ALTHOUGH AN INSURER HAD OFFERED TO PROVIDE COVERAGE, THE MANUFACTURER FOUND THE RATES QUOTED TO BE PROHIBITIVELY EXPENSIVE.

1979-0570 NOUN R J
PRODUCT LIABILITY AND SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS): AN ANALYSIS OF SELECTED ISSUES AND POLICY ALTERNATIVES.
NTIS, DECEMBER 1979. 49 P.
SERI/TR-354-365

AN OVERVIEW IS PRESENTED OF THE VARIOUS LEGAL ISSUES REGARDING SWECS PERFORMANCE AND SAFETY, ACCORDING TO WHEN SUCH ISSUES MAY ARISE DURING THE SWECS MANUFACTURING AND MARKETING PROCESSES. NEXT, THE MOST SIGNIFICANT ISSUES ARE TRANSLATED INTO A SERIES OF QUESTIONS, FOLLOWED BY A LEGAL ANALYSIS THAT ADDRESSES THESE QUESTIONS WITHIN THE FRAMEWORK OF THE PRESENT PRODUCT LITIGATION SYSTEM. THE SPECIAL PROBLEMS PRESENTED TO SWECS BY JUDICIAL TREATMENT OF DESIGN DEFECT CASES AND THE RELEVANCE OF INDUSTRY STANDARDS IN RPODUCT CASES ARE EMPHASIZED. FINALLY, A NUMBER OF POLICY ALTERNATIVES FOR DOE AND OTHERS TO CONSIDER ARE EXAMINED CONCERNING THEIR RELATIVE ADVANTAGES AND DISADVANTAGES IN DEALING WITH SELECTED ISSUES.

1979-0571 OBERMEIER J L, TOWNES H W
ECONOMIC EVALUATION OF SMALL-SCALE WIND-POWERED GENERATION SYSTEMS.
ASME TRANS. J. ENG. POWER 101(2): 213-216, APRIL 1979.

1979-0572 O'BRIEN W F, HINERMAN J M
HORIZONTAL-AXIS WIND GENERATOR PERFORMANCE WITH VARYING TIP SPEED RATIO AND ROTOR ORIENTATION.
ASME PAPER 79-WA/SOL-2, 1979. 7 P.

AN EXPERIMENTAL INVESTIGATION OF THE PERFORMANCE OF A HORIZONTAL-AXIS WIND GENERATOR WAS CONDUCTED WITH VARYING ROTOR TIP SPEED RATIO AND ORIENTATION RELATIVE TO WIND DIRECTIONS. THE MACHINE TESTED HAD A ROTOR DIAMETER OF 6.6 M, AND A THREE-PHASE ALTERNATOR WITH DIODE-RECTIFIED OUTPUT. ROTOR SPEED WAS CONTROLLED BY CHANGING THE VOLTAGE LEVEL OF THE BATTERY LOAD. OPERATION AT VARYING TIP SPEED RATIO (BLADE TIP SPEED/WIND SPEED) WAS THUS PRODUCED. ROTOR ORIENTATION RELATIVE TO WIND DIRECTION (YAW) WAS CONTROLLED BY ADJUSTING THE POSITION OF A STEERING TAIL MOUNTED ON THE WIND GENERATOR. VALUES OF PERFORMANCE COEFFICIENT ARE CALCULATED FOR THE VARIOUS DATA POINTS, USING AN ELLIPTICAL MODEL FOR PROJECTED ROTOR AREA.

1979-0573 OFFSHORE WIND ENERGY: IS IT AN OPPORTUNITY?
WIND ENERGY REP.: 7-11, OCTOBER 1979.

PROS AND CONS OF OFF-SHORE WIND ENERGY SYSTEMS ARE DISCUSSED IN A SYNOPSIS OF A MAJOR STUDY FROM THE WESTINGHOUSE ELECTRIC CORP. TITLED: DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATIONS: FINAL REPORT.

1979-0574 OGUCHI K, OUCHI N
CHARACTERISTICS OF EXPERIMENTAL SELF-CASCADED INDUCTION MOTORS.
FAC. ENG. IBARAKI UNIV. J. NO. 27: 67-74, 1979. (IN JAPANESE)

THE DETAILS AND EXPERIMENTAL RESULTS OF EXPERIMENTAL SELF-CASCADED INDUCTION MOTORS ARE DESCRIBED WHICH HAVE SINGLE WINDING ON THE STATOR AND ROTOR. THE PRINCIPLE OF OPERATION IS DESCRIBED. THE EFFECTS OF THE SPACE HARMONICS OF THE AIR-GAP FLUX ON THE MOTOR CHARACTERISTICS ARE DISCUSSED. THE TWO PROTOTYPE MOTORS WERE CONSTRUCTED WHICH HAD 36-SLOT STATOR CORE AAND 54-SLOT ROTOR CORE AVAILABLE READILY. THE NUMBER OF POLES WAS CHOSEN AS THE COMBINATION OF 12/6-POLE. THE ROTOR HAD NINE CLOSED-WINDINGS. THE EXPERIMENTAL MOTOR I HAD THE UNSATISFACTORY PERFORMANCE, BUT THE MOTOR II SATISFACTORY. THE MOTOR II HAD AN IMPROVED ROTOR WINDING FACTOR FOR 12-POLE EMFS BY A DECREASE OF COIL PITCH AND AN INCREASE OF THE NUMBER OF DUMMY COILS. THE MOTOR II HAD THE TORQUE-SPEED CHARACTERISTICS SIMILAR TO CONVENTIONAL EXTERNAL CASCADED INDUCTION MOTORS. THE PRACTICAL APPLICATION EXAMPLES OF SELF-CASCADED MOTORS ARE PRESENTED; BRUSHLESS VARIABLE SPEED DRIVES CONNECTED WITH A STATIC POWER CONVERTER AND VARIABLE SPEED CONSTANT FREQUENCY GENERATORS FOR WIND POWER CONVERSION.

1979-0575 OLGAARD P L
ON THE NUMBER OF WIND MACHINES IN DENMARK FROM 1900 TO 1950.
SOL. ENERGY 22(5): 477-478, 1979.

INFORMATION, BASED ON DANISH SOURCES, IS PRESENTED ON THE NUMBER OF WIND MACHINES USED IN DENMARK IN THE PERIOD FROM AROUND 1900 TO AROUND 1950.

1979-0576 OLIVER T K, GROVES W N, GRUBER E L, CHEUNG A
ENERGY FROM HUMID AIR.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 267-282.
SERI/TP-245-184, CONF-790501

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT BY COMPUTER MODELING.

1979-0577 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
ENERGY FROM HUMID AIR. FINAL REPORT.
NTIS, FEBRUARY 1979. 87 P.
DSE-2553-79/1

THIS IS A REPORT OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT BY COMPUTER MODELING. RESULTS FOR A NATURAL DRAFT TOWER SHOW THAT IT IS NOT A COST-EFFECTIVE WAY TO GET ENERGY FROM HUMID AIR. PARAMETRIC STUDIES ARE PRESENTED FOR EXPANSION-COMPRESSION CYCLES. WITH SUITABLE CONDITIONS, INCLUDING LARGE AMOUNTS OF COOLING DURING COMPRESSION, THIS CYCLE HAS AN ATTRACTIVE NET WORK OUTPUT. TO AVOID USING ALL THE OUTPUT POWER TO OVERCOME MACHINE LOSSES, IT APPEARS NECESSARY TO USE A ONE-MACHINE MECHANIZATION. THE MOST PROMISING USES VORTEX FLOW TO ACHIEVE THE NECESSARY EXPANSION AND SUBSEQUENT COMPRESSION WITH COOLING. POWER OUTPUT AND COSTS HAVE BEEN ESTIMATED FOR A VORTEX PLANT LOCATED IN PUERTO RICO.

1979-0578 OPLINGER J L
DISTRIBUTED WIND GENERATION ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 205-214.
CONF-790352

THE OVERALL OBJECTIVE OF THIS PROJECT IS TO DEVELOP A METHODOLOGY FOR UTILITY EVALUATION OF DISTRIBUTED WIND POWER SYSTEMS IN THEIR RESPECTIVE SERVICE AREAS. THE METHODOLOGY WILL ALLOW COMPARISON OF DISTRIBUTED WIND POWER SYSTEMS WITH CENTRAL STATION WIND PLANTS AND CONVENTIONAL CENTRAL STATION GENERATION, AS WELL AS WITH OTHER TYPES OF DISTRIBUTED GENERATION. SITE SPECIFIC ANALYSES WILL BE PERFORMED ON THREE UTILITY SYSTEMS TO ASSESS IMPACTS OF DISTRIBUTED WIND POWER PLANTS ON UTILITY SYSTEMS. PREFERRED DISTRIBUTED WIND POWER SYSTEMS WILL BE SELECTED BASED ON THE SITE SPECIFIC ANALYSES. THE PREFERRED DISTRIBUTED WIND SYSTEMS WILL FORM THE BASIS FOR AN IMPACTS AND PENETRATION ANALYSIS. THE IMPACTS TO BE EVALUATED ARE BOTH THOSE WHICH DIRECTLY AFFECT UTILITY OPERATIONS OR COSTS AND THOSE WHICH ARE EXPERIENCED INDIRECTLY AS, FOR EXAMPLE, THROUGH COMMUNITY RESPONSE TO PROPOSED INSTALLAIONS.

1979-0579 OTAWA T
WIND ENERGY PLANNING: A BIBLIOGRAPHY.
CHICAGO, ILLINOIS, COUNCIL OF PLANNING LIBRARIANS, 1979. 31 P.

THE TIME PERIOD COVERED IN THIS BIBLIOGRAPHY IS FROM JANUARY 1948 TO JUNE 1979; HOWEVER, MAJOR EMPHASIS IS PLACED ON THE PERIOD AFTER THE ARAB OIL EMBARGO (I.E., 1973). THIS BIBLIOGRAPHY IS DIVIDED INTO TEN SECTIONS: PROSPECTS OF WIND ENERGY USE; WIND RESOURCE ANALYSIS; TECHNOLOGY DEVELOPMENT; ECONOMICS OF WIND ENERGY; SITE

SELECTION FOR WIND ENERGY CONVERSION SYSTEMS; LEGAL, SOCIAL AND INSTITUTIONAL ISSUES; ENVIRONMENTAL ISSUES; APPLICATIONS OF WIND ENERGY; SMALL-SCALE APPLICATIONS; AND OTHER PERTINENT BIBLIOGRAPHIES AND REFERENCES TO WIND ENERGY PLANNING. PUBLICATION AVAILABILITY IS DESIGNATED.

1979-0580 OTNES K
A LITTLE ABOUT WIND POWER STATIONS.
FRA FYS. VERDEN 41(4): 89-92, 1979. (IN NORWEGIAN)

WIND POWER IS REVIEWED. WINDMILLS WHICH WERE IN USE UP TO THE YEAR 1900 HAD A LOW EFFICIENCY. APPLICATION OF THE RANKINE-FROUDE THEORY (CA. 1890) GAVE IMPROVED EFFICIENCY. A WIND POWER STATION WAS BUILT IN DENMARK IN 1892 BY LA COUR FOR THE PRODUCTION OF HYDROGEN AND OXYGEN BY THE ELECTROLYSIS OF NAOH. NEW TYPES OF WINDMILL, WITH HIGHER EFFICIENCIES (E.G., SAVONIUS AND DARRIEUS WINDMILLS) ARE DISCUSSED AND ILLUSTRATED. DATA ARE PRESENTED FOR WIND ENERGY AVAILABLE AT SIX DANISH OBSERVATIONS STATIONS. A PRACTICAL CALCULATION SHOWS THAT 500-1200 KWH/ANNUM PER SQUARE METRE OF PROJECTED WIND-SAIL SURFACE ARE AVAILABLE.

1979-0581 OTTOSEN G O
WIND MILLS.
U.S. PATENT NO. 4,180,369, DECEMBER 25, 1979. 4 P.

A WIND MILL CONSTRUCTION IS DISCLOSED, INCLUDING A RIGID TOWER STRUCTURE TO THE UPPER END OF WHICH IS CONNECTED FOR ROTATION ABOUT A VERTICAL AXIS A WIND TURBINE HOUSING TO WHICH IS JOURNALLED FOR ROTATION ABOUT A HORIZONTAL AXIS A PROPELLER OF THE TWO-BLADE OR THREE-BLADE TYPE, CHARACTERIZED IN THAT A STRIP MEMBER EXTENDS GENERALLY HELICALLY ABOUT THE TOWER STRUCTURE FOR COUNTERACTING THE EFFECTS OF WIND UPON THE TOWER AND THE BLADES. THE STRIP MAY BE MOUNTED ON THE UPPER PORTION OF A TOWER THE BASE PORTION OF WHICH HAS A FRUSTOCONICAL CONFIGURATION. THE PITCH OF THE HELICAL STRIP IS PREFERABLY NO GREATER THAN THREE TIMES THE MAXIMUM DIAMETER OF THE UPPER TOWER PORTION.

1979-0582 PALMA F N
WIND TURBINE.
U.S. PATENT NO. 4,168,439, SEPTEMBER 18, 1979. 6 P.

THE FOLLOWING SPECIFICATION DISCLOSES AN IMPROVEMENT IN VERTICAL AXIS WIND MACHINES HAVING UPSTANDING BLADES. THE BLADES ARE ATTACHED TO A ROTATABLE RING WHICH SUPPORTS THE BLADES AT AN ANGLE OF 45 DEGREES TO THE HORIZONTAL PLANE OF THE RING. ASSOCIATED WITH THE WIND MACHINE IS A WIND VELOCITY SENSING DEVICE PRODUCING ELECTRICAL SIGNALS RESPONSIVE TO THE WIND VELOCITY. MEANS IS PROVIDED THE BLADES ATTACHED TO THE RING TO ADJUST THE ANGLE OF ATTACK OF THE BLADES IN RESPONSE TO THE MAGNITUDE OF THE SIGNALS.

1979-0583 PANEL REPORT ON CORROSION IN ENERGY SYSTEMS.
NTIS, JUNE 1979. 135 P.
DOE/ER/01198-1310

CORROSION PROBLEMS IN HIGH-TEMPERATURE (NON-AQUEOUS) ENERGY SYSTEMS, CORROSION IN AQUEOUS ENERGY SYSTEMS AND INSTITUTIONAL PROBLEMS INHIBITING THE DEVELOPMENT OF CORROSION SCIENCE AND ENGINEERING ARE DISCUSSED.

1979-0584 PARK G L
PLANNING MANUAL FOR UTILITY APPLICATION OF WECS.
NTIS, JUNE 1979. 245 P.
COO-4450-79/1

AN APPROACH FOR EVALUATING THE FEASIBILITY OF WIND ELECTRIC CONVERSION SYSTEMS (WECS) FOR UTILITY APPLICATION IS PRESENTED AND EXPLAINED. ASSESSMENT OF WIND ENERGY POTENTIAL, SITES, INTERCONNECTION, AND CAPITAL AND PRODUCTION COSTING IS INCLUDED.

1979-0585 PARK G L, KRAUSS O, ASMUSSEN J, LAWLER J
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977.
JOINT POWER GENERATION CONFERENCE, CHARLOTTE, NORTH CAROLINA, OCTOBER 7-11, 1979. NEW YORK, IEEE, NO. CH1464-7/79, 1979. PAP. A79816-0. 5 P.

THIS PAPER REVIEWS THE FEASIBILITY OF WIND POWER APPLICATION FOR A SMALL MUNICIPAL ELECTRIC SYSTEM. IT ANALYZES AND EVALUATES THE LOCAL WIND ENERGY RESOURCE, WIND-TURBINE SITES AND HYDRO-STORAGE AS RELATED TO THE EXISTING ELECTRIC SYSTEM. COMMERCIAL AVAILABILITY OF 500-KW AND 1,500-KW WIND TURBINE GENERATORS WAS ASSUMED. CAPITAL AND PRODUCTION-COST MODELS YIELDED BUS-BAR-COST ESTIMATES FOR WIND-GENERATED ELECTRICITY WHICH ARE COMPARED WITH THE COST OF OIL-FUELED DIESEL GENERATION. DEVELOPMENT OF A SIMPLIFIED PRODUCTION-COST MODEL, TO SIMULATE THE HOURLY BEHAVIOR OF SMALL ELECTRIC SYSTEMS, WAS PART OF THE TASK. THEREFORE, ONE IMPORTANT PRODUCT OF THE STUDY IS A PROCESS FOR EVALUATING FEASIBILITY OF WIND-ENERGY GENERATION FOR SMALL UTILITIES. THIS PAPER DESCRIBES THE PROCESS BY MEANS OF ITS APPLICATION TO HART, MICHIGAN. A SUPPLEMENTAL TASK INCLUDED IN THE PROJECT WAS THE ASSESSMENT OF THE WIND-HYDROELECTRIC POTENTIAL COMBINED WITH HYDRO-STORAGE IN WESTERN MICHIGAN AS IT RELATES TO WIND POWER UTILIZATION.

1979-0586 PARTHE A C
ENERGY TECHNOLOGY AND COMMERCIALIZATION ISSUES.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 25-40.
SERI/TP-245-184, CONF-790501

THIS PAPER REVIEWS THE CURRENT DOE WIND ENERGY PROGRAM. REFERENCES ARE MADE TO PREVIOUS GOVERNMENT SPONSORED DEVELOPMENT AND DEMONSTRATION PROJECTS; WHERE APPROPRIATE, ANALOGIES AND EXPERIENCE ARE RELATED TO THE WIND ENERGY PROGRAM. COMMERCIALIZATION REQUIREMENTS, AS VIEWED BY THE SUPPLY AND MARKET SECTORS, ARE EMPHASIZED.

1979-0587 PATNAIK P C
A PRELIMINARY USER'S GUIDE FOR THE SIGMET MESOSCALE METEOROLOGY CODE. SPECIAL REPORT FOR PERIOD JUNE 15, 1977--JUNE 15, 1978.
NTIS, JUNE 1979. 140 P.
DOE/ET/20280-2

THE SIGMET COMPUTER CODE IS A DETAILED PHYSICS MESOSCALE METEOROLOGY MODEL. THE CODE SIMULATES THE TRANSIENT EVOLUTION OF THE ATMOSPHERE IN A THREE-DIMENSIONAL MESOSCALE REGION INCLUDING EFFECTS OF COMPLEX TERRAIN, NON-LINEAR ATMOSPHERIC STABILITY, PLANETARY BOUNDARY LAYER TURBULENCE, AND THERMAL FORCING DUE TO SURFACE HEAT TRANSFER AND SOLAR/TERRESTRIAL RADIATION. THIS DOCUMENT IS A PRELIMINARY USER'S GUIDE, NOT A COMPREHENSIVE AND DETAILED USER'S MANUAL.

1979-0588 PATRICK J P
WIND TURBINE GENERATOR HAVING INTEGRATOR TRACKING.
U.S. PATENT NO. 4,161,658, JULY 17, 1979. 18 P.

A POWER GENERATING SYSTEM IS DESCRIBED WHICH INCLUDES A WIND TURBINE DRIVEN GENERATOR. THE WIND TURBINE HAS A WIND DRIVEN ROTOR WITH A PLURALITY OF VARIABLE PITCH ANGLE BLADES. THE BLADE ANGLE IS SCHEDULED DURING ACCELERATION AND DECELERATION OF THE WIND TURBINE BY OPEN LOOP CONTROLS TO MINIMIZE STRESSES, AND IS SCHEDULED DURING POWERED OPERATION BY CLOSED LOOP CONTROLS TO MAINTAIN DESIRED TORQUE OR SPEED. THE CLOSED LOOP CONTROLS CONTAIN AN INTEGRATOR WHICH PRODUCES AN INTEGRAL BLADE ANGLE CONTROL SIGNAL. THE SCHEDULED BLADE ANGLE IS FED BACK TO THE INTEGRATORS THROUGH AN INTEGRATOR TRACKING NETWORK TO MAINTAIN THE INTEGRAL BLADE ANGLE CONTROL SIGNAL AT ALL TIMES WITHIN A PRESELECTED RANGE RELATIVE TO THE SCHEDULED BLADE ANGLE.

1979-0589 PAYNE P E, SHEEHAN J L
HYBRID ALTERNATE ENERGY SYSTEM (SOLAR-WIND).
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 251-254.

THE HYBRID COMBINATION OF PHOTOVOLTAIC (P/V) SYSTEMS AND WIND ENERGY CONVERSION SYSTEMS (WECS) WHICH FORMS A HYBRID ALTERNATE ENERGY SYSTEM (HAES) INCREASES OVERALL ENERGY OUTPUT AND DECREASES ENERGY STORAGE REQUIREMENTS. CLIMATOLOGICAL DATA FROM VARIOUS NEVADA SITES SHOW THAT COST-EFFECTIVE APPLICATION OF HAES AT REMOTE LOCATIONS IMPROVES THE UTILIZATION OF THE SOLAR ENERGY RESOURCE. WHILE THE TOTAL SYSTEM OUTPUT MAY BE LESS THAN THE SUM OF THE HYBRID COMPONENTS' INDIVIDUAL CAPABILITY, THE REDUCTION OF BATTERY SIZE BECOMES SIGNIFICANT. THE CLIMATOLOGY INTUITIVELY LEADS DESERT DWELLERS TO THE CONCLUSION THAT THE WIND OFTEN BLOWS AT NIGHT WHEN THE SUN DOESN'T SHINE AND THE SUN OFTEN SHINES BRIGHTLY WHEN THE DESERT IS STILL DURING THE DAY. THE DATA CONFIRM THESE INTUITIVE OBSERVATIONS AND QUANTIFY HOW MUCH THE HAES CAN DECREASE OVERALL COSTS. THE DESIGN STUDIES PERFORMED HAVE BEEN FOR REMOTE LOCATIONS FOR INDEPENDENT AND UTILITY BACK-UP HAES APPLICATIONS. THE APPLICATIONS SO FAR HAVE BEEN FOR REMOTE DESERT COMMUNICATIONS, RANCHES, AND REMOTE EQUIPMENT. THE COST IMPROVEMENT VARIES WITH EACH LOCALE AND THE COST RATIOS OF P/V, WECS, AND STORAGE. THE DATA TAKEN PREDICT AN OVERALL SYSTEM COST IMPROVEMENT IN THE RANGE OF 10% TO 40%. THE DRIVING CONSIDERATIONS ARE LOAD PROFILE, PEAK DEMAND, BACK-UP POWER, LOW MAINTENANCE, COSTS, AND POWER MANAGEMENT.

1979-0590 PEDERSON B M
DANISH LARGE WIND TURBINE PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 103-120.
NASA-CP-2106

A SHORT ACCOUNT OF THE DANISH WIND ENERGY PROGRAM AND ITS PRESENT STATUS IS GIVEN. RESULTS AND EXPERIENCES FROM TESTS ON THE GEDSER WINDMILL (200 KW) ARE PRESENTED. THE KEY RESULTS ARE PRESENTED FROM THE PRELIMINARY DESIGN STUDY AND DETAILED DESIGN OF TWO NEW WECS (630 KW EACH). THESE TWO NEW WECS ARE PLANNED TO GO INTO OPERATION IN MID-1979. THE TVIND PROJECT (2 MW) IS BRIEFLY MENTIONED.

1979-0591 PENNELL W T, WEGLEY H L
SITING SMALL WIND TURBINES.
NTIS, MARCH 1979. 16 P.
PNL-SA-7603

A RECENT SURVEY HAS INDICATED THAT IMPROPER SITING HAS BEEN A COMMON CAUSE OF DISSATISFACTION AMONG USERS OF SMALL WIND TURBINES. THAT IS, THE USER HAS NOT RECEIVED THE POWER OUTPUT OR MACHINE LIFE HE EXPECTED. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE TURBINE SITE. A PROCEDURE IS PRESENTED FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND TURBINE. A METHOD FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN IS ALSO DESCRIBED. IN SOME CASES, EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF TURBINE PERFORMANCE CAN BE MADE.

1979-0592 PETERSEN D
MODES AND FREQUENCIES OF GROWIAN ROTOR BLADES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 105-138.
JUEL-SPEZ-28

DUE TO THE KNOWN CONSTRUCTION OF GROWIAN ROTOR BLADES, MODES AND FREQUENCIES WERE CALCULATED. THE COMPUTER PROGRAM USED TAKES INTO ACCOUNT CENTRIFUGAL FORCE EFFECT, THE OFFSETS OF SHEAR CENTER, CENTER OF BENDING STIFFNESSES, AND CENTER OF GRAVITY. FURTHERMORE, THE EFFECTS OF PRE-LOADING AND PRE-TWIST ARE INDUCED WITHIN THE CURRENT VERSION. THUS, MODES AND FREQUENCIES OF A REFERENCE VERSION COULD BE CALCULATED, AND REGIONS WHERE THE MATHEMATICAL MODELLING WAS UNCERTAIN DUE TO A LACK OF INFORMATION OR DIFFICULTIES OF MODELLING ARE DISCUSSED.

1979-0593 PETERSEN G, FRIES S, MOHN J, MULLER A
WIND AND SOLAR-POWERED REVERSE OSMOSIS DESALINATION UNITS-- DESCRIPTION OF TWO DEMONSTRATION PROJECTS.
DESALINATION 31(1-3): 501-509, OCTOBER 1979.

THE ENGINEERING DESIGN, THE SITE CONDITIONS AND THE PROVIDED OPERATION MODE OF TWO RO-DESALINATION PLANTS WITH THE GKSS PLATE MODULE SYSTEM SUPPLIED BY A 6 KW WIND ENERGY CONVERTER AND A 2.5 KW SOLAR GENERATOR RESPECTIVELY, ARE DESCRIBED. THE MAIN OBJECTIVE OF THESE PROJECTS IS THE OPERATION OF TWO PROTOTYPE PLANTS TO DEMONSTRATE THE RELIABILITY AND THE LOW MAINTENANCE REQUIREMENTS FOR THESE PLANTS, WHEN THEY ARE LOCATED IN REMOTE AREAS WITH INSUFFICIENT INFRASTRUCTURE.

1979-0594 PETERSEN H
SOME DATA FOR THE 12-M LONG WIND TURBINE BLADE MANUFACTURED BY VOLUND A/S AND O.L. BOATS, DENMARK.
RISO NATL. LAB. REP. RISO-M-2194, OCTOBER 1979. 23 P.
RISO-M-2194

THE REPORT DESCRIBES THE GLASS-FIBRE BLADES DESIGNED FOR THE USE AS OUTER WING PANELS FOR THE TWO DANISH NIBE WINDMILLS. HOWEVER, THE BLADES MAY FIND APPLICATION IN OTHER WINDMILL DESIGNS, FOR WHICH REASON THEY ARE DESCRIBED HERE INDEPENDENTLY OF THEIR ORIGINAL APPLICATION.

1979-0595 PHILBRICK D, KIPHUT A, MORGAN R

WIND ANEMOMETER LOAN PROGRAM.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2287-2290.

THE PROBLEM OF OBTAINING ADEQUATE, SITE-SPECIFIC WIND DATA HAS PROMPTED THE OREGON DEPARTMENT OF ENERGY TO ESTABLISH AN ANEMOMETER LOAN PROGRAM. THIS PAPER PROVIDES A DESCRIPTION OF OREGON'S WIND ANEMOMETER LOAN PROGRAM INCLUDING AN EVALUATION OF THE EQUIPMENT, DIFFERENT MECHANISMS FOR DISTRIBUTING THE EQUIPMENT, AND PRELIMINARY WIND DATA.

1979-0596 PHILBRICK D, KIPHUT A
WIND ANEMOMETER LOAN PROGRAM.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 72-74.
CONF-790845

THE PROBLEM OF OBTAINING ADEQUATE WIND DATA IN RESIDENTIAL AREAS HAS PROMPTED THE OREGON DEPARTMENT OF ENERGY TO ESTABLISH AN ANEMOMETER LOAN PROGRAM. UNDER THIS PROGRAM, TWELVE STEWART ANEMOMETERS WERE INSTALLED IN SIX COUNTIES BETWEEN NOVEMBER 1978 AND JANUARY 1979. A DETAILED DESCRIPTION OF OREGON'S WIND ANEMOMETER LOAN PROGRAM INCLUDING AN EVALUATION OF THE EQUIPMENT, DIFFERENT MECHANISMS FOR DISTRIBUTING THE EQUIPMENT, AND PRELIMINARY WIND DATA IS PRESENTED.

1979-0597 PHILLIPS G T
A PRELIMINARY USER'S GUIDE FOR THE NOABL OBJECTIVE ANALYSIS CODE. SPECIAL REPORT, JUNE 15, 1977-JUNE 15, 1978.
NTIS, JULY 1979. 117 P.
DOE/ET/20280-T1

THE NOABL CODE WAS DEVELOPED TO PROVIDE THE USER WITH AN ECONOMICAL WINDFIELD PREDICTOR. THE MODEL PRODUCES THREE DIMENSIONAL, TERRAIN-DEPENDENT, DIVERGENCE-FREE WINDFIELDS GIVEN OBSERVED SURFACE AND/OR UPPER-AIR DATA AS INPUT.

1979-0598 PHILLIPS P D
NEPA AND ALTERNATIVE ENERGY: WIND AS A CASE STUDY.
SOL. LAW REP. 1(1): 29-54, MAY 1979.

THIS ARTICLE ANALYZES THE PROBLEM OF WHETHER AND WHEN THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA) APPLIES TO ALTERNATIVE ENERGY SOURCES, USING WIND ENERGY AS A CASE STUDY. THE THREE ISSUES WHICH DETERMINE WHETHER AND WHEN AN ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED CAN BE SUMMARIZED AS FOLLOWS: (1) IS THERE A RECOMMENDATION OR REPORT ON A PROPOSAL FOR (2) FEDERAL ACTION (3) THAT IS MAJOR AND WILL SIGNIFICANTLY AFFECT THE ENVIRONMENT. A LIVELY AWARENESS OF HOW NEPA WORKS SERVES TWO IMPORTANT FUNCTIONS. FIRST, AN AGENCY OR INDIVIDUAL ATTUNED TO THE REQUIREMENTS OF NEPA IS MORE LIKELY TO TAKE THE NECESSARY PROCEDURAL STEPS TO COMPLY WITH THE STATUTE AND LESS LIKELY TO SEE A WORTHWHILE PROJECT MIRED IN LITIGATION, AS LAWYERS QUARREL OVER THE PRECISE MEANING OF A FEDERAL OR SIGNIFICANT ACTION. SECOND, THE PROCESS OF PREPARING AN ENVIRONMENTAL ASSESSMENT (AND, IF NECESSARY, AN ENVIRONMENTAL IMPACT STATEMENT) CAN SERVE IMPORTANT ENDS. BY FORCING PROJECT PROPONENTS TO CONFRONT THE FULL RANGE OF POSSIBLE ENVIRONMENTAL IMPACTS, BALANCE COMPETING VALUES AND SEARCH OUT MITIGATING ACTIONS, NEPA PROMOTES DECISION MAKING BY FEDERAL AGENCIES WHICH WILL BE ENVIRONMENTALLY MORE SENSITIVE AND ULTIMATELY MORE WISE. WIND MAY WELL BE ONE OF THE MOST ENVIRONMENTALLY SOUND ENERGY ALTERNATIVES AVAILABLE. NEVERTHELESS, AS THE INVENTORIES OF IMPACTS IN THIS ARTICLE ILLUSTRATE, EVEN WIND ENERGY HAS ITS ENVIRONMENTAL EFFECTS.

1979-0599 PIEPER W M
THE KIRSTEN-ROTOR AS A WIND-WHEEL.
BRENNST.-WAERME-KRAFT 31(11): 441-445, NOVEMBER 1979. (IN GERMAN)

THE PERFORMANCE OF THE KIRSTEN-ROTOR IS CALCULATED FOR VARIOUS CONDITIONS OF CIRCUMFERENTIAL SPEED AND VARIOUS BLADE WIDTHS. THE KINEMATICS AND DYNAMICS OF THE KIRSTEN-ROTOR AS WELL AS THE NUMERICAL EVALUATION OF THE EQUATION FOR THE ROTOR PERFORMANCE ARE DESCRIBED IN DETAIL.

1979-0600 PIEPERS G G
POTENTIAL FOR STORAGE OF ELECTRICITY PRODUCED BY WIND ENERGY CONVERSION SYSTEMS.
ENERGY. MEETING ON PROSPECTS FOR BATTERY APPLICATIONS AND SUBSEQUENT R AND D REQUIREMENTS, BRUSSELS, JANUARY 17, 1979. PROCEEDINGS. LUXEMBOURG, COMM. EUROPEAN COMMUNITIES, 1979. P. 159-162.

THOUGH IT IS DIFFICULT TO ESTIMATE THE POTENTIAL OF USING BATTERIES AS A STORAGE SYSTEM IN COMBINATION WITH THE SUCCESS OF DEVELOPING MORE RELIABLE AND ECONOMICAL STORAGE, BATTERIES WILL CERTAINLY HAVE A SIGNIFICANT EFFECT ON ECONOMICS.

1979-0601 PIEPERS G G
THE NETHERLANDS WIND ENERGY RESEARCH PROGRAMME.
INT. POWER GENERATION 2(6): 27-28, SEPTEMBER 1979.

HOLLAND IS KNOWN TRADITIONALLY AS A WINDMILL COUNTRY, WHICH MAY SUGGEST THAT THERE IS A GREAT DEAL OF KNOWLEDGE AVAILABLE REGARDING WIND ENERGY. THIS IS UNFORTUNATELY NOT THE CASE, AS THE OLD WINDMILLS ARE OF NO USE IN TERMS OF MODERN TECHNOLOGY. THE DUTCH GOVERNMENT'S NATIONAL FIVE YEAR RESEARCH DEVELOPMENT PROGRAMME ON WIND ENERGY IS NOW IN ITS THIRD AND FINAL STAGE.

1979-0602 PLACE T W
RESIDENTIAL FLYWHEEL WITH TURBINE SUPPLY.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 395-398.

A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO A 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE IS DESCRIBED. THE TYPICAL RESIDENCE HAS A 1500-SQ FT FLOOR AREA, WITH A MAXIMUM POWER LEVEL OF 5 KW. THE FLYWHEEL SYSTEM WAS DEFINED IN A STUDY TO DETERMINE THE COST BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE IN REDUCING INITIAL COSTS WERE EXAMINED.

1979-0603 PLACE T W
RESIDENTIAL FLYWHEEL WITH WIND TURBINE SUPPLY.
MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 287-293.
CONF-790854

A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO A 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE IS DESCRIBED. THE TYPICAL RESIDENCE HAS A 1500-SQ FT FLOOR AREA, WITH A MAXIMUM POWER LEVEL OF 5 KW. THE FLYWHEEL SYSTEM WAS DEFINED IN A STUDY TO DETERMINE THE COST BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE IN REDUCING INITIAL COSTS WERE EXAMINED. THIS PAPER DESCRIBES THE PROGRESS TO DATE ON THIS PROGRAM AND THE WORK PLANNED TO COMPLETE THE STUDY.

1979-0604 POOR R H, HOBBS R B
GENERAL ELECTRIC MOD-1 TURBINE GENERATOR PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 35-59.
NASA-CP-2106

THE MOD-1 WTG IS THE FIRST MEGAWATT CLASS MACHINE IN THE NATIONAL WIND PROGRAM. THE MOD-1 PROGRAM WHICH STARTED IN SEPTEMBER OF 1976 HAS AS ITS OBJECTIVES THE DESIGN, FABRICATION, INSTALLATION AND TEST OF A MEGAWATT CLASS WIND TURBINE GENERATOR (WTG) WHICH GENERATES UTILITY GRADE ELECTRICAL POWER. THE PROGRAM IS NEARING THE FINAL PHASE OF INSTALLATION AND CHECKOUT. THE BLADES ARE THE ONLY COMPONENTS REMAINING TO BE INSTALLED. NASA-LERC IS MANAGING THE MOD-1 PROGRAM FOR DOE. GENERAL ELECTRIC'S SPACE DIVISION LOCATED IN VALLEY FORGE, PA., IS THE PRIME CONTRACTOR, WITH GE ELECTRICAL EQUIPMENT PRODUCT DEPARTMENTS SUPPLYING COMPONENTS RANGING FROM SWITCHGEAR TO THE SYNCHRONOUS GENERATOR.

1979-0605 POWER H M
WINDMILLS ON THE MIND: A STUDY IN DYNAMICS AND CONTROL.
ELECTRON. POWER 25(4): 262-268, APRIL 1979.

A DYNAMICAL ANALYSIS OF WINDMILL PERFORMANCE TOGETHER WITH CONTROL STRATEGIES ARE PRESENTED. SOME UNCONVENTIONAL WINDMILLS THAT ARE CANDIDATES FOR POWER STATION APPLICATIONS ARE REVIEWED.

1979-0606 PRATT M
A TURN TO THE WIND.
AGRIC. ENG. 60(9): 11-14, SEPTEMBER 1979.

A SUMMARY OF THE WORKSHOP ON WIND ENERGY APPLICATIONS IN AGRICULTURE IS GIVEN. PAPERS WERE PRESENTED ON: (1) A WIND-ASSIST METHOD FOR DEEP WELL IRRIGATION PUMPING; (2) RESIDENTIAL HEATING USING A GRUMMAN WINDSTREAM 25; (3) HEATING WATER WITH A "WIND CHURN"; (4) APPLE STORAGE AND COOLING USING A 10 KW HORIZONTAL AXIS TURBINE.

1979-0607 PRICE W W, MACKLIS S L
WIND ENERGY CONVERSION SYSTEM TRANSIENT PERFORMANCE ANALYSIS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 366-376.
CONF-790352

WIND TURBINE GENERATORS (WTG'S) ARE SUBJECT TO CONTINUOUS TORQUE DISTURBANCES DUE TO GUSTING WIND CONDITIONS, AS WELL AS TOWER SHADOW AND WIND SHEAR EFFECTS. THIS UNIQUE FEATURE OF WTG'S HAS LED TO A CONCERN OVER THE VOLTAGE FLUCTUATIONS AND POSSIBLE STABILITY PROBLEMS WHICH MAY RESULT WHEN WIND ENERGY CONVERSION SYSTEMS (WECS) ARE APPLIED TO ELECTRIC UTILITY SYSTEMS. SPECIFICALLY, THE QUESTION IS WHETHER OBJECTIONABLE VOLTAGE FLUCTUATIONS OR STABILITY PROBLEMS WILL PRECLUDE CERTAIN WECS APPLICATIONS OR LIMIT THE SIZE OF WTG'S FOR CERTAIN APPLICATIONS AND WHETHER SPECIAL SYSTEM DESIGNS WILL BE NECESSARY TO ENSURE SUCCESSFUL OPERATION.

1979-0608 PURPA, WINDFARMS AND THE FINANCING OF WIND POWER.
WIND ENERGY REP.: 3-5, 10, DECEMBER 1979.

1979-0609 PYKKONEN K
STUDY OF DISPERSED SMALL WIND SYSTEMS INTERCONNECTED WITH A UTILITY DISTRIBUTION SYSTEM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 22-23.
RFP-3014(VOL.2)

THE GOAL OF THIS STUDY IS TO SUPPLY UTILITIES, SWECS DESIGNERS, SWECS OWNERS AND ELECTRICAL INTERCONNECTION EQUIPMENT MANUFACTURERS WITH SUFFICIENT INFORMATION TO PROMOTE THE DEVELOPMENT OF PROCEDURES AND HARDWARE FOR THE SAFE INTERTIE OF SIGNIFICANT NUMBERS OF SWECS WITH AN ELECTRICAL UTILITY DISTRIBUTION SYSTEM. THE CONTRACTOR WILL USE A SINGLE REPRESENTATIVE UTILITY FOR PURPOSES OF ANALYSIS, AND WILL PROVIDE BROADLY APPLICABLE (I.E. GENERIC) INFORMATION WHICH CAN BE USED BY DOE, SWECS MANUFACTURERS, UTILITIES AND SWECS OWNERS IN ASSESSING THE FEASIBILITY OF DISPERSED SWECS AT ANY LOCATION IN THE UNITED STATES. THIS STUDY WILL NOT CONSIDER THE ECONOMIC ASPECTS OF DISPERSED SWECS, EXCEPT AS THE ECONOMICS OF WIND POWER LIMIT THE TYPE AND COMPLEXITY OF INTERCONNECTION EQUIPMENT AND THE EXPENSES BORNE BY A UTILITY IN SWECS MANAGEMENT PROCEDURES.

1979-0610 RAAB A
COMBINED EFFECTS OF PERIODIC AND STOCHASTIC LOADS ON THE FATIGUE OF WIND TURBINE PARTS, PART 6.
NTIS, OCTOBER 29, 1979. 60 P.
FFA-AU-1499-PT-6, N80-28732/9

SELECTED TOPICS ON SIMULATION OF TURBULENCE AND FATIGUE EVALUATION OF WIND TURBINES ARE PRESENTED. THE IMPORTANCE OF CORRECT APPLICATION OF RANDOM LOADS AND THE MATHEMATICAL DESCRIPTION OF NONSTATIONARY PROCESSES (GENERAL THEORY) ARE DISCUSSED. THE TWO POINT CROSS SPECTRA OF TURBULENCE, WITH REGARD TO SHEAR FLOW IN THE BOUNDARY LAYER OF THE EARTH AND TO THE INCLINATION OF WIND GUSTS, IS DETERMINED. THE TWO POINT CORRELATION FUNCTIONS OF TURBULENCE WHEN THESE POINTS ARE SITUATED ON ROTATING BLADES IS EVALUATED. THE DISCRETE FORM OF THE CORRELATION FUNCTIONS GIVING THE CORRELATION MATRIX AND THE PROPERTIES OF THIS MATRIX IN THE CASE OF BAND LIMITED PROCESSES ARE GIVEN. BAND LIMITED, GAUSSIAN, MULTIVARIATE RANDOM PROCESSES, HAVING A PRESCRIBED CORRELATION MATRIX, ARE SIMULATED WITH THE AID OF CHOLESKI'S ALGORITHM. THE APPLICATION OF THE DESCRIBED THEORY TO THE EVALUATION OF FATIGUE IN THE CASE OF WIND TURBINES IS SHOWN.

1979-0611 RAMAGE C S
PROSPECTING FOR METEOROLOGICAL ENERGY IN HAWAII.
AM. METEOROL. SOC. BULL. 60(5): 430-438, MAY 1979.

HAWAII, WITH NO INDIGENOUS FOSSIL FUEL RESOURCES, IS PARTICULARLY SUSCEPTIBLE TO OIL SHORTAGES; HENCE, SURVEYS HAVE BEEN UNDERWAY FOR SOME TIME TO EVALUATE THE POTENTIAL OF WIND AND INSOLATION AS ALTERNATE ENERGY SOURCES. FIXED AND MOBILE STATIONS HAVE BEEN USED TO MONITOR THE WIND DISTRIBUTION, FINDING THAT ON PARTS OF EACH OF THE

MAIN ISLANDS AVERAGE SPEEDS ARE MORE THAN ADEQUATE FOR ECONOMIC POWER GENERATION. A RADIOMETER NETWORK ON OAHU AND SCATTERED MEASUREMENTS ELSEWHERE REVEAL THAT OVER MOST AREAS SHELTERED FROM THE TRADE WINDS, INSOLATION IS AS HIGH AS ANYWHERE IN THE CONTINENTAL UNITED STATES. CLOUDINESS DATA FROM WEATHER SATELLITES ARE USED TO REFINE THE INSOLATION MAPS.

1979-0612 RAMAGE C S, OSHIRO N E, YOKOGAWA S T
HAWAII WIND POWER SURVEY: FIXED STATION DATA.
NTIS, DECEMBER 1979. 66 P.
UHMET-79-15

WINDS ARE MEASURED AT WINDY LOCATIONS IN THE HAWAIIAN ISLANDS FOR PERIODS RANGING FROM 9 TO 40 MONTHS. CAREFUL CALIBRATION AND COMPARISON WITH THE NEAREST AIRPORT MEASUREMENTS ALLOW FOR CORRECTION OR ELIMINATION OF BAD DATA. THE DIFFERENCES WERE SUFFICIENTLY SMALL TO JUSTIFY COMPUTING SPEED DURATION AND POWER DENSITY, AND DIURNAL VARIATIONS OF WIND SPEED AND POWER DENSITY FOR EACH STATION. A SIGNIFICANT AREA ON EACH ISLAND POSSESSES HIGH ANNUAL WIND POWER (POWER DENSITY AT 50 M (164 FT) AGL EXCEEDING 400 W/SQ M). THE MONITORING OF THE STRONG WIND AREA OF NORTHWEST MOLOKAI, UNTIL NOW SAMPLED ONLY DURING MOBILE SURVEY, IS OUTLINED. PLANS INCLUDE MAKING DETAILED MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND THE VERTICAL PROFILE OF THE WIND IN EACH OF THE MAJOR STRONG WIND AREAS.

1979-0613 RAMAKUMAR R, DESHMUKH R G
APPLICATION OF PROBABILITY METHODS TO EVALUATE THE RELIABILITY OF A COMBINED WIND-ELECTRIC AND CONVENTIONAL GENERATION SYSTEM.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2282-2286.

THE MODELS, APPROACHES AND THE MAJOR PARAMETERS INFLUENCING THE APPLICATION OF PROBABILITY METHODS TO EVALUATE THE RELIABILITY OF A COMBINED WIND-ELECTRIC AND CONVENTIONAL GENERATION SYSTEM FEEDING A COMMON LOAD ARE DISCUSSED. CAPACITY OUTAGE PROBABILITY TABLES AND MARKOV MODELS ARE PRESENTED FOR A WIND-ELECTRIC CONVERSION SYSTEM.

1979-0614 RAMBO F
THE "EVAC" HOUSE THAT JACK BUILT.
MOTHER EARTH NEWS NO. 58: 106-107, JULY/AUGUST 1979.

THE ARTICLE TELLS OF AN EARTH-SHELTERED, SUN-TEMPERED, NEARLY TOTALLY ENERGY-SELF-SUFFICIENT HOUSE. THE BUILDING INCORPORATES THE USE OF SOLAR HEATING, HOT WATER STORAGE SYSTEM AND A 3-KW WINDPLANT.

1979-0615 RAMSHAW R S, BOWMAN D
HIGH TEMPERATURE STORAGE FOR A WIND ENERGY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 496-498.

THE SYSTEM IS DESIGNED TO USE WIND ENERGY TO PROVIDE "TOPUP" ENERGY FOR A HOME HEATING SYSTEM. ELECTRIC POWER IS GENERATED BY A WIND TURBINE GENERATOR AND CONVERTED TO HEAT IN A HIGH TEMPERATURE STORAGE UNIT WHICH SUPPLIES THE SPECIFIED LOAD. OPERATING CURVES OF A COMMERCIAL DARRIEUS WIND TURBINE AND GENERATOR ARE USED IN THE SIMULATION FROM WHICH A TRANSFER FUNCTION IS DERIVED. IT RELATES THE ELECTRICAL HEAT ENERGY TO THE WIND SPEED INPUT. THE OUTPUT HEAT ENERGY IS DIRECTED ONLY TO THE STORAGE FROM WHICH THE LOAD ENERGY IS PARTIALLY DERIVED.

1979-0616 REDDOCH T W
THE DISPERSED SCENARIO: A CUSTOMER OR UTILITY OPTION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2. P. 2-10.

THE AUTHOR DESCRIBES SOME OF THE PROBLEMS ENCOUNTERED WHEN TRYING TO INTEGRATE SMALL, ISOLATED, CUSTOMER-OPERATED GENERATING UNITS WITH THE ELECTRIC UTILITY.

1979-0617 REDDOCH T W
FIELD EXPERIENCE WITH WIND TURBINE GENERATOR OPERATION IN UTILITY SYSTEMS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 403-413.
CONF-790352

A VITAL PART OF THE DEVELOPMENT OF WIND TECHNOLOGY IS THE SUCCESSFUL INTEGRATION OF IT INTO ELECTRICAL POWER SYSTEMS. IN ORDER TO ACHIEVE THIS OBJECTIVE, THE FEDERAL WIND ENERGY PROGRAM HAS CHOSEN SEVENTEEN CANDIDATE SITES FOR FIELD TEST STUDIES, THREE OF WHICH WILL BE DISCUSSED IN THIS REPORT. THE SITES ARE CLAYTON, NEW MEXICO; CULEBRA, PUERTO RICO; AND BLOCK ISLAND, RHODE ISLAND. EACH SITE RECEIVES A DOE/NASA MOD-0A WHICH IS RATED AT 200 KW IN A 22.4 MPH WIND AT THE 30 METER HEIGHT. THE CHARACTERISTICS OF EACH SITE ARE SUFFICIENTLY DIFFERENT SUCH THAT THE SUM TOTAL OF INFORMATION PROVIDED BY THE SITES WILL YIELD VITAL DATA FOR BASIC INTEGRATION REQUIREMENTS.

1979-0618 REDDOCH T W, KLEIN J W
NO ILL WINDS FOR NEW MEXICO UTILITY.
IEEE SPECTRUM 16(3): 57-61, MARCH 1979.

A WIND TURBINE LINKED TO THE CLAYTON, N.M. UTILITY SYSTEM IS PROVIDING 15 PERCENT OF THE UTILITY'S OFF-PEAK POWER LOAD. SPONSORED A YEAR AGO AS A FEDERAL TEST PROJECT, THE FACILITY OVERCAME SEVERAL INITIAL PROBLEMS AND IS NOW UNDERGOING TECHNICAL AND ECONOMIC EVALUATION. THE TURBINE WAS ABLE TO OPERATE 80 PERCENT OF THE TIME WHEN WINDS WERE AT ACCEPTABLE LEVELS (WHICH WAS 57 PERCENT OF THE TIME) AND YIELDED AN OVERALL 20 PERCENT EFFICIENCY. PERFORMANCE DATA FOR THE WIND TURBINE AND THE INTEGRATED OPERATION ARE SUMMARIZED AND FUTURE DESIGN CHANGES BASED ON THE EXPERIMENT ARE INDICATED. THE ISOLATED CHARACTER OF CLAYTON WAS FOUND TO MINIMIZE POTENTIAL ENVIRONMENTAL IMPACTS.

1979-0619 REED J W
ANALYSIS OF THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS.
ENERGY 4(5): 811-822, OCTOBER 1979. (SPECIAL ISSUE: RENEWABLE ENERGY PROSPECTS, PROCEEDINGS OF A CONFERENCE ON NON-FOSSIL FUEL AND NON-NUCLEAR FUEL ENERGY STRATEGIES, HONOLULU, JANUARY 9-12, 1979).

WIND ENERGY CONVERSION SYSTEMS (WECS) ARE SOLAR SYSTEMS BECAUSE THE SUN DRIVES THE ATMOSPHERIC CIRCULATION. ABOUT 20 TW OF WIND ENERGY FLOWS POLEWARD ANNUALLY, OVER LAND IN TEMPERATE LATITUDES, IN THE 500 M DEEP

ATMOSPHERIC BOUNDARY LAYER. AN AVERAGE 500 GW OF ELECTRICITY COULD BE GENERATED BY MASSIVE EXPLOITATION OF THE U.S. GREAT PLAINS WIND FIELD. THERE ARE, HOWEVER, LARGE FLUCTUATIONS IN AVAILABLE WIND POWER. THERE ARE FREQUENT 20% VARIATIONS IN ANNUAL SUPPLY; ANNUAL PERIODICITY BRINGS MOST WIND POWER DURING THE SPRING; THERE ARE STORM CYCLES, AND THERE IS A DIURNAL CYCLE. GUSTS AND TURBULENCE ALSO REQUIRE FILTERING TO MEET NORMAL POWER REQUIREMENTS. SEVERAL SCHEMES ARE EVOLVING TO TAME THIS ERRATIC WIND POWER SUPPLY. MODERN TECHNOLOGY IS REFINING HORIZONTAL-AXIS TURBINES OF A WIDE SIZE RANGE. PROGRESS IS ALSO BEING MADE TOWARD PRODUCING AN ECONOMICAL VERTICAL-AXIS TURBINE. STANDARDS FOR TURBINE PERFORMANCE EVALUATION AND INSTALLATION SITE SELECTION ARE NOW BEING DEVELOPED.

1979-0620 REED J W
SOME VARIABILITY STATISTICS OF AVAILABLE WIND POWER.
NTIS, MARCH 1979. 50 P.
SAND-78-1735

THE LONG-TERM VARIABILITY OF AVAILABLE WIND POWER HAS BEEN STUDIED IN TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED WEATHER STATIONS. MONTH BY MONTH AND YEAR BY YEAR SUMS OF WIND POWER OCCURRENCES WERE USED TO GENERATE AVERAGE, STANDARD DEVIATION, AND AUTOCORRELATION STATISTICS. THE AMPLITUDE OF THE ANNUAL CYCLE IN AVAILABLE WIND POWER WAS AT LEAST 70% OF THE AVERAGE AT ALL LOCATIONS. LONG TERM INTEGRATED POWER PRODUCTIONS SHOWED MAXIMA AND MINIMA THAT DIFFERED BY 36 TO 91% FROM AVERAGE ANNUAL PRODUCTION.

1979-0621 REGULATIONS FOR THE CALIFORNIA SOLAR ENERGY TAX CREDIT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, JULY 1979. 18 P.
P-500-79-016

GUIDELINES WHICH SPECIFY SOLAR ENERGY SYSTEM AND ENERGY CONSERVATION MEASURES APPLIED IN CONJUNCTION WITH SOLAR ENERGY SYSTEMS WHICH ARE ELIGIBLE FOR CALIFORNIA STATE TAX CREDITS ARE PRESENTED.

1979-0622 THE "RENEWABLES" AND THE ENVIRONMENT.
ATOM NO. 273: 181-186, JULY 1979.

THIS PRELIMINARY REVIEW OF THE ENVIRONMENTAL ISSUES WHICH WOULD BE RAISED BY THE INTRODUCTION OF THE RENEWABLE ENERGY SOURCES INTO THE UK'S ENERGY SUPPLY IS A SHORTENED VERSION OF EVIDENCE SUBMITTED BY THE ENERGY SUPPORT UNIT TO THE COMMISSION ON ENERGY AND THE ENVIRONMENT. THE EVIDENCE, WHICH IS BEING PUBLISHED IN FULL BY THE DEPARTMENT OF ENERGY, WAS PRESENTED BY DR. J.K. DAWSON, HEAD OF ETSU. THE UNIT IS BASED AT AERE, HARWELL. THE RENEWABLE ENERGY SOURCES ARE TAKEN TO BE THE SUN, WHOSE ENERGY CAN APPEAR IN THE FORM OF HEAT, THE WIND, THE WAVES OF THE OCEANS, PLANT MATERIALS (WHICH MAY BE CONVERTIBLE TO LIQUID OR GASEOUS FUELS) AND WATER ABOVE SEA LEVEL (FROM WHICH WE CAN DERIVE HYDRO-POWER) AND THE EARTH'S ROTATION WHICH APPEARS AS TIDAL ENERGY. IN ADDITION GEOTHERMAL ENERGY, WHICH MAY BE RECOVERABLE FROM THE EARTH'S CRUST, IS INCLUDED ALTHOUGH ON A STRICT DEFINITION IT WILL NOT BE RENEWABLE ON HUMAN TIMESCALES AT ANY PARTICULAR LOCATION IN THE UK.

1979-0623 RENEWABLE OCEAN ENERGY SOURCES. PART II. WORKING PAPERS: OCEAN WINDS, CURRENTS, WAVES, TIDES AND SALINITY GRADIENTS.
NTIS, MARCH 1979. 153 P.
PB-295876

THE SIX RENEWABLE OCEAN ENERGY SYSTEMS RECEIVING FEDERAL RESEARCH SUPPORT AT PRESENT ARE: OCEAN THERMAL ENERGY CONVERSION (OTEC), TIDES, OCEAN WINDS, WAVES, CURRENTS, AND SALINITY GRADIENTS. THIS REPORT PROVIDES DETAILED ANALYSES AND DESCRIPTIONS OF FIVE OF THE SIX TECHNOLOGIES. IT COVERS THE SUBJECTS: (A) WINDS, CURRENTS AND WAVES; (B) TIDES; AND (C) SALINITY GRADIENTS.

1979-0624 RENNE D S
WIND CHARACTERISTICS FOR AGRICULTURAL WIND ENERGY APPLICATIONS.
NTIS, JANUARY 1979. 5 P.
CONF-7904120-1, PNL-SA-7270

WIND ENERGY UTILIZATION IN AGRICULTURE CAN PROVIDE A POTENTIALLY SIGNIFICANT SAVINGS IN FUEL OIL CONSUMPTION AND ULTIMATELY A COST SAVINGS TO THE FARMER. A KNOWLEDGE OF THE WIND CHARACTERISTICS WITHIN A REGION AT A LOCATION CAN CONTRIBUTE GREATLY TO A MORE EFFICIENT AND COST-EFFECTIVE USE OF THIS RESOURCE. CURRENT RESEARCH INDICATES THAT THE IMPORTANT WIND CHARACTERISTICS INCLUDE MEAN ANNUAL WIND SPEED AND THE FREQUENCY DISTRIBUTION OF THE WIND, SEASONAL AND DIURNAL VARIATIONS IN WIND SPEED AND DIRECTION, AND THE TURBULENT AND GUSTINESS CHARACTERISTICS OF THE WIND. FURTHER RESEARCH IS UNDERWAY TO PROVIDE A BETTER DEFINITION OF THE TOTAL WIND RESOURCE AVAILABLE, IMPROVED METHODS FOR SITING WECS AND IMPROVED UNDERSTANDING OF THE ENVIRONMENT TO WHICH THE WECS RESPOND.

1979-0625 RENNE D S, ELLIOTT D L
OVERVIEW OF TECHNIQUES FOR ANALYZING THE WIND ENERGY POTENTIAL OVER LARGE AREAS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 181-189.
RFP-3014(VOL.2)

THIS STUDY'S OBJECTIVE IS TO PRODUCE A REFINED ANALYSIS OF WIND ENERGY POTENTIAL OVER LARGE AREAS BY DEVELOPING PROTOTYPE TECHNIQUES FOR IDENTIFYING, SCREENING, AND ANALYZING ALL AVAILABLE WIND DATA WITHIN A GIVEN AREA AND FOR IDENTIFYING, THROUGH OBSERVATION AND ANALYTICAL METHODS, REGIONS OF HIGH WIND ENERGY POTENTIAL WITHIN THAT AREA WHERE NO DATA EXIST. ONCE DEVELOPED AND TESTED IN A SPECIFIC REGION, THESE PROTOTYPE TECHNIQUES WILL BE APPLIED TO OTHER LARGE AREAS OF THE U.S. THIS WORK WILL ULTIMATELY RESULT IN A HIGHLY REFINED NATIONAL WIND ENERGY ASSESSMENT.

1979-0626 REPPERT M H
SUMMER ATTIC AND WHOLE-HOUSE VENTILATION.
NTIS, JULY 1979. 155 P.
SUMMER ATTIC AND WHOLE-HOUSE VENTILATION WORKSHOP, GAITHERSBURG, MARYLAND, JULY 13, 1978.
PB-297497, NBS-SP-548

THIS REPORT CONTAINS THE PROCEEDINGS OF THE SUMMER ATTIC AND WHOLE-HOUSE VENTILATION WORKSHOP. THE PURPOSE OF THE WORKSHOP WAS TO PROVIDE A FORUM FOR TECHNICAL DISCUSSION TO ASSESS SUMMER ENERGY SAVINGS THAT MIGHT BE ACHIEVED FROM THE USE OF STATIC AND POWERED ATTIC VENTILATION AND WHOLE-HOUSE VENTILATION EQUIPMENT. PAPERS ON EXPERIMENTAL AND MATHEMATICAL MODEL STUDIES RELATING TO ATTIC AND WHOLE-HOUSE VENTILATION WERE PRESENTED. IN ADDITION, A PAPER ON ROOF SOLAR ABSORPTANCE AND ITS EFFECT ON THE COOLING REQUIREMENT OF A RESIDENCE WAS PRESENTED.

1979-0627 RILEY J D, ODLAND R, BARKER H
STANDARDS, BUILDING CODES, AND CERTIFICATION PROGRAMS FOR SOLAR TECHNOLOGY APPLICATIONS.
NTIS, JULY 1979. 140 P.
SERI/TR-53-095

THIS REPORT IS A PRIMER ON SOLAR STANDARDS DEVELOPMENT. IT EXPLAINS THE DEVELOPMENT OF STANDARDS, BUILDING CODE PROVISIONS, AND CERTIFICATION PROGRAMS AND THEIR RELATIONSHIP TO THE EMERGING SOLAR TECHNOLOGIES. THESE AREAS ARE IMPORTANT IN THE COMMERCIALIZATION OF SOLAR TECHNOLOGY BECAUSE THEY LEAD TO THE ATTAINMENT OF TWO GOALS: THE DEVELOPMENT OF AN INDUSTRY INFRASTRUCTURE AND CONSUMER CONFIDENCE.

1979-0628 ROAN V P
A NEW CONCEPT IN HORIZONTAL AXIS WIND TURBINE ROTORS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 680.

A NEW CONCEPT HAS BEEN DEVELOPED AT THE UNIVERSITY OF FLORIDA WHEREBY THE ROTOR BLADE IS CONSTRUCTED OF SEGMENTS SEPARATED BY AERODYNAMIC FENCES, WHICH MAY BE INDIVIDUALLY ORIENTED TO ACHIEVE THE SAME EFFECT AS A CONTINUOUSLY CONTOURED BLADE. SEGMENTS MAY BE MADE FROM INEXPENSIVE, LIGHT WEIGHT MATERIAL AND "SANDWICHED" ON THE ROTOR BLADE SHAFTS IN DIFFERENT NUMBERS AND VARIOUS ORIENTATIONS TO ALLOW THE SAME BASIC COMPONENTS TO BE USED FOR ENTIRE FAMILIES OF WIND TURBINES. SEVERAL PROTOTYPES HAVE BEEN BUILT AND TESTED, INCLUDING A 14 FOOT, 3-BLADED, 2 KILOWATT SYSTEM. BOTH POWER COEFFICIENT DATA AND PROJECTED ECONOMICS HAVE BEEN FAVORABLE FOR THE CONCEPTS INVOLVED IN THIS WIND MACHINE.

1979-0629 ROBBINS W H, THOMAS R L
LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 50-70.
CONF-790352

ONE FACET OF THE FEDERAL WIND ENERGY PROGRAM, LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT, IS BEING MANAGED BY THE NASA LEWIS RESEARCH CENTER. THESE ACTIVITIES CONSIST OF SEVERAL ON-GOING WIND SYSTEM DEVELOPMENTS ORIENTED TOWARD UTILITY APPLICATION. IN ADDITION, A COMPREHENSIVE TECHNOLOGY PROGRAM, WHICH SUPPORTS THE WIND TURBINE PROJECTS, IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES.

1979-0630 ROBERT J, NEWMAN B G
LIFT AND DRAG OF A SAIL AEROFOIL.
WIND ENG. 3(1): 1-22, 1979.

TESTS HAVE BEEN MADE ON A TWO-DIMENSIONAL SAIL AEROFOIL FORMED BY WRAPPING FABRIC ROUND A CIRCULAR LEADING EDGE AND BRINGING THE TWO SIDES TOGETHER TO FORM A SHARP TRAILING EDGE. FOR MOST OF THE TESTS UNCALENDERED NYLON WAS USED, BUT MORE LIMITED TESTS WERE MADE ON A SLIGHTLY HEAVIER CALENDERED DACRON FABRIC. MEASUREMENTS WERE MADE FOR THREE LEADING-EDGE RADII AND THREE CHORD LENGTHS. IN ADDITION THE PRESSURE INSIDE THE SAIL AND THE FORCE ON THE TRAILING EDGE WERE MEASURED. THE AEROFOILS WERE FOUND TO BE STABLE WITH NO TENDENCY TO FLAP. DUE TO THE INCREASE OF CAMBER WITH ANGLE OF ATTACK THEY GENERALLY HAD A HIGH LIFT-CURVE SLOPE AND A HIGH MAXIMUM LIFT BUT THEIR DRAG WAS ALSO HIGH WHEN COMPARED WITH COMPARABLE RIGID AEROFOILS.

1979-0631 ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. ATMOSPHERIC TEST DATA COLLECTED FROM SMALL WIND ENERGY CONVERSION SYSTEMS. SECOND INTERIM REPORT.
NTIS, JULY 1979. 120 P.
RFP-3004(VOL.1)

VOLUME I OF THE SECOND INTERIM REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES THE 16 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TESTED AS OF JUNE 30, 1979, AND PROVIDES THE SIGNIFICANT QUANTITATIVE AND QUALITATIVE DATA COLLECTED TO THAT DATE.

1979-0632 ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. CONTROLLED VELOCITY, VIBRATION AND DYNAMOMETER TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS. SECOND INTERIM REPORT.
NTIS, JULY 1979. 43 P.
RFP-3004(VOL.2)

VOLUME II OF THE SECOND INTERIM REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES PROGRESS IN THE DEVELOPMENT OF CONTROLLED VELOCITY, VIBRATION, AND DYNAMOMETER TEST CAPABILITIES. CONTROLLED VELOCITY TEST RESULTS FOR THE AERO POWER SL 1000 WIND SYSTEM AND VIBRATION TEST RESULTS FOR THE GRUMMAN, PINSON, MILLVILLE, KEDCO, AND 1/3 SCALE UNITED TECHNOLOGIES RESEARCH CENTER WIND MACHINES ARE PROVIDED.

1979-0633 RODRIGUEZ D J
COMPARISON OF THE FINITE ELEMENT AND FINITE DIFFERENCE METHODS IN A DIAGNOSTIC REGIONAL WIND FIELD MODEL.
NTIS, MAY 1979. 97 P.
UCRL-52789

A COMPARATIVE STUDY WAS UNDERTAKEN TO INVESTIGATE THE SIMILARITIES AND DIFFERENCES BETWEEN THE FINITE ELEMENT AND FINITE DIFFERENCE METHODS OF NUMERICALLY APPROXIMATING AN OBJECTIVE ANALYSIS EQUATION. BOTH MODELS ARE THREE-DIMENSIONAL, TIME-INDEPENDENT, AND INCORPORATE TERRAIN IN ADJUSTING A FIELD OF OBSERVED THREE-COMPONENT VELOCITIES TO ACHIEVE MASS-CONSISTENCY. PRINCIPLES FROM THE CALCULUS OF VARIATIONS ARE UTILIZED IN DEVELOPING MODEL EQUATIONS. THE VARIATIONAL APPROACH ASSUMES THAT VELOCITIES INPUT TO THE MODELS ARE A FAIR REPRESENTATION OF ACTUAL MEAN WINDS. STARTING WITH METEOROLOGICAL DATA AVAILABLE RANDOMLY ON A REGIONAL SCALE, WIND COMPONENT VALUES ARE INTERPOLATED AND EXTRAPOLATED TO EACH GRID POINT IN THE CALCULATIONAL DOMAIN IN A MANNER CONSISTENT WITH PREVAILING METEOROLOGY. MODEL ADJUSTMENTS ARE MADE IN RESPONSE TO THE ORIGINAL MASS-CONSISTENCY IN THIS FIELD OF DISCRETE VELOCITIES AND TO THE TOPOGRAPHICAL BOUNDARY SURFACE REPRESENTING THE APPLICATION AREA.

1979-0634 ROSE M
CUTTYHUNK ISLAND INSTALLATION WTG ENERGY SYSTEMS, INC. MP1-200 CONTROL SYSTEM DESIGN.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 283-296.
CONF-790352

A CONTROL SYSTEM FOR A WIND GENERATOR MUST SATISFY MANY REQUIREMENTS IF IT IS TO BE INTERCONNECTED TO A UTILITY NETWORK. IT SHOULD BE FULLY AUTOMATIC IN OPERATION AND CONTAIN THE NECESSARY LOGIC FOR STABLE AND ACCURATE

CONTROL OF THE GENERATOR'S FREQUENCY, POWER, VOLTAGE AND VAR OUTPUT. IN ADDITION, IT SHOULD PROVIDE THE NECESSARY PROTECTION FOR THE SYSTEM IN THE EVENT OF A COMPONENT FAILURE. A SYSTEM FOR CONTROLLING THE SPEED OF A WIND GENERATOR HAS BEEN DEVELOPED BY WTG ENERGY SYSTEMS, INC. WHICH UTILIZES LOAD MODULATION WITH A FIXED PITCH ROTOR CONFIGURATION. THE MP1-200 WIND TURBINE (FIGURE 1) PICTURED ON CUTTYHUNK ISLAND, MASSACHUSETTS UTILIZES A THREE BLADED, 80 FEET IN DIAMETER ROTOR OPERATING UPWIND OF THE TOWER. THE MACHINE IS CONSTRUCTED ENTIRELY OF STEEL. THE TOWER HEIGHT, MEASURED FROM GROUND LEVEL TO THE ROTOR'S CENTER LINE, IS 80 FEET. THE ROTOR OPERATES AT A CONSTANT 30 RPM DRIVING A 250 KVA SYNCHRONOUS GENERATOR THROUGH A 40:1 TRANSMISSION. BLADE TIPS ROTATE 60 DEGREES OUT OF PLANE TO PROVIDE AERODYNAMIC BRAKING. A 24 INCH DISC BRAKE MOUNTED ON THE HIGH SPEED SHAFT IS USED FOR PARKING THE ROTOR.

1979-0635 SCI AWARDED 4 KW DESIGN CONTRACT.
WIND ENERGY REP.: 6, OCTOBER 1979.

1979-0636 SACKS T
WORLD'S WINDPOWER PROGRAMMES LEAVE THE UK IN THEIR WAKE.
ELECTR. REV. 205(23): 16-17, DECEMBER 14-21, 1979.

THIS REPORT DISCUSSES HOW BRITAIN IS IN DANGER OF BEING RELEGATED TO THE ROLE OF AN ALSO-RAN IN THE WINDPOWER FIELD. UNLESS AT LEAST ONE (AND PREFERABLY MORE) AEROGENERATOR IN THE MEGAWATT CLASS IS BUILT SOON, THE UK WILL LAG SO FAR BEHIND OTHER COUNTRIES IN OPERATIONAL EXPERIENCE THAT AN UNBRIDGEABLE GAP IN WINDPOWER KNOWLEDGE MAY OPEN.

1979-0637 SANDIA TESTS EXTRUDED BLADES.
WIND POWER DIG. NO. 17: 14-16, FALL 1979.

1979-0638 SANESI N L
WINDPOWER AT BOARDMAN, OREGON, AND BREAK-EVEN ECONOMICS.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 47-50.
CONF-790845-(SUPPL.)

FIVE YEARS OF WIND DATA AT BOARDMAN, OREGON, IS ANALYZED FOR EXPECTED ELECTRIC ENERGY GENERATION FROM LARGE (1 TO 3 MWE) HORIZONTAL AXIS WIND TURBINE GENERATORS. BREAK-EVEN INVESTMENT COSTS REQUIRED FOR WIND TURBINE GENERATORS TO ECONOMICALLY OPERATE IN THE PACIFIC NORTHWEST ARE EXAMINED. THREE VARIABLES CAN IMPROVE THE BREAK-EVEN ECONOMICS: HIGHER AVERAGE ANNUAL CAPACITY FACTORS, HIGHER AMOUNTS OF CAPACITY CREDIT, AND LOWER FIXED COSTS. OTHER UNCERTAINTIES FOR THE WIND ENERGY TECHNOLOGIES TO OVERCOME BEFORE BEING CONSIDERED FOR COMMERCIAL APPLICATIONS ARE DEMONSTRATED OPERATING COMPATIBILITY WITHIN A UTILITY SYSTEM, RELIABLE PERFORMANCE, AND OUTAGE DATA. ONLY YEARS OF ON-SITE TESTING WILL ANSWER THESE QUESTIONS.

1979-0639 SARKISIAN P H, MCGOWAN J G
A PRELIMINARY INVESTIGATION OF THREE ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND FARM APPLICATIONS. VOLUME I. EXECUTIVE SUMMARY.
GOLDEN, COLORADO. ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1979. 21 P.
RFP-3059/67025/3533/80/4-1

THIS REPORT SUMMARIZES THE RESULTS OF AN ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF THREE ADVANCED WIND FURNACE HEATING SYSTEMS. THE WORK REPRESENTS AN EXTENSION OF PREVIOUS WORK ON WIND POWERED HEATING SYSTEMS AND EXTENDS THIS WIND ENERGY APPLICATION TO THE SUPPLY OF ELECTRICITY AS WELL AS SPACE AND HOT WATER ENERGY LOADS FOR RURAL RESIDENCES AND FARMS. DETAILS OF THE PROPOSED SYSTEMS AND THE ANALYTICAL MODELING OF THE OVERALL SYSTEM AND SUBCOMPONENTS ARE PRESENTED AS WELL AS TYPICAL SYSTEM ENERGY AND ECONOMIC PERFORMANCE.

1979-0640 SARKISIAN P H, MCGOWAN J G
A PRELIMINARY INVESTIGATION OF THREE ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND FARM APPLICATIONS. VOLUME II. TECHNICAL REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1979. 250 P.
RFP-3059/67025/3533/80/4-2

THIS REPORT IS PRIMARILY CONCERNED WITH AN ANALYSIS OF ADVANCED WIND FURNACE ENERGY SYSTEMS. THREE SUCH SYSTEMS, THE IMPROVED WIND FURNACE SYSTEM AND THE WIND DRIVEN TOTAL ENERGY SYSTEM, TYPES I AND II, FOR THE SUPPLY OF ENERGY TO ELECTRICAL, SPACE HEATING AND DOMESTIC HOT WATER LOADS ARE CONSIDERED FOR NEW ENGLAND RESIDENTIAL AND FARM APPLICATIONS. THESE SYSTEMS ARE STUDIED WITH THE AID OF AN INTERACTIVE DIGITAL COMPUTER SIMULATION (WDTES1) AND AN ECONOMICS PROGRAM (WSDECO). ALTHOUGH THE PROGRAMS INCORPORATE SOME IDEALIZATIONS, THEY REPRESENT A NECESSARY PRELIMINARY INVESTIGATION OF THE TOTAL SYSTEM AND ITS COMPONENTS. THE COMPUTER MODELS ARE DESIGNED TO BE GENERAL ENOUGH TO ALLOW FOR WIDE VARIATIONS OF LOADS, COMPONENT SIZES, WORKING FLUIDS AND ENERGY COSTS, BUT SPECIFIC ENOUGH TO APPROACH AN OPTIMUM DESIGN POINT BASED ON MAXIMUM ENERGY EFFICIENCY OR MINIMUM TOTAL SYSTEM COSTS.

1979-0641 SCHEFFLER R L
STATUS OF THE SOUTHERN CALIFORNIA EDISON COMPANY 3 MW WIND TURBINE GENERATOR (WTG) DEMONSTRATION PROJECT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 312-315.
CONF-790352

TO DEMONSTRATE THE CONCEPT OF UTILITY SCALE ELECTRICITY PRODUCTION FROM A HIGH WIND ENERGY RESOURCE, SOUTHERN CALIFORNIA EDISON COMPANY (SCE) HAS INITIATED A PROGRAM TO CONSTRUCT AND TEST A 3 MEGAWATT (3,000 KILOWATT) SCHACHLE WIND TURBINE GENERATOR (WTG) AT A SCE-OWNED SITE NEAR PALM SPRINGS, CALIFORNIA. THE BACKGROUND AND CURRENT STATUS OF THIS PROGRAM ARE PRESENTED ALONG WITH A SUMMARY OF FUTURE PLANNED PROGRAM ACTIVITIES.

1979-0642 SCHEFFLER R L
STATUS OF THE SOUTHERN CALIFORNIA EDISON COMPANY 3 MW WIND TURBINE GENERATOR (WTG) DEMONSTRATION PROJECT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 355-362.
NASA-CP-2106

TO DEMONSTRATE THE CONCEPT OF UTILITY SCALE ELECTRICITY PRODUCTION FROM A HIGH WIND ENERGY RESOURCE, SOUTHERN CALIFORNIA EDISON COMPANY (SCE) HAS INITIATED A PROGRAM TO CONSTRUCT AND TEST A 3 MEGAWATT (3000 KILOWATT) SCHACHLE WIND TURBINE GENERATOR (WTG) AT A SCE-OWNED SITE NEAR PALM SPRINGS. THE BACKGROUND AND CURRENT STATUS OF THIS PROGRAM ARE PRESENTED ALONG WITH A SUMMARY OF FUTURE PLANNED PROGRAM ACTIVITIES.

1979-0643 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
IMPACT OF STORM FRONTS ON UTILITIES WITH WECS ARRAYS.

WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 378-387.
CONF-790352

THE OBJECTIVES OF THIS DOE SPONSORED RESEARCH PROJECT ARE TO DETERMINE THE IMPACT OF SIGNIFICANT CHANGES IN WECS GENERATION ON AGC REGULATION, ECONOMIC DISPATCH, AND GOVERNOR FREQUENCY REGULATION; AND TO DETERMINE SOLUTIONS FOR SUCH OPERATING PROBLEMS CAUSED BY WECS GENERATION CHANGES. AN AGC SATURATION PROBLEM AND A RESULTANT VIOLATION OF NAPSIC PERFORMANCE REQUIREMENTS WERE SHOWN TO OCCUR FOR LARGE SIMULTANEOUS STORM INDUCED WECS GENERATION CHANGE AND LOAD CHANGE. THIS PROBLEM IS ALLEVIATED IF SPINNING RESERVE MARGINS ARE INCREASED. AN IMPROVEMENT IN RESPONSE TO WECS GENERATION CHANGES IS SHOWN TO BE POSSIBLE BY INCLUDING A HIGHER PERCENTAGE OF FASTER RESPONDING UNITS. FINALLY A CYCLING PHENOMENA WAS SHOWN TO OCCUR ON NUCLEAR UNITS IF THE GENERATION CHANGES ON ECHELONS IS GREAT ENOUGH TO CAUSE FREQUENCY DEVIATIONS THAT EXCEED GOVERNOR DEMAND ON THE UNIT IN QUESTION.

1979-0644 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
IMPACT OF STORM FRONTS ON UTILITIES WITH WECS ARRAYS. FINAL REPORT.
NTIS, OCTOBER 1979. 149 P.
COO-4450-79/2

THE EFFECTS OF LARGE RAPID CHANGES IN GENERATION FROM LARGE ARRAYS OF WIND TURBINE GENERATORS ON THE OPERATION OF AUTOMATIC GENERATION CONTROL AND FREQUENCY REGULATION WILL BE ASSESSED. THE MAXIMUM CHANGE AND RATES OF CHANGE OF GENERATION FROM AN ARRAY OF WIND TURBINES DUE TO PASSAGE OF A THUNDERSTORM FRONT IS DETERMINED FIRST. THE ASSESSMENT REQUIRED (1) MODELING AN ARRAY OF WIND TURBINES IN ORDER TO DETERMINE POWER VARIATION FOR CHANGES IN WIND SPEED CAUSED BY A STORM FRONT; (2) SIMULATION OF THE MODEL TO DETERMINE POWER VARIATION FROM A WORST CASE COASTAL FARM DUE TO PASSAGE OF A FRONT; AND (3) ANALYSIS OF THE MAXIMUM CHANGE AND RATES OF CHANGE FROM THE PORTION OF THE ARRAY AFFECTED BY THE FRONT.

1979-0645 SCHMITZ K, TERHORST W, WAGNER H J
SOLAR ENERGY--A COMPETITOR FOR NUCLEAR ENERGY?--SELECTED RESULTS OF ENERGY MODEL ANALYSIS.
ATOMKERNENERG. KERNTECH. 34(3): 177-181, 1979. (IN GERMAN)

NOWADAYS THE DIRECT AND INDIRECT USE OF SOLAR ENERGY IN THE FEDERAL REPUBLIC OF GERMANY SEEMS TO BE ONLY ECONOMICAL WITH THE APPLICATION OF WIND POWER STATIONS, SOLAR COLLECTORS AND HEAT PUMPS. THE CONTRIBUTION OF THESE TECHNOLOGIES TO THE POWER SUPPLY UNTIL 2010 IS EXAMINED BY MEANS OF AN ENERGY MODEL. THIS METHOD OFFERS THE ADVANTAGE OF WORKING WITHIN THE FRAMEWORK OF A CONSISTENT INTEGRATED PERSPECTIVE OF THE ENERGY ECONOMY. IT HAS BEEN SHOWN THAT THE CONTRIBUTION OF WIND POWER STATIONS TO THE OVERALL POWER GENERATION WILL BE MINIMAL UNTIL 2010. SOLAR COLLECTORS AND HEAT PUMPS PREFERABLY SUBSTITUTE LIGHT DISTILLATE OIL AND GAS IN THE RESIDENTIAL SECTOR. MARKET SHARES OF APPROXIMATELY 10 PERCENT SEEM TO BE POSSIBLE UNTIL THE YEAR 2010, CONSIDERING THE PRESENT STATE OF TECHNOLOGY. THE APPLICATION OF SOLAR ENERGY IS, THEREFORE, NO COMPETITOR FOR NUCLEAR ENERGY, WHICH IS ONLY USED FOR POWER GENERATION.

1979-0646 SCHNEIDER A D, CLARK R N
WIND-ASSISTED IRRIGATION PUMPING.
IRRIGATION & DRAINAGE IN THE NINETEEN-EIGHTIES. ASCE IRRIGATION AND DRAINAGE DIVISION SPECIALTY CONFERENCE, ALBUQUERQUE, JULY 17-20, 1979. NEW YORK, ASCE, 1979. P. 115-120.

A WIND-ASSISTED PUMPING SYSTEM HAS BEEN DESIGNED FOR USE WITH AN EXISTING IRRIGATION WELL AND VERTICAL TURBINE PUMP. THE SYSTEM HAS OPERATED SATISFACTORILY AND HAS EFFECTIVELY UTILIZED THE UNSTEADY POWER OUTPUT OF A WIND TURBINE. WIND-ASSISTED POWER SYSTEMS CAN BE UTILIZED IN ANY RURAL OR REMOTE APPLICATION WHERE A SECOND POWER SOURCE IS AVAILABLE.

1979-0647 SCHONBALL W
MECHANICAL OVERLOAD SYSTEMS FOR WIND GENERATORS.
U.S. PATENT NO. 4,142,830, MARCH 6, 1979. 4 P.

MOUNTED ON A VERTICAL AXIS THERE IS A HORIZONTAL AXIS AND, VERTICALLY SPACED THEREFROM, A WIND WHEEL GENERATOR AND COUNTERWEIGHT UNIT. WHEN THE WIND SPEED EXCEEDS A PREDETERMINED LIMIT, THE UNIT IS SWUNG THEREBY, IN A VERTICAL PLANE, DECREASING THE EFFECT OF THE WIND ON THE WHEEL AND PROTECTING IT FROM OVERLOAD.

1979-0648 SEELEY D, EUSER B, JOYCE C, MORGAN G H, LAITOS J G
SOLAR ENERGY LEGAL BIBLIOGRAPHY. FINAL REPORT.
NTIS, MARCH 1979. 169 P.
SERI/TR-62-069

THE SOLAR ENERGY LEGAL BIBLIOGRAPHY IS A COMPILATION OF APPROXIMATELY 160 SOLAR PUBLICATIONS ABSTRACTED FOR THEIR LEGAL AND POLICY CONTENT (THROUGH OCTOBER 1978). EMPHASIS IS ON LEGAL BARRIERS AND INCENTIVES TO SOLAR ENERGY DEVELOPMENT. ABSTRACTS ARE ARRANGED UNDER MANY CATEGORIES, INCLUDING WIND RESOURCES.

1979-0649 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE TO TELEVISION RECEPTION CAUSED BY HORIZONTAL AXIS WINDMILLS.
IEEE PROC. 67(8): 1133-1142, AUGUST 1979.

INTERFERENCE TO TELEVISION RECEPTION PRODUCED BY HORIZONTAL AXIS WIND TURBINE GENERATORS OR WINDMILLS HAS BEEN IDENTIFIED AND QUANTIFIED BY THEORETICAL AND EXPERIMENTAL STUDIES. IT IS FOUND THAT THE ROTATING BLADES OF A WINDMILL CAN PRODUCE PULSE AMPLITUDE MODULATION (PAM) OF THE TOTAL SIGNAL RECEIVED, AND THAT FOR AN ANTENNA SO LOCATED AS TO PICK UP THE SPECULAR OR FORWARD SCATTERING OFF THE BLADES, THIS EXTRANEOUS MODULATION CAN DISTORT THE VIDEO PORTION OF A TV SIGNAL REPRODUCTION IN THE VICINITY OF THE WINDMILL. THE DISTORTION IS WORST AT THE HIGHER FREQUENCIES, AND THEREFORE, POSES MORE OF A PROBLEM AT UHF THAN VHF. BASED ON LABORATORY STUDIES AS WELL AS ON-SITE MEASUREMENTS, A MODULATION LEVEL HAS BEEN ESTABLISHED AT WHICH THE VIDEO INTERFERENCE IS JUDGED "ACCEPTABLE", AND THIS THRESHOLD OF INTERFERENCE IS SUBSTANTIALLY INDEPENDENT OF THE AMBIENT SIGNAL STRENGTH. A THEORY HAS BEEN DEVELOPED TO COMPUTE THE INTERFERENCE REGION ABOUT A WINDMILL FOR ANY GIVEN TV TRANSMITTER, AND THE RESULTS ARE IN GOOD AGREEMENT WITH THOSE OBTAINED FROM ON-SITE MEASUREMENTS.

1979-0650 SENGUPTA D L, SENIOR T B A
WIND TURBINE GENERATOR INTERFERENCE TO TELEVISION RECEPTION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 213-214.
RFP-3014(VOL.1)

FOR THE PAST THREE YEARS THE RADIATION LABORATORY, UNDER SPONSORSHIP FROM DOE, HAS BEEN STUDYING THE EFFECTS OF

LARGE HORIZONTAL AXIS WIND TURBINE GENERATORS (WTG) OR WINDMILLS ON THE PERFORMANCE OF VARIOUS ELECTROMAGNETIC SYSTEMS. THE INVESTIGATION OF THE PROBLEM OF INTERFERENCE TO TELEVISION (TV) RECEPTION CAUSED BY WINDMILLS IS REVIEWED.

1979-0651 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE CAUSED BY HORIZONTAL AXIS WIND TURBINE GENERATORS.
ENVIRONMENTAL CONTROL SYMPOSIUM, WASHINGTON, D.C., NOVEMBER 28, 1978. NTIS, SEPTEMBER 1979. P. 173-181.
DOE/EV-0046(VOL.3)

SINCE 1976, THE RADIATION LABORATORY, UNDER SPONSORSHIP FROM DOE, HAS BEEN STUDYING THE EFFECTS OF LARGE HORIZONTAL AXIS WIND TURBINE GENERATORS (WTG) OR WINDMILLS ON THE PERFORMANCE OF VARIOUS ELECTROMAGNETIC SYSTEMS, AND THE PRESENT PAPER SUMMARIZES THE INVESTIGATION TO DATE.

1979-0652 SFORZA P M, STASI W J
FIELD TESTING THE VORTEX AUGMENTOR CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 171-184.
SERI/TP-245-184, CONF-790501

THIS REPORT CONCERNS THE FIELD TEST OF A LARGE-SCALE VAC MODEL. HERE WE PRESENT THE DETAILS OF A WIND DATA NETWORK, THE PROTOTYPE INSTRUMENTATION, THE DATA ACQUISITION AND PROCESSING SYSTEM, THE RESULTS OF THE FIELD TESTS OF SYSTEM PERFORMANCE, THE COMPARISONS TO THEORETICAL PREDICTIONS, AND A DISCUSSION OF THE PROBLEMS ASSOCIATED WITH FIELD TESTING AS WELL AS RECOMMENDATIONS FOR FURTHER RESEARCH BASED UPON THE EXPERIENCE GAINED IN THE PRESENT PROGRAM.

1979-0653 SHANKAR P N
DEVELOPMENT OF VERTICAL AXIS WIND TURBINES.
INDIAN ACAD. SCI. PROC. C2(1): 49-66, MARCH 1979.

DEVELOPMENT OF VERTICAL AXIS WIND TURBINES BASED ON THE DARRIEUS ROTOR IS DESCRIBED. ON THE ANALYTICAL SIDE, A PERFORMANCE ANALYSIS WAS DEVELOPED WHICH PERMITS THE ESTIMATION OF THE CHARACTERISTICS OF SUCH MACHINES. A 5 M HIGH WIND TURBINE USING CURVED WOODEN BLADES WAS DESIGNED, FABRICATED AND TESTED. BOTH THE THEORY AND INITIAL TESTS CONFIRMED THE LOW STARTING TORQUE OF THE TURBINE. WIND TUNNEL TESTS WERE PERFORMED ON MODEL SAVONIUS ROTORS TO DETERMINE OPTIMUM STARTER BUCKET CONFIGURATIONS. FINALLY A STRAIGHT-BLADED TURBINE WAS DESIGNED AND CONSTRUCTED. IT IS CONCLUDED FROM PRESENT EXPERIENCE THAT DARRIEUS TURBINES ARE LIKELY TO BE USEFUL IN LARGE SYSTEMS USED TO GENERATE ELECTRICAL POWER FOR GRID; FOR DIRECT WATER PUMPING PURPOSES, HOWEVER, THESE TURBINES ARE UNLIKELY TO BE SUITABLE.

1979-0654 SHEPHERD D G
WIND POWER.
ADV. ENERGY SYST. TECHNOL. 1: 1-124, 1978.

A BACKGROUND OF WIND POWER IS PRESENTED IN AN INTRODUCTORY SECTION. THE SUBJECTS COVERED IN ADDITIONAL SECTIONS ARE: ENERGY, POWER, AND MOMENTUM CONSIDERATIONS (ENERGY AVAILABLE, PERFORMANCE BOUNDARIES); TURBINE TYPES AND TERMINOLOGY; AERODYNAMICS OF WIND TURBINES (FLOW THROUGH A ROTOR, AERODYNAMIC ANALYSIS OF PROPELLER TYPE AND CROSS-WIND AXIS TYPE ROTORS); WIND ENERGY CONCENTRATORS AND AUGMENTORS; WIND CHARACTERISTICS AND SITING; ENVIRONMENTAL CONSIDERATIONS; STRUCTURAL CONSIDERATIONS; TESTING AND TEST PROCEDURES; APPLICATIONS AND SYSTEMS; ECONOMICS OF WIND POWER; STATE OF THE ART; AND WIND AND WEATHER PERMITTING.

1979-0655 SHEPHERD D C
ROCKY FLATS SUPPORTING RESEARCH AND TECHNOLOGY (SRT) PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 168-170.
RFP-3014(VOL.1)

THE SUPPORTING RESEARCH AND TECHNOLOGY (SRT) TASK ELEMENT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM ADDRESSES THE NEED FOR DEVELOPING TECHNOLOGY THAT WILL REDUCE SWECS COSTS AND IMPROVE SYSTEM RELIABILITY AND PERFORMANCE. THE FY 1979 ROCKY FLATS PROGRAM PLAN INCLUDES NINE SRT PROJECTS WHICH FOCUS ON THE DEVELOPMENT OF IMPROVED OR SIMPLIFIED ANALYTICAL TECHNIQUES AND THE DETERMINATION OF SPECIFIC COMPONENT PERFORMANCE DATA UNDER SPECIFIC CONDITIONS. A GENERAL STATEMENT FOR EACH PROJECT IS INCLUDED.

1979-0656 SHRINIVASA U, NARASIMHA R, JAJU S P G
PROSPECTS FOR WIND ENERGY UTILIZATION IN KARNATAKA STATE.
INDIAN ACAD. SCI. PROC. C2(4): 521-544, DECEMBER 1979.

THE TOTAL WIND ENERGY POTENTIAL OF THE STATE EXCEEDS THE CURRENT ELECTRICAL ENERGY CONSUMPTION BY AN ORDER OF MAGNITUDE. THERE IS LIKELY TO BE A STRONG NEED FOR MECHANICAL ASSISTANCE TO IRRIGATION FOR THE DRY CROPS OF THE NORTHERN REGION. A SUITABLE WINDMILL WOULD BE ABLE TO LIFT 10000 LITRES OF WATER PER HOUR IN WINDS OF 10 KM/H AND COSTING LESS THAN RS 10000. THE ECONOMIC RETURN FOR A THREE HECTARE FARM GROWING TWO DRY CROPS A YEAR USING A WIND PUMP COSTING ABOUT RS 12000 COULD BE 150 PERCENT ON AN INITIAL INVESTMENT OF RS 15000.

1979-0657 SIGL A B, COROTIS R B, WON D J
RUN DURATION ANALYSIS OF SURFACE WIND SPEEDS FOR WIND ENERGY APPLICATION.
J. APPL. METEOROL. 18(2): 156-166, FEBRUARY 1979.

HOURLY WIND SPEED RECORDS ARE USED TO DEVELOP A MODEL FOR THE PROBABILITY DISTRIBUTION OF WIND SPEED PERSISTENCE ABOVE AND BELOW FIXED REFERENCE SPEEDS. EXAMINATION OF DURATION HISTOGRAMS FROM 19 SITES FOR RECORDS VARYING FROM 5-24 YEARS LEADS TO THE DEVELOPMENT OF A SIMPLE COMPOSITE DISTRIBUTION. ENFORCEMENT OF SMOOTH BEHAVIOR AND A PARAMETER SENSITIVITY ANALYSIS ALLOW THE MODEL TO BE INTERPRETED IN TERMS OF A SINGLE FREE PARAMETER, WHICH IS THEN SHOWN TO BE HIGHLY CORRELATED TO THE SEASONAL MEAN WIND SPEED AT A SITE. COMPARISON OF RUN DURATION RESULTS FOR 1 AND 3 H DATA (THE LATTER BEING THE STANDARD DIGITIZATION PRESENTLY USED BY THE NATIONAL CLIMATIC CENTER) INDICATES A DEFINITE BIAS WITH THE 3 H RECORDS. A CORRECTION SCHEME IS DERIVED TO IMPROVE THE 3 H RESULTS.

1979-0658 SIMONIN J
TURBO-ELECTRIC AND TURBO-PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 681-683.

THIS PAPER DESCRIBES A THREE-BLADED WIND TURBINE OF AN ALUMINUM-STAINLESS STEEL ALLOY. THE TURBINE DRIVES A CURRENT GENERATOR (OR PUMP) WHICH IS A TWO OR THREE PHASE ALTERNATOR WITH PERMANENT MAGNETS AND ON ELECTRONIC

REGULATION WITH AN AUTOMATIC LIMITATION OF TENSION. THREE DIFFERENT MODELS WITH POWER BETWEEN 15 W AND 300 AND 12 TO 48 V. THE TURBINE HAS AN EFFICIENCY BASED UPON THE TOTAL WIND ENERGY OF APPROXIMATELY 40 PERCENT. IT CHARGES BATTERIES IN WINDS WITH VELOCITIES BELOW 5 MPH.

1979-0659 SIVASEGARAM S
CONCENTRATION AUGMENTATION OF POWER IN A SAVONIUS-TYPE WIND ROTOR.
WIND ENG. 3(1): 52-61, 1979.

A DETAILED EXPERIMENT WAS UNDERTAKEN, BASED ON MODEL TESTS, FOR DETERMINING THE OPTIMUM DESIGN OF A SYMMETRICAL, STRAIGHT-WALLED CONCENTRATOR. POWER AUGMENTATION BY A FACTOR OF 1.5 OR SLIGHTLY MORE IS POSSIBLE WITH CONCENTRATORS OF MODERATE SIZE. CONCENTRATORS WITH WIDER DUCT ANGLES GIVE BETTER POWER AUGMENTATION THAN THOSE WITH NARROWER ANGLES AND COMPARABLE SIZES. THE OPTIMUM VALUE OF THE MINIMUM WIDTH OF THE CONCENTRATOR IS ABOUT HALF THE ROTOR-WAKE WIDTH, AND THE OPTIMUM POSITION OF THE CONCENTRATOR IS OBTAINED WHEN THE DISTANCE BETWEEN THE ROTOR AXIS AND THE AXIS OF THE DUCT IS ABOUT ONE QUARTER OF THE ROTOR WAKE WIDTH. A REDUCTION IN THE CLEARANCE BETWEEN THE ROTOR AND THE SIDE WALLS OF THE CHAMBER RESULTS IN AN INCREASE IN POWER OUTPUT.

1979-0660 SLATER K, LODGE M
EVALUATION OF THE WORTH OF SYSTEM SCALE WIND GENERATION TO THE PRINCE EDWARD ISLAND ELECTRICAL GRID.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXPOSITION, TORONTO, OCTOBER 2-4, 1979. CONFERENCE DIGEST. NEW YORK, IEEE, 1979. P. 30-31.

THE SCOPE OF THIS SUMMARY IS RESTRICTED TO DESCRIBING THE RESULTS OF A STUDY OF THE UTILITY ASPECTS OF WIND ENERGY CONVERSION.

1979-0661 SMITH D R
WORKSHOP ON POWER CONDITIONING FOR ALTERNATIVE ENERGY TECHNOLOGIES. EXECUTIVE SUMMARY.
NTIS, 1979. 142 P.
SERI/TP-35-217(PT.2)

AS VARIOUS ALTERNATIVE ENERGY TECHNOLOGIES SUCH AS PHOTOVOLTAICS, WIND, FUEL CELLS, AND BATTERIES ARE EMERGING AS POTENTIAL SOURCES OF ENERGY FOR THE FUTURE, THE NEED ARISES FOR DEVELOPMENT OF SUITABLE POWER-CONDITIONING SYSTEMS TO INTERFACE THESE SOURCES TO THEIR RESPECTIVE LOADS. SINCE MOST OF THESE SOURCES PRODUCE DC ELECTRICITY AND MOST ELECTRICAL LOADS REQUIRE AC, AN IMPORTANT COMPONENT OF THE REQUIRED POWER-CONDITIONING UNITS IS A DC-TO-AC INVERTER. THE DISCUSSIONS DEAL WITH THE DEVELOPMENT OF POWER CONDITIONERS FOR EACH ALTERNATIVE ENERGY TECHNOLOGY.

1979-0662 SOCIAL ASSESSMENT OF ON-SITE SOLAR ENERGY TECHNOLOGIES.
NTIS, APRIL 1979. 251 P.
HCP/R4040-02

THE RESULTS OF AN ASSESSMENT OF THE IMPACT OF ON-SITE SOLAR ENERGY TECHNOLOGY UPON SOCIETY ARE PRESENTED. THE ASSESSMENT UTILIZES THE METHODOLOGY OF SOCIAL INDICATORS. TWENTY-FIVE APPROPRIATE SOCIAL DESCRIPTIONS PROVIDE THE FRAMEWORK FOR ASSESSING THE TECHNOLOGIES OF SOLAR SPACE HEATING AND COOLING, SOLAR WATER HEATING, WIND ENERGY CONVERSION, FUELWOOD AND PHOTOVOLTAICS. THE REPORT CONCENTRATES UPON THOSE AREAS WHICH CAUSE CONCERN AS THESE FORMS OF SOLAR ENERGY REALIZE INCREASING ACCEPTANCE AND USAGE BY INDIVIDUAL CITIZENS.

1979-0663 SOLAR ENERGY PROGRAM. ANNUAL REPORT, 1978.
NTIS, FEBRUARY 1979. 95 P.
ANL-79-16

THIS ANNUAL REPORT DESCRIBES THE WORK DONE AT ARGONNE NATIONAL LABORATORY ON THE SOLAR ENERGY PROGRAM DURING FY 1978 (JULY 1, 1977 TO JUNE 30, 1978). AREAS INCLUDED IN THIS REPORT ARE SOLAR ENERGY COLLECTION, HEATING AND COOLING, THERMAL ENERGY STORAGE, OCEAN THERMAL ENERGY CONVERSION, PHOTOVOLTAICS, SATELLITE POWER SYSTEMS, BIOCONVERSION, CENTRAL RECEIVER SOLAR THERMAL POWER, AND WIND ENERGY CONVERSION.

1979-0664 BOLAND J F
DESIGN PARAMETERS FOR SMALL WIND SYSTEMS.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP, DENVER, COLORADO, DECEMBER 18, 1979. NTIS, OCTOBER 1979, VOL. 2, PT. 2, P. 577-586.
SERI/TP-31-248(VOL.2)(PT.2)

THE ROCKY FLATS WIND SYSTEMS PROGRAM, OPERATED FOR THE DEPARTMENT OF ENERGY BY ROCKWELL INTERNATIONAL, WAS ORGANIZED IN 1976 TO SUPPORT DOE (THEN ERDA) IN ESTABLISHING SMALL WIND ENERGY CONVERSION SYSTEMS AS A VIABLE, COST-EFFECTIVE ALTERNATE ENERGY SOURCE. THESE SMALL SYSTEMS WOULD HAVE OUTPUTS LESS THAN 100 KW AND TYPICAL ROTOR DIAMETERS LESS THAN 30 M (100 FT). TO PROVIDE DATA HELPFUL IN THIS DEVELOPMENT WORK, A TEST CENTER FOR SMALL WIND SYSTEMS HAS BEEN ESTABLISHED AT THE DOE ROCKY FLATS PLANT ABOUT 30 MILES NORTHWEST OF DENVER. WHEN FULLY OPERATIONAL, THIS CENTER WILL BE CAPABLE OF SIMULTANEOUSLY FIELD TESTING UP TO 50 SMALL WIND SYSTEMS. COMMERCIALLY AVAILABLE SYSTEMS ARE NOW BEING TESTED AT THIS FACILITY. IN THE FUTURE, TESTING WILL BE CONDUCTED ON PROTOTYPE SYSTEMS BEING DEVELOPED BY PRIVATE COMPANIES.

1979-0665 ALDER G M
THE AERODYNAMIC PERFORMANCE OF THE SAVONIUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E10/119-126.

THIS PAPER DESCRIBES WIND TUNNEL TESTS ON A SAVONIUS ROTOR. THE ROTOR WAS OF HIGH ASPECT RATIO WITH BLADES OF SEMICIRCULAR CROSS-SECTION. THE MEAN AND THE PERIODIC COMPONENTS OF TORQUE, DRAG FORCE AND SIDE FORCE WERE MEASURED. THE RESULTS ARE PRESENTED.

1979-0666 ALEXANDER A J
WIND TUNNEL CORRECTIONS FOR SAVONIUS ROTORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E6/69-80.

THIS PAPER DESCRIBES SOME WORK DONE TO OBTAIN WIND TUNNEL AIR-SPEED CORRECTIONS FOR A SERIES OF SAVONIUS ROTORS. TO CHECK THE VALIDITY OF THESE AIR-SPEED CORRECTIONS POWER-MEASUREMENT TESTS WERE CARRIED OUT IN A LARGER WIND TUNNEL AND THE CORRECTED RESULTS COMPARED WITH THE ORIGINAL WORK. CONSIDERING THE MAGNITUDE OF THE CORRECTIONS AGREEMENT WAS GOOD, PARTICULARLY AT THE POINT OF MAXIMUM EFFICIENCY.

1979-0667 BONTIUS G H, MANDERS A H E, STOOP T

IMPLICATIONS OF LARGE SCALE INTRODUCTION OF POWER FROM LARGE WIND ENERGY CONVERSION SYSTEMS INTO THE EXISTING ELECTRIC POWER SUPPLY SYSTEM IN THE NETHERLANDS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G3/27-38.

THE DUTCH NATIONAL PROGRAM ON WIND ENERGY INCLUDES A BASIC STUDY OF THE CONSEQUENCES FOR THE NATIONAL ELECTRIC POWER SUPPLY SYSTEM IF A LARGE PROPORTION OF THE ELECTRIC ENERGY PRODUCED WERE DERIVED FROM LARGE WIND ENERGY CONVERSION SYSTEMS (WECS). THE EXISTING MV DISTRIBUTION GRID (10-20 KV) WILL NOT BE SUFFICIENT TO ABSORB THE POWER FROM ARRAYS OR PARKS OF WINDTURBINES. IT CAN BE SHOWN THAT ONLY TRANSMISSION NETWORKS AND SUBSTATIONS WITH VOLTAGES FROM 50 KV UPWARDS CAN BE USED. INTRODUCTION OF WINDTURBINES INTO THE EXISTING SYSTEM DOES NOT LEAD TO SAVINGS WITH REGARD TO THE NECESSARY POWER TO BE INSTALLED IN THE FORM OF CONVENTIONAL PLANT.

1979-0668 BUILTJES P J H
INTERACTION OF WINDMILL WAKES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B5/49-58.

THIS PAPER DESCRIBES HOW THE INTERACTION BETWEEN THE WAKES OF A GROUP OF DARRIEUS-ROTOR TYPE WINDMILLS WAS SIMULATED IN A SERIES OF WIND TUNNEL TESTS TO REACH AN ESTIMATE OF THE ENERGY OUTPUT OF SUCH A GROUP OF WINDMILLS. THE TESTS WERE REPEATED FOR VARIOUS SPACING BETWEEN THE WINDMILLS.

1979-0669 DE LAGARDE J M
A NEW CONCEPT. THE FLEXIBLE BLADE WINDMILL (FBW).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E5/61-68.

MODERN PLASTIC FOAMS AVAILABLE TODAY MAKE IT POSSIBLE TO DEVELOP A NEW CONCEPT FOR WINDMILLS. FLEXIBLE BLADES MADE OF FOAM BONDED TO RIGID LEADING AND TRAILING EDGES AND DRAWN BACKWARD BY A STRAPPING SYSTEM, ACT LIKE A BOAT SAIL CREATING A FORWARD FORCE WHEN SUBMITTED TO A SIDE WIND. BY DISPOSING SUCH BLADES TANGENTIALLY TO A CYLINDER VERY LIGHT, CHEAP AND EFFICIENT WINDMILLS WITH BUILT-IN REGULATION PROPERTIES CAN BE CONSTRUCTED. THE MODULAR CONSTRUCTION OF SUCH MACHINES COULD OPEN THE WAY TO VERY BIG SIZES. THIS KIND OF WINDMILL IS BEING DEVELOPED IN FRANCE THROUGH A JOINT INDUSTRY-UNIVERSITY PROGRAM.

1979-0670 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A3/17-28.

TESTING PROGRAMS ON SMALL WIND TURBINES AND LARGE UTILITY CLASS MACHINES ARE PRESENTED. DEMAND CHARGES FOR SMALL SYSTEMS AND THE POTENTIAL FOR TV INTERFERENCE WITH LARGE SYSTEMS ARE ADDRESSED. COST REQUIREMENTS OF 1 CENT TO 2 CENTS PER KWH ARE NEEDED TO ACHIEVE A SIGNIFICANT MARKET. PRESENT EXPERIMENTAL AND PROTOTYPE SYSTEMS PRODUCE ENERGY AT 10 CENTS TO 20 CENTS PER KWH.

1979-0671 DREES H M
THE CYCLOTURBINE AND ITS POTENTIAL FOR BROAD APPLICATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E7/81-88.

THE CYCLOTURBINE IS A VERTICAL AXIS, STRAIGHT BLADED, WIND DRIVEN TURBINE WITH CYCLICALLY PITCHED BLADES. ITS CONSTRUCTION, THE CONSIDERATIONS USED IN THE DESIGN, AND THE TURBINE'S PERFORMANCE CHARACTERISTICS ARE DESCRIBED. THE MACHINE'S PRESENT STATE OF DEVELOPMENT IS ALSO DESCRIBED.

1979-0672 FANTOM I D
PAPERS PRESENTED AT THE SECOND INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. 2 VOLS. 690 P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978.

1979-0673 FAXEN T
WAKE INTERACTION IN AN ARRAY OF WINDMILLS. THEORY AND PRELIMINARY RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B6/59-72.

THIS PAPER DESCRIBES A MODEL FOR PREDICTING THE POWER OUTPUT OF A GENERAL ARRAY OF WIND TURBINES WHICH USES A COMPUTER PROGRAM CAPABLE OF HANDLING ANY NUMBER OF IDENTICAL WIND TURBINE UNITS AT ANY POWER COEFFICIENT OR HEIGHT IN AN ARRAY OF ARBITRARY GEOMETRY ON LEVEL TERRAIN, AS THE WIND DIRECTION VARIES THROUGH 360 DEGREES. AN EXAMPLE INDICATES THAT FOR LARGE ARRAYS SIGNIFICANT POWER LOSSES CAN OCCUR FOR IMPROPER GEOMETRY. THE BIGGER THE ARRAY, THE MORE IMPORTANT IS AN ESTIMATE OF TURBULENCE. WAKE PROFILES OBTAINED IN FIELD TESTS AT THE 60 KW TEST UNIT AT KALKUGNEN, SWEDEN, ARE COMPARED TO THOSE PREDICTED BY THE MODEL WITH GOOD CORRELATION.

1979-0674 FRAENKEL P L
AN INTERNATIONAL DEVELOPMENT PROGRAMME TO PRODUCE A WIND-POWERED WATER-PUMPING SYSTEM SUITABLE FOR SMALL-SCALE ECONOMIC MANUFACTURE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. H1/1-16.

THIS REPORT DESCRIBES A HORIZONTAL AXIS WIND-TURBINE PUMPING SYSTEM, WHICH, THROUGH THE SUBSTITUTION OF DIFFERENT ROTORS AND PUMPS ON A STANDARD TRANSMISSION AND TOWER STRUCTURE IS APPLICABLE FOR A VARIETY OF PUMPING DUTIES INCLUDING CROP IRRIGATION AND BORE-HOLE WATER SUPPLIES IN ARID REGIONS. THE SYSTEM IS DESIGNED FOR ECONOMIC LOW-VOLUME MANUFACTURE, USING LIGHT INDUSTRIAL FACILITIES IN THIRD WORLD COUNTRIES. DISCUSSED IS THE RATIONALE FOR DEVELOPING A WIND-PUMP SYSTEM OF THIS KIND. A TECHNICAL DESCRIPTION OF THE CHOSEN SYSTEM IS PRESENTED. ECONOMIES ARE ALSO SOUGHT BY WEIGHT SAVINGS IN THE TRANSMISSION AND ROTOR CONFIGURATIONS.

1979-0675 GARSTANG M, PIELKE R, ASPLIDEN C, SNOW J W
OFFSHORE WIND POWER MODEL ESTIMATES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B4/33-48.

THE DETERMINATION OF WIND POWER POTENTIAL OF COASTAL WIND FIELDS THROUGH CONVERSION BY WINDMILLS IS EXAMINED IN TERMS OF A TWO AND THREE DIMENSIONAL MODEL. A WAVE-CYCLONE MODEL IS USED TO PROVIDE A PRELIMINARY ESTIMATE OF THE FREQUENCY DISTRIBUTION OF LARGE SCALE OR SYNOPTIC CONDITIONS ON THE NORTHEAST COAST OF THE UNITED STATES.

TESTS OF THE SKILL OF THE MODEL DEPEND UPON CAREFULLY DESIGNED MEASUREMENTS. THE POTENTIAL POWER OF COASTAL WIND MODELS IN PREDICTING OPTIMUM LOCATIONS OF WIND ENERGY CONVERSION SYSTEMS IN A REGION OF POOR OBSERVATIONS IS GREAT. APPLICATION, HOWEVER, DEPENDS UPON VERIFICATION OF MODEL PREDICTIONS.

1979-0676 GRYLLS W, DALE B, SARRE P E
A THEORETICAL AND EXPERIMENTAL INVESTIGATION INTO THE VARIABLE PITCH VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E9/101-118.

A COMPUTER MODEL OF THE VARIABLE PITCH VERTICAL AXIS WIND TURBINE IS USED TO INVESTIGATE THE POWER CHARACTERISTICS OF THIS CLASS OF MACHINE. THE PAPER GOES ON TO DESCRIBE THE CONSTRUCTION AND TESTING OF A 2.4 M DIAMETER PROTOTYPE. THE CORRELATIONS BETWEEN THE EXPERIMENTAL AND THEORETICAL FINDINGS ARE DISCUSSED.

1979-0677 GUSTAVSSON B, TORNKVIST G
TEST RESULTS FROM THE SWEDISH 60 KW EXPERIMENTAL WIND POWER UNIT
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D1/1-8.

MEASUREMENT DATA ARE TAPE RECORDED AND PROCESSED IN A COMPUTERIZED DATA REDUCTION AND PRESENTATION SYSTEM. INTERESTING RESULTS HAVE BEEN OBTAINED CONCERNING POWER CHARACTERISTICS, POWER PRODUCTION AND CONTROL, INFRA SOUND LEVEL AND DYNAMICS OF THE SYSTEM. EXPERIENCE OF THE OVERALL PERFORMANCE IS ALSO REPORTED.

1979-0678 HARDELL R, LJUNGSTROM O
OFF-SHORE BASED WIND TURBINE SYSTEMS (OS-WTS) FOR SWEDEN--A SYSTEMS CONCEPT STUDY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B8/85-113.

THE SWEDISH WIND ENERGY PROSPECTING PROGRAM NOW INCLUDES STUDIES OF POTENTIAL OFF-SHORE SITINGS. LAND AREAS WITH HIGH WINDS AND CORRESPONDING LOW COST WIND ENERGY ARE SCARCE IN SWEDEN. OFF-SHORE (OS) SITES MAY PROVE TO BE MORE COST-EFFECTIVE AND WILL REDUCE THE LAND REQUIREMENT FOR A GIVEN NATIONAL WIND ENERGY PRODUCTION. ENVIRONMENTAL, SOCIAL AND INDUSTRIAL ASPECTS AND IMPACTS OF OS-WTS ARE DISCUSSED, IN COMPARISON WITH LAND BASED SYSTEMS. THE GENERAL CONCLUSION IS THAT THE ADVANTAGES OF OS SYSTEMS ARE DOMINANT AND THAT FURTHER OS-SYSTEMS DESIGN, DEVELOPMENT AND PLANNING FOR SWEDEN SHOULD BE STRONGLY ENCOURAGED.

1979-0679 HOLME O
PERFORMANCE EVALUATION OF WIND POWER UNITS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C2/13-30.

THE PERFORMANCE CRITERION FOR A WIND POWER UNIT (WPU) IS THE AMOUNT OF ELECTRIC ENERGY PRODUCED DURING A TIME PERIOD, CONVENIENTLY EXPRESSED AS THE MEAN POWER OUTPUT FOR THE PERIOD. A METHOD IS PROPOSED FOR PRESENTING THE MEAN POWER OUTPUT IN NONDIMENSIONAL FORM AS A FUNCTION OF A FEW NON-DIMENSIONAL PARAMETERS. THE PARAMETER OF DOMINATING INFLUENCE IS THE RATIO BETWEEN THE WPU CHARACTERISTIC WIND SPEED WHICH IS THE WIND SPEED AT WHICH THE WPU WOULD PRODUCE ITS RATED POWER IF THERE WERE NO POWER LOSSES AND THE MEAN WIND SPEED AT THE WPU SITE. THE USE OF THE METHOD IS DEMONSTRATED BY SOME EXAMPLES.

1979-0680 HUGOSSON S
THE SWEDISH WIND ENERGY PROGRAMME.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A2/7-15.

THIS PAPER REVIEWS SWEDISH WIND ENERGY PROGRAMME. FULL SCALE PROTOTYPE LARGE SCALE WIND POWER UNITS ARE PLANNED TO ENTER OPERATION AND EVALUATION IN EARLY 1981. WORK ON SMALL SCALE WIND POWER UNITS IS CENTERED AROUND SPECIFYING A VERY RELIABLE AND SIMPLIFIED UNIT OF 8-10 KW SIZE, EQUIPPED WITH AN INDUCTION GENERATOR FOR STRAIGHTFORWARD CONNECTION TO A STABLE GRID. A COMPREHENSIVE MEASUREMENT PROJECT TO MAP THE WINDS OVER SWEDEN AT 50-100-150 METERS LEVEL HAS STARTED, TOGETHER WITH DEVELOPMENT OF WIND FORECASTING METHODS. LONGER-RANGE TECHNICAL DEVELOPMENT PROJECTS ARE IN HAND.

1979-0681 IGRA O, SCHULGASSER K
DESIGN AND CONSTRUCTION OF A PILOT PLANT FOR A SHROUDED WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F1/1-12.

THIS REPORT DESCRIBES HOW A SHROUDED WIND TURBINE PILOT PLANT WAS DESIGNED AND CONSTRUCTED FOR USE IN THE OPEN AIR. THE 3 M DIAMETER TURBINE GENERATES ABOUT 1 KW FOR A 5 M/S FREE STREAM WIND. THE PROBLEMS ASSOCIATED WITH THE MAINTENANCE OF THE AERODYNAMICALLY SHAPED SHROUD ARE DISCUSSED.

1979-0682 JENSEN N O, FRANDSEN S
ATMOSPHERIC TURBULENCE STRUCTURE IN RELATION TO WIND GENERATOR DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C1/1-12.

WIND GENERATOR DESIGN CRITERIA, BOTH FOR STRUCTURAL STRENGTH AND GENERATING PERFORMANCE, DEPEND CRITICALLY UPON THE STRUCTURE OF THE AMBIENT WIND. UNDER CONDITIONS APPROPRIATE FOR WIND POWER GENERATION THE ATMOSPHERIC BOUNDARY LAYER WILL ALWAYS BE IN A TURBULENT STATE. HENCE, GENERATOR DESIGN MUST ACKNOWLEDGE THE STOCHASTIC NATURE OF TURBULENT WIND VARIATIONS. MANY PROPERTIES OF BOUNDARY LAYER TURBULENCE CAN BE USEFULLY PARAMETERIZED IN TERMS OF VARIOUS SPECTRAL DISTRIBUTIONS INCLUDING SPATIAL PHASE AND COHERENCE RELATIONS. THIS PAPER SUMMARIZES THE AUTHOR'S EMPIRICAL KNOWLEDGE OF THESE CONCEPTS.

1979-0683 JOHANSON E E, GOLDENBLATT M K
AN ECONOMIC MODEL TO ESTABLISH THE VALUE OF WECS TO A UTILITY SYSTEM (WIND ENERGY CONVERSION SYSTEMS).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G2/9-26.

THIS PAPER DESCRIBES AN ECONOMIC MODEL THAT DETERMINES THE VALUE OF A WECS INSTALLATION WHICH WAS DESIGNED TO BE COMPATIBLE WITH EXISTING UTILITY PRODUCTION COST MODELS AND PLANNING TECHNIQUES. IT PROVIDES THE UTILITY WITH THE CAPABILITY OF REOPTIMIZING THE UTILITY CONVENTIONAL SOURCE MIX SO THAT THE MAXIMUM SAVINGS AND CAPACITY CREDIT ARE OBTAINED. THE MODEL, APPLIED TO A UTILITY IN THE NORTHEASTERN UNITED STATES FOUND THAT EACH WECS HAS LESS VALUE THAN THE FIRST SINCE THE FIRST UNITS REPLACE THE MOST EXPENSIVE FUELS. SENSITIVITY ANALYSES WERE APPLIED TO VARIOUS ECONOMIC FACTORS TO FIND WHICH AFFECTED THE VALUE OF THE WECS TO THE ACTIVITY

MOST.

1979-0684 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C4/49-66.

THE EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE ARE FORMULATED. QUASI-STEADY BLADE-ELEMENT STRIP THEORY WAS APPLIED TO DERIVE THE AERODYNAMIC OPERATOR WHICH INCLUDES BOUNDARY LAYER TYPE GRADIENT WINDS. THE FINAL EQUATIONS WHICH HAVE PERIODIC COEFFICIENTS WERE SOLVED TO OBTAIN THE AEROELASTIC RESPONSE AND STABILITY OF LARGE HORIZONTAL AXIS WIND TURBINE BLADE. A NEW METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION (REQUIRED FOR THE STABILITY ANALYSIS) HAS BEEN IMPLEMENTED. REPRESENTATIVE STEADY-STATE RESPONSES AND STABILITY BOUNDARIES, APPLICABLE MAINLY TO AN EXISTING BLADE DESIGN, ARE PRESENTED.

1979-0685 LODGE M
WIND ENERGY PROSPECTING IN PRINCE EDWARD ISLAND. A PROGRAM OVERVIEW AND STATUS REPORT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B3/21-32.

THE PROGRAM HAS THREE ELEMENTS WHICH ARE: WIND MONITORING DATA ANALYSIS AND SITING; LARGE WIND ENERGY CONVERSION SYSTEMS (WECS), INTEGRATION WITH UTILITY GRID; RURAL AND FARM APPLICATION OF SMALL WECS.

1979-0686 LUNDSAGER P, ASKEGAARD V, BJERREGAARD E
MEASUREMENTS OF PERFORMANCE AND STRUCTURAL RESPONSE OF THE DANISH 200 KW GEDSER WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D2/9-26.

THE INSTRUMENTATION IS DESCRIBED. 84 CHANNELS HAVE BEEN INSTALLED, 46 OF WHICH ARE TELEMETERED FROM THE ROTOR. THE ROTOR INSTRUMENTATION LAYOUT WAS DETERMINED FROM LABORATORY TESTS ON SINGLE BLADES, DURING WHICH THE FINAL INSTRUMENTATION WAS INSTALLED AND CALIBRATED. SHORT TERM MEASUREMENTS WILL BE PERFORMED DURING AUTOMATIC OPERATION AS WELL AS FORCES MANOEUVRES USING SCANNING FREQUENCIES UP TO 50 CPS. LONG TERM POWER/WIND MEASUREMENTS WILL BE CARRIED OUT. EXAMPLES OF RECORDS WILL BE PRESENTED AND DISCUSSED TOGETHER WITH EXPERIENCE WITH THE EQUIPMENT APPLIED.

1979-0687 MATZEN R
WIND ENERGY-HEAT GENERATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. H2/17-32.

THIS REPORT DISCUSSES THE USE OF FIXED PITCH PROPELLOR WIND-POWER PLANTS FOR WATER HEATING FITTED WITH ADJUSTABLE WATERBRAKES AS A GUST SAFETY MEASURE. IT DESCRIBES SOME EXPERIMENTS ON SIMPLE NON-ADJUSTABLE GENERATORS BUILT INTO A 135 LITRE TANK. TWO MAIN TYPES OF ADJUSTABLE BRAKE ARE ALSO DESCRIBED.

1979-0688 MUSGROVE P J, MAYS I D
DEVELOPMENT OF THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E4/39-66.

THIS PAPER DESCRIBES MEASUREMENTS THAT HAVE BEEN MADE ON A PROTOTYPE. THE PERFORMANCE HAS BEEN MEASURED IN THE OPEN AIR WITH REASONABLE AGREEMENT WITH THEORETICAL PREDICTIONS. IT COMPARES FAVOURABLY WITH AVAILABLE TEST DATA FOR DARRIEUS AND HORIZONTAL AXIS WINDMILLS. THE CHOICE OF OPTIMUM SOLIDITY IS DISCUSSED, AND THE EFFECTS OF LOW ASPECT RATIO CONSIDERED. IT IS SHOWN THAT LOW ASPECT RATIO COMBINED WITH HIGH SOLIDITY CAN BE EXPECTED TO GIVE AERODYNAMIC SELF START WITH ONLY MINOR LOSS OF PERFORMANCE. A LOW ASPECT RATIO, HIGH SOLIDITY VERTICAL AXIS WINDMILL WAS THEREFORE ALSO CONSTRUCTED, AND THESE EXPECTATIONS CONFIRMED.

1979-0689 OTTENS H H, ZWAAN R J
INVESTIGATIONS ON THE AEROELASTIC STABILITY OF LARGE WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C3/31-48.

THIS PAPER PRESENTS A DISCUSSION OF THE AEROELASTIC STABILITY OF WIND TURBINES WITH VERTICAL AXIS (VAWT) AND WITH HORIZONTAL AXIS (HAWT). RESULTS ARE GIVEN FOR AN EXISTING 5 M VAWT TEST-BED WITH AND WITHOUT A TIE-DOWN SYSTEM. DIFFICULTIES IN INTERPRETING PRELIMINARY RESULTS FOR A HAWT ARE DISCUSSED.

1979-0690 PIEPERS G G, SENS P F
THE NETHERLANDS RESEARCH PROGRAM ON WIND ENERGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A1/1-6.

AN OVERVIEW OF THE PRESENT STATUS AND FUTURE PLANS OF THE DUTCH WIND ENERGY PROGRAMME IS PRESENTED.

1979-0691 REICHEL R S
WINDPOWER PROGRAMMES IN TANZANIA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED... CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A5/45-52.

THE ELECTRICAL ENERGY DEMANDS FOR VILLAGES CAN HARDLY BE MET BY CONVENTIONAL METHODS BECAUSE INITIAL LOADS ARE TOO SMALL TO JUSTIFY THE WIDESPREAD USE OF TRANSMISSION LINES. WINDPOWER BASED VILLAGE POWER CENTRES COULD WELL BE ECONOMICAL, EVEN WITH PRESENT TANZANIAN ELECTRICITY SELLING RATES. INDIVIDUAL AND INSTITUTIONAL WIND POWER PROGRAMMES ARE MAINLY GEARED TOWARDS THE MANUFACTURING OF LOW COST EQUIPMENT WITHIN TANZANIA. SOME PROGRAMMES USING IMPORTED WINDMILLS FOR WATER PUMPING EXIST AS WELL.

1979-0692 ROTHMAN E A
THE EFFECT OF CONTROL MODES ON ROTOR LOADS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C7/107-117.

A LIMITED STUDY OF THE INTERDEPENDENCE OF WIND TURBINE CONTROL MODES IN SEVERE TURBULENCE AND RESULTING COMPONENT LOADING HAS BEEN CONDUCTED. THE STUDY WAS PERFORMED WITH AN AEROELASTIC, GROUNDED MODEL OF THE WIND TURBINE WITH TIME VARIABLE COLLECTIVE PITCH AND ROTOR SPEED. THE RESULTS SHOW THAT TURBINE LOADING IS

SIGNIFICANTLY INFLUENCED BY THE CONTROL MODE WHICH SUGGESTS THAT TURBINE WEIGHT CAN BE INFLUENCED BY THE CONTROL MODE AND, THEREFORE, THAT THE MOST DIRECT AND SECURE ROUTE TO THE LOWEST COST TURBINE IS THROUGH A CONSIDERATION OF THE COMPLETE SYSTEM AND ITS ENVIRONMENT.

1979-0693 SABZEVARI A
POWER AUGMENTATION IN A DUCTED SAVONIUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F3/25-34.

SEVERAL DUCTINGS, CONCENTRATORS AND DIFFUSERS ARE EXAMINED AND THEIR EFFECTS ON THE PERFORMANCE CHARACTERISTICS OF A SPLIT S SAVONIUS ROTOR ARE PRESENTED. THE SYSTEMATIC RESULTS OBTAINED FROM THE PERFORMANCE OF THE SEVERAL MODELS UNDER INVESTIGATION HAVE LED TO THE DESIGN OF A CIRCULARLY DUCTED SAVONIUS ROTOR EQUIPPED WITH A NUMBER OF IDENTICAL WIND CONCENTRATORS AND DIFFUSERS ALONG THE PERIPHERY OF ITS CYLINDRICAL HOUSING. THE NEW DESIGN TAKES ADVANTAGE OF WIND CONCENTRATION, DIFFUSION AND THE GENERATED WIND-DRAUGHT DUE TO THE LOW PRESSURE REGION BEHIND THE CIRCULAR ROTOR HOUSING CYLINDER. WIND TUNNEL RESULTS ARE PRESENTED.

1979-0694 SMEDMAN-HOEGSTROM A S
MEASUREMENT OF WIND SPEED AROUND A WIND POWER PLANT IN SWEDEN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B7/73-84.

THE PAPER DESCRIBES A METEOROLOGICAL FIELD STATION THAT HAS SET UP OPERATION AT A 60 KW WIND POWER TEST STATION AT KALKUGNEN IN SWEDEN. IT CONSISTS OF TWO 42 M MASTS, BOTH EQUIPPED WITH CUP ANEMOMETERS AT 6 LEVELS AND WIND DIRECTION AT TWO LEVELS. TEMPERATURE IS MEASURED AT 6 LEVELS. ON ONE MAST RADIATION, HUMIDITY AND AIR PRESSURE ARE ALSO MEASURED.

1979-0695 SORENSEN B
THE REGULATION OF AN ELECTRICITY SUPPLY SYSTEM INCLUDING WIND ENERGY GENERATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G1/1-8.

SIMULATIONS OF A SYSTEM CONSISTING OF A NUMBER OF FUEL-BASED POWER GENERATION UNITS, PLUS WIND ENERGY GENERATORS WITHOUT ENERGY STORAGE FACILITIES ARE DONE. A SIMPLE WIND FORECASTING TECHNIQUE, BASED ON CRUDE EXTRAPOLATIONS, IS USED TO PREDICT THE BASE AND INTERMEDIATE LOAD, THAT WIND GENERATORS CAN BE EXPECTED TO REPLACE. DECISIONS TO START OR STOP FUEL-BASED UNITS ARE MADE ON THE BASIS OF THESE PREDICTIONS. IF THEY ARE WRONG BEYOND THE REGULATING CAPACITY OF THE POWER UNITS ALREADY IN OPERATION, USE OF PEAK LOAD UNITS OR UNPLANNED IMPORT IS REQUIRED. THE OPTIMUM SHARE OF WIND GENERATORS IN SUCH A MODEL SYSTEM IS DISCUSSED.

1979-0696 SOUTH P, RANGI R S, TEMPLIN R J
OPERATING EXPERIENCE WITH THE MAGDALEN ISLANDS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E1/1-10.

THIS PAPER DESCRIBES THE EXPERIENCE OBTAINED ON THE MAGDALEN ISLANDS WIND TURBINE DURING THE FIRST NINE MONTHS AFTER ERECTION. IT EXPLAINS SOME OF THE PROBLEMS ASSOCIATED WITH OPERATING THE MACHINE ON A REMOTE SITE. SOME DATA IS GIVEN ON THE BLADE DYNAMIC STRESSES AND ON THE BLADE NOISE LEVEL PRODUCED BY THE TURBINE.

1979-0697 THORNBLAD P
GEARS FOR WIND POWER PLANTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C6/89-106.

THIS REPORT DISCUSSES THOSE FACTORS WHICH INFLUENCE THE SIZE, WEIGHT AND COST OF GEARS FOR LARGE WIND POWER PLANTS. A COMPARISON BETWEEN SEVERAL DIFFERENT GEARING CONFIGURATIONS IS MADE, WHICH SHOWS CLEARLY THAT PLANETARY GEARS HAVE BIG ADVANTAGES OVER PARALLEL GEARS FOR THIS APPLICATION. A NEW EPICYCLIC GEAR DESIGN BASED ON EXPERIENCE FROM HUNDREDS OF EPICYCLIC GEARS USED FOR MARINE PROPULSION IS PRESENTED. A THREE STAGE VERSION OF THIS DESIGN OFFERS AN ATTRACTIVE SOLUTION TO THE TRANSMISSION PROBLEMS OF LARGE WIND POWER PLANTS.

1979-0698 USHIYAMA I
THE DEVELOPMENT OF WIND POWER PLANTS IN JAPAN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A4/29-4.

THIS PAPER REVIEWS THE HISTORICAL DEVELOPMENT, THE PRESENT STATUS AND FUTURE PROSPECTS OF WIND POWER PLANTS IN JAPAN. THERE ARE NO LARGE SCALE DEVELOPMENT PROJECTS. A NUMBER OF TRIALS OF SMALL SCALE DEVELOPMENTS HAVE BEEN MADE. ABOUT 10 PERCENT OF JAPAN'S PRESENT TOTAL POWER CONSUMPTION COULD BE OBTAINED FROM WIND POWER.

1979-0699 VAN ESSEN A A, TER BRUGGE R, VAN DEN BERG J M, PIEPERS G G, BONGAARTS A L M
PHYSICAL PLANNING ASPECTS OF LARGE-SCALE WIND ENERGY EXPLOITATION IN THE NETHERLANDS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B1/1-10.

IT HAS BEEN ESTIMATED THAT 5000 WIND ENERGY CONVERSION SYSTEMS (WECS) WITH A DIAMETER OF 50 M COULD PRODUCE 10-20% OF PRESENT DAY ELECTRICITY PRODUCTION IN THE NETHERLANDS OCCUPYING 20% OF THE COASTAL AREA. THE PHYSICAL PLANNING ASPECTS ARE STUDIED. THE COASTAL AREA OF THE NETHERLANDS IS SUBDIVIDED INTO 52 REGIONS WITH AN AVERAGE YEARLY WIND VELOCITY OF MORE THAN 6 M/S AT 40 M HEIGHT, EACH SUFFICIENTLY LARGE TO CONTAIN ONE OR MORE WIND ENERGY PARKS OF MORE THAN 100 WECS. THE SITING OF WECS WILL INVOLVE DECISIONS IN WHICH COMPROMISES BETWEEN VARIOUS INTERESTS WILL HAVE TO BE SOUGHT.

1979-0700 VAN HOLTEN T
TIPVANE RESEARCH AT THE DELFT UNIVERSITY OF TECHNOLOGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F2/13-24.

THIS PAPER PRESENTS SOME FIRST RESULTS OF WORK DONE TO VERIFY THE TIPVANE CONCEPT. TIPVANES ARE SMALL AUXILIARY WINGS MOUNTED AT THE TIPS OF TURBINE BLADES SO THAT A DIFFUSER EFFECT IS GENERATED, RESULTING IN A MASS FLOW AUGMENTATION THROUGH THE TURBINE DISC. MASS FLOW AUGMENTATIONS OF 4 OR 5 HAVE BEEN DEMONSTRATED.

1979-0701 VANSANT J H, MCCONNELL R D, WATTS A
A 200 KW VERTICAL AXIS WIND TURBINE--RESULTS OF SOME PRELIMINARY TESTS.

INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E2/11-22.

AN EXPERIMENTAL VERTICAL AXIS WIND TURBINE HAS BEEN INSTALLED IN THE MAGDALEN ISLANDS. A PERFORMANCE EVALUATION PROGRAM IS BEING CARRIED OUT. THROUGH A MECHANICAL DRIVE SYSTEM, IT POWERS A 224 KW INDUCTION GENERATOR WHICH IS CONNECTED TO THE ISLAND'S ELECTRICAL DISTRIBUTION GRID. THE GENERATOR IS USED AS A STARTING MOTOR AND ALSO TO KEEP THE TURBINE RUNNING AT NEAR CONSTANT SPEED. THE TURBINE HAS BEEN OPERATED AT APPROXIMATELY THREE-FOURTHS RATED SPEED. SOME RESULTS OF PERFORMANCE MEASUREMENTS AT THIS SPEED ARE PRESENTED WITH OTHER DATA.

1979-0702 VOLLAN A J
THE AEROELASTIC BEHAVIOUR OF LARGE DARRIEUS-TYPE WIND ENERGY CONVERTERS DERIVED FROM THE BEHAVIOR OF A 5.5 M ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C5/67-88.

CONDITIONS OF SIMILARITY WERE INVESTIGATED FOR DARRIEUS ROTORS OF VARIOUS SIZES AND TROPOSKIEN SHAPED BLADES. IT IS SHOWN THAT THE ROTORS ARE SIMILAR WITH REGARD TO THEIR AEROELASTIC BEHAVIOUR. SCALING UP A SMALL ROTOR, HOWEVER, LEADS TO A VERY HEAVY STRUCTURE AND THE CONTROL OF THE BENDING STRESSES CREATES PROBLEMS. IT IS NECESSARY THEREFORE TO REDUCE THE STRUCTURAL EXPANSE OF LARGER WIND ENERGY CONVERTERS WHICH RESULTS IN INCREASED DANGER OF AEROELASTIC INSTABILITY.

1979-0703 WARNE D F, KETLEY G R, TYNDALL D H, CROWDER R
DESIGN CONCEPT FOR A 60 M DIAMETER WIND TURBINE GENERATOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D3/27-37.

THIS PAPER DISCUSSES THE DESIGN OF A LARGE WIND TURBINE GENERATOR SUITABLE FOR NETWORK OPERATION. THE AIM HAS BEEN TO DESIGN A MACHINE FOR MINIMUM ENERGY COST AT HIGH MEAN WIND SPEEDS (10-12 M/S AT 10 M HEIGHT) TYPICALLY FOUND ON HILL SITES ALONG THE NORTH WEST COAST OF SCOTLAND. THE DESIGN PHILOSOPHY HAS BEEN SIMPLICITY AND RUGGEDNESS; IT HAS LED TO THE SELECTION OF A FIXED PITCH, FIXED SPEED TURBINE COUPLED THROUGH A FIXED RADIO TRANSMISSION TO AN INDUCTION GENERATOR.

1979-0704 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 197 . PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B2/11-20.

THE WIND CHARACTERISITCS PROGRAM ELEMENT (WCPE) HAS THE RESPONSIBILITY FOR ASSEMBLING AND DEVELOPING WIND CHARACTERISTICS INFORMATION APPROPRIATE TO THE NEEDS OF THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND THE OPERATION OF WECS. THE TECHNICAL PROGRAM OF THE WCPE HAS BEEN DIVIDED INTO FOUR AREAS. RESEARCH AND DEVELOPMENT PROGRESS AND PRODUCTS IN EACH OF THESE PROGRAM AREAS ARE SUMMARIZED IN THIS PRESENTATION.

1979-0705 WILSON R E, MCKIE W R
A COMPARISON OF AERODYNAMICS ANALYSES FOR THE DARRIEUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E8/89-100.

IN THIS REPORT, A COMPARISON IS MADE OF THE SINGLE STREAMTUBE, MULTIPLE STREAMTUBE, FIXED WAKE AND FREE WAKE ANALYSES OF A STRAIGHT BLADED DARRIEUS ROTOR USING POTENTIAL FLOW AERODYNAMICS. THE ANGLE OF ATTACK, LIFT COEFFICIENT, CIRCULATION AND LOADS ARE EXAMINED FOR A ROTOR OPERATING AT MAXIMUM PERFORMANCE. THE UNSTEADY AERODYNAMIC FORCES ARE EVALUATED WITH SPECIAL CONSIDERATION GIVEN TO WAKE CROSSING TRANSIENTS.

1979-0706 SOLAR TAX CREDIT REGULATIONS. INTERIM COMMITTEE REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 17 P.
NP-24048

ON SEPTEMBER 25, 1978, GOVERNOR BROWN SIGNED INTO LAW AB 3623, A MODIFICATION TO EXISTING STATUTES WHICH ALLOW CALIFORNIA TAXPAYERS TO CREDIT UP TO 55 PERCENT OF THE COST OF A SOLAR ENERGY SYSTEM AGAINST THEIR STATE INCOME TAX OBLIGATIONS (REVENUE AND TAXATION CODE, SECTIONS 17052.5 AND 23601). ON OCTOBER 25, 1978, THE ENERGY COMMISSION ADOPTED AN ORDER INSTITUTING HEARINGS TO CONFORM THE COMMISSION'S REGULATIONS (TITLE 20, CHAPTER 2, SUBCHAPTER 8, ARTICLE 1) TO THE STATUTORY CHANGES RESULTING FROM AB 3623. THE ORDER PROVIDED FOR CONSIDERATION OF THE DEFINITION OF SOLAR ENERGY SYSTEM, ADOPTION OF ELIGIBILITY CRITERIA FOR WIND AND SOLAR ELECTRIC SYSTEMS, AND OTHER TECHNICAL OR CLARIFYING CHANGES. A SET OF PROPOSED NEW REGULATIONS, TOGETHER WITH A STAFF REPORT IN SUPPORT OF THE SUGGESTED CHANGES, WAS MADE AVAILABLE TO THE PUBLIC ON DECEMBER 29, 1978. HEARINGS ON THE PROPOSED REVISIONS TO THE REGULATIONS WERE HELD ON JANUARY 15 AND JANUARY 16, 1979, IN SAN FRANCISCO AND LOS ANGELES, RESPECTIVELY. THIS INTERIM COMMITTEE REPORT SUMMARIZES THE ARGUMENTS ON THE PROPOSED REGULATIONS AND THE COMMITTEE'S CONCLUSIONS TO DATE.

1979-0707 SOLAR TAX CREDIT REGULATIONS. FINAL COMMITTEE REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 5 P.

THIS FINAL COMMITTEE REPORT, TOGETHER WITH THE INTERIM COMMITTEE REPORT AND THE ATTACHED SET OF PROPOSED REGULATIONS, CONSTITUTE RECOMMENDATIONS OF THE SOLAR IMPLEMENTATION AND COORDINATION COMMITTEE TO THE CALIFORNIA ENERGY COMMISSION FOR THE IMPLEMENTATION OF AB 3623. THESE RECOMMENDATIONS WILL BE CONSIDERED FOR ACTION AT THE COMMISSION'S JULY 11, 1979 BUSINESS MEETING IN SACRAMENTO.

1979-0708 SOLBERG J
PASSIVE SOLAR UNDERGROUND: A HYBRID TAKES ROOT.
ALTERN. SOURCES ENERGY NO. 39: 10-12, SEPTEMBER 1979.

TWO EXAMPLES OF EARTH SHELTERED PASSIVE SOLAR HOUSES BUILT IN MINNESOTA ARE DESCRIBED. ONE DESIGN INCORPORATES WIND ENERGY AND PASSIVE SOLAR TO ACHIEVE ENERGY EFFICIENCY, WHEREAS THE OTHER DESIGN RELIES ON PASSIVE SOLAR AND A BACK-UP OIL/WOOD FURNACE.

1979-0709 SOUTH P, WATTS A
MAGDALEN ISLANDS VAWT FIELD TEST.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 334-351.

CONF-790352

AN EXPERIMENTAL VAWT HAS BEEN INSTALLED ON THE MAGDALEN ISLANDS AS A JOINT HYDRO-QUEBEC-NRC VENTURE. THE ROTOR IS 37 M HIGH BY 24 M DIAMETER AND DRIVES A 224 KW INDUCTION GENERATOR WHICH IS CONNECTED TO THE ISLANDS' ELECTRICAL DISTRIBUTION GRID. THE TURBINE HAS BEEN OPERATED AT UP TO APPROXIMATELY 80% OF DESIGN RPM. SOME RESULTS OF PERFORMANCE MEASUREMENTS AT THIS SPEED ARE GIVEN. THE RESULTS INDICATE THAT THE TURBINE PERFORMANCE IS SATISFACTORY AND THAT IT SHOULD PRODUCE ITS FULL RATED POWER. THE TURBINE ROTOR WAS DESTROYED IN AN ACCIDENT AND THE TURBINE IS UNDERGOING EXTENSIVE REPAIRS.

1979-0710 SPAULDING A P
WTG ENERGY SYSTEMS' MP1-200: 200 KILOWATT WIND TURBINE GENERATOR.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 79-88.
NASA-CP-2106

THE AREAS TO BE DISCUSSED ARE RELATED TO THE PRELIMINARY DESIGN CRITERIA AS UTILIZED ON THE MP1-200. THE SIGNIFICANCE OF THESE DESIGN CRITERIA IS BASED ON THE FACT THAT THE MP1-200 IS THE ONLY WIND TURBINE IN OPERATION TODAY THAT IS PRODUCING SYNCHRONOUS ALTERNATING CURRENT USING A FIXED PITCH ROTOR CONFIGURATION. THE MP1-200 IS INSTALLED ON CUTTYHUNK ISLAND, MASSACHUSETTS AS PART OF THE ISLAND'S INDEPENDENT UTILITY GRID SYSTEM.

1979-0711 SPERA D A
DESIGN EVOLUTION OF LARGE WIND TURBINE GENERATORS.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 25-33.
NASA-CP-2106

THE DESIGN OF LARGE WIND TURBINES OF THE HORIZONTAL-AXIS TYPE HAS EVOLVED RAPIDLY DURING THE PAST FIVE YEARS. MAJOR CHANGES HAVE TAKEN PLACE IN THE STRUCTURAL AND MECHANICAL FEATURES OF SECOND GENERATION WIND TURBINES LIKE THE 2.5 MW MOD-2, COMPARED WITH FIRST GENERATION MACHINES LIKE THE 200 KW MOD-0A AND 2.0 MW MOD-1. THESE CHANGES HAVE REDUCED THE PROJECTED COST OF ELECTRICITY PRODUCED BY SECOND GENERATION WIND TURBINES TO ONE-HALF THAT OF FIRST GENERATION SYSTEMS. TO SHOW THE SCOPE AND NATURE OF RECENT CHANGES IN WIND TURBINE DESIGNS, DEVELOPMENTS OF THREE TYPES ARE DESCRIBED: (1) SYSTEM CONFIGURATION DEVELOPMENTS; (2) COMPUTER CODE DEVELOPMENTS; AND (3) BLADE TECHNOLOGY DEVELOPMENTS. DEVELOPMENTS IN SYSTEM CONFIGURATION ARE SHOWN BY DIRECT COMPARISON OF MOD-2 COMPONENTS WITH EQUIVALENT ELEMENTS IN THE EARLIER MOD-0A SYSTEM.

1979-0712 SPERA D A, RICHARDS T R
MODIFIED POWER LAW EQUATIONS FOR VERTICAL WIND PROFILES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 47-56.
ALSO: NTIS, 1979. 11 P.
PNL-3214, N80-13623, NASA-TM-79275, DOE/NASA/1059-79/4

EQUATIONS ARE PRESENTED FOR CALCULATING POWER LAW EXPONENTS FROM WIND SPEED AND SURFACE ROUGHNESS DATA. RESULTS ARE EVALUATED BY COMPARISON WITH WIND PROFILE DATA MEASURED AT A VARIETY OF SITES.

1979-0713 SPERA D A, VITERNA L A, RICHARDS T R, NEUSTADTER H E
PRELIMINARY ANALYSIS OF PERFORMANCE AND LOADS DATA FROM THE 2-MEGAWATT MOD-1 WIND TURBINE GENERATOR.
NTIS, OCTOBER 1979. 16 P.
NASA-TM-81408, DOE/NASA/1010-79/5

PRELIMINARY TEST DATA ON OUTPUT POWER VERSUS WIND SPEED, ROTOR BLADE LOADS, SYSTEM DYNAMIC BEHAVIOR, AND START-STOP CHARACTERISTICS ON THE MOD-1 WIND TURBINE GENERATOR ARE PRESENTED. THESE DATA WERE ANALYZED STATISTICALLY AND ARE COMPARED WITH DESIGN PREDICTIONS OF SYSTEM PERFORMANCE AND LOADS. TO DATE, THE MOD-1 WIND TURBINE GENERATOR HAS PRODUCED UP TO 1.5 MW OF POWER, WITH A MEASURED POWER VERSUS WIND SPEED CURVE WHICH AGREES CLOSELY WITH DESIGN. BLADE LOADS WERE MEASURED AT WIND SPEEDS UP TO 14 M/S AND ALSO DURING RAPID SHUTDOWNS. PEAK TRANSIENT LOADS DURING THE MOST SEVERE SHUTDOWNS ARE LESS THAN THE DESIGN LIMIT LOADS. ON THE INBOARD BLADE SECTIONS, FATIGUE LOADS ARE APPROXIMATELY EQUAL TO THE DESIGN CYCLIC LOADS. ON THE OUTBOARD BLADE SECTIONS, HOWEVER, MEASURED CYCLIC LOADS ARE SIGNIFICANTLY LARGER THAN DESIGN VALUES, BUT THEY DO NOT APPEAR TO EXCEED FATIGUE ALLOWABLE LOADS AS YET.

1979-0714 SPERA D A
STRUCTURAL ANALYSIS CONSIDERATIONS FOR WIND TURBINE BLADES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 211-224.
NASA-CP-2106

ITEMS WHICH SHOULD BE CONSIDERED IN THE STRUCTURAL ANALYSIS OF A PROPOSED BLADE DESIGN ARE BRIEFLY REVIEWED. THESE ITEMS INCLUDE THE SPECIFICATIONS, MATERIALS DATA, AND THE ANALYSIS OF VIBRATIONS, LOADS, STRESSES, AND FAILURE MODES. THE REVIEW IS LIMITED TO THE GENERAL NATURE OF THE APPROACHES USED AND RESULTS ACHIEVED.

1979-0715 SPERA D A
STRUCTURAL DYNAMIC ANALYSIS OF LARGE WIND TURBINES IN THE USA.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 239-269.
JUEL-SPEZ-28

INFORMATION IS PRESENTED CONCERNING COMPUTER CODES USED TO ANALYZE LARGE WIND TURBINES, THE WEST HYBRID WIND TURBINE SIMULATOR, AND BLADE STRESS ANALYSIS AND MODIFICATIONS FOR THE MOD-0A 200 KW WIND TURBINE IN CLAYTON, NEW MEXICO.

1979-0716 SPERO E, DYBBS A
SOLAR ASSISTED AND WIND POWERED HEAT PUMP FOR RESIDENTIAL DWELLINGS.
ASME PAPER 79-WA/HT-33, 1979. 10 P.

THIS PAPER PRESENTS A PRACTICAL AND COST-EFFECTIVE DESIGN OF A RESIDENTIAL ENERGY SYSTEM. THE SYSTEM COMBINES THE USE OF SOLAR COLLECTORS AND A WIND TURBINE WITH A WATER TO AIR HEAT PUMP. THE WIND TURBINE IS DIRECTLY COUPLED TO THE COMPRESSOR OF THE HEAT PUMP AND A THERMAL ENERGY GENERATOR, THUS ELIMINATING INTERMEDIATE STAGES AND IMPROVING ENERGY CONVERSION EFFICIENCY. THE RESULTS INDICATE THAT THE COLLECTOR AND STORAGE ELEMENTS ARE

SMALLER THAN EXPECTED BECAUSE OF THE HIGH DEGREE OF MATCHING BETWEEN THE SOLAR AND WIND ENERGY AVAILABILITY AND DEMAND, ALONG WITH AN INCREASED PROBABILITY THAT ONE OF THESE ENERGY SOURCES WILL BE AVAILABLE.

1979-0717 STATE SOLAR ENERGY INCENTIVES PRIMER: A GUIDE TO SELECTION AND DESIGN.
NTIS, DECEMBER 1979. 38 P.
SERI/SP-434-470

1979-0718 STEVENS M J M, SMULDERS P T
ESTIMATION OF THE PARAMETERS OF THE WEIBULL WIND SPEED DISTRIBUTION FOR WIND ENERGY UTILIZATION PURPOSES.
WIND ENG. 3(2): 132-145, 1979.

THIS PAPER DEALS WITH METHODS FOR ESTIMATING THE PARAMETERS OF THE WEIBULL WIND SPEED DISTRIBUTION FROM A GIVEN SET OF WIND SPEED DATA. OF THE FIVE METHODS PRESENTED, TWO ARE SELECTED FOR WIND ENERGY EVALUATION STUDIES: ONE USES WEIBULL PROBABILITY PAPER, THE OTHER SO-CALLED PERCENTILES. FOR A COMPARISON BOTH METHODS HAVE BEEN APPLIED TO THE DATA FROM SIX METEOROLOGICAL STATIONS. THE SIMPLE GRAPHICAL METHOD USING WEIBULL PROBABILITY PAPER IS PREFERRED TO THAT EMPLOYING PERCENTILE ESTIMATORS.

1979-0719 STOCKETT'S WIND WHEEL.
WIND POWER DIG. NO. 17: 44-47, FALL 1979.

WILEY STOCKETT'S WIND WHEEL IS DESCRIBED: 50-FOOT DIAMETER, FOUR BLADES. A SECOND STOCKETT WIND WHEEL, 40-FOOT, 8 BLADES, IS ALSO DISCUSSED. THE FIRST IS BEING USED IN BUSHLAND FOR WATER PUMPING FOR IRRIGATION; THE SECOND IS INTENDED FOR POWER GENERATION AND HOUSE HEATING.

1979-0720 STODDARD W
WIND TURBINE DYNAMIC BLADE LOADS DUE TO WIND GUSTS AND WIND DIRECTION CHANGES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 141-150.
PNL-3214

A SIMPLE METHODOLOGY HAS BEEN DEVELOPED FOR THE CALCULATION OF BLADE DYNAMICS AND VIBRATION FOR ROTOR-TYPE WIND TURBINES. THE METHOD EMPLOYS EQUATIONS OF MOTION OF THE SLENDER ROTOR BLADE IN THE FLAPPING (OUT OF PLANE), LEAD-LAG (IN PLANE), AND TORSIONAL (FEATHERING) DEGREES OF FREEDOM. BLADE MOTIONS, FORCES AND MOMENTS CAN BE FOUND FOR PERTURBATIONS DUE TO GRAVITY, CROSSWIND, YAW RATE, AND AXISYMMETRIC FLOW.

1979-0721 SULLIVAN W N
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME I. EXECUTIVE SUMMARY.
NTIS, AUGUST 1979. 28 P.
SAND-78-0962(VOL.1)

THE ECONOMIC ANALYSIS OF THE DARRIEUS VERTICAL AXIS WIND TURBINE IS CONTAINED IN FOUR SEPARATE VOLUMES. THIS FIRST VOLUME SUMMARIZES THE COMPLETE STUDY, PRESENTING A DESCRIPTION OF THE TECHNICAL APPROACH USED, KEY RESULTS, AND MAJOR CONCLUSIONS.

1979-0722 SULLIVAN W N
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME II. ECONOMIC OPTIMIZATION MODEL.
NTIS, AUGUST 1979. 100 P.
SAND-78-0962(VOL.2)

THIS REPORT IS PART OF A FOUR-VOLUME STUDY OF DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT) ECONOMICS. THIS VOLUME DESCRIBES A COMPUTER MODEL OF VAWT COST AND PERFORMANCE FACTORS USEFUL FOR SYSTEM DESIGN AND OPTIMIZATION. THE CONTENT AND LIMITATIONS OF THE MODEL ARE OUTLINED. OUTPUT DATA ARE PRESENTED TO DEMONSTRATE SELECTION OF OPTIMA AND TO INDICATE SENSITIVITY OF ENERGY COST TO DESIGN PARAMETER VARIATIONS OPTIMIZED SPECIFICATIONS GENERATED BY THIS MODEL FOR SIX POINT DESIGNS ARE SUMMARIZED. THESE DESIGNS SUBSEQUENTLY RECEIVE A DETAILED ECONOMIC ANALYSIS DISCUSSED IN VOLUME IV. AN APPENDIX IS INCLUDED WITH A FORTRAN IV LISTING OF THE MODEL AND A DESCRIPTION OF THE INPUT/OUTPUT CHARACTERISTICS.

1979-0723 SULLIVAN W N, NELLUMS R O
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME IV. SUMMARY AND ANALYSIS OF THE A.T. KEARNEY AND ALCOA LABORATORIES POINT DESIGN ECONOMICS STUDIES.
NTIS, AUGUST 1979. 249 P.
SAND-78-0962(VOL.4)

THE A.T. KEARNEY AND ALCOA ECONOMIC STUDIES ARE TWO INDEPENDENT ATTEMPTS TO ASSESS THE INSTALLED COSTS OF A SERIES OF SIX DARRIEUS VERTICAL AXIS WIND TURBINE DESIGNS. THE DESIGNS COVER A RANGE OF SIZES WITH PEAK OUTPUTS FROM 10 TO 1600 KW. ALL ARE DESIGNED TO PRODUCE UTILITY GRID ELECTRICAL POWER. VOLUME IV OF THIS REPORT SUMMARIZES, COMPARES, AND ANALYZES THE RESULTS OF THESE STUDIES. THE KEARNEY AND ALCOA FINAL REPORTS ARE INCLUDED IN THE APPENDICES.

1979-0724 SULLIVAN W N
ECONOMIC OVERVIEW OF VERTICAL AXIS WIND TURBINES.
NTIS, 1979. 9 P.
CONF-790352-1, SAND-79-0733C

SANDIA LABORATORIES, AS PART OF ITS INVESTIGATION OF THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT), HAS BEEN INVOLVED RECENTLY IN AN ECONOMIC ASSESSMENT OF THE CONCEPT. THE CLASS OF VAWT'S INVESTIGATED USE CURVED, FIXED PITCH BLADES OF CONSTANT SECTION RIGIDLY ATTACHED TO A VERTICAL ROTATING TOWER. QUALITATIVELY, THE MAIN ADVANTAGES OF THE VAWT OVER MORE CONVENTIONAL, PROPELLER-TYPE MACHINES ARE THE ELIMINATION OF YAW CONTROLS, THE PLACEMENT OF MECHANICAL EQUIPMENT AT GROUND LEVEL, ITS AMENABILITY TO SIMPLE, LOW-COST BLADE FABRICATION TECHNIQUES, AND AERODYNAMIC STALL CHARACTERISTICS WHICH ELIMINATE THE NEED FOR ACTIVE PITCH CONTROL DEVICES. THE MAIN DISADVANTAGES RELATIVE TO MODERN PROPELLER MACHINES ARE A SOMEWHAT LOWER AERODYNAMIC EFFICIENCY (ABOUT 10% LOWER), THE LIMITED ABILITY OF THE ROTOR TO SELF-START, AND GENERALLY LOWER ROTOR OPERATING RPM'S, WHICH LEADS TO HIGHER TORQUE CAPACITY REQUIREMENTS FOR THE DRIVE TRAIN.

1979-0725 SULLIVAN W N
ECONOMIC OVERVIEW OF VERTICAL AXIS WIND TURBINES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA,

MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 73-82.
CONF-790352

SANDIA LABORATORIES, AS PART OF ITS INVESTIGATION OF THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT), HAS BEEN INVOLVED RECENTLY IN AN ECONOMIC ASSESSMENT OF THE CONCEPT. THE CLASS OF VAWT'S INVESTIGATED USE CURVED, FIXED PITCH BLADES OF CONSTANT SECTION RIGIDLY ATTACHED TO A VERTICAL ROTATING TOWER. QUALITATIVELY, THE MAIN ADVANTAGES OF THE VAWT OVER MORE CONVENTIONAL, PROPELLER-TYPE MACHINES ARE THE ELIMINATION OF YAW CONTROLS, THE PLACEMENT OF MECHANICAL EQUIPMENT AT GROUND LEVEL, ITS AMENABILITY TO SIMPLE, LOW-COST BLADE FABRICATION TECHNIQUES, AND AERODYNAMIC STALL CHARACTERISTICS WHICH ELIMINATE THE NEED FOR ACTIVE PITCH CONTROL DEVICES. THE MAIN DISADVANTAGES RELATIVE TO MODERN PROPELLER MACHINES ARE A SOMEWHAT LOWER AERODYNAMIC EFFICIENCY (ABOUT 10% LOWER), THE LIMITED ABILITY OF THE ROTOR TO SELF-START, AND GENERALLY LOWER ROTOR OPERATING RPM'S, WHICH LEADS TO HIGHER TORQUE CAPACITY REQUIREMENTS FOR THE DRIVE TRAIN.

1979-0726 SULLIVAN W N
OPERATIONAL EXPERIENCE WITH VAWT BLADES AT SANDIA LABORATORIES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 205-210.
NASA-CP-2106

SANDIA LABORATORIES HAS OPERATED THREE DARRIEUS TURBINES (2 METER, 5 METER, AND 17 METER DIAMETER ROTORS) AT ITS TEST FACILITY FOR THE LAST SEVERAL YEARS. THROUGH THIS TEST PROGRAM, A VARIETY OF BLADE TYPES AND ROTOR CONFIGURATIONS HAVE BEEN TESTED FOR STRUCTURAL AND AERODYNAMIC PERFORMANCE. THIS PAPER WILL DISCUSS PRIMARILY BLADE STRUCTURAL PERFORMANCE ASPECTS OF THE TESTS ON THE 17 METER ROTOR.

1979-0727 SULLIVAN W N
OVERVIEW OF VERTICAL AXIS WIND TURBINE (VAWT) BLADE DESIGN PROCEDURES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 185-192.
NASA-CP-2106

THE DESIGN OF A VAWT BLADE SECTION INVOLVES PRIMARILY THE SELECTION OF A MANUFACTURING TECHNOLOGY, ESTABLISHING STRUCTURAL INTEGRITY, AND OBTAINING ACCEPTABLE AERODYNAMIC PERFORMANCE. IN THIS PAPER, A SURVEY IS PRESENTED OF THE PRACTICES WHICH HAVE BEEN APPLIED FOR DESIGNING VAWT BLADES IN THE PAST. THROUGH THIS PRESENTATION, AN ATTEMPT IS MADE TO DISCUSS STRENGTHS AND WEAKNESSES OF THE EXISTING PROCEDURES. WHERE APPROPRIATE, DISCUSSION IS PROVIDED ON PLANNED OR SUGGESTED FUTURE WORK IN DEVELOPING IMPROVED DESIGN TOOLS.

1979-0728 SULLIVAN T L, SIROCKY J R, VITERNA L A
DESIGN, FABRICATION, AND TEST OF A STEEL SPAR WIND TURBINE BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 267-284.
NASA-CP-2106

ONE POTENTIAL MEANS FOR REDUCING THE COSTS OF WIND TURBINE BLADES IS TO USE A MASS PRODUCED STRUCTURE AS THE PRIMARY STRUCTURAL MEMBER OF THE BLADE. TAPERED BEAMS SUCH AS THOSE USED FOR UTILITY POLES ARE THE TYPE OF MASS PRODUCED STRUCTURE ENVISAGED. THE AIRFOIL SHAPE COULD BE FORMED BY LIGHT-WEIGHT FOAM OR LIGHT-WEIGHT RIBS OVERWRAPPED WITH FIBERGLASS CLOTH. IN ORDER TO DETERMINE THE FEASIBILITY OF THIS CONCEPT, A 60 FT. STEEL SPAR BLADE WAS DESIGNED. USING THIS DESIGN, TWO BLADES WERE FABRICATED AT THE LEWIS RESEARCH CENTER AND TESTED ON THE MOD-0 WIND TURBINE. THE DESIGN AND FABRICATION OF THE BLADES ARE DESCRIBED. PERFORMANCE AND BLADE LOAD INFORMATION IS GIVEN AND COMPARED TO ANALYTICAL PREDICTION. IN ADDITION, PERFORMANCE IS COMPARED TO THAT OF THE ORIGINAL MOD-0 ALUMINUM BLADES. COSTS FOR BUILDING THE TWO BLADES IS GIVEN, AND PROJECTION IS MADE FOR THE COST IN MASS PRODUCTION. FINALLY, DESIGN IMPROVEMENTS TO REDUCE WEIGHT AND IMPROVE FATIGUE LIFE ARE SUGGESTED.

1979-0729 SWIFT-HOOK D T
THE UK FIELD MEASUREMENTS COLLABORATION (WIND TURBINES).
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 4-1 TO 4-4.

THIS PAPER DESCRIBES THE R AND D OF WIND TURBINES IN THE UK. BRIEF DETAILS ON MACHINES BEING DEVELOPED ON SIX SITES ARE PRESENTED. THE R AND D OF TECHNICAL WORKING GROUPS COVERING AERODYNAMICS, WIND DATA, MATERIALS AND STRUCTURES, INSTRUMENTATION AND SYSTEM CONNECTION IS DISCUSSED.

1979-0730 SWISS M
ENERGY ALTERNATIVES FOR THE YEAR 2000.
ENERGY INT. 16(6): 22-24, JUNE 1979.

REMOTE VILLAGES IN DEVELOPING COUNTRIES PRESENTLY RELYING ON OIL FOR A SUBSTANTIAL PART OF THEIR ENERGY SUPPLY COULD FIND THAT IT WOULD BE MORE ECONOMICAL TO INTRODUCE LOCALLY AVAILABLE RENEWABLE RESOURCES THAN TO REPLACE OIL WITH ANOTHER IMPORTED FUEL. TWO POSSIBILITIES ARE WIND AND BIOMASS ENERGY. THE AUTHOR LOOKS AT SOME OF THE PROGRESS THAT HAS BEEN MADE IN THE DEVELOPED WORLD FOR EXPLOITING THESE TWO ENERGY SOURCES. HE CONCLUDES THAT FURTHER DEVELOPMENT IS NEEDED IN MICROBIAL PRODUCTION OF FUELS FROM BIOMASS BEFORE THEY WILL BE ECONOMICALLY FEASIBLE FOR AREAS OF LOW AGRICULTURAL SELF-SUFFICIENCY IN COMPARISON TO METHANE AND ETHANOL PRODUCTION FROM PETROLEUM SOURCES. SEVERAL LARGE-SCALE OFFSHORE WIND PROJECTS ARE EXAMINED AND COMPARED WITH LAND SITES.

1979-0731 SYNERJY: A DIRECTORY OF ENERGY ALTERNATIVES.
NEW YORK, SYNERJY, 1979. 67 P.

THIS DIRECTORY CONTAINS A VARIETY OF INFORMATION ABOUT PRACTICAL, NON-POLLUTING ALTERNATIVES TO FOSSIL FUELS AND NUCLEAR ENERGY. THE 3000 U.S. AND FOREIGN SOURCES INCLUDE PUBLICATIONS, MAJOR ARTICLES (IN ENGLISH), CONFERENCES, RESEARCH ASSOCIATIONS, MANUFACTURERS, AND FACILITIES. MOST OF THE NON-GOVERNMENT PUBLICATIONS ARE AVAILABLE AT MAJOR PUBLIC LIBRARIES. SUBSCRIPTION INFORMATION IS GIVEN. THIS SYNERJY INCLUDES ONLY SOURCES NOT IN SYNERJY VOL. 5 (JULY 1978), SYNERJY VOL. 4 (JULY 1977), SYNERJY VOL. 3 (JULY 1976), SYNERJY VOL. 2 (JULY 1975) OR SYNERJY VOL. 1 (JULY 1974). SINCE THERE IS NO REPETITION, REFERENCE TO THE EARLIER EDITIONS OF SYNERJY IS NECESSARY FOR PREVIOUS INFORMATION. SYNERJY IS UPDATED SEMI-ANNUALLY; JULY ISSUES ARE CUMULATIVE FOR ONE YEAR. THE PURPOSE OF SYNERJY IS TO INCREASE COMMUNICATION AMONG INDIVIDUALS AND GROUPS INTERESTED IN ALTERNATIVE SOURCES OF ENERGY AND TO STIMULATE GROWTH IN THESE AREAS: SOLAR ENERGY, GEOTHERMAL ENERGY AND OTHER STEAM, OTHER THERMAL ENERGY, ELECTRICAL ENERGY, WATER POWER, WIND POWER, AND ENERGY STORAGE.

1979-0732 SYSTEM DYNAMICS OF MULTI-UNIT WECS.
WIND ENERGY REP.: 11-13, DECEMBER 1979.

1979-0733 TAKLE E S, SHAW R H
COMPLIMENTARY NATURE OF WIND AND SOLAR ENERGY AT A CONTINENTAL MID-LATITUDE STATION.
INT. J. ENERGY RES. 3(2): 103-112, APRIL-JUNE 1979.

DAILY VALUES OF SOLAR AND WIND ENERGY HAVE BEEN USED (1) TO STUDY RENEWABLE ENERGY AVAILABILITY AT VARIOUS TIMES OF THE YEAR, (2) TO TEST THE LEVEL OF PERSISTENCE FOR INFERENCES ABOUT THE PRACTICALITY OF ENERGY STORAGE AND (3) TO EXAMINE THE COMPLEMENTARY BEHAVIOR OF THESE TWO DAILY TIME SERIES ON BOTH SEASONAL AND DAILY BASES. RESULTS FOR THE STATION STUDIED (CENTRAL IOWA) SHOW A BIMODAL DISTRIBUTION FOR WINTER SOLAR ENERGY, WHEREAS NON-WINTER SOLAR AND WIND (ALL SEASONS) SHOW UNIMODAL DISTRIBUTIONS. WIND AND SOLAR ENERGY WERE OBSERVED TO BE HIGHLY COMPLEMENTARY ON AN ANNUAL BASIS, BUT ONLY SLIGHTLY COMPLEMENTARY ON A DAILY BASIS.

1979-0734 TAYLOR R H
WIND POWER RESEARCH AND DEVELOPMENT IN THE UK.
ELECTRON. POWER 25(7): 485-488, JULY 1979.

IN THE USA, EXPENDITURE ON WIND POWER RESEARCH AND DEVELOPMENT HAS REACHED $60 MILLION FOR 1979. BRITAIN IS SEVERAL YEARS BEHIND IN TERMS OF EXPENDITURE. THE USA NOW HAS SEVERAL LARGE MACHINES EITHER WORKING OR NEAR COMPLETION. BUT, AS BRITAIN IS CONCENTRATING ITS EFFORTS ON DESIGNS AND SITES, E.G. OFFSHORE PLANT, WHICH THE U.S. PROGRAMME IS NOT COVERING IN GREAT DEPTH, BRITAIN STILL HAS SOMETHING TO OFFER THE INTERNATIONAL RESEARCH EFFORT.

1979-0735 TAYLOR T B
STORAGE OF SOLAR ENERGY.
INDIAN ACAD. SCI. PROC. C2(1): 319-330, SEPTEMBER 1979.

THIS ARTICLE DESCRIBES VARIOUS METHODS FOR SOLAR ENERGY STORAGE, BOTH FROM DIRECT SOLAR ENERGY (SUNLIGHT) AND INDIRECT (E.G. FROM WINDMILLS). METHODS CONSIDERED INCLUDE BATTERIES, HEAT OF HYDRATION OF COMPOUNDS, AND LOW TEMPERATURE STORAGE IN PONDS. ARGUMENTS ARE PRESENTED FOR USING A SYSTEMS APPROACH TO THE SELECTION OF SOLAR ENERGY STORAGE SYSTEMS.

1979-0736 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. FY 1979 REPORT. REPORTING PERIOD OCTOBER 1, 1978-SEPTEMBER 28, 1979.
NTIS, DECEMBER 1979. 126 P.
RFP-3126/3533/80-2

THE FY 1979 ANNUAL REPORT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM DESCRIBES THE OBJECTIVES, APPROACH, AND ACHIEVEMENTS OF THE PROGRAM AND EACH OF ITS TASK AREAS DURING THE PERIOD OCTOBER 1, 1978 - SEPTEMBER 28, 1979. DURING THIS PERIOD, ADDITIONAL TESTING OF 17 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) WAS CONDUCTED AND THE TEST CENTER'S CAPABILITIES WERE EXPANDED TO INCLUDE CONTROLLED VELOCITY AND VIBRATION TESTING OF SWECS. WORK ON EIGHT DESIGN AND ANALYSIS PROJECTS FOR ADVANCED PROTOTYPES IN THREE SIZE RANGES PROGRESSED THROUGH A SERIES OF DESIGN REVIEWS AND FABRICATION WAS INITIATED.

1979-0737 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. ANNUAL REPORT FOR OCTOBER 1, 1977-SEPTEMBER 30, 1978.
NTIS, FEBRUARY 1979. 142 P.
RFP-2974/3533-79-2

THE FY 1978 ANNUAL REPORT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM DESCRIBES THE OBJECTIVES, APPROACH, AND ACHIEVEMENTS OF THE PROGRAM AND EACH OF ITS TASK AREAS DURING THE PERIOD OCTOBER 1, 1977 - SEPTEMBER 30, 1978. DURING THIS PERIOD, ADDITIONAL TESTING OF TEN SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) WAS CONDUCTED AND THE TEST CENTER WAS EXPANDED TO ACCOMMODATE UP TO 30 SWECS. WORK ON NINE DESIGN AND ANALYSIS PROJECTS FOR ADVANCED PROTOTYPES IN THREE SIZE RANGES PROGRESSED THROUGH A SERIES OF DESIGN REVIEWS, WITH PROTOTYPE DELIVERY SCHEDULED TO BEGIN IN MID-1979. SUPPORTING ACTIVITIES INCLUDED A SYSTEMS ENGINEERING PROJECT WHICH ANALYZED THE COST OF SWECS COMPONENTS AND FABRICATION, A TASK EFFORT IN TECHNICAL SUPPORT TO STANDARDS DEVELOPMENT, AND THE DISSEMINATION OF INFORMATION. PLANNING FOR A SWECS FIELD EVALUATION PROGRAM AND TWO NEW TASK AREAS INVOLVING SPECIAL STUDIES AND SUPPORTING RESEARCH AND TECHNOLOGY (SRT) WAS CONDUCTED.

1979-0738 TELFORD J W
PIVOTED BLADE BARREL ROTOR WIND TURBINE.
U.S. PATENT NO. 4,137,009, JANUARY 30, 1979. 42 P.

THE DISCLOSED WIND TURBINE HAS ZERO MEAN CAMBER AIRFOIL BLADES VERTICALLY PIVOTED AT THE OUTER ENDS OF PAIRS OF RADIUS ARMS. THE INNER ENDS OF THE RADIUS ARMS ARE FIXED TO A ROTATING MAST. EACH BLADE IS PROVIDED WITH A STEERING VANE. THE DEFLECTION OF EACH VANE WITH RESPECT TO ITS ASSOCIATED BLADE IS CONTROLLED BY A CAM TOGGLE MECHANISM. THE DISCLOSED CAM TOGGLE MECHANISM INCLUDES A DOUBLE-FACED FACE CAM, HAVING A CLOSED CAM TRACK ON ITS UPPER FACE AND ANOTHER CLOSED CAM TRACK ON ITS LOWER FACE. EACH CAM TRACK CONSISTS OF TWO CIRCULAR DWELL PORTIONS.

1979-0739 TEMPLIN R J, MCCONNELL R D
SUMMARY REPORT ON THE COLLAPSE OF THE MAGDALEN ISLANDS WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORMIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 353-365.
CONF-790352

ON THE MORNING OF 6 JULY 1978, HYDRO-QUEBEC PERSONNEL ARRIVED AT THE SITE OF THE MAGDALEN ISLAND 230 KW VERTICAL AXIS WIND TURBINE. THE TURBINE WAS FOUND TURNING, UNATTENDED, AT ABOUT 30 RPM. THE MAIN DISC BRAKE WAS NO LONGER CONNECTED TO THE ROTOR'S DRIVE TRAIN AND THE SPOILERS WERE WORKING INTERMITTENTLY. CLOSE TO 9:30 AM (LOCAL TIME) THE SPOILERS CLOSED COMPLETELY AND THE TURBINE BEGAN AN HOUR OF RUNNING AT 60 RPM TO 70 RPM. THE TURBINE EVENTUALLY SPED UP TO ABOUT 74 RPM, THE EVIDENT LOCATION OF A MECHANICAL RESONANCE, AND TURBINE BLADES BEGAN STRIKING THE ROTOR'S SUPPORT CABLES. FINALLY, A CABLE TURNBUCKLE BROKE AND AT 10:19 (LOCAL TIME) THE TURBINE ROTOR BROKE OFF AND FELL TO THE GROUND. ANALYSIS OF THE TURBINE FAILURE IS PRESENTED.

1979-0740 TEMPLIN R J
DESIGN CHARACTERISTICS OF THE 224 KW MAGDALEN ISLANDS VAWT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 143-154.
NASA-CP-2106

THE EVOLUTION OF THE MAIN DESIGN FEATURES OF THE MAGDALEN ISLANDS VAWT IS DESCRIBED. THE TURBINE HAS A ROTOR HEIGHT OF 120 FT (36.58 M) AND DIAMETER 80 FT (24.38 M). IT WAS OPERATED AS A JOINT PROJECT BETWEEN NRC AND

HYDRO-QUEBEC IN GRID-COUPLED MODE FROM JULY 1977 TO JULY 1978 WHEN THE ROTOR WAS DESTROYED IN AN ACCIDENT. THE ACCIDENT, ALTHOUGH UNFORTUNATE, TESTED THE BASIC INTEGRITY OF THE DESIGN IN A GROSS OVERSPEED CONDITION, AND THE ROTOR IS BEING REBUILT WITH MINOR MODIFICATIONS. SOME DIRECTIONS FOR FUTURE VAWT RESEARCH ARE SUGGESTED.

1979-0741 TENNYSON G P
THE FEDERAL WIND ENERGY PROGRAM: AN OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 1-13.
SERI/TP-245-184, CONF-790501

THE FEDERAL WIND ENERGY PROGRAM IS REVIEWED. PARTICULAR EMPHASIS IN THE REVIEW IS THAT ATTENTION GIVEN THROUGH FEDERAL FUNDING TO INNOVATIVE SYSTEMS.

1979-0742 TETZLAFF G, BEYER R
WIND ENERGY POTENTIAL IN THE NORTHERN PART OF GERMANY.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 253-259.
PNL-3214

THE GERMAN WIND ENERGY PROGRAM CENTERS AROUND A MAJOR WIND TURBINE TO BE BUILT IN GERMANY. THIS WIND TURBINE IS DESIGNED TO BE INTRODUCED AS A POWER PLANT IN THE MAIN POWER GRID. IT IS IN PARTICULAR MEANT TO BE INTEGRATED IN THE NETWORK OF THE DIFFERENT EXISTING POWER PLANTS. THE GENERAL METEOROLOGICAL CONDITIONS ENCOUNTERED IN GERMANY ARE CHARACTERIZED BY THE TOPOGRAPHY, AS FAR AS WIND IS CONCERNED.

1979-0743 TEWARI S K, NINGAIAH, SUBRAMANYAM D V V, SAMRAJ A C
A HORIZONTAL AXIS SAIL WINDMILL FOR USE IN IRRIGATION.
INDIAN ACAD. SCI. PROC. C2(1): 107-116, MARCH 1979.

SOME BASIC CONSIDERATIONS ARE DESCRIBED IN THE DESIGN AND DEVELOPMENT OF A HORIZONTAL AXIS WINDMILL INTENDED PRIMARILY FOR IRRIGATION IN SMALL FARMS FROM SHALLOW OPEN WELLS. THIS WINDMILL HAS SIX TRIANGULAR SAILS SWEEPING A CIRCLE OF 10 M DIAMETER AND IS AN ADAPTATION FROM GREEK SAIL WINDMILLS. FOR THE CONSTRUCTION OF THIS WINDMILL ALL EFFORTS WERE MADE TO USE MATERIALS AND PARTS READILY AVAILABLE IN THE HARDWARE MARKET EXCEPT FOR THE GEAR BOXES. PRELIMINARY PERFORMANCE TESTS HAVE INDICATED A PUMPING RATE OF 6000-11000 LITRES/HR OVER A HEAD OF 6.85 M IN WIND SPEEDS OF 10-16 KM/HR.

1979-0744 THALLER L H
REDOX FLOW CELL ENERGY STORAGE SYSTEMS.
NTIS, 1979. 12 P.
DOE/NASA/1002-79/3, NASA-TM-79143, CONF-790611-2

NASA-REDOX ENERGY STORAGE SYSTEMS ARE BEING DEVELOPED FOR ULTIMATE USE IN STAND-ALONE VILLAGE POWER APPLICATIONS AND DISTRIBUTED ENERGY STORAGE INSTALLATIONS FOR ELECTRIC UTILITY SERVICE. IN THE FORMER APPLICATION, EITHER SOLAR PHOTOVOLTAIC ARRAYS OR WIND TURBINES SUPPLY THE PRIMARY POWER AND AN ELECTROCHEMICAL STORAGE SYSTEM STORES ENERGY DURING TIMES OF EXCESS POWER GENERATION CAPABILITY AND DELIVERS ENERGY DURING TIMES OF INSUFFICIENT POWER GENERATION.

1979-0745 THARPE B J
CAPACITY CREDITS: AN OVERLOOKED BENEFIT OF SOLAR ENERGY SYSTEMS.
ENERGY TECHNOL. 6: 45-54, APRIL 1979.

GENERAL ELECTRIC RE-EVALUATES ECONOMIC-FEASIBILITY STUDIES MADE OF SOLAR ENERGY SYSTEMS IN 1972 AND REPORTS THAT CAPACITY CREDITS NOW APPEAR TO INCREASE THE VALUE OF THESE SYSTEMS. THE FLEXIBILITY FOR USE IN EITHER ON-SITE OR CENTRALIZED APPLICATIONS IS NOTED, THE CAPACITY CREDITS VARYING BY REGION, UTILITY, AND CHOICE OF SOLAR EQUIPMENT. A SERIES OF 13 CHARTS IS USED TO ILLUSTRATE THESE POINTS AND TO DEMONSTRATE APPLICATIONS OF WIND TURBINES, PHOTOVOLTAICS, AND SOLAR HEATING AND COOLING. THE EVALUATION TOOLS DESCRIBED CAN BE USED FOR EITHER DECENTRALIZED OR CENTRALIZED SOLAR SYSTEMS BUT THE UTILITY AND THE USER MUST BE CONSIDERED IN MAKING THE EVALUATION TO ENSURE THAT THE SOLAR SYSTEMS ARE PROPERLY INTEGRATED WITH THE UTILITY SYSTEM.

1979-0746 THEYSE F H
PLANT FOR GENERATING AND ACCUMULATING ELECTRIC ENERGY WITH THE AID OF WIND POWER OR SOLAR ENERGY.
U.S. PATENT NO. 4,171,491, OCTOBER 16, 1979. 4 P.

AN ELECTRIC SOLAR OR WIND POWER PLANT WITH A FLYWHEEL BATTERY IN WHICH THE ELECTRIC GENERATOR IS IN THE FORM OF A DC GENERATOR IS DESCRIBED. THE GENERATOR IS ELECTRICALLY CONNECTED TO BRUSHLESS DC MOTORS SWITCHED IN PARALLEL, WHICH CAN ALSO ACT AS GENERATORS AND EACH OF WHICH IS COUPLED TO A FLYWHEEL.

1979-0747 THOR S E
COMPUTER METHODS FOR STRUCTURAL WEIGHT OPTIMIZATION OF FIBER REINFORCED PLASTICS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 216-237.
JUEL-SPEZ-28

SOME OF FFA'S COMPUTER PROGRAMS FOR ANALYSIS AND OPTIMUM DESIGN OF FIBER REINFORCED PLASTICS ARE DISCUSSED. A GENERAL FLOW CHART FOR ANALYSIS OF FIBER REINFORCED STRUCTURES IS PRESENTED.

1979-0748 THIRD ANNUAL DESKBOOK DIRECTORY OF SOLAR PRODUCT MANUFACTURERS.
SOL. ENG. MAG. 4(12): 19, 21-40, 42-46, 48, DECEMBER 1979.

MANUFACTURERS OF SOLAR COLLECTORS AND COLLECTOR COMPONENTS, SOLAR SYSTEMS, PASSIVE SYSTEMS AND COMPONENTS, ACTIVE SOLAR SYSTEM COMPONENTS, AND SOLAR POWER GENERATION PRODUCTS ARE LISTED. POWER GENERATION SYSTEMS AND COMPONENTS REFER TO PHOTOVOLTAICS, SOLAR THERMAL POWER GENERATION, SMALL HYDRAULIC GENERATORS, OTEC, SPACE POWER SATELLITE, WIND TURBINES, AND ELECTRICAL STORAGE.

1979-0749 THRESHER R W
ATMOSPHERIC CONSIDERATIONS FOR DESIGN OF WECS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 13-27.
PNL-3214

THE KEY OBJECTIVE OF CURRENT WIND TURBINE DESIGN EFFORTS IS TO REDUCE THE COST OF ENERGY TO A MINIMUM, AND

STILL PROVIDE A SAFE AND RELIABLE TURBINE SYSTEM. THE MAJOR THRUST OF SUPPORTING RESEARCH AND TECHNOLOGY DEVELOPMENT PROGRAMS SHOULD BE DIRECTED TOWARD THIS SAME GOAL. TO FOCUS ATTENTION ON THE RELATIONSHIP BETWEEN THE COST OF ENERGY (COE) AND ATMOSPHERIC CONSIDERATIONS, THIS PAPER EXAMINES THE FACTORS INVOLVED TO DETERMINE THE IMPORTANT ATMOSPHERIC CONTRIBUTIONS.

1979-0750 THRESHER R W
WIND SYSTEM DESIGN AND RESEARCH CONSIDERATIONS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1. P. 189-196.
RFP-3014(VOL.1)

THE KEY OBJECTIVE OF CURRENT WIND TURBINE DESIGN EFFORTS IS TO REDUCE THE COST OF ENERGY TO A MINIMUM, AND STILL PROVIDE A SAFE AND RELIABLE TURBINE SYSTEM. THE MAJOR THRUST OF ANY SUPPORTING RESEARCH AND TECHNOLOGY DEVELOPMENT PROGRAM SHOULD BE DIRECTED TOWARD THIS SAME GOAL. THE FACTORS WHICH CONTRIBUTE TO THE COST OF ENERGY, AND WHICH CAN POSSIBLY BE IMPROVED BY RESEARCH AND DEVELOPMENT ARE ANALYZED.

1979-0751 THOMAS J
NAVY ENERGY AWARENESS.
NAVY CIV. ENG. 20(1): 3, 1979.

THE NAVY R AND D PROGRAM IS STRUCTURED TO ACHIEVE MAXIMUM PRACTICAL ENERGY CONSERVATION AND AID IN SUBSTITUTING, WHERE PRACTICAL, ALTERNATE ENERGY SOURCES TO REPLACE PETROLEUM AND NATURAL GAS. PROGRESS AND ACTIVITIES IN THE FOLLOWING AREAS ARE REVIEWED: WIND POWER, GEOTHERMAL ENERGY, SOLAR-GENERATED POWER, PHOTOVOLTAIC POWER SYSTEMS, LIGHTING SYSTEMS, AND RECYCLING EXHAUST GASES. A QUICK, LOW-COST METHOD OF DETERMINING THE AIR-LEAKAGE RATE FROM THE EXTERNAL SURFACES OF BUILDINGS IS BEING RESEARCHED AND DEVELOPED.

1979-0752 THUMANN A
WHAT IS AN ENERGY AUDIT? HOW DOES IT AFFECT THE USE OF SOLAR ENERGY?
SOL. ENG. MAG. 4(7): 15-16, JULY 1979.

ENERGY AUDITS FOR IDENTIFYING ENERGY USES IN BUILDINGS OR PLANT FACILITIES AND POTENTIAL AREAS OF ENERGY CONSERVATION ARE REVIEWED. THE SIMPLEST ENERGY AUDIT IS THE WALK THROUGH IN WHICH A VISUAL INSPECTION EVALUATES LOW- OR NO-COST ENERGY CONSERVATION MEASURES. A MINI-AUDIT UTILIZES TESTS AND MEASUREMENTS TO ASSESS ENERGY LOSSES AND USES AND LIFE CYCLE COSTING METHODS FOR EVALUATING MODIFICATIONS. THE MAXI-AUDIT EVALUATES ENERGY REQUIREMENTS FOR EACH INDIVIDUAL PROCESS OR SERVICE AND MAY UTILIZE COMPUTER SIMULATIONS TO ASSESS ENERGY USE PATTERNS AND ANNUAL PREDICTIONS. THE RESIDENTIAL CONSERVATION SERVICE PROGRAM SEPARATES ENERGY CONSERVATION MEASURES INTO THE CATEGORIES OF ENERGY CONSERVATION WITHOUT UTILIZATION OF A RENEWABLE ENERGY RESOURCE, AND RENEWABLE RESOURCE MEASURES INVOLVING SOLAR AND WIND ENERGY. SOME OF THE ENERGY CONSERVING MEASURES LISTED ARE ELIGIBLE FOR TAX CREDITS.

1979-0753 TODD R W
SMALL SCALE WIND ENERGY SYSTEMS.
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 2-1 TO 2-2.

THIS PAPER EXAMINES THE DESIGN CHARACTERISTICS AND APPLICATIONS OF SMALL (LESS THAN 50 KW) WINDMILLS.

1979-0754 TRACI R M, PHILLIPS G T, ROCK K C
WIND ENERGY SITING METHODOLOGY WINDFIELD MODEL VERIFICATION PROGRAM. I. OAHU, HAWAII DATA SET. INTERIM REPORT FOR THE PERIOD 15 SEPTEMBER 1978 TO 15 APRIL 1979.
NTIS, APRIL 1979. 171 P.
RLO/2440-79/3, DOE/ET/20280-79/3

AN IMPORTANT LINK IN THE CHAIN OF ACTIVITIES FOR IMPLEMENTING PRACTICAL WIND ENERGY CONVERSION SYSTEMS (WECS) IS THE PROSPECTING OR SITE SCREENING AND SELECTION ACTIVITY. CURRENT TECHNIQUES HAVE PROVEN TO BE INADEQUATE, TIME CONSUMING AND EXPENSIVE. THIS REPORT PROVIDES AN IMPROVED AND MORE ECONOMICAL SITING METHODOLOGY. THE APPROACH IS TO MAKE USE OF MATHEMATICAL WINDFIELD MODELLING TO OBJECTIVELY EXTRAPOLATE CLIMATOLOGICAL DATA FROM A SMALL NUMBER OF SITES IN A REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION.

1979-0755 TRACI R M, PHILLIPS G T, ROCK K C
UTILITY AND VERIFICATION OF MATHEMATICAL WINDFIELD MODELS FOR WIND ENERGY REGIONAL SCREENING AND SITE SELECTION.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 381-391.
PNL-3214

A WECS SITING METHODOLOGY HAS BEEN DEVELOPED IN RECENT YEARS WHICH MAKES USE OF NUMERICAL WINDFIELD MODELS TO OBJECTIVELY AND ACCURATELY EXTRAPOLATE HISTORICAL OR FIELD TEST DATA FROM SITES WITHIN A MESOSCALE REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION. AS PART OF THE DEVELOPMENT PROGRAM, TWO WINDFIELD MODELS HAVE BEEN DEVELOPED FOR COMPLEMENTARY USE IN THE METHODOLOGY: SIGMET, A PRIMITIVE EQUATION, TERRAIN CONFORMAL, MESOSCALE METEOROLOGY MODEL AND NOABL, A SIMPLIFIED PHYSICS, TERRAIN CONFORMAL WINDFIELD MODEL.

1979-0756 TRENKA A
SWECS TEST ACTIVITIES AT ROCKY FLATS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 216-220.
RFP-3014(VOL.1)

A MAJOR OBJECTIVE IS TO PROVIDE A FACILITY WHERE TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) CAN BE PERFORMED UNDER ACTUAL ENVIRONMENTAL CONDITIONS. THE DATA COLLECTED FROM THIS TESTING WILL: (1) PROVIDE INFORMATION FOR POTENTIAL BUYERS OF SWECS AND (2) PROVIDE A SOUND TECHNOLOGICAL BASE FOR USE BY THE ENGINEER AND DEVELOPER OF SWECS. EVERY EFFORT IS BEING MADE TO COLLECT ACCURATE DATA IN A SOUND ENGINEERING FASHION AND TO PROVIDE THAT DATA COLLECTED WILL BE USEFUL. THIS EFFORT IS BEING IMPLEMENTED THROUGH CONSISTENT AND MEANINGFUL TEST PROCEDURES SO THAT THE DATA WILL GIVE ACCURATE PERFORMANCE PREDICTIONS FOR CONDITIONS THAT THE CONSUMER IS LIKELY TO SUBJECT A GIVEN MACHINE TO. THE DATA COLLECTED FOR USE BY THE ENGINEER AND/OR MANUFACTURER SHALL BE ACCURATE AND SUFFICIENTLY DESCRIBED, IN ENGINEERING TERMS, SO AS TO BE READILY USEFUL.

1979-0757 TRENKA A R, LIVESAY J C
SWECS/UTILITY INTERFACE AT ROCKY FLATS TEST SITE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO,

FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 16-21.
RFP-3014(VOL.2)

THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER HAS BEEN DEVELOPED TO PROVIDE THE CAPABILITY TO TEST COMMERCIALLY AVAILABLE AND PROTOTYPE WIND TURBINE GENERATORS (WTG) AND TO ACQUIRE REPRESENTATIVE DATA. OPERATIONS OF THE TEST CENTER INCLUDE ANALYZING ALL DATA, PROVIDING ENGINEERING AND SUPPORT CAPABILITIES, AND DEVELOPING IMPROVED TEST TECHNIQUES. FOUR MAJOR SECTIONS COMPRISE THE TEST CENTER'S OPERATIONS: ATMOSPHERIC TESTING SYSTEM, POWER MANAGEMENT SYSTEM, DATA MANAGEMENT SYSTEM, AND SUPPORT SYSTEM. THIS DISCUSSION IS CONFINED TO THE POWER MANAGEMENT SYSTEM (PMS), THE OBJECTIVE OF WHICH IS TO CONTROL THE UTILIZATION OF SITE POWER RECEIVED FROM THE COLORADO PUBLIC SERVICE COMPANY (PSC) AS WELL AS POWER GENERATED BY THE TEST MACHINES.

1979-0758 TWIDDELL J
ENERGY WITH HARMONY IN THIRD WORLD.
ELECTR. REV. 204(6): 12-13, FEBRUARY 9, 1979.

OIL IS BECOMING TOO EXPENSIVE FOR ENERGY USE IN THIRD WORLD COUNTRIES. A PROGRAM FOR RENEWABLE ENERGY SUPPLIES IN DEVELOPING COUNTRIES IS SUGGESTED THAT COULD PRODUCE A LIFE STYLE FREE FROM EXCESSIVE URBANIZATION. THE POSSIBLE ROLE OF ELECTRICAL ENGINEERS IN ACHIEVING THIS PROGRAM FOR USING HYDRO, SOLAR, WIND, WAVE AND TIDAL POWER AND THE COMBUSTION OF ORGANIC AND BIOMASS MATERIALS TO PRODUCE ELECTRIC POWER IS DISCUSSED.

1979-0759 UPENDRA S S, SAMAGA B S, KRISHNA S S
SOME EXPERIMENTAL STUDIES ON WIND TURBINE MODELS.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 454-459.
CONF-791229

A WIND TUNNEL TEST RIG HAS BEEN CONSTRUCTED IN ORDER TO CARRY OUT MODEL STUDIES ON A FEW WIND MILL DESIGNS AND TO COMPARE THEIR RELATIVE MERITS. A SIMPLE ROPE BRAKE IS USED TO LOAD THE WIND TURBINES EXTERNALLY AND AN ELECTRONIC STROBOSCOPE IS EMPLOYED TO MEASURE THE ROTATIONAL SPEED. THE FOLLOWING MODELS HAVE BEEN STUDIED: VERTICAL SHAFT, TWO BLADE ROTOR WITH VARIABLE CENTER TO CENTER DISTANCE BETWEEN THE BLADES; VERTICAL SHAFT, FOUR BLADE ROTOR; AND HORIZONTAL SHAFT, FOUR BLADE FAN TYPE ROTOR WITH VARIABLE BLADE PITCH. THE VERTICAL SHAFT DESIGNS HAVE BEEN TESTED IN CONJUNCTION WITH A BAFFLE IN FRONT OF THE MODEL, WHICH SERVES AS A STATIONARY VANE WITH VARIABLE ANGULAR ORIENTATION. EXPERIMENTS HAVE BEEN CARRIED OUT WITH SIMULATED WIND VELOCITIES IN THE RANGE OF 3 TO 7 M/SEC., WHICH IS THE AVERAGE SURFACE WIND VELOCITY PREVALENT IN THE WEST COAST REGIONS OF KARNATAKA. TYPICAL RESULTS ARE PRESENTED.

1979-0760 URBANEK A
1500 SOLAR PLANTS IN SWITZERLAND.
SONNENENERG. WAERMEPUMPE 4(5/6): 28-35, SEPTEMBER-DECEMBER 1979. (IN GERMAN)

IN SWITZERLAND, IN THE END OF 1980, APPROXIMATELY 1500 SOLAR PLANTS WILL BE OPERATING. SWITZERLAND WAS THE FIRST EUROPEAN COUNTRY TO BEGIN TO TURN TO ALTERNATIVE ENERGY SOURCES, WHICH BEGAN SPONTANEOUSLY BY PRIVATE INITIATIVE AFTER THE OIL CRISIS OF 1973. THEREFORE, TODAY THERE ARE A VARIETY OF PLANTS IN WHICH SOLAR ENERGY, WIND ENERGY AND BIOENERGY ARE USED.

1979-0761 VACHON W A, DOWNEY W T, MARCH F, MADIO F R, SCHIMKE G R
WIND ENERGY IN THE MOUNTAINS OF NEW HAMPSHIRE AS A POTENTIAL ENERGY SOURCE FOR THE PORTSMOUTH NAVAL SHIPYARD.
NTIS, OCTOBER 1979. 189 P.
AD-A076975

A FEASIBILITY STUDY WAS CONDUCTED TO DETERMINE WHETHER THE WIND ENERGY IN THE MOUNTAINOUS REGIONS OF NEW HAMPSHIRE COULD BE USED AS A POSSIBLE ENERGY SOURCE FOR THE PORTSMOUTH NAVAL SHIPYARD IN PORTSMOUTH, NEW HAMPSHIRE. THE RESULTS INDICATE THAT THERE IS ADEQUATE WIND ENERGY AVAILABLE AT MOUNTAIN SITES TO DRIVE EVEN THE LARGEST WIND TURBINE GENERATORS (WT'S) NOW PLANNED, AND THAT MANY POTENTIAL SITES EXIST IN RELATIVELY CLOSE PROXIMITY TO UTILITY LINES.

1979-0762 VALTER G P
ELECTRICAL SYSTEM FOR WIND TURBINE UNITS.
ENERGIESPECTRUM 3(5): 118-123, MAY 1979. (IN DUTCH)

WIND TURBINES ARE CLASSIFIED AS CONSTANT SPEED AND VARIABLE SPEED TYPES. THE FIRST CLASS IS SUBDIVIDED INTO SYNCHRONOUS AND ASYNCHRONOUS TYPES. THE FORMER HAS THREE PHASE WINDING AND VARIABLE COUPLING WITH THE ROTOR. THE ASYNCHRONOUS TYPE WORKS AS A MOTOR AT LOW REVOLUTION RATES AND AS A GENERATOR AT HIGH REVS. THE VARIABLE SPEED TYPES TYPICALLY USE A STATIC CONVERTOR WITH THYRISTOR CONTROL. A DETAILED SCHEME IS DESCRIBED FOR A 25 M DIAMETER WIND TURBINE WITH A NOMINAL SPEED (DC) IN PARALLEL WITH A BALLAST RESISTOR, A 12-PULSE CONVERTOR WITH 600 MW CAPACITY, AND A 350 V/10 KV TRANSFORMER WITH TWO PRIMARIES (ONE STAR, ONE DELTA CONNECTED).

1979-0763 VAN BRONKHORST J
MOD-1 STEEL BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 325-342.
NASA-CP-2106

SINCE SEPTEMBER OF 1977, DESIGN, DEVELOPMENT, FABRICATION, TESTING AND TRANSPORT OF TWO 100-FOOT METAL BLADES FOR THE MOD-1 WTS HAS BEEN COMPLETED. BECAUSE THE METAL BLADE DESIGN WAS STARTED LATE IN THE MOD-1 SYSTEM DEVELOPMENT, MANY OF THE DESIGN REQUIREMENTS (ALLOCATIONS) WERE RESTRICTIVE FOR THE METAL BLADE CONCEPT, PARTICULARLY THE MAXIMUM WEIGHT REQUIREMENT. THE UNIQUE DESIGN SOLUTIONS REQUIRED TO ACHIEVE THE WEIGHT GOAL RESULTED IN A LABOR INTENSIVE (EXPENSIVE) FABRICATION, PARTICULARLY FOR A QUANTITY OF ONLY TWO BLADES MANUFACTURED USING MINIMAL TOOLING. NEVERTHELESS, THE VERY EXISTENCE OF THE BLADES REPRESENTS A MAJOR ACHIEVEMENT IN LARGE WIND TURBINE SYSTEM DEVELOPMENT.

1979-0764 VANDERELST W J
THE AERODYNAMICS OF AXIAL FLOW WIND POWER TURBINES.
NTIS, JUNE 1979. 37 P.
CSIR-ME-1619, N80-23781/1

A GENERAL ANALYSIS OF THE AERODYNAMICS OF WIND POWER TURBINES OF THE AXIAL FLOW TYPE IS PRESENTED. THE DESIGN PARAMETERS APPEAR IN NONDIMENSIONAL FORM AND ARE PRESENTED GRAPHICALLY. THE THEORY IS APPLICABLE TO ANY TYPE OF WIND POWER GENERATOR, INCLUDING SLOW RUNNING WINDMILLS NORMALLY USED FOR POWERING WATER PUMPS AS WELL AS FAST RUNNING MACHINES WHICH ARE SUITABLE FOR THE GENERATION OF ELECTRIC POWER.

1979-0765 VANDERELST W J
THE AERODYNAMICS OF CONTRA-ROTATING AXIAL FLOW WIND POWER TURBINES.
NTIS, NOVEMBER 1979. 28 P.
CSIR-ME-1638, N80-33868

THE SPECIAL CASE OF A CONTRA-ROTATING, AXIAL FLOW TURBINE IS ANALYZED AND IT IS SHOWN IN WHAT OPERATING REGIME SUCH WIND MACHINES WITH CONTRA-ROTATING ROTORS ARE SUPERIOR TO THE CONVENTIONAL SINGLE ROTOR TURBINE. NONDIMENSIONAL PARAMETERS SUITABLE FOR USE IN DESIGNING CONTRA-ROTATING BLADES ARE PRESENTED BY MEANS OF FORMULAE AND GRAPHS.

1979-0766 VAN WYK J D
ELECTRO--WIND ENERGY SYSTEM WITH OVERSYNCHRONOUS CASCADE AND SIMPLE ADAPTIVE MAXIMAL POWER CONTROL.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS.
ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2291-2295.

THE CONVERSION OF MECHANICAL ENERGY FROM A WIND TURBINE INTO ELECTRICAL ENERGY BY USING AN INDUCTION GENERATOR WITH FEED BACK OF ITS ROTOR POWER TO THE SUPPLY SYSTEM VIA A SUPPLY COMMUTATED INVERTER IS INVESTIGATED. THE POWER ELECTRONIC EQUIPMENT IN THE PRESENT SYSTEM IS SHOWN TO HAVE ONLY HALF THE RATED POWER.

1979-0767 VAS I E
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE PROCEEDINGS.
NTIS, DECEMBER 1979. 369 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, MAY 23, 1979.
CONF-790501, SERI/TP-245-184

22 PAPERS WERE PRESENTED CONCERNING INNOVATIVE WIND TURBINES WHICH VARY IN DESIGN FROM THE STANDARD HORIZONTAL-AXIS PROPELLER-TYPE WIND TURBINES.

1979-0768 VAS I E
A SUMMARY OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 335-344.
SERI/TP-245-184, CONF-790501

SERI FULFILLS THIS FUNCTION IN THE WIND ENERGY AREA BY PROVIDING TECHNICAL MANAGEMENT FOR THE ADVANCED CONCEPTS PROGRAM ENTITLED WIND ENERGY INNOVATIVE SYSTEMS (WEIS) PROGRAM. THE OBJECTIVE OF THIS PROGRAM IS TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF POTENTIALLY COST COMPETITIVE INNOVATIVE SYSTEMS. STUDIES PERFORMED IN THIS PROGRAM ARE SUBCONTRACTED TO SMALL AND LARGE PRIVATE COMPANIES AS WELL AS TO UNIVERSITIES.

1979-0769 VEENHUIZEN S D, LIN J T
WIND RESOURCE ASSESSMENT IN THE OLYMPIC PENINSULA AND THE NORTH CASCADES.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 19-22.
CONF-790845

NUMERICAL ESTIMATES OF WINDS WERE CONDUCTED IN AREAS OF THE OLYMPIC PENINSULA AND THE NORTH CASCADES OF WASHINGTON TO ASSESS POTENTIAL SITES FOR WIND POWER GENERATION. SINCE THESE AREAS ARE VERY RUGGED AND SPARSELY POPULATED, INSUFFICIENT WIND ANEMOMETER DATA WERE AVAILABLE TO MAKE QUANTITATIVE DETERMINATIONS OF WIND SPEEDS AND DIRECTIONS. FURTHER, IN THESE AREAS, TERRAIN FEATURES AND TOPOGRAPHY PLAY AN IMPORTANT ROLE IN DETERMINING THE LOCATION OF SPECIFIC WIND TURBINE GENERATOR SITES. A NUMERICAL MODEL WAS THEREFORE UTILIZED TO ESTIMATE WIND ENERGY POTENTIAL IN THESE TWO REGIONS.

1979-0770 VERMA L R, LYTLE W F, HELLICKSON M A
WIND ENERGY POTENTIAL FOR AGRICULTURAL APPLICATIONS IN SOUTH DAKOTA.
ASAE PAPER 79-3509, 1979. 20 P.

THE PAPER REPORTS ON A STUDY TO EVALUATE THE POTENTIAL OF WIND ENERGY IN EAST CENTRAL SOUTH DAKOTA. IN ORDER TO ACHIEVE THIS, CLIMATOLOGICAL DATA RECORDS WERE ANALYZED FOR HURON, SOUTH DAKOTA FOR 1965-1976. THE SPECIFICS DESIRED FROM THIS STUDY WERE: WIND ENERGY AVAILABLE IN EAST CENTRAL SOUTH DAKOTA; INTENSITY AND VARIATION IN THIS ENERGY ON A DAILY AND MONTHLY BASIS; RELATIVE POTENTIAL OF WIND ENERGY AS COMPARED TO OTHER SOURCES SUCH AS SOLAR RADIATION ENERGY; COMBINED POTENTIAL OF WIND AND SOLAR ENERGIES IN EAST CENTRAL SOUTH DAKOTA; POTENTIAL OF WIND ENERGY FOR AGRICULTURAL APPLICATIONS. RESULTS INDICATE THAT SIGNIFICANT IMPROVEMENT IN THE UNIFORMITY OF THE ENERGY FLUX IS ACHIEVED BY COMBINING WIND AND SOLAR ENERGIES.

1979-0771 VERMA S D
VERTICAL AXIS WINDMILL AND WIND COLLECTOR.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. P. 460-463.
CONF-791229

A VERTICAL AXIS WINDMILL IS DESIGNED IN COMBINATION WITH A WIND COLLECTOR AMPLIFIER. THE COLLECTOR HAS A LARGE ENTRANCE CROSS-SECTION AND A SMALL EXIT PORT. THIS WAY WIND SPEED IS INCREASED AND THE NEEDED SIZE OF THE PADDLES IS DECREASED. THE VERTICAL SHAFT OF THE WINDMILL WAS CONNECTED WITH THE DC CAR GENERATOR VIA STEP-UP OIL-FILLED GEAR WITH GEAR RATIO 1:16. A WORKING MODEL OF THE WINDMILL, COLLECTOR-AMPLIFIER AND DC GENERATOR SYSTEM IS FABRICATED, TESTED AND WAS FOUND TO WORK FOR WIND SPEED > 24 KM/H. BELOW THIS SPEED THE WINDMILL USED TO ROTATE BUT ANGULAR SPEED WAS TOO LOW FOR GENERATOR TO GIVE DC OUT-PUT.

1979-0772 VERMA L R, HELLICKSON M A
WIND AND SOLAR ENERGY COMBINATION FOR AGRICULTURAL APPLICATIONS IN SOUTH DAKOTA.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 407-412.

THE INCREASING SEARCH FOR RENEWABLE ENERGY SOURCES HAS REVIVED INTEREST AND LED TO REEVALUATION OF WIND AND SOLAR ENERGIES TOGETHER WITH SEVERAL OTHER ALTERNATIVES. WIND AND SOLAR ENERGIES ARE FREE, CLEAN AND REPLENISHABLE SOURCES OF ENERGY PARTICULARLY SUITED TO APPLICATIONS ON U.S. FARMS BECAUSE OF ABUNDANT AVAILABILITY OF SPACE FOR SOLAR COLLECTORS AND WIND TURBINES. SUPPLEMENTING THE SOLAR ENERGY WITH WIND ENERGY, WHEN THE SUN IS NOT SHINING, CAN MAKE THE AVAILABLE ENERGY MORE UNIFORM THAN BY EITHER SUN OR WIND ALONE.

1979-0773 VINAYAGALINGAM T, SIVASEGARAM S
A VARIABLE-STROKE, WIND-OPERATED WATER-PUMPING SYSTEM.
WIND ENG. 3(2): 127-131, 1979.

THIS PAPER DESCRIBES THE DESIGN OF A STROKE ADJUSTING MECHANISM FOR RECIPROCATING WATER PUMPS DRIVEN BY A WIND ROTOR. THE DESIGN IS SIMPLE AND IS ESSENTIALLY A CLOSED-LOOP TYPE OF CONTROL DEVICE WHICH ENSURES THAT THE ROTOR OPERATES AT ITS MAXIMUM SPEED AT ANY GIVEN WIND SPEED.

1979-0774 VINAYAGALINGAM T
THE PEDAL WIND TURBINE.
J. ENERGY 3(4): 254-256, JULY-AUGUST 1979.

A NEW TYPE OF VERTICAL AXIS, RESISTANCE-TYPE WIND TURBINE IS PRESENTED. THE ESSENTIAL FEATURES ARE (1) CONSTANT SPEED "BLADE CYCLING" ENABLING A SMOOTH OPERATION AND (2) USE OF SAILS WHICH WILL ASSUME THE DESIRABLE BUCKET SHAPE UNDER WIND PRESSURE. THE OPERATIONAL SPEEDS ARE LOW AND THE TURBINE COULD BE CONSTRUCTED OF LIGHTWEIGHT MATERIALS. THEORETICAL ANALYSIS FOR A FLAT SAIL TURBINE HAS SHOWN THAT THE TORQUE CHARACTERISTICS ARE MUCH MORE UNIFORM THAN IN THE CASE OF THE SAVONIUS ROTOR. THUS THE STALLING PROBLEM IS CONSIDERABLY REDUCED.

1979-0775 VRIES O DE
FLUID DYNAMIC ASPECTS OF WIND ENERGY CONVERSION.
AGARDOGRAPH NO. 243, JULY 1979. ALSO: NTIS, JULY 1979. 150 P.
AGARD-AG-243, AD-A076315

A REVIEW IS MADE OF THE FLUID DYNAMIC ASPECTS OF WIND ENERGY CONVERSION. A SHORT SURVEY OF THE TOTAL FRAMEWORK OF WIND ENERGY CONVERSION IS GIVEN TO BRING THE FLUID DYNAMICS ASPECT IN ITS PROPER DIMENSIONS. NEXT, THE SEVERAL WIND CONCENTRATOR CONCEPTS ARE DISCUSSED, WHILE THE MAIN BODY OF THE REPORT IS FORMED BY A DISCUSSION OF THE THEORY OF WIND-DRIVEN TURBINES, INCLUDING BOTH THE HORIZONTAL-AXIS AND THE VERTICAL-AXIS TURBINES. THE REPORT CONCLUDES WITH A SURVEY OF INHOMOGENEOUS FLOW AND TURBULENCE EFFECTS, TURBINE CONTROL AND WAKE INTERFERENCE EFFECTS. THE AGARDOGRAPH HAS BEEN PRODUCED AT THE REQUEST OF THE FLUID DYNAMICS PANEL OF AGARD.

1979-0776 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF WIND POWER POTENTIAL.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 363-372.
PNL-3214

WITH WIND TURBINES SEVERE WINDS MAY ALSO CAUSE DAMAGE TO BLADES BUT CONTRIBUTE NOTHING TO POWER GENERATED BY THE SYSTEM. EACH GENERIC TYPE OF WIND TURBINE HAS A SPEED AT WHICH IT BEGINS TO PRODUCE POWER. TREES OF DIFFERENT GENERIC TYPES ALSO HAVE DIFFERENT THRESHOLDS AT WHICH THEY BEGIN TO DISPLAY WIND DEFORMATION. THIS PAPER WILL DESCRIBE TECHNIQUES FOR USING TREES AS AN INDICATOR OF WIND POWER POTENTIAL AND THEIR LIMITATIONS AS A WIND PROSPECTING TOOL.

1979-0777 WAHRENBROCK H E
CAN WE AFFORD NOT TO DEVELOP THE HIGH-TOWER WINDMILL NOW?
PUBLIC UTIL. FORTN. 104(7): 42-47, SEPTEMBER 27, 1979.

THE FEDERAL POWER COMMISSION INVESTIGATION IN THE 1940S OF THE POTENTIALITIES OF WIND POWER FOR ELECTRIC UTILITY USE WAS CONDUCTED BY PERCY H. THOMAS. THE AUTHOR HAD PREVIOUSLY PRESENTED THOMAS AS AN EXPERT WITNESS ON TRANSMISSION OF ELECTRIC ENERGY THROUGH AN INTERSTATE POWER POOL IN ONE OF THE EARLIEST FPC JURISDICTIONAL CASES; HERE HE RECALLS HOW THE PLAN WAS SHELVED BY THE NIXON ADMINISTRATION AND LIMITATIONS IMPOSED ON THE NEWLY LAUNCHED PROGRAM TO STALL DEVELOPMENT OF ANY WINDMILL LARGE ENOUGH FOR ECONOMIC UTILITY USE. MR. WAHRENBROCK REVIEWS THE PLANS OF THE HIGH-TOWER WINDMILL, EXPLAINS THE INCREASED EFFICIENCY AVAILABLE FROM THE WINDMILL, AND HOW ELECTRICITY GENERATED BY THE WINDMILL CAN BE FED INTO A UTILITY SYSTEM. AN EXPERIMENT CONDUCTED AT GRANDPA'S KNOB IN VERMONT IN THE 1940S IS REVIEWED.

1979-0778 WAINAUSKI H
WIND TUNNEL TESTS OF A 1/30 SCALE MODEL OF A 3.5 MEGAWATT WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 2050-2058.

A 2.44 M (8.0 FT.) DIAMETER, 2 BLADE WIND TURBINE WAS TESTED IN THE 5.49 M (18 FT.) THROAT OF THE UNITED TECHNOLOGIES LOW SPEED WIND TUNNEL TEST FACILITY. THE APPROXIMATELY 1/30 SCALE MODEL WAS TESTED OVER A RANGE OF VELOCITIES, TIP SPEEDS AND BLADE ANGLES FULLY ENCOMPASSING THE OPERATING SPECTRUM OF A VARIABLE PITCH WIND TURBINE. THE EFFECTS OF SCALE, BLADE SURFACE ROUGHNESS AND BLADE INBOARD PLANFORM AND AIRFOIL MODIFICATIONS (TO FACILITATE DESIGN AND MANUFACTURE) WERE INVESTIGATED. THE RESULTS SHOW THAT THE MEASURED PERFORMANCE OF THE MODEL WIND TURBINE, ADJUSTED FOR SCALE EFFECTS, IS WITHIN ONE PERCENT OF THE PREDICTED PERFORMANCE OF THE FULL SCALE WIND TURBINE WHEN COMPARED ON AN ANNUAL ENERGY OUTPUT BASIS FOR THE 3.5 MEGAWATT RATING.

1979-0779 WAKE S J, BRAUN H R, BRISTOW D J
OPERATION AND ANALYSIS OF A VERTICAL AXIS WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 303-307.

A 15 MINUTES PROTOTYPE VERTICAL AXIS WIND TURBINE (VAWT) LOCATED AT THE DEFENCE RESEARCH ESTABLISHMENT OTTAWA (DREO) HAS BEEN MONITORED FOR THREE YEARS. THE TURBINE IS USED IN COMBINATION WITH STORAGE BATTERIES TO DRIVE A CONTINUOUS 60 W LOAD. THIS SYSTEM IS DESCRIBED AS ARE THE FAILURES AND MODIFICATIONS. A COMPUTER SIMULATION OF THE VAWT/BATTERY STORAGE SYSTEM IS DISCUSSED IN RELATION TO ACTUAL DREO SITE DATA. TEMPERATURE AND WIND DATA FROM A WEATHER STATION AT ALERT NORTHWEST TERRITORIES ARE USED TO ILLUSTRATE HOW THE PROGRAM MIGHT BE UTILIZED TO ASSESS THE SUITABILITY OF THE SYSTEM IN ANOTHER LOCATION.

1979-0780 WALDON C A, CARR M J, GROTZKY V K
MILLVILLE WIND TURBINE GENERATOR: FAILURE ANALYSIS AND CORRECTIVE DESIGN MODIFICATION.
NTIS, JULY 1979. 25 P.
RFP-2992/3533/79-3

FATIGUE CRACKS IN THE BLADE SKINS OF THE MILLVILLE WIND TURBINE GENERATOR WERE FRACTOGRAPHICALLY ANALYZED. IT IS BELIEVED THEY WERE CAUSED BY LARGE FLAPWISE DEFLECTIONS DURING A WIND STORM ON DECEMBER 4, 1978. THE DEFLECTIONS CAUSED THE SKIN TO BUCKLE, WHICH INITIATED RAPIDLY GROWING FATIGUE CRACKS. PROPAGATION CONTINUED TO THE LEADING EDGE, MOVING RADIALLY INWARD AND OUTWARD ALONG THE LEADING EDGE RADIUS. COMMUNICATION BETWEEN ROCKWELL AND MILLVILLE RESULTED IN A MODIFIED BLADE DESIGN WHICH INCORPORATES SEVERAL CORRECTIVE TECHNIQUES.

1979-0781 WALKER S N, ZAMBRANO T G

WIND ENERGY ASSESSMENT OF THE SAN GORGONIO PASS REGION.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 405-415.
PNL-3214

THE SAN GORGONIO PASS REGION HAS BEEN IDENTIFIED AS AN AREA THAT MAY BE SUITED FOR A LARGE ARRAY OF WECS. THIS PAPER REPORTS THE PROGRESS-TO-DATE MADE IN THE SOUTHERN CALIFORNIA EDISON- AND CALIFORNIA ENERGY COMMISSION-SPONSORED FIELD INVESTIGATION OF THE WIND ENERGY POTENTIAL OF THE SAN GORGONIO PASS REGION. THE FIELD PROGRAM IS ORGANIZED TO OBTAIN WIND INFORMATION, WHICH CAN BE DIRECTLY INTERPRETED IN TERMS OF WECS DESIGN REQUIREMENTS.

1979-0782 WALTERS R E, MIGLIORE P G, WOLFE W P
INNOVATIVE STRAIGHT BLADED VERTICAL AXIS WIND TURBINE.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 231-244.
SERI/TP-245-184, CONF-790501

THOSE THEORETICAL AND EXPERIMENTAL STUDIES OF STRAIGHT BLADED DARRIEUS WIND TURBINES WHICH HAVE BEEN CONDUCTED AT WEST VIRGINIA UNIVERSITY (WVU) SINCE 1975 ARE REVIEWED IN THIS PAPER. EMPHASIS IS PLACED ON THE UNUSUAL AERODYNAMIC EFFECTS WHICH RESULT FROM THE ORBITAL MOTION OF THE TURBINE BLADES, AND THE SIGNIFICANCE OF THESE EFFECTS REGARDING TURBINE BLADE DESIGN IS DISCUSSED.

1979-0783 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G
VERTICAL AXIS WIND TURBINE DEVELOPMENT. FINAL REPORT, EXECUTIVE SUMMARY FOR MARCH 1, 1976-JUNE 30, 1977.
NTIS, JULY 1979. 22 P.
ORO-5135-77/5(SUMM.), WVU-AE-TR-58

THE PURPOSE OF THIS WORK IS TO EVALUATE THE POTENTIAL OF A CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE (CCVAWT). THIS CONCEPT IS THAT OF A VERTICAL AXIS WIND TURBINE WHICH USES STRAIGHT BLADES COMPOSED OF AIRFOIL SHAPES HAVING HIGH EFFICIENCY, I.E., HIGH LIFT TO DRAG RATIOS. THIS WOULD BE ATTAINED BY USING CIRCULATION CONTROLLED AIRFOILS FOR THE BLADES; THESE AIRFOILS CONTAIN SLOTS NEAR ROUNDED TRAILING EDGES THROUGH WHICH A SMALL AMOUNT OF COMPRESSED AIR IS BLOWN TO OBTAIN HIGH LIFT FORCES. THE STRAIGHT BLADES ALLOW CYCLIC PITCH CONTROL, WHICH COULD BE USED TO FURTHER INCREASE MACHINE EFFICIENCY.

1979-0784 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G
VERTICAL AXIS WIND TURBINE DEVELOPMENT. FINAL REPORT, MARCH 1, 1976-JUNE 30, 1977.
NTIS, JULY 1979. 243 P.
ORO-5135-77/5

THEORETICAL AND EXPERIMENTAL RESEARCH ACCOMPLISHED IN EVALUATING AN INNOVATIVE CONCEPT FOR VERTICAL AXIS WIND TURBINES (VAWT) IS DESCRIBED. THE CONCEPT IS THAT OF USING STRAIGHT BLADES COMPOSED OF CIRCULATION CONTROLLED AIRFOIL SECTIONS. THE THEORETICAL ANALYSIS HAS BEEN DEVELOPED TO DETERMINE THE UNSTEADY LIFT AND MOMENT CHARACTERISTICS OF MULTIPLE-BLADE CROSS-FLOW WIND TURBINES. TO DETERMINE THE DRAG DATA NEEDED AS INPUT TO THE THEORETICAL ANALYSIS, AN OUTDOOR TEST MODEL VAWT HAS BEEN CONSTRUCTED; DESIGN DETAILS, INSTRUMENTATION, CALIBRATION RESULTS, AND INITIAL TEST RESULTS ARE REPORTED. INITIAL TESTING WAS WITH FIXED PITCH BLADES HAVING CROSS-SECTIONS OF CONVENTIONAL SYMMETRICAL AIRFOILS. COSTS OF BUILDING THE TEST MODEL ARE INCLUDED, AS WELL AS COST ESTIMATES FOR BLADES CONSTRUCTED WITH COMPOSITE MATERIALS. THESE COSTS ARE COMPARED WITH THOSE OF OTHER TYPES OF WIND TURBINES.

1979-0785 WAN Y H, DODD C W, EVERS J L
CONTROL OF DISPERSED VERTICAL AXIS WIND TURBINES.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 413-424.

WIND TURBINES USED AS THE PRIMARY SOURCE OF ENERGY IN A REMOTE REGION ARE CALLED DISPERSED WIND ENERGY SYSTEMS. THE USE OF A VERTICAL AXIS WIND TURBINE (VAWT) IN THIS MODE OF OPERATION REQUIRES SPECIAL CONTROL CONSIDERATIONS. A COMPUTER SIMULATION EXAMINING THE TURBINE'S OUTPUT VOLTAGE UNDER TIME VARYING WIND CONDITIONS EVALUATES THREE POSSIBLE CONTROL TECHNIQUES.

1979-0786 WARREN A W
AN EXPANDED SYSTEM SIMULATION MODEL FOR SOLAR ENERGY STORAGE. VOLUME 1.
NTIS, AUGUST 1979. 107 P.
N79-33881, NASA-CR-159601, DOE/NASA/0042-79/1-V-1

THE SIMULATION MODEL FOR WIND ENERGY STORAGE (SIMWEST) PROGRAM NOW INCLUDES WIND AND/OR PHOTOVOLTAIC SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL AND PNEUMATIC) AND IS AVAILABLE FOR THE UNIVAC 1100 SERIES AND THE CDC 6000 SERIES COMPUTERS. THE LEVEL OF DETAIL IS CONSISTENT WITH A ROLE OF EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND AND/OR PHOTOVOLTAIC ENERGY SYSTEMS. THE SOFTWARE PACKAGE CONSISTS OF TWO BASIC PROGRAMS AND A LIBRARY OF SYSTEM, ENVIRONMENTAL, AND LOAD COMPONENTS. THE FIRST PROGRAM IS A PRECOMPILER WHICH GENERATES COMPUTER MODELS (IN FORTRAN) OF COMPLEX WIND AND/OR PHOTOVOLTAIC SOURCE/STORAGE/APPLICATION SYSTEMS, FROM USER SPECIFICATIONS USING THE RESPECTIVE LIBRARY COMPONENTS. THE SECOND PROGRAM PROVIDES THE TECHNO-ECONOMIC SYSTEM ANALYSIS WITH THE RESPECTIVE I/O, THE INTEGRATION OF SYSTEM DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES.

1979-0787 WARREN A W, EDSINGER A W
SIMWEST: A SIMULATION MODEL FOR WIND AND PHOTOVOLTAIC ENERGY STORAGE SYSTEMS. (CDC USER'S MANUAL). VOL. 1.
NTIS, AUGUST 1979. 486 P.
N79-33883/6, NASA-CR-159607, DOE/NASA/0042-79/3-V-1

PROCEDURES ARE GIVEN FOR USING THE SIMWEST PROGRAM ON CDC 6000 SERIES COMPUTERS. THIS EXPANDED SOFTWARE PACKAGE INCLUDES WIND AND/OR PHOTOVOLTAIC SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL, AND PNEUMATIC).

1979-0788 WARREN A W, EDSINGER R W, BURROUGHS J D
SIMWEST: A SIMULATION MODEL FOR WIND AND PHOTOVOLTAIC ENERGY STORAGE SYSTEMS. (CDC PROGRAM DESCRIPTIONS). VOL. 2.
NTIS, AUGUST 1979. 247 P.
N79-33884/4, NASA-CR-159608, DOE/NASA/0042-79/4-V-2

THE COMPUTER PROGRAMS FOR THE CDC VERSION OF SIMWEST (1979 REVISION) ARE DESCRIBED. MACRO FLOW CHARTS AND SOURCE CODE LISTINGS FOR EACH MAJOR PROGRAM ENTITY ARE PRESENTED.

1979-0789 WARREN A W
AN EXPANDED SYSTEM SIMULATION MODEL FOR SOLAR ENERGY STORAGE. (UNIVAC OPERATION MANUAL REVISIONS). VOL. 2.
NTIS, AUGUST 1979. 198 P.
N79-33882/8, NASA-CR-159602, DOE/NASA/0042-79/2-V-2

ADDITIONS OR REVISIONS OF COMPONENTS OF THE SIMWEST PROGRAM ARE PROVIDED FOR INSERTION INTO THE MANUAL USED WITH THE UNIVAC 1100 SERIES COMPUTER.

1979-0790 WATSON D B, ARRILLAGA J, DENSEM T
CONTROLLABLE DC POWER SUPPLY FROM WIND-DRIVEN SELF-EXCITED INDUCTION MACHINES.
INST. ELECTR. ENG. PROC. 126(12): 1245-1248, DECEMBER 1979.

A VARIABLE-SPEED GENERATING SYSTEM IS DESCRIBED WHICH USES A 3-PHASE SQUIRREL-CAGE INDUCTION MACHINE WITH SELF-EXCITATION CAPACITORS. THE VARIABLE-FREQUENCY/VARIABLE-VOLTAGE GENERATED IS THEN FED THROUGH A 3-PHASE CONTROLLED RECTIFIER TO PROVIDE A DC SUPPLY AT CONSTANT VOLTAGE. THE PROPOSED SCHEME IS SUITABLE FOR WIND POWER SOURCES AS IT ALLOWS WIDE CHANGES IN WIND TURBINE SPEED. AT ALL SPEEDS, OPTIMUM GENERATING POWER CAN BE SET UP BY RECTIFIER DELAY ANGLE CONTROL.

1979-0791 WATSON G
A NEW TURBINE FOR MAKING USE OF WIND ENERGY.
REV. ELECTROTEC. 65(5): 210-212, SEPTEMBER-OCTOBER 1979. (IN SPANISH)

THIS ARTICLE DESCRIBES THE DESIGN OF A WIND TURBINE BY NEW AGE ACCESS LTD., HEXHAM, ENGLAND. IT IS OF THE VERTICAL AXIS DARRIEUS TYPE, THE ROTOR LOOPS BEING MADE OF HOLLOW FIBRE-GLASS SEGMENTS FILLED WITH POLYURETHANE FOAM, AND EACH HAVING TWO SPRING-CONTROLLED GOVERNING VALVES. THE MAIN ROTOR IS STARTED BY MEANS OF AN AUXILIARY ROTOR MOUNTED ON THE SAME SHAFT; THIS CONSISTS OF TWO SAVONIUS SEMI-CYLINDRICAL ELEMENTS (MADE OF HALVED OIL-DRUMS) MOUNTED AT RIGHT ANGLES.

1979-0792 WATTS A W
WIND/HYDRO GENERATION ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 190-203.
CONF-790352

THE BUREAU OF RECLAMATION IS CURRENTLY INVOLVED IN A SPECIAL 3-YEAR STUDY OF THE FEASIBILITY TO INTEGRATE WIND TURBINE GENERATORS WITH AN EXISTING FEDERAL HYDROELECTRIC SYSTEM. RECLAMATION'S INTEREST IS IN IMPLEMENTATION OF THE WIND TURBINE TECHNOLOGY AND NOT THE RESEARCH AND DEVELOPMENT OF THE HARDWARE. THE STUDY STARTED IN OCTOBER 1977 AND IS DESIGNED TO: TEST THE CONCEPT OF INTEGRATING WIND AND HYDROELECTRIC GENERATION FACILITIES FOR PRODUCTION OF WHOLESALE POWER; DETERMINE THE ENVIRONMENTAL IMPACTS OF WIND GENERATION WITHIN THE STUDY AREA; EVALUATE THE FEASIBILITY AND JUSTIFICATION FOR CONSTRUCTING A LARGE-SCALE WIND FARM; AND MEASURE THE ACCEPTANCE AND REACTION OF THE PUBLIC TO THE PLAN.

1979-0793 WATTS A, QURAESHI S, ROWLEY L P
RESULTS OF A UTILITY SURVEY OF THE STATUS OF LARGE WIND TURBINE DEVELOPMENT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 363-374.
NASA-CP-2106

A SURVEY OF THE STATUS OF WIND TURBINE DEVELOPMENT HAS BEEN COMMISSIONED BY A UTILITY COMPANY HAVING INTEREST IN THE APPLICATION OF WIND POWER TO THE GENERATION OF ELECTRICITY. THE UTILITY, HYDRO-QUEBEC, IS CONSIDERED ONE OF THE MAJOR UTILITIES IN NORTH AMERICA IN THAT IT SERVICES ONE OF THE LARGEST GEOGRAPHICAL LAND MASSES IN THE CONTINENT. AN INDICATION OF THE SCOPE OF THE UTILITY IS GIVEN.

1979-0794 WE WORK WITH ENERGY.
NTIS, 1979. 46 P. (IN GERMAN)
NP-24030

THIS BROCHURE DEALS WITH CURRENT QUESTIONS IN NATIONAL ECONOMICS AND ECONOMIC AND SOCIAL POLICY. TO ILLUSTRATE THIS COMPLETELY, THE INDIVIDUAL DEPARTMENTS OF THE COMPANY DISCUSS WORK IN THE FIELDS OF GEOTHERMAL HEAT, SOLAR ENERGY, HEAT PUMPS, WIND ENERGY, AND BIOENERGY. THIS IS FOLLOWED BY THE 1978 COMPANY REPORT AND ANNUAL BALANCE.

1979-0795 WEED G D
WIND DRIVEN POWER GENERATION.
U.S. PATENT NO. 4,178,126, DECEMBER 11, 1979. 6 P.

A JOURNALED ROTOR IS PROVIDED FOR ROTATION ABOUT AN AXIS TO BE DISPOSED TRANSVERSE TO A FLUID FLOW PATH AND THE ROTOR INCLUDES A PLURALITY OF MOUNTING PORTIONS SPACED RADIALLY OUTWARDLY FROM AND CIRCUMFERENTIALLY ABOUT THE AXIS GENERALLY PARALLELING THE AXIS OF ROTATION OF THE ROTOR. VANE ASSEMBLY DISPLACEMENT CONTROL STRUCTURE IS OPERATIVELY CONNECTED TO THE VANE ASSEMBLIES FOR ANGULARLY DISPLACING THE VANE ASSEMBLIES RELATIVE TO THE CORRESPONDING MOUNTING PORTIONS 180 DEGREES EACH 360 DEGREES OF ANGULAR DISPLACEMENT OF THE ROTOR AND IN DIRECTIONS OPPOSITE THE DIRECTION OF ANGULAR DISPLACEMENT OF THE ROTOR UPON ROTATION OF THE LATTER. THE VANE ASSEMBLIES ARE VARIOUSLY OPTIMUMLY ANGULARLY POSITIONED RELATIVE TO THE CORRESPONDING MOUNTING PORTIONS AND EACH OTHER TO EFFECT SUBSTANTIALLY MAXIMUM THRUST THEREFROM ON THE ROTOR AS A RESULT OF FLUID FLOW THEREAGAINST FROM ONE SIDE OF THE AXIS OF ROTATION OF THE ROTOR.

1979-0796 WEBSTER G W
DEVICES FOR UTILIZING THE POWER OF THE WIND.
U.S. PATENT NO. 4,154,556, MAY 15, 1979. 6 P.

A WIND POWER DEVICE IS DESCRIBED WHICH USES A CURVED DUCT THROUGH WHICH A ROTATABLE SHAFT PASSES IN A DIRECTION SUCH THAT THE AXIS OF THE SHAFT IS NORMAL TO THE PLANE CONTAINING ONE END OF THE CURVED DUCT AND WHICH CONTINUES THROUGH THE CURVING PORTION OF THE WALL OF THE DUCT OPPOSITE THE END OF THE DUCT TO THE OUTSIDE OF THE DUCT WHERE IT IS CONNECTIBLE TO A POWER-CONSUMING DEVICE. A SET OF RADIALLY EXTENDING HELICALLY CURVED AEROFOIL BLADES IS ATTACHED TO THE SHAFT AT THE END OF THE DUCT. SUPPORT MEANS MOUNTED ON THE BLADES AT THE TIPS THEREOF REST ON A FIXED ANNULAR GUIDE MEANS SURROUNDING THE END OF THE DUCT. MOUNTING MEANS SUPPORTS THE DUCT IN A POSITION IN WHICH THE SHAFT IS VERTICAL.

1979-0797 WEGLEY H L

OVERVIEW OF WIND CHARACTERISTICS FOR OPERATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 161-167.
PNL-3214

1979-0798 WEGLEY H L, PENNELL W T
SITING SMALL WIND MACHINES.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 198-212.
RFP-3014(VOL.1)

A RECENT SURVEY INDICATED THAT IMPROPER SITING WAS A COMMON CAUSE OF DISSATISFACTION AMONG SMALL WIND MACHINE USERS. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE MACHINE SITE. A PROCEDURE IS DESCRIBED FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND MACHINE AND FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN. IN SOME CASES EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF MACHINE PERFORMANCE CAN BE MADE.

1979-0799 WEGLEY H L
WIND FORECASTING FOR UTILITIES HAVING SIGNIFICANT PENETRATION OF SMALL WIND SYSTEMS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 24-33.
RFP-3014(VOL.2)

IN RESPONSE TO THE NEED FOR WIND-FORECASTING RELIABILITY DATA, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE FEDERAL WIND ENERGY PROGRAM ESTABLISHED THE WIND CHARACTERISTICS FOR WECS OPERATION PROGRAM AREA IN FISCAL YEAR 1978. THE WORK PERFORMED AND PLANNED IN THIS PROGRAM AREA IS DESCRIBED AS IT RELATES TO THE OPERATION OF A UTILITY HAVING A HIGH PENETRATION OF SWECS, I.E., THOSE UTILITIES THAT USE SWECS FOR PRODUCING AN OPERATIONALLY SIGNIFICANT PERCENTAGE OF THEIR POWER.

1979-0800 WELLMAN C
WIND AND UTILITIES; EXPLORING BLOCK ISLAND.
WIND POWER DIG. NO. 17: 32-35, FALL 1979.

THE DOE PROJECT ON BLOCK ISLAND IS DESCRIBED.

1979-0801 WEINGART O
FABRICATION OF LARGE COMPOSITE SPARS AND BLADES.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2, 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-B, 4 P.

THIS PAPER IS A CONTINUATION OF A PREVIOUSLY PUBLISHED REPORT DESCRIBING PREPARATIONS FOR THE FABRICATION OF A 20,000 LB. FILAMENT-WOUND D-SPAR FOR THE DOE NASA 150 FOOT COMPOSITE WIND TURBINE BLADE. IN THIS PAPER, THE AUTHOR BRIEFLY SUMMARIZES THE PREVIOUS PAPER AND DESCRIBES THE ACTUAL FABRICATION AND SHIPMENT OF THE 150 FT. SPAR BY STRUCTURAL COMPOSITES INDUSTRIES, INC.

1979-0802 WEINGART O
FABRICATION OF LARGE COMPOSITE SPARS AND BLADES.
U.S. NATIONAL BUREAU OF STANDARDS SPEC. PUBL. NO. 563. ADVANCED COMPOSITES: DESIGN AND APPLICATIONS. PROCEEDINGS OF THE MEETING OF THE MECHANICAL FAILURES PREVENTION GROUP, 29TH, GAITHERSBURG, MARYLAND, MAY 23-25, 1979. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1979. P. 155-172.

A NATIONAL WIND ENERGY PROGRAM HAS BEEN ESTABLISHED TO DEVELOP THE TECHNOLOGY NECESSARY TO ENABLE WIND ENERGY SYSTEMS TO BE COST-COMPETITIVE WITH CONVENTIONAL POWER GENERATION SYSTEMS AND CAPABLE OF RAPID COMMERCIAL EXPANSION FOR PRODUCING SIGNIFICANT QUANTITIES OF ELECTRICAL POWER. WIND TURBINE GENERATORS BEING DEVELOPED UNDER THIS PROGRAM WILL REQUIRE ROTOR DIAMETERS OF UP TO 300 FEET. BECAUSE OF THE CONSIDERABLE EXTENSION IN THE TECHNOLOGY REQUIRED TO DESIGN AND CONSTRUCT BLADES OF THIS SIZE, IT WAS HIGHLY DESIRABLE TO ESTABLISH AN EARLY TECHNOLOGY BASE. TO THAT END, THE DEPARTMENT OF ENERGY, THROUGH NASA-LEWIS RESEARCH CENTER HAS AWARDED SEVERAL CONTRACTS FOR THE DESIGN, FABRICATION AND TEST OF LARGE LOW-COST WIND TURBINE BLADES BUILT OF COMPOSITE MATERIALS.

1979-0803 WENDELL L L
WIND RESOURCE ASSESSMENT STATUS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 83-93.
CONF-790352

AN ASSESSMENT OF WIND POWER AS AN ENERGY RESOURCE IN THE US IS PRESENTED.

1979-0804 WENDELL L L
WIND RESOURCE ASSESSMENT STATUS.
NTIS, 1979. 13 P.
PNL-SA-6918(REV.1)

THE FIRST OBJECTIVE OF THE WCPE'S REGIONAL ASSESSMENT WAS TO DEVELOP AND TEST PROTOTYPE TECHNIQUES FOR THE ANALYSIS OF WIND-ENERGY POTENTIAL AND DISTRIBUTION OVER A LARGE AREA. THESE TECHNIQUES INVOLVED THE UTILIZATION OF A MUCH LARGER DATA SET, THE APPLICATION OF METEOROLOGICAL AND TOPOGRAPHIC FACTORS IN THE ANALYSIS, AND THE USE OF INDIRECT METHODS OF WIND POWER ESTIMATION IN AREAS WHERE NO WIND MEASUREMENTS EXISTED. FIVE STATES IN THE PACIFIC NORTHWEST WERE SELECTED AS A TEST OF THESE TECHNIQUES.

1979-0805 WENDELL L L
OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 15-24.
SERI/TP-245-184, CONF-790501

WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) HAS BEEN ESTABLISHED TO ASSEMBLE AND DEVELOP WIND CHARACTERISTICS INFORMATION FOR THOSE INVOLVED IN 1) DESIGNING AND EVALUATING THE PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), 2) PLANNING ENERGY PROGRAMS, 3) SELECTING SITES FOR INSTALLING WECS, AND 4) OPERATING WECS. THE TECHNICAL PORTION OF THE WCPE HAS BEEN DIVIDED INTO FOUR PROGRAM

AREAS TO EXPEDITE THE ACCOMPLISHMENT OF THESE TASKS. RESEARCH PLANS AND OVERALL PROGRESS TO DATE ARE PRESENTED WITH EMPHASIS ON THE RESOURCE ASSESSMENT PROGRAM AREA.

1979-0806 WENDELL J
WIND ENERGY CONVERSION. VOLUME 10. AEROELASTIC STABILITY OF WIND TURBINE ROTOR BLADES. ASRL-TR-184-16.
NTIS, SEPTEMBER 1978. 94 P.
COO-4131-T1(VOL.10)

THE NONLINEAR EQUATIONS OF MOTION OF A GENERAL WIND TURBINE ROTOR BLADE ARE DERIVED FROM FIRST PRINCIPLES. THE TWISTED, TAPERED BLADE MAY BE PRECONED OUT OF THE PLANE OF ROTATION, AND ITS ROOT MAY BE OFFSET FROM THE AXIS OF ROTATION BY A SMALL AMOUNT. THE AERODYNAMIC CENTER, CENTER OF MASS, SHEAR CENTER, AND AREA CENTROID ARE DISTINCT IN THIS DERIVATION. THE EQUATIONS ARE APPLICABLE TO STUDIES OF FORCED RESPONSE OR OF AEROELASTIC FLUTTER, HOWEVER, NEITHER GRAVITY FORCING, NOR WIND SHEAR AND GUST FORCING ARE INCLUDED. THE EQUATIONS DERIVED ARE APPLIED TO STUDY THE AEROELASTIC STABILITY OF THE NASA-ERDA 100 KW WIND TURBINE, AND SOLVED USING THE GALERKIN METHOD. THE NUMERICAL RESULTS ARE USED IN CONJUNCTION WITH A MATHEMATICAL COMPARISON TO PROVE THE VALIDITY OF AN EQUIVALENT HINGE MODEL DEVELOPED BY THE WIND ENERGY CONVERSION PROJECT AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

1979-0807 ENERGY FROM THE WIND: BILL SMITH HAS A WINDMILL.
LIVING ALTERN. 1(1): 8-10, SEPTEMBER 1979.

WITH THOUSANDS OF MILES OF OPEN SHORELINES, AND HILLY TERRAIN INLAND, NEW ENGLAND IS PERHAPS THE BEST PLACE IN THE COUNTRY TO PRODUCE ENERGY FROM THE WIND. YET IT IS AN INDUSTRIOUS INDIVIDUAL LIKE BILL SMITH OF JAMESTOWN, RHODE ISLAND, NOT THE GOVERNMENT NOR THE POWER COMPANIES, WHO IS DOING THE PIONEERING WORK AND PAVING THE WAY FOR NEW ENGLAND TO MAKE USE OF ITS OWN NATURAL RESOURCES IN ITS STRUGGLE TOWARD ENERGY INDEPENDENCE. AFTER TRYING SEVERAL DESIGNS THAT PROVED TO BE INEFFICIENT, BILL SMITH VISITED THE MIDWEST WHERE WINDMILLS HAVE BEEN SUCCESSFULLY GENERATING ELECTRICITY SINCE THE 1920'S. HE WAS ABLE TO BUY THE ORIGINAL JACOBS WIND ELECTRIC GENERATOR THAT WAS A PROTOTYPE FOR GENERATORS THAT HAVE OPERATED VIRTUALLY TROUBLE-FREE FOR DECADES. THE JACOBS WIND GENERATOR NOW PROVIDES ALMOST ALL OF THE SMITH'S HOME ELECTRICAL NEEDS, GENERATING 300 TO 600 KILLOWATT HOURS PER MONTH. HE HAS ATTEMPTED OTHER ALTERNATIVE METHODS OF ENERGY USE, INTEGRATING WIND, WOOD, AND SUN IN HIS ATTEMPT TO MOVE TOWARD ENERGY INDEPENDENCE.

1979-0808 WENTINK T
ALASKAN WIND POWER STUDY.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 243-250.
PNL-3214

THE OBJECTIVE OF THIS PAPER IS THE DETERMINATION OF ALASKA'S WIND POWER POTENTIAL (WPP) FOR THE EVENTUAL PRACTICAL APPLICATION OF ITS WIND ENERGY. THE PAPER DEALS ONLY WITH WIND CHARACTERISTICS, NOT APPLICATIONS.

1979-0809 WHITE M L, WEIGEL W D
A LOW COST COMPOSITE BLADE FOR A 300 FOOT DIAMETER WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 331-336.

A PROTOTYPE COMPOSITE BLADE FOR A 300 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, FABRICATED AND SUCCESSFULLY SUBJECTED TO STRUCTURAL AND NATURAL FREQUENCY TESTS.

1979-0810 WHITE M L, WEIGEL W D
LOW COST COMPOSITE BLADE FOR A 300 FOOT DIAMETER WIND TURBINE.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2, 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-C, 6 P.

IN THE REPORTED R AND D WORK, A PROTOTYPE COMPOSITE BLADE FOR A 300 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, FABRICATED AND SUCCESSFULLY SUBJECTED TO STRUCTURAL AND NATURAL FREQUENCY TESTS. THE BLADE CONSISTS OF A FILAMENT WOUND E-GLASS-EPOXY LEADING EDGE SPAR, AN E-GLASS-POLYESTER TRAILING EDGE SPLINE FABRICATED FROM PULTRUSIONS, SANDWICH PANELS CONSTRUCTED OF PHENOLIC RESIN IMPREGNATED KRAFT PAPER HONEYCOMB FACED WITH GLASS CLOTH-EPOXY, AND A STEEL HUB ADAPTER. COMPOSITE COMPONENTS ARE JOINED BY EPOXY ADHESIVE BONDING, AND THE HUB ADAPTER IS MECHANICALLY FASTENED TO THE SPAR AND SPLINE. TOTAL WEIGHT OF THE BLADE IS APPROXIMATELY 36,000 POUNDS, OF WHICH ALMOST 26,000 POUNDS ARE COMPOSITE STRUCTURE AND THE REMAINDER THE STEEL ADAPTER. A WOVEN ROVING MATERIAL HAVING ALMOST ALL FIBERS ORIENTED TRANSVERSE TO ITS LENGTH WAS USED TO WIND THE 19,000 POUND, MONOCOQUE SHELL SPAR, PRODUCING AN EFFICIENT STRUCTURE WITH APPROXIMATELY 90 PERCENT SPANWISE FIBER ORIENTATION AND A STRUCTURAL TAPER IN OVERALL DIMENSIONS AND WALL THICKNESS.

1979-0811 WHITE P W
PROPOSAL FOR GENERATING HEAT FROM WIND ENERGY FOR DOMESTIC AND OTHER USES.
ENERGY FOR INDUSTRY. OXFORD, NEW YORK, PERGAMON PRESS, 1979. P. 141-151.

THE CONCEPT OUTLINED HAS A HEAT PUMP WITH THE COMPRESSOR DRIVEN DIRECTLY BY A WIND-POWERED TURBINE. HEAT IS ABSORBED IN THE EVAPORATOR OF THE HEAT PUMP BY AMBIENT CONVECTION AND SOLAR RADIATION. THE MISMATCH BETWEEN SUPPLY AND DEMAND IS OVERCOME BY PROVIDING A THERMAL STORE USING THE LATENT HEAT OF WATER. THE STRUCTURE OF THIS STORE SERVES THE TWO FURTHER FUNCTIONS OF SUPPORTING THE WIND-POWERED TURBINE AND ABSORBING HEAT FOR TRANSMISSION UNIFORMLY TO THE EVAPORATOR. THE TURBINE IS SHROUDED AND DRIVEN AT HIGH SPEED DUE TO THE SHAPE OF THE INLET DUCT. THE ADVANTAGES FOR THIS ARRANGEMENT ARE LOW TORQUE REACTION, LOW NOISE, HIGH AERODYNAMIC EFFICIENCY AND THE ABILITY TO DRIVE THE COMPRESSOR DIRECTLY.

1979-0812 WHITFORD D H, MINARDI J E
UTILITY-SIZED WIND-POWERED ELECTRIC PLANTS BASED ON THE MADARAS ROTOR CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 71-88.
SERI/TP-245-184, CONF-790501

THE MADARAS ROTOR POWER PLANT CONCEPT WAS ANALYZED AND UPDATED TO DETERMINE ITS CAPABILITY TO COMPETE TECHNICALLY AND ECONOMICALLY WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES (HAWTG). THIS CONCEPT, DEVELOPED IN THE 1930'S, UTILIZES ROTATING CYLINDERS, VERTICALLY MOUNTED ON FLAT CARS, TO REACT WITH THE WIND (MAGNUS EFFECT) AND PROPEL AN ENDLESS TRAIN OF CARS AROUND A CLOSED TRACK AT CONSTANT SPEED. ALTERNATORS GEARED TO THE WHEELS OF EACH CAR GENERATED ELECTRICAL POWER, WHICH WAS TRANSMITTED TO A POWER STATION BY A TROLLEY SYSTEM. THE STUDY CONSISTED OF A WIND TUNNEL TEST SERIES, AN ELECTROMECHANICAL DESIGN, PERFORMANCE ANALYSIS, AND A COST ANALYSIS.

1979-0813 WIEBE B C
WIND POWER--ITS POTENTIAL FOR THE TELECOMMUNICATIONS INDUSTRY.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 434-437.

THIS PAPER REPORTS ON THE PRELIMINARY OPERATIONAL RESULTS OF SYSTEMS UNDERGOING IN SITU FAMILIARIZATION TESTS. THE PROGRAM HAS INVOLVED THE FOLLOWING FIRMS: ALBERTA GOVERNMENT TELEPHONES, SASKATCHEWAN TELECOMMUNICATIONS, MANITOBA TELEPHONES, CN/CP TELECOMMUNICATIONS, CANADIAN BROADCASTING CORPORATION, SHELL CANADA, AND NEWFOUNDLAND TELEPHONES. THE COST BENEFIT POTENTIAL OF A WIND POWER SYSTEM IS EXAMINED, AND A HISTORY OF THE TEST PROGRAM TO DATE INCLUDING INSTALLATION RESULTS, OPERATIONAL RESULTS AND THE REDUCTION OF DIESEL FUEL CONSUMPTION IS PRESENTED. THE FINAL TOPIC LOOKS AT THE GENERAL RESPONSE FROM INDUSTRY INVOLVED IN THE PROGRAM, IN ASSOCIATION WITH A STATEMENT AS TO FUTURE DEVELOPMENTS AND SYSTEM AVAILABILITY.

1979-0814 WIEDEMANN H O
APPARATUS FOR UTILIZING NATURAL ENERGIES.
U.S. PATENT NO. 4,159,427, JUNE 26, 1979. 20 P.

AN APPARATUS WHICH STORES NATURAL ENERGIES AVAILABLE ON AND/OR UNDER THE SURFACE OF THE WORLD'S OCEAN IS DESCRIBED. SUCH ENERGIES INCLUDE SOLAR ENERGY, WAVE ENERGY, WIND ENERGY, AS WELL AS ENERGY STORED IN THE HEAT OF THE SEA WATER. THE ENERGY EXTRACTING AND STORING EQUIPMENT IS INSTALLED ON A FLOATING VESSEL OR RAFT. THE ENERGY STORING EQUIPMENT INCLUDES FLYWHEEL TYPE ROLLERS OR CYLINDERS DRIVEN BY ELECTRIC MOTORS ENERGIZED BY ELECTRIC GENERATORS WHICH IN TURN RECEIVE THEIR ENERGY FROM THE ENERGY EXTRACTING EQUIPMENT. THE FLYWHEEL TYPE ROLLERS OR CYLINDERS INCLUDE A SUPPORTING HOLLOW CYLINDER HAVING A RELATIVELY THIN WALL ONTO WHICH THERE ARE WOUND FIBERS IMPREGNATED OR EMBEDDED IN A SYNTHETIC RESIN.

1979-0815 WIESNER W
MANUFACTURERS' VIEW OF WIND RESOURCE ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 285-290.
PNL-3214

THIS PAPER PRESENTS A BRIEF OUTLINE OF BOEING ENGINEERING AND CONSTRUCTION'S TREATMENT OF THE SEVERAL AREAS OF WIND RESOURCES NOW RAPIDLY BEING EXPLORED AND QUANTIFIED IN THE UNITED STATES. THE SUBJECT MATTER COVERS A BROAD RANGE OF HIGHLY VARIABLE DATA, THUS, THIS PAPER ONLY REVIEWS SOME OF THE ASPECTS OF HOW A MANUFACTURER OF LARGE WIND TURBINES MAKES USE OF WIND RESOURCES.

1979-0816 PUTTING WYOMING WIND TO WORK.
DENVER POST, EMPIRE MAG., JULY 15, 1979. 5 P.

THE WIND FARM PROJECT AT MEDICINE BOW, WYOMING, IS DESCRIBED.

1979-0817 WIND AND UTILITIES.
WIND POWER DIG. NO. 17: 20-29, FALL 1979.

A NUMBER OF IMPORTANT CONSIDERATIONS ABOUT WIND ENERGY AND UTILITIES ARE ADDRESSED.

1979-0818 WIND ENERGY INFORMATION DIRECTORY.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., OCTOBER 1979. 31 P.

"WIND ENERGY INFORMATION" HAS BEEN PREPARED TO PROVIDE RESEARCHERS, DESIGNERS, MANUFACTURERS, DISTRIBUTORS, DEALERS, AND USERS OF WIND ENERGY CONVERSION SYSTEMS WITH EASY ACCESS TO TECHNICAL INFORMATION.

1979-0819 WIND ENERGY SYSTEMS APPLICATION TO REGIONAL UTILITIES. EXECUTIVE SUMMARY.
NTIS, JUNE 1979. 40 P.
DOE/ET/20063-T1(EXEC. SUMM.)

THIS STUDY DEVELOPED A GENERIC PLANNING PROCESS THAT UTILITIES CAN USE TO DETERMINE THE FEASIBILITY OF UTILIZING WECS (WIND ENERGY CONVERSION SYSTEMS) AS PART OF THEIR FUTURE MIX OF EQUIPMENT. WHILE THIS IS PRIMARILY AN ECONOMIC PROCESS, OTHER QUESTIONS DEALING WITH WECS AVAILABILITY, CAPACITY CREDIT, OPERATING RESERVE, PERFORMANCE OF WECS ARRAYS, ETC., HAD TO BE ADDRESSED. THE APPROACH WAS TO ESTABLISH THE WORTH, OR BREAKEVENVALUE, OF WECS TO THE UTILITY AND TO DETERMINE THE IMPACT THAT WECS ADDITIONS WOULD HAVE ON THE UTILITIES MIX OF CONVENTIONAL SOURCE.

1979-0820 WIND ENERGY SYSTEMS APPLICATION TO REGIONAL UTILITIES.
NTIS, SEPTEMBER 1979. 339 P.
DOE/ET/20063-T1(VOL.2)

A METHODOLOGY FOR ANALYZING THE ECONOMIC IMPACT OF WECS ON A UTILITY IS DESCRIBED IN VOLUME I OF THIS REPORT. THE METHODOLOGY REQUIRES EXTRAPOLATING BOTH HISTORICAL UTILITY LOAD DATA AND HISTORICAL WIND POWER INTO A YEAR OF ANALYSIS; CALCULATING THE TOTAL AMOUNT OF FUNDS MADE AVAILABLE IN THAT YEAR, AS A RESULT OF THE INCLUSION OF WIND POWER IN THE UTILITY MIX; AND THEN ESTIMATING THE PRESENT VALUE OF THE TOTAL FUNDS MADE AVAILABLE TO THE UTILITY OVER THE LIFE OF THE WECS. TO APPLY THE METHODOLOGY TO A SPECIFIC CASE, IT WAS NECESSARY TO DEVELOP VARIOUS COMPUTER PROGRAMS. THE FOLLOWING SECTIONS IN THIS REPORT LIST THE PROGRAMS DEVELOPED FOR THIS STUDY, BRIEFLY SUMMARIZE THEIR CONTENTS, AND EXPLAIN HOW THEY ARE USED. WHEREVER POSSIBLE, A TYPICAL INPUT/OUTPUT FILE IS SHOWN.

1979-0821 WIND ENERGY SYSTEMS. QUARTERLY REVIEW, JULY 1, 1979-SEPTEMBER 30, 1979.
NTIS, DECEMBER 1979. 176 P.
SERI/PR-351-480

THE QUARTERLY REVIEW FOR THE WIND ENERGY SYSTEMS (WES) PROGRAM IS A VISUAL PRESENTATION PREPARED BY THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) AS AN OVERVIEW OF THE EFFORTS IN THE PROGRAM. THIS QUARTERLY REVIEW IS DELIVERED TO FULFILL SERI'S ANNUAL OPERATING PLAN (AOP) REPORTING REQUIREMENTS. THE REVIEW PRESENTS THE OBJECTIVES, ACCOMPLISHMENTS, ACTIVITIES, AND OUTPUTS OF EACH OF THE TASKS IN THE WES PROGRAM.

1979-0822 WIND ENTHUSIAST FACES LOCAL OPPOSITION TO INSTALLATION OF 4 KW MACHINE.
WIND POWER DIG. NO. 17: 14, FALL 1979.

1979-0823 WIND POWER.
NAVY CIV. ENG. 20(1): 4, SUMMER 1979.

THE US NAVY RESEARCH AND DEVELOPMENT PROGRAM FOR WIND TURBINES IS DESCRIBED. TESTING STATIONS AND TURBINE SPECIFICATIONS ARE PRESENTED.

1979-0824 WOLFE R, CLEGG P
HOME ENERGY FOR THE EIGHTIES.
CHARLOTTE, VERMONT, GARDEN WAY PUBL. CO., 1979. 272 P.

ALTERNATIVE ENERGY IDEAS AVAILABLE TO THE HOMEOWNER ARE PRESENTED IN A SIMPLE BUT COMPREHENSIVE TREATMENT. COMPLEX FORMULAS HAVE BEEN REDUCED TO SIMPLE RULES-OF-THUMB. PRACTICAL EXPLANATIONS ARE SUPPLEMENTED BY A LIST OF REFERENCES THAT CONTAIN MORE ELABORATE TECHNICAL DATA ON ENERGY CONSERVATION, SOLAR ENERGY, WIND POWER, WATER POWER, AND WOOD HEAT. A COMPLETE CATALOG OF AVAILABLE EQUIPMENT FOLLOWS EACH CHAPTER, SO THAT THE HOMEOWNER CAN SEE HOW THE EQUIPMENT WORKS, WHAT IT LOOKS LIKE, HOW MUCH IT COSTS, AND WHERE TO PURCHASE THE ITEM.

1979-0825 WOOLDRIDGE G L
CHARACTERISTICS OF AIR FLOW OVER CERTAIN TOPOGRAPHIC FEATURES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 329-339.
PNL-3214

1979-0826 AIKEN R
WIND ELECTRIC POWER GENERATION AND CONNECTION TO A RURAL ELECTRIC COOPERATIVE IN NORTHEAST NEBRASKA.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 271-288.
CONF-7905109

THE RESULTS OF THREE YEARS' EXPERIENCE IN FARM ELECTRIC DEMAND RECORDS AND INITIATION OF A WIND ELECTRIC SYSTEM ARE PRESENTED. FARMERS AND RURAL ELECTRIC COOPERATIVES ARE WILLING TO EXPERIMENT WITH WIND ELECTRIC-UTILITY INTERFACE SYSTEMS, THOUGH INITIAL REC RESISTANCE HAD TO BE OVERCOME. WIND GENERATED ELECTRICITY APPEARS TO MATCH FARM DEMAND ON BOTH SEASONAL AND DAILY BASIS THOUGH ELECTRICITY RETURNED TO THE REC POSES UNRESOLVED ISSUES.

1979-0827 ARGYRIS J H, AICHER W, KARL F, JUEMMERLE W, MUELLER M
ROTORMODELL ZUR VERIFIZIERUNG VON RECHNENVERFAHREN. (ROTOR MODEL FOR VERIFICATION OF COMPUTATION METHODS).
NTIS, 1979. 58 P. (IN GERMAN, ENGLISH SUMMARY)
N81-15467, ISD-262

IN ORDER TO PROVE THE QUALITY OF IDEALIZATION AND THE VALIDITY OF COMPUTATION FOR WINDMILLS, A DRIVEN MODEL OF A WINDMILL WITH A 7.4 M DIAMETER ROTOR WAS CONSTRUCTED. NEW DATA ACQUISITION AND DATA TRANSMISSION SYSTEMS WITH 16 CHANNELS AND DIGITIZATION IN THE ROTATING SYSTEM WERE DEVELOPED AND TESTED. THE DYNAMIC RESPONSE OF THE ROTOR BLADES TO THE CYCLIC LOADING OF GRAVITY WAS TAKEN TO COMPARE MEASUREMENTS AND COMPUTATIONS. FOR THE MEASUREMENTS AND EVALUATION WHICH WERE PERFORMED BY A MEASUREMENT SYSTEM AND A COMPUTER, THE NECESSARY SOFTWARE WAS BUILT.

1979-0828 BARCHET W R
OVERVIEW OF WIND ENERGY RESOURCE ASSESSMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 207-211.
PNL-3214

1979-0829 BARCHET W R, ELLIOTT D L
PACIFIC NORTHWEST REGIONAL ASSESSMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 213-226.
PNL-3214

THE WIND ENERGY RESOURCE OF THE UNITED STATES AND ITS TERRITORIES MUST BE DESCRIBED IN ADEQUATE DETAIL TO MEET THE NEEDS OF A VARIETY OF USERS. TO MEET THESE NEEDS, THE WIND CHARACTERISTIC PROGRAM ELEMENT, MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY (PNL), DEVELOPED, APPLIED AND TESTED TECHNIQUES USING EXISTING WIND INFORMATION TO ASSESS THE WIND ENERGY POTENTIAL OF THE NORTHWEST REGION. THIS ASSESSMENT INCLUDED IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING.

1979-0830 BOWES M A, PERLEY R
ANALYSIS OF WIND SPEED CHARACTERISTICS FOR DESIGN CRITERIA DEVELOPMENT IN THE KAMAN/DOE 40-KW WIND TURBINE GENERATOR PROGRAM.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 31-44.
PNL-3214

THIS PROJECT IS TO DESIGN AND FABRICATE A 40-KW HORIZONTAL AXIS WIND TURBINE GENERATOR. THIS WORK IS PART OF THE SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) DEVELOPMENT PROGRAM THAT IS BEING DIRECTED BY ROCKWELL INTERNATIONAL. THE 40-KW WTG SYSTEM IS THE RESULT OF AN EXTENSIVE ANALYSIS AND DESIGN EFFORT WHICH WAS PREDICATED ON ACHIEVING THE LOWEST SYSTEM COST CONSISTENT WITH THE ESTABLISHED PERFORMANCE REQUIREMENTS. CENTRAL TO THIS EFFORT WERE THE DEVELOPMENT AND APPLICATION OF DESIGN EVALUATION CRITERIA BASED ON STATISTICAL WIND SPEED MODELS.

1979-0831 BUTLER N G
WIND ENERGY FROM A UTILITY PLANNING PERSPECTIVE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 305-310.
PNL-3214

IN ASSESSING THE POTENTIAL FOR THE GENERATION OF ELECTRICAL ENERGY FROM THE WIND, A UTILITY WOULD HAVE TO ADDRESS THE VARIOUS QUESTIONS. THIS PAPER DESCRIBES ONE METHOD A UTILITY COULD USE TO ASSESS THE POTENTIAL FOR WIND GENERATION. THE PRIMARY OBJECTIVE WOULD BE TO EXTRACT THE MAXIMUM AMOUNT OF ENERGY PER YEAR AT THE LOWEST COST.

1979-0832 BUZENBERG R J, DAVID M L, WAGNER J P, GLYNN E F, JOHNSON G L, SHULTIS J K
MARKET POTENTIAL FOR WIND ENERGY APPLICATIONS IN AGRICULTURE.

WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 22-41.
CONF-7905109

THE METHODOLOGY, DATA, ASSUMPTIONS AND ANALYSIS OF THIS STUDY IN CONSIDERING POTENTIAL APPLICATIONS SERVING OVER 2.8 MILLION COMMERCIAL AND NON-COMMERCIAL FARMS IN THE FIFTY STATES, FOUND 991,700 APPLICATIONS LOCATED IN 21 STATES TO BE ECONOMICALLY VIABLE UNDER THE MOST LIBERAL SET OF ASSUMPTIONS, I.E., LOW WIND SYSTEM CAPITAL COSTS AND ALTERNATIVE ENERGY COSTS EQUIVALENT TO $.08 PER KWH. OVER 685,000 ECONOMICALLY VIABLE APPLICATIONS WERE CONCENTRATED IN ONLY SIX STATES--TEXAS, MISSOURI, IOWA, OKLAHOMA, KANSAS AND NEBRASKA. THE TOTAL CAPITAL COST OF THE 991,700 WTGS'S TO PURCHASERS IS ESTIMATED AT $10.0 BILLION FOR AN AVERAGE COST OF $10,084 EACH. THE ANNUAL TOTAL AMOUNT OF UTILIZED WIND ENERGY GENERATED BY THESE WTGS'S IS 21.1 BILLION KWH (ABOUT 18% OF THE POTENTIAL ELECTRICAL FARM LOAD FOR THE 23 STATE AREA) VALUED AT $1.7 BILLION ($.08 PER KWH). AGGREGATE NET ANNUAL SAVINGS TO USERS WAS ESTIMATED TO BE $68.7 MILLION. THE SIZE CHARACTERISTICS OF THE 991,700 WTGS'S FOUND TO BE ECONOMICALLY FEASIBLE WHEN LOW CAPITAL COSTS AND HIGH ALTERNATE ENERGY COSTS ARE ASSUMED IS SHOWN. THE 10 KW GENERATOR WITH A RATED SPEED OF 9 OR 8 M/S (SWEPT AREA EQUAL TO 85 TO 108 SQUARE METERS) ACCOUNTS FOR NEARLY TWO-THIRDS OF THE TOTAL.

1979-0833 CARTER G M, GILHAUSEN D B
THE POTENTIAL IMPACT OF AUTOMATED WIND GUIDANCE ON WIND ENERGY CONVERSION OPERATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 191-203.
PNL-3214

THE NATIONAL WEATHER SERVICE HAS BEEN PRODUCING NUMERICAL-STATISTICAL FORECASTS OF SURFACE WINDS FOR APPROXIMATELY 250 LOCATIONS THROUGHOUT THE UNITED STATES. THESE FORECASTS, MADE BY THE MODEL OUTPUT STATISTICS (MOS) TECHNIQUE, SERVE PRIMARILY AS GUIDANCE FOR AVIATION AND PUBLIC WEATHER FORCASTERS. THIS PAPER DESCRIBES HOW THE VARIOUS MOS WIND FORECASTS ARE PRODUCED AND SHOW VERIFICATION RESULTS TO INDICATE HOW THE QUALITY OF THE GUIDANCE VARIES WITH FORECAST PROJECTION AND GEOGRAPHIC LOCATION. THE ADVANTAGES AND DISADVANTAGES OF USING THE MOS APPROACH FOR FUTURE ENERGY-RELATED APPLICATIONS, SUCH AS PREDICTING HOURLY AVERAGE WINDS OR ESTIMATING WIND POWER OUTPUT, ALSO ARE DISCUSSED.

1979-0834 CHERRY N J
WIND ENERGY RESOURCE ASSESSMENT OF NEW ZEALAND.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 261-271.
PNL-3214

A PROGRAM FOR THE UTILIZATION OF WIND ENERGY ON A LARGE SCALE IN NEW ZEALAND WOULD REQUIRE A PROVEN NEED FOR THE ENERGY: DEMONSTRATION THAT THE WIND IS A PRACTICAL ENERGY RESOURCE AS TO WHERE AND WHEN THE ENERGY WOULD BE AVAILABLE, AND THE CHOICE OF A SMALL NUMBER OF SITES FOR TESTING AND EVALUATING PILOT PLANTS. SUFFICIENT WIND DATA EXISTS IN THE ARCHIVES OF THE NEW ZEALAND METEOROLOGICAL SERVICE TO BROADLY CHARACTERIZE MOST AREAS OF THE COUNTRY AND TO INDICATE A NUMBER OF POSSIBLE PILOT PLANT SITES AS DISCUSSED HEREIN.

1979-0835 CLARK R N, SCHNEIDER A D, NELSON V, GILMORE E, BARIEAU R E
DEEP WELL, WIND ASSISTED IRRIGATION PUMPING.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979 P. 67-86.
CONF-7905109

A WIND ENERGY PROJECT FOR IRRIGATION PUMPING WAS STARTED AT THE USDA SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEXAS, IN 1977. THE PUMPING SYSTEM USES BOTH A WIND TURBINE AND AN ELECTRIC MOTOR TO POWER A CONVENTIONAL VERTICAL-TURBINE IRRIGATION PUMP. THE ELECTRIC MOTOR IS SIZED TO OPERATE THE PUMP ON A STAND-ALONE BASIS AND RUNS CONTINUOUSLY. THE WIND TURBINE IS COUPLED TO THE PUMPING SYSTEM THROUGH AN OVERRUNNING CLUTCH AND COMBINATION GEAR DRIVE, AND FURNISHES POWER TO THE PUMP ONLY WHEN THE WINDSPEED EXCEEDS 6 METERS/SECOND (6 M/S). THE VERTICAL-AXIS, OR DARRIEUS, WIND TURBINE WAS DESIGNED TO PRODUCE 40 KW IN A 15 M/S WIND. THE ROTOR HEIGHT IS 17 M, AND THE MAXIMUM ROTOR DIAMETER IS 11.3 M.

1979-0836 CONNELL J R
OVERVIEW OF WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 5-12.
PNL-3214

1979-0837 COROTIS R B
STATISTICAL RELIABILITY OF WIND POWER ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 311-321.
PNL-3214

THIS PAPER PROVIDES WORKING GUIDELINES FOR THE ANALYSIS OF SITE WIND DATA IN THE DEVELOPMENT OF SITE AND REGIONAL WIND POWER ASSESSMENTS. NO EXTENSIVE SET OF BACKGROUND THEORY AND DATA IS PRESENTED HERE SINCE IT IS AVAILABLE IN PREVIOUSLY PUBLISHED PAPERS AND REPORTS. FOR NATIONAL WEATHER SERVICE SITES HOURLY AND 3-HOURLY DATA ARE NORMALLY AVAILABLE FROM THE NATIONAL CLIMATIC CENTER (NCC). WITH SPECIALIZED COMPUTER ALGORITHMS IT IS POSSIBLE TO ANALYZE THESE DATA TAPES TO DERIVE DESIRED STATISTICS SUCH AS THE MEAN, VARIANCE AND PROBABILITY DISTRIBUTIONS OF HOURLY AND MONTHLY WIND SPEED AND WIND POWER, AND TEMPORAL CORRELATION (AUTOCORRELATION), THE POWER SPECTRAL DENSITY AND THE PERSISTENCE.

1979-0838 DEVELOPMENT, INSTALLATION AND TESTING OF A WIND TURBINE DIESEL HYBRID, 1979.
MISSISSAUGA, ONTARIO, DAF INDAL LTD., 1979. AVAILABLE FROM ONTARIO GOVERNMENT PUBLIC SERVICES, TORONTO. 89 P.

THIS REPORT DEALS WITH A PILOT-SCALE INSTALLATION AND TEST OF WIND-POWER ASSISTANCE TO A DIESEL GENERATOR. THE OBJECTIVE OF THIS PROJECT WAS TO DEMONSTRATE AN ALTERNATIVE MEANS OF PROVIDING ELECTRICAL POWER IN REMOTE AREAS USING RENEWABLE ENERGY RESOURCES.

1979-0839 DORAN J C
WIND DIRECTION VARIATIONS IN STRONG WINDS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 151-158.
ALSO: NTIS, DECEMBER 1979. 9 P.
PNL-3214, PNL-SA-7831, CONF-790665-5

FLUCTUATIONS IN BOTH THE MAGNITUDE AND DIRECTION OF THE WIND MAY BE AN IMPORTANT FACTOR IN THE DESIGN AND PERFORMANCE OF WIND TURBINES. WHILE SOME DATA ARE AVAILABLE ON WIND SPEED CHANGES, RELATIVELY LITTLE IS KNOWN ABOUT THE BEHAVIOR OF WIND DIRECTION FLUCTUATIONS. THE IMPORTANCE OF THIS QUANTITY CAN BE APPRECIATED BY SIMPLY CONSIDERING TWO TYPES OF WIND TURBINES. THIS PAPER DESCRIBES SOME MEASUREMENTS OF WIND DIRECTION FLUCTUATIONS AND PRESENTS A MEANS OF INTERPRETING THEM THAT MAY BE USEFUL TO DESIGNERS.

1979-0840 DUTTON J A, HOJSTRUP J
A MODEL FOR THE PROBABILITY STRUCTURE OF ATMOSPHERIC TURBULENCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 59-67.
PNL-3214

THIS PAPER DESCRIBES THE INITIAL PHASE OF AN INVESTIGATION INTO THE STATISTICAL STRUCTURE OF TURBULENCE IN THE ATMOSPHERIC BOUNDARY LAYER.

1979-0841 ELLIOTT D L
METEOROLOGICAL AND TOPOGRAPHICAL INDICATORS OF WIND ENERGY FOR REGIONAL ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 273-283.
ALSO: NTIS, DECEMBER 1979. 12 P.
PNL-3214, PNL-SA-7832, CONF-790665-3

EXISTING WIND DATA PROVIDE THE PRIMARY BASIS FOR ASSESSING A REGION'S WIND ENERGY POTENTIAL. HOWEVER, THE EXISTING WIND DATA MUST BE EVALUATED CAREFULLY TO DETERMINE THEIR REPRESENTATIVENESS OF THE SITE AND LOCAL AREA, BECAUSE WIND ENERGY IS VERY SENSITIVE TO VARIATIONS IN TERRAIN, VEGETATION, ROUGHNESS, HEIGHT ABOVE GROUND, AND INSTRUMENT EXPOSURE. IN ANALYZING THE WIND ENERGY IN COMPLEX TERRAIN AND DATA-SPARSE AREAS, THE PAPER RELIES ON THE USE OF VARIOUS INDIRECT INDICATORS OF WIND ENERGY AND AN UNDERSTANDING OF THE PHYSICAL PROCESSES AND FEATURES THAT RESULT IN HIGH WINDS IN SOME AREAS BUT NOT IN OTHER AREAS.

1979-0842 ENERGY SYSTEM FOR THE GEORGETOWN UNIVERSITY ACADEMIC BUILDING. VOLUME III. APPENDICES. FINAL REPORT.
NTIS, DECEMBER 10, 1979. 332 P.
DOE/ET/23136-T1(VOL.3)

RESULTS OF A STUDY TO (1) PROVE THE NEED FOR A NATIONAL EXEMPLAR FOR HIGHER EDUCATION ENERGY SYSTEM, (2) IDENTIFY AN APPROPRIATE SITE, AND (3) SELECT THE OPTIMUM ENERGY SYSTEM ARE PRESENTED. THE SITE SELECTED WAS GEORGETOWN UNIVERSITY AND THE SYSTEM WAS A PHOTOVOLTAIC POWER SYSTEM. THIS VOLUME OF THE REPORT CONTAINS THE APPENDICES: (A) GEORGETOWN UNIVERSITY ACADEMIC BUILDING DESIGN AND REQUIREMENTS; (B) CLIMATE DATA; (C) OPINION SURVEY ON TECHNICAL WEIGHTING FACTORS; (D) CENTRAL RECEIVER/TOWER SOLAR THERMAL ENERGY SYSTEMS; (E) WIND MACHINE STUDY FOR GEORGETOWN UNIVERSITY APPLICATION; (F) SOLAR THERMAL SYSTEM--POINT FOCUS COLLECTOR, STEAM RANKINE CONVERSION SYSTEM; (G) INSTITUTIONAL CRITERIA; (H) RELATIVE IMPORTANCE OF INSTITUTIONAL CRITERIA; (J) PHOTOVOLTAIC CELL AND MODULE COSTS; (K) A PROFILE OF THE ENROLLMENT AND GEOGRAPHIC DISTRIBUTION OF AMERICAN INSTITUTIONS OF HIGHER LEARNING; (L) SHADOWING ANALYSIS STUDY; (M) GEORGETOWN UNIVERSITY ENERGY AUDIT; (N) FEDERAL LEGISLATION RELATED TO GRANTS AND LOANS TO HIGHER EDUCATION; (O) SUMMARY CHARTS FOR SYSTEM RATINGS; AND (P) CONSTRUCTION COST IMPLICATIONS.

1979-0843 ENGSTROM S
THE SWEDISH WIND ENERGY PROGRAM, AS IT APPLIES TO SMALL WIND ENERGY SYSTEMS AND AGRICULTURAL APPLICATIONS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 247-248.
CONF-7905109

A BRIEF DESCRIPTION IS PRESENTED OF THE WIND ENERGY PROGRAM OF THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT. SMALL WIND ENERGY SYSTEMS AND AGRICULTURAL APPLICATIONS ARE EMPHASIZED.

1979-0844 FAXEN T
SOME METEOROLOGICAL ACTIVITIES IN THE NATIONAL SWEDISH WIND ENERGY PROGRAM.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 113-130.
PNL-3214

TWO MAJOR PROJECTS CONDUCTED BY THE UNVERSITY OF UPPSALA'S DEPARTMENT OF METEOROLOGY ON BEHALF OF THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT ARE DISCUSSED. FIRST, THE METEOROLOGICAL FIELD STATION AT SWEDEN'S 60-KW WINDMILL IS PRESENTED. THEN, THE GOTLAND-SKANE PROJECT, WHICH WAS TO DETERMINE SITES FOR TWO 1- TO 2-MW PROTOTYPE WINDMILLS, IS DESCRIBED.

1979-0845 FINAL ENVIRONMENTAL IMPACT REPORT FOR THE CALIFORNIA ENERGY COMMISSION SOLAR PROGRAM AND WIND PROGRAM.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 203 P.
NP-25204

THIS FINAL ENVIRONMENTAL IMPACT REPORT (FEIR) ANALYZES THE CALIFORNIA ENERGY COMMISSION'S (CEC) SOLAR PROGRAM AND WIND PROGRAM. THE SOLAR PROGRAM IS NOT EXPECTED TO HAVE ANY SIGNIFICANT ENVIRONMENTAL EFFECTS. THE CALIFORNIA WIND PROGRAM WAS DIRECTED TO LOCATE AND VERIFY SITES FOR WIND FARMS, ESTABLISH A WIND INFORMATION CENTER AND TEST A MEDIUM SCALE WIND TURBINE GENERATOR AS A DEMONSTRATION OF THE FEASIBILITY AND RELIABILITY OF WIND ENERGY. CONSTRUCTION IMPACTS FROM TURBINE PAD LEVELING, ACCESS ROADS, AND TRANSMISSION CORRIDORS COULD BE CONSIDERABLE. CONFLICTS WITH EXISTING AND FUTURE LAND USE MAY ALSO OCCUR. OPERATIONAL EFFECTS INCLUDE MINOR CHANGES IN MICROCLIMATE, BIRD COLLISIONS WITH THE TURBINE BLADES, NOISE, INCREASED OFF-ROAD VEHICLE USE, AESTHETICS AND RADIO AND TELEVISION WAVE INTERFERENCE.

1979-0846 FRAENKEL P
POWER GUIDE: A CATALOGUE OF SMALL-SCALE POWER EQUIPMENT.
NEW YORK, CHARLES SCRIBNER'S SONS, 1979. 240 P.

THIS GUIDE IS INTENDED TO HELP THOSE SEEKING TO BUY SMALL-SCALE POWER EQUIPMENT, PARTICULARLY FOR USE IN REMOTE AND UNDERDEVELOPED PARTS OF THE WORLD, BY INDICATING A SELECTION OF APPROPRIATE COMMERCIALLY-AVAILABLE POWER SOURCES. IT GIVES BASIC INFORMATION ON THE PROS AND CONS AND THE CRITERIA FOR CHOOSING A VARIETY OF DIFFERENT ENERGY CONVERSION SYSTEMS, TOGETHER WITH A SELECTION OF INTERNATIONALLY AVAILABLE ITEMS OF EQUIPMENT, AND THE NAMES AND ADDRESSES OF THEIR MANUFACTURERS AND AGENTS. ADDITIONAL MATERIAL ON RELATED CONSULTANCY AND INFORMATION SERVICES, PLUS A LISTING OF ORGANIZATIONS CONCERNED WITH RESEARCH AND DEVELOPMENT IN SMALL-SCALE POWER PRODUCTION IS ALSO INCLUDED.

1979-0847 FRANKLIN R
WIND-DRIVEN REFRIGERATION PROJECT.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 297-298.
CONF-7905109

THIS PAPER IS TO PROVIDE A DESCRIPTION OF THE PROJECT AND AN ACCOUNT OF CONSTRUCTION DETAILS. TESTING OF PERFORMANCE BEYOND PROOF OF CONCEPT HAS NOT BEEN DONE. THEREFORE, THE ONLY REPORT OF PERFORMANCE IS LIMITED TO THE STATEMENT THAT ICE HAS BEEN FROZEN IN THE ICE BUILDER AND THAT SATISFACTORY OPERATION HAS BEEN MAINTAINED FOR APPROXIMATELY 75 HOURS. THE TURBINE IS CAPABLE OF RUNNING THE COMPRESSOR IN A 12 TO 15 MPH WIND.

1979-0848 FRENCH WINDMILL CATCHES ISLAND BREEZES.
ELECTR. REV. INT. 205(22): 62-63, DECEMBER 7, 1979.

ELECTRICITE DE FRANCE HAS HIGH HOPES THAT WIND POWER WILL PROVIDE ELECTRICITY FOR THE ISLE OF USHANT. EDF HAS RECENTLY INSTALLED A 100 KW AEROGENERATOR ON THE ISLAND TO HELP MEET SOME OF THE ENERGY NEEDS OF ITS 1448 INHABITANTS AND POWER WILL BEGIN TO BE FED INTO THE ISLAND'S NETWORK THIS MONTH.

1979-0849 GINOSAR M, COOK C, WACO D
WIND ENERGY RESOURCE DEVELOPMENT IN CALIFORNIA.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 229-239.
PNL-3214

THE CALIFORNIA ENERGY COMMISSION (CEC) STAFF IS ACTIVELY ENGAGED IN WIND RESOURCE DEVELOPMENT THROUGHOUT THE STATE. SINCE THE ECONOMIC FEASIBILITY OF WIND ENERGY CONVERSION SYSTEMS DEPENDS HEAVILY ON THE TOTAL AMOUNT OF POWER AVAILABLE IN A SPECIFIC AREA, THE GOAL IS TO CHARACTERIZE THE NATURE OF THE WIND RESOURCE FOR THE MANY DIVERSE WIND REGIMES IN CALIFORNIA.

1979-0850 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD-0A 200 KW WIND TURBINE.
CECON '79 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 26TH, CLEVELAND, JUNE 5-7, 1979. PISCATAWAY, N.J., IEEE, 79CH1395-3REG 2, 1979. P. 29-37.

THE MOD-0A 200 KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE LEWIS RESEARCH CENTER OF NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY. THE PROJECT IS A PART OF THE FEDERAL WIND ENERGY PROGRAM AND IS DESIGNED TO OBTAIN EARLY WIND TURBINE OPERATIONAL AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. ON MARCH 6, 1978 THE MOD-0A WIND TURBINE WAS TURNED OVER TO THE TOWN OF CLAYTON LIGHT AND WATER PLANT, CLAYTON, NM, FOR UTILITY OPERATION AND ON DECEMBER 31, 1978, THE MACHINE HAD COMPLETED TEN MONTHS OF UTILITY OPERATION. THIS PAPER DESCRIBES THE MACHINE AND DOCUMENTS THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM.

1979-0851 GOLDENBLATT M
A METHOD FOR ESTIMATING THE IMPACT OF WECS ON UTILITY OPERATING RESERVE REQUIREMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 169-176.
PNL-3214

THE SUBJECT DEALT WITH IN THIS PAPER IS HOW TO DETERMINE THE IMPACT WIND ENERGY CONVERSION SYSTEMS (WECS) WOULD HAVE ON A UTILITY'S GENERATING MIX. THE METHOD UTILIZED FOR DETERMINING THIS IMPACT IS TO ASSUME THAT PRESENT ON-LINE OPERATING RESERVES ARE BASED UPON A UTILITY'S ABILITY TO SATISFY ITS LOAD REQUIREMENTS 99% OF THE TIME.

1979-0852 GUNKEL W W, FURRY R B, LACEY D R, NEYELOFF S, PORTER T G
DEVELOPMENT OF WIND-POWERED WATER HEATING SYSTEM FOR DAIRY APPLICATION.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 124-157.
CONF-7905109

APPROXIMATELY 25% OF THE ELECTRICAL ENERGY CONSUMED ON DAIRY FARMS IS EXPENDED FOR HEATING WATER USED FOR WASHING AND SANITIZING MILK HANDLING EQUIPMENT. THE ELECTRICAL ENERGY FOR THIS OPERATION AVERAGES ABOUT 150 KWH'S PER YEAR FOR EACH MILKING COW. WITH NEARLY 12 MILLION COWS IN THE U.S., THIS ENERGY TOTALS ABOUT 2000 GIGAWATT HOURS ANNUALLY. RESEARCH IS CURRENTLY UNDERWAY AT THE AGRICULTURAL ENGINEERING DEPARTMENT OF CORNELL UNIVERSITY THAT IS INVESTIGATING THE MECHANICAL AND ECONOMIC FEASIBILITY OF SUBSTITUTING WIND ENERGY FOR DAIRY WATER HEATING. AUXILIARY USE OF THE HOT WATER FOR RURAL HOME HEATING IS ALSO BEING CONSIDERED. THIS PROJECT IS PART OF A PROGRAM SPONSORED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE AND DEPARTMENT OF ENERGY TO DEVELOP APPLICATIONS OF WIND ENERGY IN RURAL AREAS.

1979-0853 HANSEN A C
DATA ANALYSIS AT THE ROCKY FLATS WIND SYSTEMS TEST AND DEVELOPMENT CENTER.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 103-110.
PNL-3214

AT THE ROCKY FLATS WIND SYSTEMS TEST AND DEVELOPMENT CENTER, DATA ANALYSIS TECHNIQUES ARE IN USE THAT PERMIT MEANINGFUL AND USEFUL INTERPRETATION OF EVERY INSTANT IN THE OPERATION OF SWECS IN RANDOM WINDS. THIS PAPER WILL DISCUSS THREE OF THE METHODS IN USE AND GIVE EXAMPLES OF THEIR APPLICATION USING SAMPLES OF DATA FROM AN ENERTECH 1500 AND A JACOBS 3 KW-SYSTEM.

1979-0854 HAWORTH W L, MATTILA J M
A CHALLENGE FOR WARRANTIES.
SOL. AGE 4(5): 30-33, MAY 1979.

THE LEGAL ASPECTS OF DEVELOPING AND ENFORCING WARRANTIES FOR SOLAR ENERGY SYSTEMS ARE REVIEWED. THE MAGNUSON-MOSS ACT OUTLINES THE LEGAL REQUIREMENTS THAT MUST BE MET BY ANY CONSUMER EXPRESS WARRANTY AND STATES THE LIMITATIONS THAT MAY BE MADE ON IMPLIED WARRANTIES. THE ACT DOES NOT REQUIRE A WARRANTY ON ANY GIVEN PRODUCT OR SPECIFY THE LEVEL OF PROTECTION UNDER A WARRANTY. A SURVEY OF THE SOLAR INDUSTRY INDICATED THAT LIMITED WARRANTIES WERE FAVORED BUT THAT THE NATURE OF THE WARRANTY BE AN ELEMENT OF MARKETING STRATEGY. VOLUNTARY APPROACHES TO PROVISION OF WARRANTIES BY THE SELLER WERE FOUND NOT TO WORK AND IN HUD'S CYCLE 4 PROGRAM, SELLERS WERE REQUIRED TO COMPLY WITH THE MAGNUSON-MOSS ACT. WARRANTIES FOR PHOTOVOLTAICS, WIND AND

BIOMASS CONVERSION ARE DISCUSSED.

1979-0855 HEALD R C
BOUNDARY LAYER WIND SHEAR.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 343-350.
PNL-3214

THE DEVELOPMENT OF MODERN HORIZONTAL AXIS WIND TURBINES HAS CREATED A NEED TO KNOW THE CHARACTERISTICS OF THE WIND FIELD TO WHICH THE TURBINE IS EXPOSED. VERTICAL WIND SHEAR IS ONE IMPORTANT FACTOR AFFECTING TURBINE DESIGN. AS THE BLADES OF A HORIZONTAL AXIS TURBINE ROTATE, THEY WILL SWEEP THROUGH AIR MOVING AT DIFFERENT SPEEDS AND DIRECTIONS AND THEREBY BE SUBJECTED TO VARIABLE LOADS. THIS STUDY PRESENTS STATISTICS ON BOUNDARY LAYER WIND SHEAR AND ITS DIURNAL VARIATION FROM WIND MEASUREMENTS AT SEVERAL LOCATIONS OVER LEVEL TERRAIN.

1979-0856 HIESTER T R, PENNELL W T
SITING TECHNOLOGIES FOR LARGE WIND TURBINE CLUSTERS.
NTIS, NOVEMBER 1979. 23 P.
PNL-SA-7965

SITE SELECTION FOR LARGE WIND TURBINE CLUSTERS REQUIRES THOROUGH DOCUMENTATION OF THE WIND CHARACTERISTICS AT THE SITE, BECAUSE OF THE INFLUENCE THESE CHARACTERISTICS WILL HAVE ON THE ECONOMICS, OPERATIONS, AND SERVICE LIFE OF THE WIND TURBINES. THE WIND PROSPECTING STRATEGY CAN BE USED BY A UTILITY TO DETERMINE SPECIFIC LOCATIONS FOR EACH WIND TURBINE IN A CLUSTER OF 10 TO 50 MACHINES. THE KEY TO SITE SELECTION IS KNOWING WHAT AND WHERE TO MEASURE. SITING TECHNIQUES TO BE USED AT THE VARIOUS STAGES OF THE WIND-PROSPECTING STRATEGY ARE DISCUSSED. THESE TECHNIQUES HELP DETERMINE WHERE TO MEASURE. WHAT TO MEASURE AT THE SITE IS STILL A MOOT QUESTION. SUGGESTIONS ARE MADE ON WHAT DATA ARE NEEDED AT WHAT SAMPLING RATES. THESE ARE BASED ON THE ASSUMPTION THAT UNTIL FURTHER EXPERIENCE IN SITING LARGE CLUSTERS OF WIND TURBINES IS IN HAND, THOROUGH DOCUMENTATION OF WIND CHARACTERISTICS AFFECTING MACHINE AND CLUSTER OUTPUT CHARACTERISTICS, OPERATION STRATEGIES, AND SERVICE LIFE ARE NECESSARY.

1979-0857 HIESTER T R, PENNELL W T
STATUS OF THE LARGE WIND TURBINE HANDBOOK.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 417-428.
PNL-3214

DOCUMENTATION OF SITING METHODOLOGIES IN HANDBOOK FORM IS A MAJOR PRODUCT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE FEDERAL WIND ENERGY PROGRAM. A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SMALL WECS) (WEGLEY, ET AL., 1978) WAS WRITTEN AND PUBLISHED BY PACIFIC NORTHWEST LABORATORY (PNL). IT IS BEING UPDATED ACCORDING TO REVIEW COMMENTS AND WILL BE REPUBLISHED FOR WIDER DISTRIBUTION. THIS PAPER DESCRIBES THAT DOCUMENT WHICH IS REFERRED TO AS THE LARGE WECS HANDBOOK (LWH).

1979-0858 HOLTER O E, INGEBRETSEN F, PARR H
PHYSICS AND ENERGY RESOURCES.
OSLO, NORWAY, UNIVERSITETSFORLAGET, 1979. 224 P. (IN NORWEGIAN)

THE QUESTION OF ENERGY RESOURCES IS TREATED FROM A PHYSICS VIEWPOINT AT UNIVERSITY LEVEL. FOLLOWING AN INTRODUCTORY CHAPTER ON THE SIZE OF ENERGY RESOURCES AND THEIR DURATION, THE BASIC THERMODYNAMICS OF ENERGY SYSTEMS ARE PRESENTED. FURTHER CHAPTERS DEAL WITH DIRECT SOLAR ENERGY; HYDROELECTRIC ENERGY, WIND AND WAVE ENERGY; BASIC NUCLEAR PHYSICS; FISSION AND NUCLEAR POWER PLANTS; CONTROLLED THERMONUCLEAR FUSION; IONIZING RADIATION, ITS PHYSICAL AND BIOLOGICAL EFFECTS; FISSION, FUSION AND ENVIRONMENTAL PROBLEMS, THE THERMAL BALANCE OF THE EARTH AND CLIMATE.

1979-0859 HOWELL D G
PROCESSING OF ALBERTA WIND DATA AND ITS APPLICATION TO WIND ENERGY SYSTEM DESIGN.
SOLAR ENERGY: BRINGING IT DOWN TO EARTH. NATIONAL CONFERENCE ON SOLAR ENERGY, 5TH, CHARLOTTETOWN, PRINCE EDWARD ISLAND, CANADA, AUGUST 18, 1979. VOLUME 1. NTIS, 1979. PAPER 79-6, 11 P.
CONF-7908116-(VOL.1)

ATMOSPHERIC ENVIRONMENT SERVICE (AES) HAS BEEN GATHERING HOURLY METEOROLOGICAL DATA ACROSS CANADA FOR OVER 60 YEARS. TWENTY YEARS OF DATA FOR FIVE LOCATIONS IN ALBERTA WERE OBTAINED ON MAGNETIC TAPE FROM AES. A COMPUTER WAS USED TO ANALYSE THIS DATA AND PRODUCE TABLES AND GRAPHS USABLE IN DESIGNING WIND ENERGY SYSTEMS. INCLUDED IN THESE GRAPHS ARE HOURLY AND DAILY WIND POWER, DURATION OF LOW WIND SPEEDS, AND DIRECTION FREQUENCY, WIND POWER AND TOTAL ENERGY ROSES. THE METHOD OF DATA ANALYSIS IS DISCUSSED AS WELL AS THE APPLICATION OF THESE GRAPHS TO WIND ENERGY SYSTEM DESIGN. IN ADDITION, THE AUTOMATIC WIND DATA GATHERING SYSTEM PRESENTLY USED IN THE SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) IS HIGHLIGHTED.

1979-0860 HUTTER U
MODERN WIND TURBINES. MODERNITY WITH ROOTS.
VORTRAEGE DER RHEINISCH-WESTFAELISCHEN AKADEMIE DER WISSENSCHAFTEN. NATUR- UND WIRTSCHAFTSWISSENSCHAFTEN. OPLADEN, GERMANY, WESTDEUTSCHER VERLAG, 1979. P. 7-44. (IN GERMAN)

THE LOW ENERGY OF CONPENSATORY ATMOSPHERIC MOVEMENTS NEAR THE SURFACE AND ITS PRONOUNCED INCREASE WITH HEIGHT DICTATE WIND TURBINE SYSTEMS OF A SIZE GREATER THAN ANY PREVIOUSLY PLANNED. INDEPENDENT OF THE BASIC PRINCIPLE SUGGESTED, THE MOST EFFECTIVE METHOD OF MINIMIZING THE TOTAL EXPENDITURE IS TO USE THE HIGHEST POSSIBLE SPECIFIC SPEED. IN CASES WHERE WIND ENERGY SYSTEMS SUPPLY AN APPROPRIATE AMOUNT OF POWER TO A GRID, THE ANALYSIS OF THE DISCREPANCY BETWEEN THE MOMENTARY POWER AVAILABLE AND THE MOMENTARY DEMAND HAS, ASSUMING LARGE-SCALE SEPARATION OF THE WIND TURBINES IN AVAILABLE AREAS, SHOWN SURPRISINGLY GOOD RESULTS. THE COMPLEMENTARY USE OF SOLAR AND WIND ENERGY SYSTEMS, TAKING INTO CONSIDERATION GLOBAL CLIMATIC DATA, ALSO SEEMS VERY PROMISING. THE POTENTIAL AND PRECONDITIONS OF THE USE OF WIND POWER SYSTEMS ARE DISCUSSED.

1979-0861 BLUHM R, FREEBAIRN-SMITH R
COMMUNITY WIND ELECTRICAL POWER CASE STUDY: MUIR BEACH. FINAL REPORT.
NTIS, OCTOBER 1979. 52 P.
DOE/SF/01963-T2

MUIR BEACH EXPERIENCES RELATIVELY STEADY NORTHWEST COASTAL WINDS. RECORDINGS AT ANEMOMETER STATIONS HAVE INDICATED WIND SPEEDS AVERAGING 10 TO 12 MPH OVER THE YEAR. THIS COMPARES FAVORABLY WITH THE MINIMUM OF 8 TO 9 MPH GENERALLY CONSIDERED NECESSARY FOR FEASIBLE WIND-ELECTRIC GENERATION. GIVEN THE TOWN'S WIND ENVIRONMENT, A 100 KW WIND TURBINE OF THE KIND PLANNED COULD PROVIDE AN ANNUAL OUTPUT OF ABOUT 150,000 KWH, OR ABOUT

ONE-EIGHTH OF MUIR BEACH'S PROJECTED NEED. ESPECIALLY PROMISING FOR MUIR BEACH ARE OTHER POTENTIAL SITES AT HIGHER ELEVATIONS ON NEIGHBORING MT. TAMALPAIS, WHERE FEDERAL RECORDS INDICATE ANNUAL AVERAGE SPEEDS OF 18 MPH. EACH 100 KW WIND TURBINE SITED THERE COULD CONSERVATIVELY YIELD AT LEAST DOUBLE AND PERHAPS TRIPLE THE OUTPUT OF THE FIRST SYSTEM.

1979-0862 JACKSON P S
THE INFLUENCE OF LOCAL TERRAIN FEATURES ON THE SITE SELECTION FOR WIND ENERGY GENERATING SYSTEMS.
LONDON, ONTARIO, UNIVERSITY OF WESTERN ONTARIO, BOUNDARY LAYER WIND TUNNEL LABORATORY, MAY 1979. 86 P.
BLWT-1-1979

1979-0863 JOHNSON G L, WAGNER J
AGRICULTURAL APPLICATIONS OF WIND RESOURCE ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 293-301.
PNL-3214

GIVEN THE POTENTIAL AGRICULTURAL, UTILITY AND OTHER MARKETS FOR WIND POWER SYSTEMS THERE EXISTS A NEED FOR RELIABLE INFORMATION FROM WHICH TECHNICAL, FINANCIAL AND ECONOMIC QUESTIONS ABOUT WECS USE CAN BE ANSWERED TO SERVE THE INFORMATION NEEDS OF WECS MANUFACTURERS, DISTRIBUTORS AND POTENTIAL LARGE AND SMALL-SCALE USERS. THE REGIONAL WIND ENERGY RESOURCE ASSESSMENTS ARE BEING DESIGNED TO SATISFY THE NEED FOR ACCESSIBLE, RELIABLE AND USEFUL WIND DATA.

1979-0864 KADLEC E G
CHARACTERISTICS OF FUTURE VERTICAL AXIS WIND TURBINES (VAWTS).
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 133-141.
NASA-CP-2106

SANDIA LABORATORIES IS DEVELOPING DARRIEUS VAWT TECHNOLOGY WHOSE ULTIMATE OBJECTIVE IS ECONOMICALLY FEASIBLE, INDUSTRY-PRODUCED, COMMERCIALLY MARKETED WIND ENERGY SYSTEMS. THE FIRST FULL CYCLE OF DEVELOPMENT IS COMPLETE, AND RESULTING CURRENT TECHNOLOGY DESIGNS HAVE BEEN EVALUATED FOR COST-EFFECTIVENESS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, AND SYSTEM ANALYSES CAPABILITIES HAVE EVOLVED DURING THIS CYCLE TO SUPPORT AND EVALUATE THE SYSTEM DESIGNS. THIS REPORT PRESENTS THE CHARACTERISTICS OF CURRENT TECHNOLOGY DESIGNS AND ASSESSES THEIR COST-EFFECTIVENESS. POTENTIAL IMPROVEMENTS IDENTIFIED IN THIS FIRST CYCLE ARE ALSO PRESENTED ALONG WITH THEIR COST BENEFITS.

1979-0865 KAIMAL J C
WIND STATISTICS AT THE BOULDER ATMOSPHERIC OBSERVATORY TOWER.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 81-90.
PNL-3214

THIS PAPER PRESENTS RECENT ANALYSES OF WIND FLUCTUATION DATA OBTAINED FROM THE 300-M TOWER AT THE BOULDER ATMOSPHERIC OBSERVATORY (BAO). THE ANALYSES ARE PART OF AN ONGOING EFFORT TO PROVIDE TURBULENCE STATISTICS FOR USE IN THE DESIGN OF WIND TURBINE GENERATORS. THE PERFORMANCE AND LIFE EXPECTANCY OF LARGE ROTOR BLADES ARE DIRECTLY AFFECTED BY SUCH FACTORS AS THE VERTICAL GRADIENT OF THE HORIZONTAL WIND VELOCITY, WIND DIRECTION VARIABILITY WITH TIME, AND GUST DISTRIBUTION OVER THE PLANE OF THE BLADES.

1979-0866 KEAR E B
PRELIMINARY RESULTS OF A 15-KW WECS OPERATING WITH UTILITY INTERFACE ON A PRIVATE DAIRY FARM.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 249-263.
CONF-7905109

DURING THE WINTER OF 1976, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AGENCY (NYSERDA), NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC), GRUMMAN AEROSPACE CORPORATION (LATER TO BE NAMED GRUMMAN ENERGY SYSTEMS) AND CLARKSON COLLEGE, MET TO DISCUSS THE POSSIBILITY OF RESPONDING TO THE THEN RECENTLY ISSUED REQUEST FOR PROPOSALS (RFP) FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) ASKING FOR PROOF OF CONCEPT PROJECTS INVOLVING THE UTILIZATION OF WIND ENERGY IN AGRICULTURE. UPON REVIEWING THE RFP, IT APPEARED TO THE GROUP THE BASIC OBJECTIVES WERE QUITE REALISTIC AND A DECISION WAS MADE TO RESPOND UTILIZING A GRUMMAN WINDSTREAM 25 AND LOCATING THE SYSTEM ON AN OPERATING DAIRY FARM IN NORTHERN NEW YORK STATE WHERE IT APPEARS GOOD AVERAGE WIND VELOCITIES OCCUR ACCORDING TO REED'S ANNUAL WIND POTENTIAL FOR THE UNITED STATES. IT WAS DECIDED TO TAKE THE APPROACH OF TYING THE WINDSTREAM 25 DIRECTLY INTO THE POWER GRID ON THE FARMSTEAD SIDE OF THE POWER METERS UTILIZING A GEMINI SYNCHRONOUS CONVERTER WHICH, AT THAT TIME, SEEMED TO BE THE ONLY AVAILABLE OFF THE SHELF STATE-OF-THE-ART CONVERSION SYSTEM.

1979-0867 KIRCHHOFF R H
TURBULENCE AND WTG PERFORMANCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 131-137.
PNL-3214

THE UNIVERSITY OF MASSACHUSETTS 25-KW WIND TURBINE HAS BEEN INSTRUMENTED TO DETERMINE ITS STEADY STATE AND DYNAMIC OPERATING CHARACTERISTICS. THE RESULTS PRESENTED IN THIS PAPER FOCUS ON THE DYNAMIC RESPONSE OF THE TURBINE. R.M. YOUNG GILL TYPE ANEMOMETERS ARE USED TO MEASURE THE TURBULENT WIND CHARACTERISTICS. GENERATOR OUTPUT AND OTHER RESPONSE CHARACTERISTICS OF INTEREST ARE RECORDED ON FM TAPE.

1979-0868 KLUETER H H
SUMMARY OF WORKSHOP ON WIND ENERGY APPLICATIONS IN AGRICULTURE.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 1-9.
CONF-7905109

ABOUT 100 PARTICIPANTS ATTENDED THE THREE DAY WORKSHOP. THIS SUMMARY COVERS HIGHLIGHTS OF THE PAPERS FOR EACH DAY.

1979-0869 DIESENDORF M
COMMUNITY USE OF WINDPOWER.
ENERGY AND PEOPLE: SOCIAL IMPLICATIONS OF DIFFERENT ENERGY FUTURES. CANBERRA, AUSTRALIA, SOCIETY FOR SOCIAL RESPONSIBILITY IN SCIENCE (A.C.T.), 1979. P. 166-167.

THE AEROGENERATOR AT THE TVIND SCHOOLS, NEAR ULFBORG IN WESTERN DENMARK, IS AT PRESENT THE WORLD'S LARGEST OPERATING WIND MACHINE. DUBBED THE TVINDMILL, IT WAS BUILT BY THE SCHOOL TEACHERS AND VOLUNTEER WORKERS. THE ORIGINAL PURPOSE OF THE PROJECT WAS TWOFOLD: (1) TO PROVIDE ENERGY IN THE FORM OF HEAT AND ELECTRICITY FOR THE THREE SCHOOLS WHICH HAVE A TOTAL POPULATION OF 700 TO 800 PEOPLE; AND (2) TO PRODUCE A DEMONSTRATION MODEL OF THE COMMUNITY USE OF A RENEWABLE ENERGY SOURCE. THE TVINDMILL HAS PRODUCED ONLY A SMALL QUANTITY OF ELECTRICAL ENERGY TO DATE AS IT IS STILL UNDERGOING ITS INITIAL TEST PROGRAM. ACCORDING TO THE AUTHOR, THE PROJECT CURRENTLY IS UNDER ATTACK BY THE ELECTRICITY INDUSTRY, WITH ITS COMMITMENT TO NUCLEAR POWER DESPITE THE ECONOMIC PROBLEMS, BECAUSE IT FEELS THREATENED BY THE SUCCESSFUL CONSTRUCTION OF THE TVINDMILL.

1979-0870 LEE T R
ENERGY SELF-SUFFICIENCY IN MONSOONAL AUSTRALIA.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 173-177.

THIS PAPER DESCRIBES THE DARWIN SOLAR VILLAGE PROJECT, A SMALL RESIDENTIAL DEVELOPMENT NOW BEING CONSTRUCTED ON THE NORTH COAST OF AUSTRALIA. IT SETS OUT THE HISTORY OF THE PROJECT'S CONCEPTUAL DEVELOPMENT AND DESCRIBES THE TECHNOLOGY TO BE EMPLOYED AND THE SOCIAL REQUIREMENTS TO ACHIEVE THE AIM OF ENERGY SELF-SUFFICIENCY AT CURRENT WESTERN AMENITY LEVELS. THE PROJECT IS NOW ONLY NINE MONTHS INTO ITS PLANNED FIVE-YEAR CONSTRUCTION PERIOD. SIGNIFICANT RESULTS WILL NOT BE AVAILABLE FOR YWO YEARS.

1979-0871 LILJEDAHL L A
AGRICULTURAL USE OF WIND POWER.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 12-21.
CONF-7905109

THE FIRST OBJECTIVE OF THIS WORKSHOP IS TO MAKE A PUBLIC PRESENTATION OF THE RESEARCH THAT HAS BEEN CONDUCTED UNDER THE USDA-DOE PROGRAM OF RESEARCH ON THE AGRICULTURAL USE OF WIND POWER IN THE 4 YEARS SINCE THIS WORK BEGAN. SEVERAL STUDIES HAVE BEEN COMPLETED, AND SUBSTANTIAL PROGRESS HAS BEEN MADE IN SEVERAL OTHERS. THEREFORE, THE AGRICULTURAL INDUSTRY, THE AGRICULTURAL EQUIPMENT INDUSTRY, AND THE PUBLIC-AT-LARGE SHOULD BE INFORMED OF WHAT HAS BEEN LEARNED TO DATE. THE SECOND OBJECTIVE OF THIS WORKSHOP IS TO OBTAIN RECOMMENDATIONS, FROM AN INFORMED, BROADLY REPRESENTATIVE GROUP, ON THE FUTURE DIRECTION OF THE USDA PROGRAM ON WIND ENERGY RESEARCH. THESE RECOMMENDATIONS COME FROM THE WORKSHOP DISCUSSION GROUPS.

1979-0872 MA F S, CHAN M L, CURTICE D H
INTERFACING DISPERSED SOLAR AND WIND SYSTEMS WITH ELECTRICAL DISTRIBUTION SYSTEMS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2138-2142.

THE RESULTS OF A RESEARCH EFFORT TO DEVELOP A METHODOLOGY FOR EVALUATING THE IMPACTS ON THE PLANNING AND OPERATION OF THE ELECTRIC DISTRIBUTION SYSTEMS AS A RESULT OF INCREASED PENETRATION OF DISPERSED SOLAR AND WIND (DSW) ELECTRIC GENERATORS ARE REPORTED. A DISCUSSION OF THE MAJOR CONSIDERATIONS IN THE PLANNING AND OPERATION OF THE DISTRIBUTION SYSTEM WHEN DSW DEVICES ARE INTRODUCED IS PRESENTED. ALL OF THESE CONSIDERATIONS NEED TO BE FACTORED INTO THE COST OF SERVICE DETERMINATION FOR RATE DESIGNS. ALSO, THE METHODOLOGY BEING DEVELOPED FOR THE ANALYSIS IS DESCRIBED.

1979-0873 MARIER D
SPECIAL EDITION: WIND ENERGY.
ALTERN. SOURCES ENERGY NO. 38: 1-56, JULY 1979.

SEVERAL ARTICLES ARE PRESENTED WHICH DISCUSS WIND TURBINE MANUFACTURERS, SYNCHRONOUS INVERTERS, INDUCTION GENERATORS, NEW WIND TURBINE PROJECTS, TAX CREDITS FOR WIND POWERED SYSTEMS, A CONCENTRATED ALTERNATOR DESIGN, THE NEW YORK CITY ENERGY TASK FORCE, AND INSTALLING AND MAINTAINING SMALL WIND TURBINES.

1979-0874 MCKENZIE B A
HOW FARMERS ADOPT NEW PRACTICES AND EQUIPMENT.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 299-302.
CONF-7905109

THE UTILIZATION OF WIND TURBINES BY THE FARMING INDUSTRY IS ANALYZED. ECONOMIC CONSIDERATIONS AS WELL AS USABILITY AND RELIABILITY ARE DISCUSSED.

1979-0875 MCPHILLIPS M
WIND PRODUCTS BUYER'S GUIDE.
NEW YORK, EVEREST HOUSE, 1979. P. 115-124.

WIND PRODUCTS ARE LISTED IN ALPHABETICAL ORDER IN THREE CATEGORIES: WIND MACHINES, WATER PUMPING WINDMILLS, AND WIND SYSTEM COMPONENTS AND MANUFACTURERS.

1979-0876 MERONEY R N
WECS SITE SCREENING BY PHYSICAL MODELING.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 393-404.
PNL-3214

THIS PAPER SUMMARIZES THE RESULTS OF A PHYSICAL MODELING PROGRAM TO STUDY THE INTERACTION OF WIND AND TOPOGRAPHY. THE PROGRAM'S PRIMARY PURPOSE WAS TO PROVIDE INFORMATION OF USE TO WIND-POWER SITE SELECTION; HOWEVER, THE RESULTS WILL ALSO BE OF INTEREST TO THOSE INVOLVED IN ARCHITECTURAL PLANNING, WIND LOADING ON BUILDINGS, FOREST BLOWDOWN, BALLISTICS, OR SNOW DRIFTING.

1979-0877 NEUSTADTER H E
USE OF WIND DATA WITH AN OPERATIONAL WIND TURBINE IN A RESEARCH AND DEVELOPMENT ENVIRONMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 179-188.
PNL-3214

THE DEPARTMENT OF ENERGY IDENTIFIED 17 CANDIDATE SITES FOR DETAILED EVALUATION AS POTENTIAL SITES FOR INSTALLATION OF LARGE, HORIZONTAL AXIS WIND TURBINES (WT), AS PART OF ITS WIND ENERGY PROGRAM. FROM THESE

INITIAL SITES, FOUR WERE SUBSEQUENTLY SELECTED FOR INSTALLATION OF THE WT, KNOWN AS MOD-0A. THIS PAPER DESCRIBES THE MOD-0A WT. THE FOLLOWING SECTIONS DESCRIBE THE METEOROLOGICAL DATA COLLECTED, SHOW SOME OF THE ANALYSES BASED ON THESE WIND DATA, AND DISCUSS ADDITIONAL AREAS CURRENTLY BEING INVESTIGATED IN RELATION TO THESE DATA.

1979-0878 PANOFSKY H A, VILARDO J M, SHIRER H N, LIPSCHUTZ R C, LARKO D E
EFFECT OF COMPLEX TERRAIN ON WIND FLUCTUATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 91-100.
PNL-3214

THE PURPOSE OF THIS PAPER IS TO DESCRIBE TECHNIQUES WHICH MAKE POSSIBLE THE ESTIMATION OF CERTAIN STATISTICS OF THE NATURAL WIND FROM EASILY ACCESSIBLE METEOROLOGICAL AND TERRAIN VARIABLES, WITH EMPHASIS ON STRONG WINDS AND ON COMPLEX TERRAIN.

1979-0879 PENNELL W T
OVERVIEW OF WIND ENERGY SITING METHODOLOGIES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 325-328.
PNL-3214

1979-0880 POWELL D C
REVIEW OF GUST MODEL CONCEPTS.
NTIS, NOVEMBER 1979. 21 P.
PNL-SA-7966

WITHIN THE PAST TWO YEARS PACIFIC NORTHWEST LABORATORY (PNL) HAS BEEN ASSOCIATED DIRECTLY OR INDIRECTLY WITH SEVERAL DOCUMENTS IN WHICH THE AUTHORS SET FORTH THEIR CONCEPT OF A WIND COMPONENT GUST MODEL. IN THIS PAPER THREE MODELS, EACH REPRESENTING A SOMEWHAT DIFFERENT CONCEPT, ARE REVIEWED. A GUST MODEL CAN BE DEFINED AS A MATHEMATICAL MODEL THAT BEGINS BY DESCRIBING WIND FLUCTUATIONS IN TERMS OF DISCRETE EVENTS AND ENDS BY DEFINING STATISTICS OF THOSE EVENTS. IN THE PRESENT MODELS, ALL WIND FLUCTUATION IS DESCRIBED IN TERMS OF EITHER INDIVIDUAL WIND COMPONENTS WITH RESPECT TO A CARTESIAN COORDINATE SYSTEM AT A SINGLE POINT, OR VOLUME AVERAGES OF THESE WIND COMPONENTS.

1979-0881 POWELL D C
WIND FLUCTUATIONS DESCRIBED AS DISCRETE EVENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 71-79.
PNL-3214

THIS PAPER DISCUSSES A WIND FLUCTUATION DESCRIPTION THAT IS EXPRESSED AS THE FREQUENCY OF OCCURRANCE OF SOME SPECIFICALLY DEFINED CLASS OF TURBULENCE EVENTS.

1979-0882 PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. 479 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979, PORTLAND, OREGON, JUNE 19-21, 1979.
PNL-3214

THIS CONFERENCE CONTAINS 38 PAPERS, WITH SUBJECT MATTER CONCERNED WITH WIND ENERGY IN TERMS OF CHARACTERISTICS FOR OPERATIONS, RESOURCE ASSESSMENT AND SITING METHODOLOGIES. THE MAIN ENGINEERING DISCIPLINES INVOLVED ARE: MECHANICAL, AERONAUTICAL, ELECTRICAL AND CIVIL.

1979-0883 ROSENFELD C L, MAULE P A
REMOTE SENSING APPLICATIONS TO WIND POWER FACILITY SITING.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 375-379.
PNL-3214

PROSPECTING FOR WIND POWER POTENTIAL PROCEEDS FROM A REGIONAL OR LARGE-AREA ASSESSMENT TO THE IDENTIFICATION OF EXPERIMENTAL SITES FOR INSTRUMENTATION WITH ANEMOMETERS. THIS RESEARCH IS CENTERED ON AN EVALUATION OF REMOTE SENSING AND ASSOCIATED INTERPRETATION TECHNIQUES TO ASSIST IN THE RECONNAISSANCE FOR INDICATORS OF WIND POWER POTENTIAL.

1979-0884 SHINN J H, SHERMAN C A, WALTON J J, HILL K L, CLEGG B R, WHISLER D
OAHU SURFACE WIND NETWORK. SUMMARY OF DATA, AUGUST 1976 THROUGH JULY 1978.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JUNE 1979. 469 P.
UCID-18232, E1.28:UCID-18232

A TWENTY-ONE STATION NETWORK OF SURFACE WIND OBSERVATIONS ON OAHU, HAWAII, PROVIDES AN EXTENSIVE DATA BASE FOR CHARACTERIZATION OF MESOSCALE PHENOMENA. THESE DATA ARE AVAILABLE IN HOURLY AVERAGES OF WIND SPEED AND DIRECTION BEGINNING IN AUGUST 1976, AND ARE SUMMARIZED HERE BY MEANS OF AN AUDIT AND STATISTICS. THE AUDIT SHOWS THE AMOUNT OF DATA AVAILABLE FROM EACH STATION, AND THE STATISTICS PROVIDED ARE THE "AVERAGE" DAY (DIURNAL TREND) AND DEVIATION, THE MONTHLY TRENDS OF DAILY MEANS, THE WIND SPEED DURATION CURVE, THE WEIBULL DISTRIBUTION FIT AND A FREQUENCY OF OCCURRENCE HISTOGRAM.

1979-0885 SIMS R
ENVIRONMENTAL AND SOCIOECONOMIC ASPECTS OF SELECTED DISPERSED SOLAR ELECTRIC TECHNOLOGIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2047-2051.

THE ENVIRONMENTAL IMPACTS EXPECTED TO RESULT FROM WIDESPREAD USE OF CERTAIN DISPERSED SOLAR ELECTRIC TECHNOLOGIES APPEAR TO BE RELATIVELY MINOR WHEN COMPARED WITH THOSE EMANATING FROM EXISTING ELECTRICITY GENERATING FACILITIES. THOSE IMPACTS WHICH WILL OCCUR WILL PRIMARILY BE EXTREMELY LOCALIZED HEALTH CONCERNS. CONVERSELY, SIGNIFICANT SOCIOECONOMIC BARRIERS TO THE DEPLOYMENT OF SUCH ONSITE SYSTEMS MAY EXIST. THE MOST SIGNIFICANT OF THESE APPEAR TO INVOLVE THE ISSUES OF INTERFACE WITH ELECTRICAL UTILITIES, ZONING, BUILDING CODES, SAFETY, INSURANCE AND PUBLIC ACCEPTANCE.

1979-0886 SISTERSON D L, HICKS B B
APPLICATION OF POWER LAWS FOR WIND ENERGY ASSESSMENT.

PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 353-359.
ALSO: NTIS, 1979. 8 P.
PNL-3214, CONF-790665-2

THIS INVESTIGATION MAKES USE OF WIND DATA FROM THE ANL METEOROLOGY TOWER IN NORTHERN ILLINOIS. FOR CONVENIENCE, AND SINCE QUESTIONS OF WIND ENERGY WILL BE ADDRESSED IN WHICH THE USE OF THE POWER-LAW WIND PROFILE IS COMMON, POWER LAWS HAVE BEEN FITTED TO ACTUAL WIND PROFILES, AND THE FREQUENCY DISTRIBUTION OF THE POWER-LAW EXPONENT HAS THEN BEEN DETERMINED HOURLY, SEASONALLY, AND ANNUALLY.

1979-0887 SLOOP J L, WATT M H, GORDON J J
SOLAR ENERGY IN AFRICA: SURVEY OF NEEDS AND ACTIVITIES; POTENTIAL APPLICATIONS OF SMALL SOLAR ENERGY SYSTEMS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS.
ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1471-1474.

THIS TWO-PART STUDY CONSISTS OF A SURVEY OF SOLAR ENERGY ACTIVITIES IN EIGHT AFRICAN COUNTRIES AND AN ASSESSMENT OF SPECIFIC ENERGY NEEDS OF A TYPICAL AFRICAN VILLAGE. THE AFRICAN COUNTRIES OF KENYA, CAMEROON, NIGERIA, NIGER, IVORY COAST, SENEGAL, MAURITANIA, AND MALI, THOUGH DIFFERING IN CLIMATE AND ECONOMIC AND ENERGY RESOURCES, HAVE SIMILAR ELECTRIC ENERGY NEEDS. NOT SURPRISINGLY, THE GREATEST NEED FOR SOLAR ENERGY WAS IN RURAL APPLICATIONS. THE SURVEY SHOWED PHOTOVOLTAICS TO BE THE MOST PROMISING SOLAR ENERGY TECHNOLOGY FOR MEETING THE ELECTRIC POWER NEEDS OF REMOTE AFRICAN VILLAGES. IN THE CASE STUDY OF THE AFRICAN VILLAGE, THREE SOLAR TECHNOLOGIES--PHOTOVOLTAICS, WIND, AND SOLAR THERMAL--WERE CONSIDERED FOR MEETING THE VILLAGE'S ELECTRIC ENERGY REQUIREMENT.

1979-0888 SMALL SEWAGE LAGOON ENHANCEMENT PROJECT.
NTIS, 1979. 6 P.
DOE/R5/10125-1

THE INTENT WAS TO APPLY SIMPLE, EXISTING TECHNOLOGY TO ENHANCE THE EFFICIENCY OF A SMALL, OVERLOADED SEWAGE LAGOON SYSTEM. IF SUCCESSFUL, THE TECHNIQUE EMPLOYED COULD BE USED BY SMALL COMMUNITIES AND BY FOOD PROCESSING PLANTS IN NORTHERN STATES TO ALLEVIATE A SERIOUS ENVIRONMENTAL PROBLEM WITH A LOW EXPENDITURE OF ENERGY AND REDUCED COSTS FOR CAPITAL, MAINTENANCE, AND OPERATION. THE PROBLEM ORIGINATES FROM LOW RATES OF BACTERIAL DEGRADATION OF ORGANIC WASTES DURING WINTER MONTHS, RESULTING IN COMPLAINTS ABOUT ODOR DURING SPRING AND FALL TURNOVER TIMES. THE PROPOSED SOLUTION INVOLVES RAISING WATER TEMPERATURE IN SEWAGE LAGOONS BY INSULATING THE SURFACE AND ADDING HEAT PROVIDED BY WIND-TURBINE POWERED RESISTANCE HEATERS IMMERSED IN THE LAGOONS. THUS SMALL LAGOON SYSTEMS AT COLD WEATHER SITES COULD ACCOMMODATE INCREASED LOADS WITHOUT EXPANDING THE SIZE OF THE SYSTEM OR INVESTING IN PROHIBITIVELY COSTLY AERATION SYSTEMS. THE PROPOSAL PRESENTED ESTIMATED COSTS DEMONSTRATING THAT THE LAGOON IN ALLENDALE COULD BE TREATED BY THE NEW METHOD AT AN ANNUAL SAVINGS OF 65,000 KILOWATT HOURS AND WITH RECOVERY OF ADDED CAPITAL INVESTMENT IN TWO YEARS COMPARED WITH THE AERATION METHOD. BEYOND THAT POINT A SAVINGS IN OPERATING COSTS OF $2000 TO $3000 ANNUALLY COULD BE REALIZED (BASED ON PRESENT COSTS FOR ELECTRICITY).

1978-0285 AHMADI G
SOME PRELIMINARY RESULTS ON THE PERFORMANCE OF A SMALL VERTICAL-AXIS CYLINDRICAL WIND TURBINE.
WIND ENG. 2(2): 65-74, 1978.

THE PERFORMANCE OF A NEWLY DEVELOPED VERTICAL-AXIS ROTOR WITH FLEXIBLE BLADES IS STUDIED. THE MODEL OF THE TURBINE IS DESCRIBED AND SOME PRELIMINARY EXPERIMENTAL RESULTS ON ITS PERFORMANCE ARE PRESENTED. THE EFFECT OF WIND VELOCITY AND VARIOUS BLADE ANGLE SETTINGS ON THE POWER COEFFICIENT ARE DISCUSSED AND THE POSSIBLE USE OF THIS SIMPLE AS WELL AS ECONOMICAL WIND ENERGY CONVERTER IN THE RURAL AREAS IS POINTED OUT.

1978-0286 ALLISON H J
DECENTRALIZED POWER SYSTEMS FOR DEVELOPING COUNTRIES.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 112-116.

DECENTRALIZED POWER SYSTEMS WHICH OPERATE FROM RENEWABLE ENERGY RESOURCES CAN SUPPLY RELIABLE ENERGY TO REMOTE AREAS OF THE DEVELOPING COUNTRIES OF THE WORLD. SUCH SYSTEMS CAN DO MUCH TO IMPROVE THE QUALITY OF LIFE FOR MILLIONS OF PEOPLE THROUGHOUT THE WORLD. THIS PAPER DESCRIBES AN ENERGY SYSTEM WHICH INTEGRATES SOLAR, WIND, AND BIOMASS RESOURCES IN A MANNER WHICH PRODUCES A MORE FLEXIBLE AND RELIABLE POWER SOURCE THAN COULD BE MADE AVAILABLE FROM SEPARATE USES OF THESE RENEWABLE RESOURCES.

1978-0287 BILGEN E, PARASCHIVOIU I, KAINE M
HYBRID WIND TURBINE SUITABLE FOR DEVELOPING COUNTRIES.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 2, PAP. 4.3.3. 6 P.

IN THIS ARTICLE, A STUDY IS PRESENTED ON A HYBRID WIND TURBINE WHICH CONSISTS OF TWO VERTICAL AXIS COAXIAL TURBINES, ONE OF SAVONIUS TYPE AND THE OTHER A SCREW TYPE. THE SAVONIUS TYPE TURBINE ROTATES IN A UNIFORM VELOCITY FIELD WHILE THE SECOND, THE SCREW TYPE, CONVERTS THE KINETIC ENERGY OF THE VORTEX FLOW GENERATED IN THE CENTER OF THE FIRST TURBINE.

1978-0288 CROMACK D, EDDS M
OPERATIONAL ASPECTS OF THE UMASS WIND TURBINE.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 62-72.

THE WIND FURNACE PROJECT WAS BEGUN IN 1975 UNDER AN NSF GRANT TO INVESTIGATE THE FEASIBILITY OF USING WIND POWER FOR SPACE HEATING IN A COLDER CLIMATE. THIS WORK HAS CONTINUED UNDER ERDA AND DOE SUPPORT AS PART OF THE ROCKWELL INTERNATIONAL WIND ENERGY PROGRAM. SOLAR HABITAT I, AND ENERGY CONSERVATION HOUSE DESIGNED BY PROFESSOR CURTIS JOHNSON OF THE DEPARTMENT OF FOOD, AND AGRICULTURAL ENGINEERING, SERVES AS A DEMONSTRATION FACILITY FOR THE WIND FURNACE. CONCEPTUALLY THE WIND FURNACE IS A HEATING SYSTEM CONSISTING OF A WIND TURBINE, SOLAR FLAT PLATE COLLECTORS, A STORAGE SYSTEM AND A HEAT DELIVERY SYSTEM. WATER IN THE INSULATED THERMAL STORAGE TANK IS HEATED BY THE SOLAR COLLECTORS AND BY THE ELECTRICITY GENERATED BY THE WIND TURBINE. IN TURN, THIS WATER IS USED TO HEAT THE HOUSE BY CONVENTIONAL BASEBOARD HOT WATER CONVECTORS. A GAS FIRED HOT AIR FURNACE SERVES AS THE AUXILIARY BACK-UP HEATING SYSTEM.

1978-0289 CROMACK D E, HERONEMUS W E
WIND POWER FOR SPACE HEATING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 185-201.
CONF-770921/1

ONE OF THE MOST COST EFFECTIVE APPLICATIONS FOR WIND POWER IS THOUGHT TO BE FOR SPACE HEATING. THIS PAPER PRESENTS A BRIEF DESCRIPTION OF THE UMASS WIND FURNACE, THE DESIGN AND CONSTRUCTION ASPECTS ALONG WITH A DISCUSSION OF THE PRELIMINARY COMPONENT TESTS AND INITIAL OPERATIONAL EXPERIENCE. THE WIND FURNACE WILL BE DEMONSTRATED UNDER FULLY AUTOMATIC OPERATION DURING THE 1977-78 HEATING SEASON.

1978-0290 DARKAZALLI G, MCGOWAN J G
ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF RESIDENTIAL WIND OR WIND AND SOLAR POWERED HEATING SYSTEMS.
SOL. ENERGY 21(5): 415-421, 1978.

A PERFORMANCE AND COST MODEL FOR A VARIETY OF WIND POWERED SPACE AND WATER HEATING SYSTEMS FOR SINGLE FAMILY RESIDENCES IS PRESENTED. IN ADDITION TO WIND POWERED SYSTEMS, COMBINED WIND AND SOLAR SYSTEMS ARE MODELED AND COMPARED TO CONVENTIONAL AND SOLAR ONLY HEATING SYSTEMS. ANALYTICAL RESULTS ARE PRESENTED FOR A SITE IN AMHERST, MASSACHUSETTS. SYSTEM CAPITAL ECONOMIC DETAILS INCLUDE AN ITEMIZED COST BREAKDOWN OF THE WIND HEATING SYSTEM COMPONENTS. THE RESULTS DEMONSTRATE THAT WIND POWERED SYSTEMS ARE PRESENTLY COMPETITIVE WITH ELECTRIC BASED HEATING SYSTEMS AND WILL BE COMPETITIVE WITH OIL OR GAS SYSTEMS IN THE FUTURE.

1978-0291 KILKIS B
USE OF WIND ENERGY FOR IRRIGATION AND ENERGY SUPPLY PURPOSES IN A TURKISH VILLAGE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 347-363.

THE DESIGN CONSIDERATIONS, PROCEDURE AND DETAILS OF A WINDMILL DESIGN AIMED TO MEET THE SPECIFIC DEMANDS OF A TURKISH VILLAGE ARE PRESENTED. THE DESIGN MAINLY CONSISTS OF A HORIONTAL AXIS, THREE BLADED, 14.7 M. DIAMETER ROTOR AND A HYDRAULIC ENERGY STORAGE SYSTEM. COMPUTED ROTOR POWER IS 7.5 KW AT 6 M/SEC CONSTANT WIND SPEED. MECHANICAL (1.34 KW) AND/OR ELECTRICAL (1 KW) ENERGY SUPPLY IS MADE AVAILABLE DEPENDING UPON THE INSTANTANEOUS MODE OF DEMAND.

1978-0292 KUMAR K L, GROVER O P, SACHDEVA R C
WIND MILLS FOR RURAL INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1838-1842.

STUDIES OF DIFFERENT TYPES OF WIND MILLS REVEAL THE POSSIBILITY OF ADAPTING SOME OF THEM FOR RURAL INDIA. A VERTICAL-AXIS VERTICAL BLADED WIND MILL IS SEEN TO BE SUITABLE FOR PROVIDING A SELF-SUFFICIENT RURAL UTILITY SYSTEM FOR INDIAN CONDITIONS. A HORIZONTAL-AXIS MULTIBLADED ROTOR IS FOUND TO BE OPERATIONAL AT LOW WIND-SPEEDS AND USEFUL FOR HIGH INITIAL-TORQUE TASKS SUCH AS SUGAR-CANE EXTRACTORS AND OIL EXTRACTORS.

1978-0293 MCGOWAN J G, CROMACK D E, EDDS M, LEWIS D C
OPERATIONAL EVALUATION OF A WIND POWERED HEATING SYSTEM.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING,

DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 746-752.

THIS PAPER PRESENTS EXPERIMENTAL RESULTS AND OPERATIONAL EXPERIENCE FOR A RESIDENTIAL WIND HEATING SYSTEM (WIND FURNACE) INSTALLED IN NEW ENGLAND BASED ON A 25 KW WIND TURBINE GENERATOR. IN ADDITION TO A DESCRIPTION OF MODIFICATIONS TO THE ORIGINAL WIND (AND SOLAR) SYSTEM, THE DATA ACQUISITION AND REDUCTION SYSTEM IS DESCRIBED. DETAILED PERFORMANCE DATA IS PRESENTED FOR THE WIND TURBINE GENERATOR ALONG WITH A SUMMARY OF THERMAL TEST RESULTS.

1978-0294 MUKHOPADHYAY V
VERTICAL AXIS TILTING BLADE WINDMILL SUITABLE FOR USE IN RURAL AREAS IN INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1863-1866.

A VERTICAL AXIS DIFFERENTIAL DRAG TYPE WINDMILL IS DEVELOPED ALONG WITH A WORKING MODEL TO DEMONSTRATE THE FEASIBILITY. THE POWER COEFFICIENT VARIATION WITH TIP SPEED RATIO IS CALCULATED BASED ON A SIMPLE ANALYTICAL MODEL AND COMPARED WITH OTHER TYPES OF WINDMILLS. THIS TYPE OF WINDMILL IS THOUGHT TO BE SUITABLE AND COST EFFECTIVE FOR USE IN SMALL IRRIGATION, LIFTING WATER FROM WELLS AND TUBEWELLS ETC. IN RURAL AREAS IN INDIA, BECAUSE OF ITS INHERENT SIMPLICITY AND ABILITY TO RESPOND TO GUSTY WINDS WITHOUT A STEERING MECHANISM. BECAUSE OF SLOW ROTATIONAL SPEED, NO EXPENSIVE GEARING MECHANISM IS NECESSARY. THUS THE PROBLEM OF PILFERAGE COULD BE MINIMIZED AND TIMELY MAINTENANCE ENSURED. THESE POINTS ARE OFTEN OVERLOOKED IN DESIGN AND INSTALLATION OF SOME EFFECIENT BUT EXPENSIVE AND SOPHISTICATED WINDMILLS FOR RURAL USE.

1978-0295 NOLL R B, DREES H M, NICHOLS L
DEVELOPMENT OF THE 1-2 KW CYCLOTURBINE.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 40-49.
CONF-780357

THE DESIGN AND DEVELOPMENT OF A SMALL WIND ENERGY SYSTEM IN THE 1 TO 2 KW RANGE IS DISCUSSED. THE CYCLOTURBINE, A VERTICAL-AXIS, STRAIGHT-BLADED, WIND-DRIVEN TURBINE WITH CYCLICALLY PITCHED BLADES IS BEING DEVELOPED FOR ROCKWELL INTERNATIONAL. THE COMPLETED TURBINE IS INTENDED FOR USE IN RURAL AND REMOTE APPLICATIONS NECESSITATING VERY HIGH RELIABILITY AND LOW COST IN BOTH THE TURBINE AND THE ELECTRICAL SYSTEM. THE CONSTRUCTION AND DESIGN CONSIDERATIONS OF THE SYSTEM CURRENTLY UNDER DEVELOPMENT ARE DISCUSSED AND PERFORMANCE CHARACTERISTICS FOR EXISTING CYCLOTURBINES ARE GIVEN.

1978-0296 PLUCHARD A
SOLAR ENERGY AND TELECOMMUNICATIONS, A FRENCH PROGRAMME OF DEVELOPMENT AND RESEARCH.
SOLTECH '78 CONFERENCE PROCEEDINGS. MIDDLE EAST SOLAR TECHNOLOGY EXHIBITION AND CONFERENCE, BAHRAIN, BAHRAIN, APRIL 24, 1978. LONDON, ENGLAND, UK-ISES, 1978. P. 19-20.

THE DEVELOPMENT IN FRANCE OF SMALL POWER SUPPLIES, CALLED AEROSOLEC, WHICH USE BOTH SOLAR CELL ARRAYS AND WIND TURBINES FOR TELECOMMUNICATIONS STATIONS IN REMOTE SITES IS DESCRIBED. THE SYSTEM DESIGN CAN BE TAILORED TO FIT THE PREVAILING CLIMACTIC ENVIRONMENT; ELECTRIC BATTERIES ARE USUALLY USED.

1978-0297 DRIGGS C L, HOESON M J
REVIEW OF ALTERNATIVE CAES CONCEPTS FOR THE FUTURE.
1978 COMPRESSED AIR ENERGY STORAGE SYMPOSIUM PROCEEDINGS. CAES TECHNOLOGY SYMPOSIUM, PACIFIC GROVE, CALIFORNIA, MAY 15, 1978. P. 967-1002.
CONF-780599-P2

THE MAJORITY OF PROPOSED CAES PLANT CONCEPTS FOR THE NEAR TERM TYPICALLY ARE LARGE SCALE UNITS (180 TO 280 MW) REQUIRING HIGH GRADE DISTILLATE FUEL, GENERALLY INTENDED FOR APPLICATION TO LARGE UTILITY SYSTEMS IN PLANT SIZES OF 500 TO 2,000 MW. A NUMBER OF ALTERNATIVE CONCEPTS INVOLVING THE USE OF COMPRESSED AIR STORAGE INCLUDING CONCEPTS FOR ELECTRIC POWER GENERATION ON A SMALL SCALE ARE REVIEWED WITH SOME PROJECTIONS OF PERFORMANCE AND COSTS.

1978-0298 REICHEL R
RURAL ELECTRIFICATION AND WINDPOWER IN TANZANIA.
NTIS, MARCH 1978. 253 P.
PB-298774

PRESENT RURAL ELECTRIFICATION IN TANZANIA MEANS SUPPLYING ELECTRICITY TO TOWNSHIPS AND TO ONLY A FEW OF THE EXISTING 8000 REGISTERED VILLAGES, WHICH ARE NOT YET ELECTRIFIED IN ANY CONSIDERABLE NUMBERS DUE TO TECHNICAL AND ECONOMICAL PROBLEMS. THE INITIAL DEMAND IS NORMALLY LOW AND THE DISTANCES ARE TOO GREAT TO JUSTIFY THE EXPENSES OF TRANSMISSION LINES. THUS INDIVIDUAL POWER STATIONS SEEM TO BE THE ONLY ALTERNATIVE. DEMAND FIGURES FOR TYPICAL VILLAGES ARE EVALUATED, AND COMPARED TO DATA FROM EUROPE. OUT OF THE ALTERNATIVE SOURCES OF ENERGY ONLY ONE, THE WIND ENERGY, IS DESCRIBED IN SOME DETAIL. SOME WINDPOWER THEORY AND BRIEF EXPLANATIONS OF WINDPOWER TERMS ARE GIVEN. THE STATUS OF CURRENT WINDPOWER RESEARCH IS DESCRIBED INCLUDING A LIST OF PAST AND PRESENT PROTOTYPES. BASED ON COMMERCIALLY MANUFACTURED WIND ENERGY SYSTEMS AND CAREFUL COST ESTIMATIONS AND CALCULATIONS, TWO WIND ENERGY SUPPLY SCHEMES ARE PROPOSED: ONE IS FOR A TELE-COMMUNICATION LINK AND THE OTHER FOR A COMPLETE VILLAGE POWER STATION OF 45 KW RATED OUTPUT. THE POWER STATION BASED ON WIND-ENERGY WAS FOUND TO DELIVER THE ELECTRICITY AT PRICES CHEAPER THAN THE DIESEL-BASED SCHEME AND, UNDER CERTAIN CONDITIONS, WORKING PROFITABLE IF CURRENT ELECTRICITY SELLING PRICES IN TANZANIA ARE CONSIDERED. OPERATING AND DESIGN CRITERIA ARE DISCUSSED.

1978-0299 SODERHOLM L H
RURAL USE OF WIND POWER TO CONSERVE ENERGY RESOURCES.
IEEE TRANS. IND. APPL. IA-14(6): 492-497, NOVEMBER - DECEMBER 1978.

ENERGY DERIVED FROM THE WIND OFFERS POSSIBILITIES FOR SUPPLEMENTING RURAL POWER SUPPLIES. BASIC CONCEPTS OF WIND-DERIVED POWER AND THE POSSIBILITIES OF CONSERVING ENERGY, REDUCING ELECTRICAL DEMAND, AND IMPROVING ELECTRICAL SYSTEM LOAD FACTORS ARE CONSIDERED.

1978-0300 SODERHOLM L H
USING WIND ENERGY FOR PEAK ELECTRICAL LOAD LEVELING.
ASAE, SUMMER MEETING, LOGAN, UTAH, JUNE 27-30, 1978. PAPER 78-3040. ST. JOSEPH, MICHIGAN, ASAE, 1978. 12 P.

THE POSSIBILITIES AND VALUE OF USING WIND ENERGY FOR LEVELING PEAK ELECTRICAL LOADS ON RURAL ELECTRIC POWER SYSTEMS ARE CONSIDERED FOR BOTH POWER SUPPLIERS AND USERS. A PRELIMINARY ANALYSIS OF EXPERIMENTAL AND

SIMULATION DATA FOR THE GRUMMAN "WINDSTREAM" WIND SYSTEM INDICATES THAT WIND ENERGY CAN MAKE A SUBSTANTIAL CONTRIBUTION TO LOAD LEVELING ON RURAL POWER SYSTEMS, PARTICULARLY FOR RURAL HEATING LOADS.

1978-0301 SRINATH L S, TEWARI S K
METHODOLOGY FOR EVALUATING THE WORTH OF A NEW ENERGY RESOURCE WITH PARTICULAR REFERENCE TO WIND ENERGY UTILISATION IN RURAL AREAS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1826-1831.

EVALUATION OF NEWER ENERGY RESOURCES HAS BEEN BESET WITH PROBLEMS LIKE UNCERTAINTY AND LACK OF DATA, ABSENCE OF WELL DEFINED CRITERIA, ETC. NEVERTHELESS, SUCH AN EVALUATION IS DESIRABLE EVEN WHILE MAKING DECISIONS TO SUPPORT AN R&D PROGRAM. IN THIS PAPER A METHODOLOGY IS PROPOSED WHICH INCLUDES EMPHASIS ON SEVERAL RELEVANT SOCIAL AND ECONOMIC FACTORS AND WHICH CONSIDERS AT THE SAME TIME SUBJECTIVE PREFERENCES OF DECISION MAKERS. A STUDY OF THE USE OF WIND ENERGY IN SEVERAL APPLICATIONS INDICATES THAT ITS CONVERSION INTO SHAFT WORK WITH THE OPTION FOR A SUBSEQUENT CONVERSION INTO ELECTRICITY HAS BEEN WELL ESTABLISHED. THEREFORE, A SEARCH FOR ALTERNATIVES TO WIND ENERGY SHOULD SCAN ALL THOSE ENERGY RESOURCES AND THEIR CONVERSIONS WHICH RESULT IN SHAFT OR MECHANICAL WORK.

1978-0302 VALDEZ M E, KITTLAUS E R
CONTROLLING A WIND GENERATOR FOR INCREASED EFFICIENCY.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 247-249.

THE POWER SYSTEMS LABORATORY IN THE CALIFORNIA STATE UNIVERSITY AT LONG BEACH IS STUDYING THE PROBLEM OF WIND POWER, CONCENTRATING ON THE CONCEPT OF SMALL AND MEDIUM-SIZE INSTALLATIONS. THIS SIZE HAS THE IMPORTANT ADVANTAGE IN THAT IT IS ALWAYS SIGNIFICANT FOR ISOLATED HOUSES, FARMS, AND COMMUNITIES. THIS CONCEPT HAS THE POTENTIAL OF BECOMING AN IMPORTANT FACTOR IN SOLVING ENERGY PROBLEMS OF THE FUTURE. THE PROJECT AT LONG BEACH IS DIRECTED AT SUPPLYING THE ENERGY NEEDS OF SUCH AN INSTALLATION AND AT THE PRODUCTION OF ELECTRICITY WITH THE HIGH RELIABILITY AND QUALITY TO WHICH WE ARE ACCUSTOMED. THIS PAPER PRESENTS THE RESULTS OF ONE OF THE PHASES OF THE PROJECT--THE INCREASE IN EFFICIENCY.

1978-0303 WENTINK T
ALASKAN WIND POWER.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 173-182.
CONF-770921/1

THE GENERAL OBJECTIVES ARE, SINCE 1973, TO EXAMINE THE POTENTIAL AND POSSIBLE APPLICATIONS OF ALASKAN WIND POWER. WHILE THESE MAY SEEM PAROCHIAL, AN IMPORTANT AUXILIARY OBJECTIVE ALWAYS IS TO CONTRIBUTE TO THE NATIONAL WIND ENERGY PROGRAM STARTED AT NSF AND CONTINUED AND EXPANDED BY ERDA. IN THIS SHORT PAPER ATTENTION IS DIRECTED TO THOSE CONFERENCE OBJECTIVES DEALING WITH PROGRESS, SIGNIFICANT RESULTS DURING THE LAST YEAR, AND APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS).

1978-0304 WIEBE B C
LICUS RELIABLE POWER AT REMOTE SITES VIA THE WIND.
INTELEC 78. INTERNATIONAL TELEPHONE ENERGY CONFERENCE, WASHINGTON, D.C., OCTOBER 25-27, 1978. NEW YORK, IEEE, 78CH1353-2, 1978. P. 79-84.

THE PAPER DEALS WITH THE DEVELOPMENT OF A RELIABLE, COST EFFECTIVE WIND POWER SYSTEM DESIGNED SPECIFICALLY FOR EXTENDED OPERATION AT UNMANNED SITES. THE SYSTEM EXAMINED IS A HYBRID VERTICAL AXIS TURBINE USED TO POWER A DIRECTLY COUPLED, LOW SPEED ALTERNATOR. A DESCRIPTION OF THIS SYSTEM IN RELATION TO BOTH A PURE DARRIEUS SYSTEM AND HORIZONTAL AXIS SYSTEMS IS PROVIDED. THE PAPER PROVIDES A DESCRIPTION OF SOME OPERATIONAL CONFIGURATIONS TO BE USED IN A USER EVALUATION PROGRAM. A DESCRIPTION OF THE METHODS REQUIRED TO PROPERLY SELECT A SITE FOR USE OF A WIND POWER SYSTEM AND THE EFFECT OF VARIOUS SITES ON THE EXPECTED CAPABILITY OF A SYSTEM IS PROVIDED. THE CAPITAL AND OPERATIONAL COST BENEFITS OF EMPLOYING A VERTICAL AXIS WIND POWER SYSTEM ARE ALSO COVERED.

1978-0305 ADLER F
GRUMMAN 8 KW WIND TURBINE GENERATOR PROJECT.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 112-118.

GRUMMAN ENERGY SYSTEMS (GESI) INVOLVEMENT IN THE 8 KW WIND TURBINE GENERATOR PROGRAM IS TO DESIGN AND BUILD A WIND TURBINE GENERATOR CAPABLE OF PRODUCING 8 KW OF ELECTRICAL POWER AT 20 MPH. THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP AND PROVIDE A PRACTICAL PROTOTYPE CAPABLE OF BEING ECONOMICALLY MANUFACTURED AND SOLD AT PRICES COMPETITIVE WITH ALTERNATIVE ENERGY SOURCES. FOR COMPETITIVE ECONOMIC COMPARISON, THE ALTERNATIVE ENERGY SOURCES TO BE CONSIDERED ARE: UTILITY GENERATED ELECTRICITY AND INDEPENDENT DIESEL OR GASOLINE GENERATING PLANTS ($.02 TO .20/KWH).

1978-0306 AGOPIAN K G, CROW S C
EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON WIND TURBINE SITING. FINAL REPORT.
NTIS, JANUARY 1978. 103 P.
RLO-2444-78/1

THE EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON THE FLOWFIELD OVER ISOLATED TERRAIN FEATURES IS STUDIED. COMPUTER CODES FOR DENSITY STRATIFIED AIRFLOW OVER TWO-DIMENSIONAL AND THREE-DIMENSIONAL IDEALIZED MOUNTAINS WERE DEVELOPED AND PARAMETRIC STUDIES PERFORMED TO EVALUATE THE SENSITIVITY OF THE NEAR-GROUND AIRFLOW AS A FUNCTION OF AMBIENT WIND SPEED AND DIRECTION, MOUNTAIN HEIGHT AND SHAPE, HEIGHT OF THE TROPOSPHERE, STRATIFICATION IN THE TROPOSPHERE, AND DIFFERENT INVERSION CONDITIONS. REGIONS OF PROBABLE FLOW SEPARATION ARE PREDICTED USING THE STRATFORD SEPARATION CRITERION AS APPLIED TO TURBULENT FLOWS.

1978-0307 AGOPIAN K G, CROW S C
THE EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON WIND TURBINE SITING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS, WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 349-360.
CONF-770921/1

THE POWER AVAILABLE FROM THE WIND VARIES AS THE CUBE OF THE WIND SPEED, SO THE PERFORMANCE OF A WIND TURBINE DEPENDS CRITICALLY ON ITS LOCATION. THE PHENOMENA GOVERNING THE DISTRIBUTION OF WINDS ARE LISTED IN ORDER OF DECREASING HORIZONTAL SCALES. WIND DISTRIBUTIONS ARE GREATLY INFLUENCED BY LOCAL TOPOGRAPHY HAVING HORIZONTAL SCALES OF TENS OF KILOMETERS, SO THE FLOW FIELD IS DOMINATED BY ATMOSPHERIC DENSITY STRATIFICATION. THE

OBJECTIVE OF THIS STUDY IS TO DEVELOP A SIMPLE AND ACCURATE METHOD FOR COMPUTING THE LOCATION OF MAXIMUM WIND VELOCITY OVER A GIVEN TERRAIN BASED ON THE LINEAR THEORY OF STRATIFIED ATMOSPHERIC FLOW.

1978-0308 AHMADI G
AEROELASTIC WIND ENERGY CONVERTER.
ENERGY CONVERS. 18(2): 115-120, 1978.

THE PRINCIPLE OF AEROELASTIC WIND ENERGY CONVERSION IS INTRODUCED AND AN H SECTION MODEL WHICH WORKS ON THE BASIS OF TORSIONAL AEROELASTIC INSTABILITY IS DESCRIBED. A MATHEMATICAL FORMULATION FOR THE PREDICTION OF THE POWER COEFFICIENT OF SUCH WIND MACHINES IS PRESENTED. A SMALL MODEL IS CONSTRUCTED AND TESTED IN A WIND TUNNEL. ALTHOUGH THE EFFICIENCY OF THE MODEL WAS VERY LOW, THE SYSTEM HAS THE ADVANTAGE OF BEING CAPABLE OF CONVERSION OF ENERGY AT VERY LOW WIND SPEED. FURTHERMORE, THIS WIND ENERGY CONVERTER IS RELATIVELY SIMPLE AND ECONOMICAL.

1978-0309 WARNE D F
DESIGN AND APPLICATION OF LARGE WIND TURBINE GENERATORS.
ENERGY AND AEROSPACE, PROCEEDINGS OF THE JOINT RAES/AIAA CONFERENCE ON ENERGY AND AEROSPACE, LONDON, DECEMBER 5-7, 1978. LONDON, ROYAL AERONAUTICAL SOCIETY, 1978. 14 P.

THE ECONOMICS OF WIND POWER ARE DETERMINED BY THE MEAN WIND SPEED AT THE INTENDED POINT OF USE, THE ECONOMIES OF SCALE (WHICH FAVOR VERY LARGE MACHINES) AND THE ALTERNATIVE COST OF SUPPLYING ENERGY. THESE THREE FACTORS ARE DISCUSSED AND THE CONCLUSION DRAWN IS THAT THE APPLICATIONS MOST LIKELY TO BE ECONOMIC ARE SMALL HIGH RELIABILITY MACHINES FOR REMOTE POWER SUPPLIES, AND VERY LARGE NETWORK CONNECTED MACHINES AT CAREFULLY SELECTED HIGH WIND SPEED SITES. THE LATTER APPLICATION IS CONCENTRATED UPON IN THE PAPER.

1978-0310 LJUNGSTROM O
OFF-SHORE MULTI-MW SIZE WIND TURBINE SYSTEM DEVELOPMENT IS THE KEY TO COST-EFFECTIVE WIND ENERGY FOR SWEDEN.
ENERGY AND AEROSPACE, PROCEEDINGS OF THE JOINT RAES/AIAA CONFERENCE ON ENERGY AND AEROSPACE, LONDON, DECEMBER 5-7, 1978. LONDON, ROYAL AERONAUTICAL SOCIETY, 1978. 13 P.

THE ADVANTAGE OF OFF-SHORE WIND TURBINES OVER LAND-BASED WIND POWER SYSTEMS FOR SWEDEN IS STRESSED. IT IS SUPPOSED THAT BASED ON CURRENT SYSTEM STUDIES OF THE VERTICAL AXIS TYPE WIND TURBINE IN MULTI-MW SIZES, IT SHOULD BE POSSIBLE TO DEVELOP VERY LARGE OFF-SHORE UNITS, UP TO 15 MW AND PERHAPS EVEN 25 MW SIZE, ASSEMBLED COMPLETE AT SHIPYARDS AND TOWED TO THE SITE. THESE WILL REQUIRE MUCH LESS AREA AND MUCH SMALLER NUMBER OF UNITS FOR A GIVEN ENERGY PRODUCTION THAN CURRENT 4-5 MW UNIT SIZE LAND BASED DESIGNS.

1978-0311 ALWARD R
WIND: A BIBLIOGRAPHY.
BUTTE, MONTANA, NATIONAL CENTER FOR APPROPRIATE TECHNOLOGY, 1978. PUBL. NO. B002. 8 P.

THIS BIBLIOGRAPHY COVERS BOOKS, PAMPHLETS, PROCEEDINGS, PERIODICALS, PLANS, AND ACCESS BIBLIOGRAPHIES ON WIND POWER AND WIND TURBINE EQUIPMENT.

1978-0312 ANAPOL'SKAYA L E, GANDIN L S
WIND ENERGY RESOURCES AND METHODS FOR THEIR ESTIMATION.
SOV. METEOROL. HYDROL. NO. 7: 6-11, 1978.

A PROCEDURE IS PROPOSED FOR EVALUATION OF CLIMATIC WIND ENERGY RESOURCES, POTENTIAL AND THAT USED BY WIND ENGINES OF A GIVEN TYPE, FROM DATA ON THE STATISTICAL FREQUENCY DISTRIBUTION OF WIND VELOCITIES AND THE PARAMETERS OF THE ENGINE. IT IS SHOWN THAT THE ANNUAL VARIATION OF AIR DENSITY SHOULD BE NEGLECTED. CLIMATIC ANNUAL AVERAGE WIND ENERGY RESOURCES ARE COMPUTED FOR SEVERAL LOCALITIES WITH STRONG WINDS. IT IS SHOWN FOR REGIONS OF THE USSR WITH THE RICHEST WIND ENERGY RESOURCES THAT ENGINE-CONTROL REGIMES SHARPLY LIMIT OPPORTUNITIES FOR THEIR UTILIZATION.

1978-0313 ANDERSSON R
HORIZONTAL AXIS TURBINE, PRIMARILY FOR WIND POWER PLANTS.
SWEDISH PATENT NO. 7,609,457-2, APRIL 1978. (IN SWEDISH)

A HORIZONTALLY AXLED ROTOR PREFERABLY FOR WIND POWER PLANTS, CONTAINING A HUB AND AT LEAST TWO IN THE HUB BEARED BLADES. THE BLADES CONTAIN A MAIN STRUT IN THE LENGTH DIRECTION. THIS INVENTION IS AIMED TO ACHIEVE A ROTOR, WHERE THE MAIN STRUT IS TORSIONALLY RIGID AND STAYED IN FOUR DIRECTIONS AND WHERE THE BEARING OF THE BLADES IN THE HUB IS FLEXIBLE ACROSS THE PROFILE OF THE BLADE. THE BLADES ARE TURNABLE ROUND THE CENTER OF THE MAIN STRUT AND ARE AUTOMATICALLY TURNED AWAY WHEN THE WIND PRESSURE INCREASES. THIS CONTROL REQUIRES HOWEVER THAT THE TUM FRICTION NOT BE TOO BIG. THE BEARING IS A BALL-AND-SOCKET JOINT. THE LOAD OF THIS JOINT IS MINIMIZED BY ARRANGING THE STAYS SO THAT THE CENTRIFUGAL FORCES ELIMINATE THE FORCES IN THE STAYS. THE WHOLE TORQUE IS TRANSMITTED TO THE HUB. THE TURNING OF THE BLADES IS CONTROLLED BY MEANS OF HYDRAULIC PISTONS.

1978-0314 ANDREWS J
WINDMILL POWER FOR AUSTRALIA. I.
ELECTRON. AUST. 40(3): 10-13, JUNE 1978.

THE POTENTIAL EXISTS FOR WIND POWERED GENERATORS TO SUPPLY A SIGNIFICANT PERCENTAGE OF AUSTRALIA'S ELECTRICITY REQUIREMENTS BY THE YEAR 2000. THE AUTHOR DISCUSSES THE NUMBER OF WINDMILLS WHICH WOULD BE NEEDED, THEIR SIZE AND LOCATION.

1978-0315 ANDREWS M B
WIND TURBINE BLADES AND PROCESS FOR THEIR MANUFACTURE.
GERMAN (FRG) PATENT NO. 2,753,891/A/, JUNE 22, 1978. 15 P. (IN GERMAN)

THE INVENTION CONCERNS A PROCESS FOR MANUFACTURING WIND TURBINE BLADES BY WOUND FIBRE TECHNIQUES, WHICH ARE VERY LIGHT AND CAN STILL GUARANTEE SUFFICIENT STRENGTH AND STIFFNESS EVEN WITH GREAT LENGTH. THE SPAR IS WOUND ON A MANDREL OF CIRCULAR CROSS SECTION, WHICH IS FLATTENED AT THE OUTER END. A REAR MANDREL IS FIXED TO THE HOLLOW SPAR AFTER WITHDRAWING THE MANDREL, AND THIS COMBINATION IS AGAIN WOUND WITH FIBRES, UNTIL THE BLADE IS COMPLETE. THE SPAR IS THEN DEFORMED IN ORDER TO PRODUCE THE REQUIRED BLADE PROFILE FOR THE COMPLETE BLADE WITH THE REAR MANDREL.

1978-0316 ANGELINI A M
ELECTRICITY FROM THE PRIMARY SOURCES TO THE END USES: ENERGY ECONOMICS AND SAVINGS.
ELETTROTECNICA 65(12): 1055-1072, DECEMBER 1978. (IN ITALIAN)

THIS PAPER DISCUSSES ENERGY ECONOMY AND SAVINGS IN AN ITALIAN CONTEXT, LOOKS AT ALTERNATIVE SOURCES SUCH AS SOLAR AND WIND ENERGY, AND WARNS OF THE EFFECTS OF AN ENERGY DEFICIT ON THE NATION'S ECONOMY.

1978-0317 ANNUAL REVIEW OF SOLAR ENERGY.
NTIS, NOVEMBER 1978. 178 P.
SERI/TR-54-066

THIS ANNUAL REVIEW FROM THE PROGRAM EVALUATION BRANCH OF SERI IS INTENDED TO PROVIDE A COMPREHENSIVE OVERVIEW OF THE UNITED STATES SOLAR ENERGY EFFORT, AND TO EVALUATE ITS EFFECTIVENESS IN RESPONDING TO LONG-TERM NATIONAL GOALS AND NEEDS.

1978-0318 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME I. STUDY SUMMARY AND CONCEPT SCREENING. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 211 P.
HCP/T-22221-01/1

THE OVERALL OBJECTIVE OF THIS STUDY WAS A BROAD ASSESSMENT OF THE ATTRACTIVENESS OF ENERGY STORAGE AND ENERGY STORAGE METHODS FOR USE WITH PHOTOVOLTAIC AND WIND ENERGY CONVERSION SYSTEMS. AREAS OF INVESTIGATION INCLUDE: ASSESSMENT OF SELECTED ENERGY STORAGE CONCEPTS; EVALUATION OF THE "WORTH" OF ENERGY STORAGE; AND INVESTIGATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE USE AND WORTH OF STORAGE.

1978-0319 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME II. PHOTOVOLTAIC SYSTEMS WITH ENERGY STORAGE. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 328 P.
HCP/T-22221-01/2

THE PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO PHOTOVOLTAIC ENERGY CONVERSION SYSTEMS AND THEIR USE OF ENERGY STORAGE ARE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND THE EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE. IN ADDITION TO ESTABLISHING COST GOALS FOR STORAGE, THE IMPACTS OF CHARGING STORAGE FROM MULTIPLE SOURCES, AS WELL AS FROM PHOTOVOLTAIC SYSTEMS ALONE, ALONG WITH THE EFFECTS OF INSOLATION, FORECASTING AND TRANSIENT SMOOTHING OF THE PV SYSTEM OUTPUT ARE DISCUSSED.

1978-0320 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME III. WIND ENERGY SYSTEMS WITH ENERGY STORAGE. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 326 P.
HCP/T-22221-01/3

PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO WIND ENERGY CONVERSION SYSTEMS (WECS) AND THEIR USE OF ENERGY STORAGE ARE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND THE EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE UTILIZATION. ALSO INCLUDED IN THIS STUDY IS THE IMPACT OF CHARGING STORAGE FROM MULTIPLE SOURCES AS WELL AS FROM WIND SYSTEMS ALONE, AND THE EFFECTS OF WIND FORECASTING AND TRANSIENT SMOOTHING OF THE WIND SYSTEM OUTPUT.

1978-0321 SOLAR ENERGY RESEARCH AND DEVELOPMENT PROGRAM BALANCE. A REVIEW BY THE SOLAR WORKING GROUP (FORMERLY THE GENERAL ADVISORY COMMITTEE).
NTIS, FEBRUARY 1978. 35 P.
DOE/IR-0004

THE WORKING GROUP WAS CONCERNED WITH THE BALANCE AMONG THE SEVERAL SOLAR TECHNOLOGIES AND THE RELATIVE AMOUNT OF RESOURCES AND ATTENTION EACH RECEIVED.

1978-0322 ARONSON R B
ENERGY STORAGE: HOW DO YOU PRESERVE WATTS AND BTU? (RESEARCH AND DEVELOPMENT).
MACH. DES. 50(1): 30-32, 34, 36, 38, JANUARY 12, 1978.

THE SEARCH IS ON FOR MORE EFFECTIVE WAYS TO STORE AND RECOVER HEAT AND ELECTRICITY. IF SUCCESSFUL, THE PAYOFF WILL BE LARGE-SCALE FUEL SAVINGS. THE ELECTRIC UTILITIES' NEED FOR INEFFICIENT PEAK-POWER GENERATORS COULD BE ELIMINATED; SIGNIFICANT AMOUNTS OF ENERGY FROM NEW POWER SYSTEMS, SUCH AS SOLAR CELLS AND WINDMILLS, COULD BE OBTAINED; AND THE ELECTRIC VEHICLE COULD BECOME MORE APPEALING AS AN ALTERNATIVE TO GASOLINE-POWERED TRANSPORTATION.

1978-0323 ARONSON R B
SAVING ENERGY IN THE HOME.
MACH. DES. 50(13): 20-21, 23, 24, 1978.

IN THE 13TH ANNUAL ARMCO STUDENT DESIGN PROGRAM, TEAMS OF INDUSTRIAL DESIGNERS AND ENGINEERS FROM FOUR UNIVERSITIES SHOWED HOW THEY WOULD SOLVE THE PROBLEM OF CUTTING FUEL COSTS FOR THE HOME OWNER. SOME OF THE FUEL SAVING IDEAS INCLUDED HYDROGEN FUELS, COOLING BY USE OF WINDMILLS, A HOT-AIR POWERED KITCHEN, AND THE REUSE OF WASTE HEAT.

1978-0324 ASHLEY H
SOME OBSERVATIONS ON FOUR CURRENT SUBJECTS RELATED TO AEROELASTIC STABILITY.
ISR. J. TECHNOL. 16(1-2): 3-22, FEBRUARY 1978.

AFTER INTRODUCTORY COMMENTS ON THE LITERATURE AND THE PURPOSES OF THIS PAPER, A TABLE IS PRESENTED SUMMARIZING THE AUTHOR'S VIEWS ON SOME CURRENTLY SOLVED VS. PARTIALLY UNSOLVED PROBLEMS RELATED TO AEROELASTIC STABILITY. THE TERM "SOLVED" IS USED IN THE PRACTICAL SENSE THAT ENGINEERS ARE ABLE TO COPE CONFIDENTLY WITH THAT PROBLEM DURING THE PROCESS OF STRUCTURAL DESIGN. SELECTED ENTRIES IN THE TABLE ARE REVIEWED, PARTIALLY TO MOTIVATE THE TOPICS IN THE REST OF THE PAPER. THE FIRST TOPIC INVOLVES THE PREDICTION OF LINEARIZED UNSTEADY AERODYNAMIC LOADS DUE TO ARBITRARY MOTIONS OF STREAMLINED SHAPES. SOME CONTRIBUTIONS BY J.W. EDWARDS ARE REFINED, WHICH WERE MOTIVATED BY THE REQUIREMENTS OF ACTIVE CONTROL SYSTEM DESIGN. THE SECOND SUBJECT IS NONLINEAR UNSTEADY AERODYNAMICS FOR THE TRANSONIC REGIME. AFTER DESCRIBING A FEW USEFUL DEVELOPMENTS FROM LOCALLY-LINEAR THEORY AND COMPUTATIONAL FLUID DYNAMICS, THERE IS SUGGESTED AN EMPIRICAL PROCEDURE FOR INTERIM-ANALYSIS PURPOSES. THE THIRD AND FOURTH SUBJECTS CONCERN RECENT DISCOVERIES REGARDING THE AEROELASTIC STABILITY OF LARGE-ASPECT-RATIO WINGS AND WIND TURBINES.

1978-0325 ASMUSSEN J, KRAUSS O, PARK G L, LINVILL D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 14 P.

COO-2992-78/1(EXEC.SUMM.)

SEVERAL GENERATION-EXPANSION ALTERNATIVES FOR SMALL ELECTRIC UTILITIES WHICH INCLUDE WINDPOWER WERE EVALUATED USING THE MUNICIPAL ELECTRIC SYSTEM OF HART, MICHIGAN, AS AN EXAMPLE. ASSUMED WIND TURBINE CONFIGURATIONS WITH MACHINES RATED AT 500-KW AND 1,500-KW TOGETHER WITH A 1,000-KW HYDROELECTRIC FACILITY WERE COMBINED WITH CONVENTIONAL HART DIESEL GENERATION PLUS BULK PURCHASE AND THEN EVALUATED. FOR COMPARISON, A NEW 3,600-KW OIL-FUELED DIESEL GENERATOR WAS ALSO EVALUATED.

1978-0326 ASMUSSEN J, PARK G L, KRAUSS O, CURTICE D, LINVILL D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 285-290.
CONF-770921/1

THIS REPORT SUMMARIZES THE RESEARCH ENTITLED "APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART,MICHIGAN, YEARS I AND II." THESE RESEARCH PROJECTS EVALUATED THE TECHNICAL AND ECONOMIC FEASIBILITY OF WIND GENERATION FOR THE HART, MICHIGAN MUNICIPAL UTILITY, WHOSE PEAK 1976 DEMAND WAS ABOUT 4 MW. THE HART SYSTEM HAS A NUMBER OF DESIRABLE FEATURES FOR WIND POWER APPLICATION: (1) IT IS LOCATED EIGHT MILES INLAND FROM THE EAST COAST OF LAKE MICHIGAN WHERE THE AVERAGE WIND VELOCITY IS ABOUT 5.5 M/S, (2) IT DEPENDS ALMOST ENTIRELY ON DIESEL GENERATION, USING GAS AND OIL, AND (3) IT HAS A SMALL HYDRO FACILITY.

1978-0327 ASMUSSEN J, PARK G L, MANNER D
AN ANALYTICAL EXPRESSION FOR THE SPECIFIC OUTPUT OF WIND TURBINE GENERATORS.
IEEE PROC. 66(10): 1295-1298, OCTOBER 1978.

USING A RAYLEIGH DISTRIBUTION FOR THE WIND SPEED FREQUENCY DISTRIBUTION, AN ANALYTICAL EXPRESSION FOR WIND TURBINE GENERATOR SPECIFIC OUTPUT IS DERIVED AND EXPRESSED IN TERMS OF MACHINE CHARACTERISTICS AND MEAN WIND SPEED. RESULTS ARE EXPRESSED AS A FAMILY OF CURVES WHICH ARE FUNCTIONS OF THE CUT-IN, RATED, AND CUT-OUT WIND SPEEDS. THE RESULTS ARE COMPARED WITH NUMERICAL CALCULATIONS USING ACTUAL WIND RECORDS AND WITH SPECIFIC OUTPUT CURVE OF HARDER.

1978-0328 AUER F
REPORT ON OUTPUT MEASUREMENTS ON A 200 WATT WIND GENERATOR.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 189-193. (IN GERMAN)

THE CONSTRUCTION AND THE VIBRATION PROBLEMATIC ON A 200 WATT WIND GENERATOR ARE DESCRIBED. FIRST OUTPUT MEASUREMENTS UNDER REALISTIC CONDITIONS ARE SUBMITTED.

1978-0329 AUER P
ADVANCES IN ENERGY SYSTEMS AND TECHNOLOGY, VOL. 1.
NEW YORK, ACADEMIC PRESS, 1978. 387 P.

THIS BOOK CONTAINS FIVE CHAPTERS WRITTEN BY DIFFERENT AUTHORS. TOPICS COVERED INCLUDE: WIND POWER; FUEL FROM BIOMASS; GEOTHERMAL ENERGY; CLEAN FUEL FROM COAL; DISTRICT HEATING WITH COMBINED HEAT AND ELECTRIC POWER GENERATION. ENVIRONMENTAL AND ECONOMIC CONSIDERATIONS ARE DISCUSSED IN SOME DETAIL AND EACH CHAPTER HAS A BIBLIOGRAPHY.

1978-0330 BAE H M, DEVINE M D
OPTIMIZATION MODELS FOR THE ECONOMIC DESIGN OF WIND POWER SYSTEMS.
SOL. ENERGY 20(6): 469-481, 1978.

TWO BASIC MODELS ARE INTRODUCED: SYSTEMS WITHOUT STORAGE--ALL POWER GENERATED IS FED DIRECTLY INTO THE EXISTING NETWORK; AND SYSTEMS WITH STORAGE--THE SYSTEMS ARE OPERATED AS PART OF BASE LOAD OR PEAK LOAD CAPACITY. THE OBJECTIVE OF THE MODELS IS TO MAXIMIZE THE TOTAL NET VALUE OF POWER GENERATED UNDER ASSUMED OPERATING RULES AND GENERAL CONDITIONS REGARDING WIND SPEED AND DEMAND VARIATIONS.

1978-0331 BAILEY D Z
ENERGY FROM SEA AND AIR BY LARGE-SPAN TENSIONED FOILS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 6, P. 2877-2907.

KINETIC ENERGY IN OCEAN AND TIDAL STREAMS, AND IN ATMOSPHERIC WINDS MAY BE EXTRACTED IN LARGE QUANTITIES BY STRETCHING HYDRO (AERO) FOILS HORIZONTALLY OVER LARGE DISTANCES ACROSS MOVING STREAMS. THESE FOILS CAN BE MADE TO SPAN VERY LARGE DISTANCES BY DESIGNING THEM TO SUSTAIN LARGE TENSILE LOADS AND ARRANGING THEM IN "CATENARY LIKE" ARCS SUCH THAT THE MAJOR FORCES ARE DEVOID OF BENDING MOMENTS.

1978-0332 BAIRD W F, GLODOWSKI C W
ESTIMATION OF WAVE ENERGY USING A WIND WAVE HINDCAST TECHNIQUE.
INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY, CANTERBURY, ENGLAND, SEPTEMBER 27-29, 1978. CRANFIELD, BEDFORD, ENGLAND, BHRA FLUID ENGINEERING, 1978. P. F3.39--F3.54.

A PROCEDURE FOR ANALYZING HOURLY VALUES OF WAVE DATA FROM SUITABLE METEOROLOGICAL DATA IS DISCUSSED IN DETAIL. THE OUTPUT WAVE PARAMETERS ARE COMPARED WITH RECORDED WAVE DATA. EMPHASIS IN THE DEVELOPMENT OF THIS PROCEDURE HAS BEEN PLACED ON COMPUTATIONAL EFFICIENCY, IN ORDER THAT MANY YEARS OF HOURLY VALUES OF THE WAVE PARAMETERS MAY BE HINDCAST AT REASONABLE COST.

1978-0333 BAKER R W, HEWSON E W
SEASONAL WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST AS RELATED TO WIND POWER POTENTIAL.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 166-175.
CONF-780754

THE SEASONAL VARIATION IN THE STRENGTH IN THE WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST IS INVESTIGATED TO ASSESS THE WIND POWER POTENTIAL IN THE REGION. THERE ARE BASIC FLOW CHANGES FROM SEASON TO SEASON OVER THE NORTHWEST THAT GREATLY AFFECT THE WIND POWER POTENTIAL OVER MANY AREAS IN THE REGION. HOWEVER, THE DIVERSITY IN THE WIND FLOW ON A MONTHLY AND SEASONAL BASIS OVER THE FIVE-STATE AREA DIMINISHES THE CHANGE OF NO OUTPUT FROM A SIMULATED NETWORK OF WIDELY DISPERSED WIND TURBINE GENERATORS AND STABILIZES THE POTENTIAL NETWORK WIND ENERGY OUTPUT ON A MONTHLY BASIS COMPARED TO THE INDIVIDUAL SITE OUTPUT.

1978-0334 BAKER R W, HEWSON E
SEASONAL WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST AS RELATED TO WIND POWER POTENTIAL.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 707-711.

THE SEASONAL VARIATION IN THE STRENGTH IN THE WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST IS INVESTIGATED TO ASSESS THE WIND POWER POTENTIAL IN THE REGION. THERE ARE BASIC FLOW CHANGES FROM SEASON TO SEASON OVER THE NORTHWEST THAT GREATLY AFFECT THE WIND POWER POTENTIAL OVER MANY AREAS IN THE REGION. HOWEVER, THE DIVERSITY IN THE WIND FLOW ON A MONTHLY AND SEASONAL BASIS OVER THE FIVE-STATE AREA DIMINISHES THE CHANCE OF NO OUTPUT FROM A SIMULATED NETWORK OF WIDELY DISPERSED WIND TURBINE GENERATORS AND STABILIZES THE POTENTIAL NETWORK WIND ENERGY OUTPUT ON A MONTHLY BASIS COMPARED TO THE INDIVIDUAL SITE OUTPUT.

1978-0335 BAKER R W, HEWSON E W, BUTLER N G, WARCHOL E J
WIND POWER POTENTIAL IN THE PACIFIC NORTHWEST.
J. APPL. METEOROL. 17(12): 1814-1826, DECEMBER 1978.

PRESENTED IS AN ASSESSMENT OF THE POTENTIAL WIND POWER RESOURCES IN THE PACIFIC NORTHWEST, BASED ON DATA FROM WIND RECORDING STATIONS INSTALLED IN AREAS SUBJECT TO STRONG OR PERSISTENT WINDS.

1978-0336 BAKER W J
WIND ENERGY--A DESIGN IDEA FOR A SMALL VERTICAL AXIS TURBINE.
ELECTRON. POWER 24(3): 186-187, MARCH 1978.

IT IS GENERALLY ACCEPTED THAT THE FUTURE FOR VERY LARGE (MEGAWATT) CAPACITY WIND-DRIVEN GENERATORS IN BRITAIN IS SOMEWHAT BLEAK, AS CLIMATIC AND ENVIRONMENTAL CONDITIONS ARE NOT PARTICULARLY FAVORABLE. PROSPECTS ARE RATHER BRIGHTER, HOWEVER, FOR LOCALLY INSTALLED UNITS OF COMPARATIVELY LOW POWER OUTPUT, ESPECIALLY WHEN INTENDED FOR PREHEATING THE MAKE-UP WATER IN DOMESTIC HOT-WATER SYSTEMS.

1978-0337 BARCHET R J
MOD-1 WIND TURBINE GENERATOR PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 76-91.
CONF-779021/1

THE OBJECTIVE OF THE MOD-1 PROGRAM, AS A VITAL ELEMENT OF THE NATIONAL WIND ENERGY PROGRAM, IS QUITE SIMPLE -- TO DEVELOP A LARGE, UTILITY-CLASS WTG WHICH HAS THE POTENTIAL FOR GENERATING UTILITY-GRADE ELECTRICAL POWER AT COSTS COMPETITIVE WITH ALTERNATIVE ENERGY SOURCES. THIS IMPLIES A MEGAWATT-CLASS MACHINE WITH AN OUTPUT POWER QUALITY COMPATIBLE WITH TYPICAL UTILITY GRID VOLTAGE/CURRENT, RIPPLE, REACTANCE, ETC.

1978-0338 BARNETT K M
WIND ENERGY PROGRAMS SPONSORED BY THE STATE OF NEW MEXICO.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 31-33.
CONF-780357

A REVIEW IS PRESENTED OF WIND ENERGY RESEARCH PROGRAMS BEING CONDUCTED BY THE STATE OF NEW MEXICO.

1978-0339 BARTOS K P
THE GOLDSTONE ENERGY PROJECT.
NTIS, FEBRUARY 15, 1978. 50 P.
NASA-CR-156133, JPL-PUB-78-5, N78-20618

THE GOLDSTONE ENERGY PROJECT WAS ESTABLISHED IN 1974 TO INVESTIGATE WAYS IN WHICH THE GOLDSTONE DEEP SPACE COMPLEX IN CALIFORNIA COULD BE MADE PARTLY OR COMPLETELY ENERGY-SUFFICIENT, ESPECIALLY THROUGH THE USE OF SOLAR- AND WIND-DERIVED ENERGY RESOURCES. WAYS IN WHICH ENERGY COULD BE CONSERVED AT THE COMPLEX WERE ALSO STUDIED.

1978-0340 BENDICK P
ELECTRICITY FROM THE WIND: A GUIDE FOR THE GENERALIST.
NTIS, 1978. 23 P.
PB80-139751

THIS GUIDE WAS COMPILED AND WRITTEN FOR THE GENERALIST WORKING IN DEVELOPING COUNTRIES WHO ARE CONSIDERING THE OPTION OF USING WIND ENERGY TO GENERATE SMALL AMOUNTS OF ELECTRICITY. IT IS NOT INTENDED TO BE COMPREHENSIVE NOR SHOULD IT BE READ AS A TECHNICAL BULLETIN. IT PRESENTS BASIC INFORMATION TO THE READER WHO KNOWS LITTLE ABOUT THE SUBJECT AND WILL HELP HIM/HER TO DECIDE WHETHER WIND ENERGY SHOULD BE EXPLORED AS A PRACTICAL ANSWER TO A SPECIFIC ENERGY NEED. DISCUSSED IN THE PAPER ARE WIND ELECTRIC SYSTEMS, MEASURING THE WIND, DETERMINING ELECTRICAL NEEDS, SELECTING COMPONENTS, AND LISTINGS OF COMMERCIAL DEALERS, MANUFACTURERS AND DISTRIBUTORS. FINANCIAL CONSIDERATIONS ARE ALSO DISCUSSED.

1978-0341 BENESCH W, JURKSCH G, DUENSING G, ZOELLNER R
WINDVERHAEL TNISSE IN DER BUNDESREPUBLIK DEUTSCHLAND IM HIMBLICK AUF DIE NUTZUNG DER WINDKRAFT. T. 1, 2. BINNENLAND: KUESTENVORFELD. (WIND CONDITIONS IN THE FEDERAL REPUBLIC OF GERMANY WITH A VIEW TO WIND ENERGY UTILIZATION. PT. 1,2. INTERIOR; COASTAL REGIONS.)
OFFENBACH, GERMANY, F.R., DEUTSCHER WETTERDIENST, 1978. (IN GERMAN)

WIND CONDITIONS HAVE BEEN DETERMINED FOR SEVERAL COASTAL AND INTERIOR REGIONS WITH A VIEW TO WIND ENERGY UTILIZATION, AND THE DATA OBTAINED ARE GIVEN IN ISOLATED FORM AND IN A GRAPHICAL REPRESENTATION.

1978-0342 BEN-DOV E, NAOT Y, RUDMAN P S
HYDROGEN FUEL PRODUCTION BY WIND ENERGY CONVERSION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 8, P. 3563-3576.

THE AUTHORS BASE THEIR ANALYSIS ON RECENT NASA EXPERIENCE AND CAPITAL COST ESTIMATES BY GENERAL ELECTRIC CO. AND BY KAMAN AEROSPACE CORP. OF WIND ENERGY CONVERSION (WEC) SYSTEMS FOR FEEDING AN ELECTRIC UTILITY GRID. FIRST CONSIDERED ARE THE COST OF WEC FOR FEEDING AN ELECTRIC UTILITY GRID AS A FUNCTION OF THE MEAN WIND SPEED.

1978-0343 BEN-DOV E, NAOT Y, RUDMAN P S
WIND ENERGY CONVERSION: A FEASIBILITY STUDY FOR ISRAEL.
ELECTRICAL AND ELECTRONICS ENGINEERS IN ISRAEL, 19TH CONVENTION, TEL-AVIV, OCTOBER 10-13, 1977. NEW YORK, IEEE, 1978. P. 42-46.

THIS PAPER CONSIDERS THE COST OF WIND ENERGY CONVERSION (WECS) FOR FEEDING AN ELECTRIC UTILITY GRID THAT HAS STORAGE CAPACITY, SUCH AS A HYDROELECTRIC COMPONENT AND, THE USE OF WEC FOR FEEDING AN ELECTRIC UTILITY GRID THAT HAS NO STORAGE CAPACITY SO THAT THE WEC HAS A FUEL SAVER ROLE ONLY. ALSO THE USE OF WEC TO PRODUCE HYDROGEN BY ELECTROLYSIS OF WATER, AS A SUBSTITUTE FOR GASOLINE, IS CONSIDERED. FINALLY SOME WIND-SPEED DATA FROM NEWLY DISCOVERED HIGH WIND-SPEED SITES IN ISRAEL ARE LISTED.

1978-0344 BENESCH W, DUENSING G, JURKSCH G, ZOELLNER R
DIE WINDVERHAELTNISSE IN DER BUNDESREPUBLIK DEUTSCHLAND IM HINDBLICK AUF DIE NUTZUNG DER WINDKRAFT. (WIND FORCE ANALYSIS FOR THE FEDERAL REPUBLIC OF GERMANY TO DETERMINE THE USEFULNESS OF WIND POWER.)
NTIS, 1978. 145 P. (IN GERMAN)
N80-17635/7

THE UTILIZATION OF WIND FORCE IN INLAND AREAS IS INVESTIGATED ON THE BASIS OF DATA SETS FROM 74 STATIONS FROM THE PERIOD 1969 TO 1974. THE DEPENDENCE OF THE ANNUAL MEANS AND AVERAGE ANNUAL CUMULATIVE FREQUENCIES OF WIND VELOCITY ON ELEVATION IS EVALUATED. ANALYSES ON THE DURATION OF THRESHOLD VALUES OF WIND VELOCITY ARE ALSO MADE. A NUMBER OF SITES SUITABLE FOR WIND POWER UTILIZATION ARE IDENTIFIED.

1978-0345 BERGEY M
VERTICAL AXIS, ARTICULATED BLADE, WIND TURBINE.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 13-22.
CONF-780357

AERODYNAMICS AND DESIGN CHARACTERISTICS OF DARRIEUS ROTORS, GIROMILL TURBINES, AND VERTICAL-AXIS ARTICULATED-BLADE WIND TURBINES ARE PRESENTED. THE RESEARCH PROGRAM AT THE UNIVERSITY OF OKLAHOMA ON VERTICAL-AXIS ARTICULATED-BLADE TURBINES IS DESCRIBED.

1978-0346 BERGEY M
WIND POWER IN OKLAHOMA.
WIND POWER DIG. NO. 13: 8-10, FALL 1978.

TWO WIND TURBINES, DEVELOPED AT THE UNIVERSITY OF OKLAHOMA WIND ENERGY CENTER ARE DESCRIBED. POWERS I IS A TWO-BLADED HORIZONTAL AXIS MACHINE. POWERS II IS A VERTICAL AXIS ARTICULATED BLADE WIND TURBINE DESIGNED AND BUILT BY ENGINEERING STUDENTS DURING 1976-1977. ITS PURPOSE WAS TO INVESTIGATE AN ADVANCED WIND-ELECTRIC SYSTEM FOR PROVIDING POWER DIRECTLY TO HOMES AND SMALL INDUSTRIES OR FOR INTEGRATION INTO THE EXISTING POWER GRID.

1978-0347 BERLINER D, CHRISTMAS S, COSTELLO D, FELLHAUER C
REVIEW OF SELECTED SOLAR MARKET STUDIES AND TECHNIQUES.
NTIS, OCTOBER 1978. 58 P.
SERI/PR-52-076

THE PRELIMINARY RESULTS OF A LITERATURE REVIEW OF SOLAR ENERGY MARKET STUDIES IN THE INDUSTRIAL PROCESS HEAT, PASSIVE, SOLAR THERMAL ELECTRIC, PHOTOVOLTAIC, WIND, AND OCEAN THERMAL TECHNOLOGIES ARE PRESENTED. USEFUL ELEMENTS OF MARKET STUDIES IN OTHER SOLAR AREAS ARE DESCRIBED AS WELL. THE MARKET RESEARCH LITERATURE IS REVIEWED IN ORDER TO INVESTIGATE TECHNIQUES OR APPROACHES THAT MAY HAVE SOME APPLICABILITY IN THE CONTEXT OF SOLAR MARKETS. A PRELIMINARY PLAN IS PRESENTED FOR THE INITIATION OF SELECTED SOLAR MARKET STUDIES DURING FY79.

1978-0348 BEUSSE H
ARRANGEMENT FOR MATCHING A WIND ROTOR TO AN ELECTRICAL GENERATOR.
GERMAN (FRG) PATENT NO. 2,623,233/A/, APRIL 6, 1978. 6 P. (IN GERMAN)

THE INVENTION CONCERNS AN ARRANGEMENT FOR MATCHING A WIND POWER MACHINE TO AN ELECTRICAL GENERATOR, WHICH FEEDS A CONSUMER NETWORK. ACCORDING TO THE INVENTION FIRST GENERATOR USING THE SHAFT HORSEPOWER OF THE WIND POWER MACHINE FEEDS AN ELECTRIC WATER, WHICH IS COUPLED TO A SECOND GENERATOR, WHOSE POWER IS TAKEN TO THE CONSUMER NETWORK. THE OUTPUT SIGNAL OF A COMPUTER WHICH HAS THE ANEMOMETER FEEDING INTO IT CONTROLS THE EXCITATION OF THE MOTOR AT SUFFICIENT WIND SPEED, SO THAT THE SPEED OF ROTATION OF THE SECOND GENERATOR IS PRACTICALLY CONSTANT, AND A SPEED REGULATOR TAKES EXCESS ENERGY VIA A CONTROLLER RECTIFIER (THYRISTOR) TO A SHUNT CIRCUIT OF THE MOTOR, IF THE WIND POWER EXCEEDS THE LOAD TAKEN FROM THE OUTPUT OF THE SECOND GENERATOR. AS AN EXTENSION OF THE ARRANGEMENT ACCORDING TO THE INVENTION IT IS PROPOSED TO ARRANGE A DIESEL ENGINE IN THE SHAFT OF THE SECOND GENERATOR, WHICH CAN BE CONTROLLED AT CONSTANT SPEED BY THE CONTROL DEVICE, SO THAT IT TAKES OVER THE MISSING OUTPUT IF THE WIND POWER IS LESS THAN THE LOAD AT THE GENERATOR OUTPUT.

1978-0349 BEYER G
SOLAR-WIND-HYDROGEN COMBINATION POWER PLANT.
GERMAN (FRG) PATENT NO. 2,650,866/A/, MAY 11, 1978. 8 P. (IN GERMAN)

A COMBINED POWER PLANT GENERATING ELECTRICAL ENERGY IS DESCRIBED. THE ELECTRIC GENERATOR IS DRIVEN BY AN INTERNAL COMBUSTION ENGINE. HYDROGEN IS USED AS FUEL. THE HYDROGEN IS GENERATED BY ELECTROLYSIS, TAKING THE NECESSARY ENERGY FROM A WIND POWER PLANT OR A SOLAR ENERGY PLANT.

1978-0350 BHUMRALKAR C M, LUDWIG F L, MANCUSO R L
ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
SYMPOSIUM ON TURBULENCE, DIFFUSION, AND AIR POLLUTION, 4TH, RENO, JANUARY 15-18, 1978. BOSTON, AMERICAN METEOROLOGICAL SOCIETY, 1978. PREPRINTS. P. 160-166.

THE PAPER DESCRIBES A PHYSICALLY BASED THREE-DIMENSIONAL MODEL THAT INCORPORATES THE EFFECT OF UNDERLYING TERRAIN AND UTILIZES AVAILABLE, CONVENTIONAL WIND INFORMATION FROM SELECTED WEATHER STATIONS IN THE VICINITY OF THE SITE. THE REQUIRED STATISTICAL WIND CHARACTERISTICS ARE ESTIMATED FROM THE HOURLY WINDS SYNTHESIZED WITH THE AID OF THE MODEL. THE METHOD CAN BE APPLIED TO VIRTUALLY ANY SITE, REGARDLESS OF TOPOGRAPHIC SETTING.

1978-0351 BHUMRALKAR C M
POSSIBLE IMPACTS OF LARGE SOLAR ENERGY SYSTEMS ON LOCAL AND MESOSCALE WEATHER.
IIASA WORKSHOP ON CLIMATE AND SOLAR ENERGY CONVERSION, LAXENBURG, AUSTRIA, DECEMBER 8-10, 1976. PROCEEDINGS.

LAXENBURG, AUSTRIA, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS, 1978. P. 123-145.

THIS PAPER REVIEWS THE VARIOUS PROPOSED SOLAR ENERGY TECHNOLOGIES INCLUDING: SOLAR THERMAL ELECTRICITY; OCEAN THERMAL ENERGY CONVERSION; WIND ENERGY CONVERSION; BIOCONVERSION, AND DISCUSSES THEIR CLIMATIC IMPACT.

1978-0352 BILTOFT C A
WIND AND WIND-POWER POTENTIAL AT DUGWAY NATIONAL TEST FACILITY PHASE I. WIND VELOCITY PROFILES.
NTIS, MARCH 1978. 24 P.
AD-A059119, DPG-TN-C625A

DATA COLLECTED AT METEOROLOGICAL TOWERS ON DUGWAY RANGES ARE USED IN A POWER LAW RELATIONSHIP FOR WIND VELOCITY WITHIN THE 8 TO 48 METER LAYER. ANALYSIS SHOWS THE POWER LAW RELATIONSHIP FUNCTIONING WELL FOR MODERATE TO HIGH WIND SPEEDS AND DURING DAYTIME. WIND SPEED HAS A MINOR INFLUENCE ON ACTUAL MAGNITUDE OF POWER LAW EXPONENTS, BUT A MAJOR INFLUENCE ON THE SCATTER OF EXPONENT VALUES, MAKING VELOCITY PROFILE RELATIONSHIPS INVALID FOR NOCTURNAL LIGHT WIND CONDITIONS. A LEAST SQUARES FIT IS USED TO COMPUTE POWER LAW EXPONENTS FOR MODERATE TO STRONG WIND SPEEDS, WHILE LOW WIND SPEED CASES ARE DESCRIBED ONLY WITH MEAN VALUES. THE BREAKDOWN OF VELOCITY PROFILE RELATIONSHIPS WITH LIGHT WIND IS NOT A SERIOUS DEFICIENCY, AS LOW WIND SPEEDS CONTRIBUTE LITTLE TO WIND POWER POTENTIAL.

1978-0353 BINDER G, FRITZSCHE A, VOLLAN A, DEKITSCH A, JOOS R
DEVELOPMENT OF A 5.5 M DIAMETER VERTICAL AXIS WIND TURBINE (PHASE II).
NTIS, JUNE 1978. 142 P.
BMFT-FB-T-79-04

IN CONTINUATION OF THE PRECEDING PROJECT, DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (PHASE I), THE DESIGN WORK WAS PERFORMED INCLUDING THE AERODYNAMIC AND STRUCTURAL DYNAMIC INVESTIGATIONS. THE WIND ENERGY CONVERTER HAS BEEN BUILT AND TESTED IN A WIND TUNNEL. THE ROTOR DIAMETER OF 5.5 M IS NOT ONLY A SUITABLE SIZE FOR THE AERODYNAMIC TESTS, BUT GUARANTEES ALSO THAT THE RESULTS OF SUBSEQUENT FIELD TESTS WILL CONTRIBUTE TO THE EXPERIMENTAL DATA REQUIRED FOR THE DESIGN OF LARGER CONVERTERS. THE LAYOUT OF THE ROTOR, THE CONSTRUCTION METHODS AND THE CHOICE OF MATERIALS PROMISE FAVOURABLE ECONOMIC CONDITIONS FOR A SERIES PRODUCTION APPLYING ADVANCED MASS PRODUCTION TECHNOLOGY, WITHOUT EXCLUDING THE MANUFACTURE IN DEVELOPING COUNTRIES. THE WIND TUNNEL TESTS, PERFORMED WITH THE 2-, 3-, AND 4-BLADE VERSION OF THE DARRIEUS-ROTOR AND WITH SAVONIUS-ROTORS OF DIFFERENT HEIGHTS CONFIRMED EXPERIMENTALLY THE AERODYNAMIC CALCULATIONS AND PROVIDED FURTHER KNOW-HOW REFERRING TO INFLUENCES NOT ACCESSIBLE TO CALCULATION.

1978-0354 BLAKE S
WIND DRIVEN WATER PUMPS, ECONOMICS, TECHNOLOGY, CURRENT ACTIVITIES.
NTIS, DECEMBER 1978. 29 P.
PB-292816

THE ILLUSTRATED HANDBOOK DISCUSSES THE ECONOMICS AND THE CHARACTERISTICS TYPICAL OF THE AERMOTOR WINDMILL AND THE INDIGENOUS WINDMILL. SINCE THE USE OF WINDMILLS CAN HAVE WORLDWIDE IMPACT UPON THE DEVELOPMENT AND UPGRADING OF WATER SUPPLIES, AN EMPHASIS IS PLACED UPON THE IMPORTANCE OF SUPPLYING THIS TECHNICAL INFORMATION TO THE DEVELOPING COUNTRIES OF THE WORLD.

1978-0355 BOESTAD G K W
DEVICE AT A WIND POWER PLANT WITH HYDRAULICLY REGULATED TURBINE BLADES.
SWEDISH PATENT NO. 7,605,308-1, MARCH 1978. (IN SWEDISH)

THIS PATENT DESCRIBES A HYDRAULIC SERVOMOTOR CONTROL ARRANGEMENT OF WIND POWER PLANTS WITH HORIZONTAL-AXIS TURBINES, THAT REGULATES THE ANGLE BETWEEN THE TURBINE-BLADES AND THE WIND IN ORDER TO REDUCE STRESSES AND INCREASE THE USEFUL RANGE OF WIND SPEEDS. IT ALSO PERMITS ONE BLADE TO TURN IN RELATION TO THE OTHER BLADE IF THE FORCES ON THE BLADES ARE NOT OF EQUAL MAGNITUDE.

1978-0356 BONNET J A, BRACETTI F P
ALTERNATE ENERGY SOURCES FOR SMALL TROPICAL ISLANDS. THE CASE OF PUERTO RICO.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 111.

A PROJECT TO INSTALL AN EXPERIMENTAL 200 KW WIND TURBINE GENERATOR SPONSORED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) IS IN THE CONSTRUCTION PHASE. A DRAFT PROPOSAL FOR A WIND POWER ASSESSMENT OF THE WHOLE ISLAND WAS SUBMITTED TO ERDA. OTHER PROJECTS ON SOLAR ENERGY, OCEAN THERMAL ENERGY CONVERSION, AND SOLID WASTE ARE MENTIONED.

1978-0357 ZULIANI G
ALTERNATIVE ENERGY SOURCES: WIND ENERGY.
ELETTRIFICAZIONE NO. 2: 65-68, 1978 (IN ITALIAN)

AMONGST ALTERNATIVE ENERGY SOURCES TO OIL AND NUCLEAR REACTORS, WIND ENERGY IS AGAIN BECOMING OF INTEREST BUT THE PERFORMANCE WITH THE PRESENT STATE OF THE ART IS RESTRICTED IN RELATION TO THE SIZE AND COST OF THE INSTALLATION. THE BASIC TECHNICAL AND CONSTRUCTIONAL FEATURES OF PROPELLERS ARE CONSIDERED AND VARIOUS EXPRESSIONS ARE GIVEN RELATING THE MECHANICAL POWER OUTPUT TO WIND VELOCITY, PROPELLER DIMENSIONS, NUMBER OF BLADES AND BLADE ANGLE. BASED ON THE EXPERIENCE GAINED, VALUES OF RATIO OF DIAMETERS AND BLADE ANGLE ARE QUOTED FOR NUMBERS OF BLADES OF 2, 4 AND ABOVE 4.

1978-0358 BOODA L
OCEAN ENERGY CHALLENGES TECHNOLOGY; GROWS.
SEA TECHNOL. 19(8): 10-14, 16-17, AUGUST 1978.

SEVERAL POSSIBILITIES UNDER CONSIDERATION BY US DOE FOR TAPPING THE SOLAR ENERGY RESOURCES INHERENT IN THE OCEAN ARE DISCUSSED, INCLUDING OCEAN THERMAL ENERGY CONVERSION (OTEC), OCEAN BIOMASS, OCEAN WAVES, OCEAN CURRENTS, OFFSHORE WINDS, TIDAL POWER AND SALINITY GRADIENTS. THE POTENTIALS FOR THESE SYSTEMS AND THEIR POLITICAL AND ECONOMIC SUPPORT ARE ANALYZED.

1978-0359 BOOTH D
OFFSHORE WIND FARM IN THE WASH.
OFFSHORE SERV. 11(5): 19-20, MAY 1978.

CLUSTERS OF HIGH EFFICIENCY WINDMILLS OFFSHORE COULD PROVIDE BRITAIN WITH AS MUCH AS 10 PER CENT OF ITS BASE LOAD ELECTRICITY WITHIN THE NEXT 10 TO 15 YEARS. TO PROVIDE WIND GENERATION OF 1000 MW, COMPARABLE WITH THE OUTPUT OF A MODERN FOSSIL FUELLED STATION, ONE WOULD REQUIRE 400 VERTICAL AXIS OFFSHORE WINDMILLS. THE MAJOR

ATTRACTION OF THE OFFSHORE WINDMILL IS THAT 400 COULD BE CLUSTERED INTO A SITE OF ONLY 10 KM SQUARE. OFF THE WASH THERE ARE SEVERAL SHALLOW WATER SITES HAVING THE MEAN WIND SPEED NECESSARY WHERE A NUMBER OF 10 KM SQUARE CLUSTERS COULD BE GROUPED.

1978-0360 BOUWMEESTER R J B, MERONEY R N, SANDBORN V A
SITES FOR WIND-POWER INSTALLATIONS: WIND CHARACTERISTICS OVER RIDGES. PART II. FINAL REPORT.
NTIS, JUNE 1978. 122 P.
RLO-2438-78/2

THE PURPOSE OF THIS RESEARCH WAS TO INCREASE KNOWLEDGE OF THE PHYSICAL PROCESSES THAT GOVERN WIND CHARACTERISTICS OVER RIDGES AND, SUBSEQUENTLY, TO IMPROVE EMPIRICAL AND NUMERICAL FOR ESTIMATING WIND VELOCITIES OVER RIDGES. THESE OBJECTIVES WERE ACHIEVED BY CONDUCTING A WIND-TUNNEL STUDY OF THE FLOW FIELD OVER TRIANGULAR-SHAPED AND SINUSOIDAL-SHAPED RIDGE MODELS WITH VARYING UPWIND AND DOWNWIND SLOPES UNDER VARIOUS THERMAL STRATIFICATION CONDITIONS. A SIMPLE TECHNIQUE WAS DEVELOPED TO PREDICT THE VELOCITY-AMPLIFICATION PROFILE ABOVE A RIDGE CREST FOR AN ARBITRARY RIDGE SLOPE. LARGEST SPEEDUPS WERE MEASURED FOR THE STEEPEST SYMMETRICAL RIDGE WHICH DID NOT CAUSE FLOW SEPARATION. CRITERIA FOR FLOW SEPARATION OVER RIDGES ARE PROVIDED IN THIS REPORT. APPLICABILITY OF THE RESULTS FOR RIDGES WITH FINITE WIDTH IS DISCUSSED.

1978-0361 BOUWMEESTER R J B, MERONEY R N, SANDBORN V A, RIDER M A
THE INFLUENCE OF HILL SHAPE ON WIND CHARACTERISTICS OVER TWO DIMENSIONAL HILLS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 646-653.
CONF-770921/2

SINCE JUNE 1975 THE FLUID MECHANICS AND WIND ENGINEERING PROGRAM AT COLORADO STATE UNIVERSITY HAS BEEN ENGAGED IN A THREE-YEAR RESEARCH PROJECT TO DETERMINE WHICH LOCATIONS ARE MOST FAVORABLE FOR WIND-POWER INSTALLATIONS. WIND-TUNNEL MODELING TECHNIQUES ARE USED TO ANALYZE SYSTEMATICALLY THE EFFECT OF CHARACTERISTIC TOPOGRAPHICAL FEATURES ON DIFFERENT FLOW REGIMES. THE RESEARCH WHICH IS PRIMARILY EXPERIMENTAL INCLUDES EVALUATION OF WIND CHARACTERISTICS OVER SIMPLE TWO-DIMENSIONAL AND THREE-DIMENSIONAL SHAPED HILLS WITH DIFFERENT UPSTREAM FLOW CONDITIONS.

1978-0362 BRAASCH R H
VERTICAL AXIS WIND TURBINE PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 745-758.
CONF-770921/2

THIS REPORT PRESENTS THE MAJOR ACTIVITIES ASSOCIATED WITH THE VERTICAL AXIS WIND TURBINE PROGRAM, TO INCLUDE: THE 17 METER RESEARCH TURBINE, PERFORMANCE DATA ON STRUCTURAL DATA, AS WELL AS LOW COST PRODUCTION AND COST STUDY.

1978-0363 BRAASCH R H
DESIGN, CONSTRUCTION, TESTING AND MANUFACTURING OF VERTICAL AXIS WIND TURBINES.
NTIS, 1978. 37 P.
CONF-781014-1, SAND-78-1253C

A SUBSTANTIAL DESIGN AND DEVELOPMENT PROGRAM HAS BEEN UNDERWAY IN THE UNITED STATES OF AMERICA ON THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT). THE PURPOSE OF THIS REPORT IS TO PRESENT CURRENTLY AVAILABLE INFORMATION ON: DESIGN, CONSTRUCTION, AND TESTING OF A 17 METER RESEARCH TURBINE; VAWT PERFORMANCE-COST OPTIMIZATION STUDY; AND VAWT MANUFACTURING STUDIES.

1978-0364 BRANDVOLD G E
VERTICAL AXIS WIND TURBINE STATUS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1978. VOL. III, P. 1843-1847.

ABOUT 50 YEARS AGO, A FRENCH INVENTOR, D.J.M. DARRIEUS, DESIGNED AN UNUSUAL VERTICAL AXIS WIND TURBINE, WHICH, FOR NEARLY 45 YEARS, DREW LITTLE ATTENTION UNTIL THE NATIONAL RESEARCH COUNCIL OF CANADA RENEWED INTEREST BY STARTING NEW DEVELOPMENT EFFORTS. TODAY IT IS ONE OF THE MORE PROMISING CANDIDATES FOR A PRACTICAL WIND POWER SYSTEM. USING FUNDING PROVIDED BY THE UNITED STATES DEPARTMENT OF ENERGY, DIVISION OF SOLAR ENERGY, SANDIA LABORATORIES IS EXPLORING THE CAPABILITIES OF THE VERTICAL AXIS WIND TURBINE (VAWT) AS AN ALTERNATIVE ENERGY SOURCE. INVESTIGATION OF THIS WIND SYSTEM TAKES SEVERAL PATHS. DETAILED COMPUTER MODELING AND ANALYSIS, CONDUCTED ALONG WITH ACTUAL DESIGN AND OPERATION OF PROTOTYPE TURBINES, WILL SEEK TO ESTABLISH THE MECHANICAL PRACTICALITY.

1978-0365 BRAY R E
SOLAR-CLIMATIC STATISTICAL STUDY.
SOLAR HEATING AND COOLING R AND D BRANCH CONTRACTORS MEETING, 3RD ANNUAL, WASHINGTON, D.C., SEPTEMBER 24, 1978. NTIS, MARCH 1978. P. 445-446.
CONF-780983

THE OBJECTIVE OF THIS STUDY IS TO DERIVE, FROM HISTORICAL DATA AVAILABLE AT 26 SOLMET STATIONS RECORDING ON AN HOURLY BASIS, FREQUENCIES AND PROBABILITIES OF SPECIFIC LEVELS OF SOLAR INSOLATION AND WIND POWER OCCURRING AND PERSISTING FOR UP TO ONE WEEK. THESE EMPIRICAL PROBABILITIES WILL BE DETERMINED FOR AVERAGE DAILY INSOLATION AND AVERAGE DAILY WIND POWER, ON A MONTHLY BASIS, CONSIDERED INDEPENDENTLY OR IN COMBINATION.

1978-0366 BROWN F
POWER COULD COME OUT IN THE WASH.
ELECTR. REV. 202(7): 16-17, FEBRUARY 17, 1978.

WINDPOWER COULD PROVIDE UP TO 20 PER CENT OF THE COUNTRY'S ENERGY REQUIREMENTS IF RESEARCH WAS GIVEN THE PROPER FUNDING. THIS PAPER REVIEWS THE CURRENT STATE OF WIND RESEARCH AND THE DIRECTION IN WHICH IT COULD PROGRESS.

1978-0367 BROWN R H
DESIGN AND UTILIZATION OF LOW-COST SOLAR COLLECTORS FOR AGRICULTURE.
ASAE, SUMMER MEETING, LOGAN, UTAH, JUNE 27-30, 1978. PAPER 78-3045. ST. JOSEPH, MICHIGAN, ASAE, 1978. 16 P.

THIS ENERGY SOURCE OFFERS A VERY REAL OPPORTUNITY FOR PRACTICAL APPLICATIONS IN AGRICULTURAL SITUATIONS SUCH AS CROP DRYING, SPACE HEATING, WATER HEATING, AND PERHAPS SPACE AND PRODUCT COOLING AND SHAFT HORSEPOWER. THE ENERGY MAY BE COLLECTED WITH LOW-COST SOLAR COLLECTORS, EXPENSIVE COLLECTORS, BIOMASS PRODUCTION FROM PLANTS

AND WIND ENERGY SYSTEMS FOR WATER PUMPING OR GENERATION OF ELECTRICITY. THE PAPER REPORTS ON THE USE OF LOW-COST SOLAR COLLECTORS FOR HEATING OF AIR AND WATER. DESIGN DATA AND SYSTEM CONCEPTS INCLUDING WIND ENERGY AND BIOMASS BURNING ARE PRESENTED.

1978-0368 BRULLE R V
GIROMILL WIND TUNNEL TEST AND ANALYSIS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 775-783.
CONF-770921/2

THE FEASIBILITY OF THE GIROMILL AS A VIABLE WIND ENERGY CONVERSION SYSTEM WAS VERIFIED BY THE INITIAL ONE YEAR FEASIBILITY STUDY COMPLETED IN MAY 1976. THIS PAPER REPORTS ON THE DESIGN, FABRICATION, AND TESTING OF A GIROMILL MODEL IN A WIND TUNNEL. THE PRIMARY OBJECTIVE OF THE TEST WAS TO VERIFY THAT THE LARSEN CYCLOGIRO THEORETICALLY COMPUTED PERFORMANCE WAS OBTAINABLE. A SECONDARY OBJECTIVE WAS TO OBTAIN A COMPARISON OF GIROMILL PERFORMANCE WITH THAT OF OTHER TYPES OF VERTICAL AXIS MACHINES.

1978-0369 ZULIANI G
ALTERNATIVE POWER SOURCES-WIND ENERGY.
ELETTRIFICAZIONE NO. 3: 117-120, MARCH 1978. (IN ITALIAN)

THIS ARTICLE DESCRIBES RECENT DEVELOPMENTS IN WIND POWERED GENERATORS OF HORIZONTAL AND VERTICAL CONSTRUCTION IN THE USA AND ELSEWHERE. AN ACCOUNT IS GIVEN OF GERMAN WORK TO COMBINE WIND AND SOLAR ENERGY FOR POWER GENERATION. THE POSSIBILITIES OF PHOTO-ELECTRIC SOLAR POWER AND COMBINED SCHEMES TO SERVE WATER HEATING OR DISTILLATION PURPOSES ARE BRIEFLY CONSIDERED.

1978-0370 BUILTJES P J H, SMITH J
CALCULATION OF WAKE EFFECTS IN WIND TURBINE PARKS.
WIND ENG. 2(3): 135-145, 1978.

CONSIDERING THE PROBLEM OF THE MUTUAL SPACING AND PATTERN IN WHICH WIND TURBINES HAVE TO BE PLACED IN ORDER TO GET AN OPTIMAL (FROM AN AERODYNAMIC AND ECONOMICAL POINT OF VIEW) ENERGY OUTPUT ON A RESTRICTED AREA, WAKE MEASUREMENTS HAVE BEEN CARRIED OUT IN A WIND TUNNEL OF A TURNING MODEL OF A DARRIEUS ROTOR. USING THESE WAKE RESULTS CALCULATIONS CONSIDERING INTERACTING WAKES OF DIFFERENT TURBINES HAVE BEEN PERFORMED USING THE COMPUTER CODE "WINDS". FOR SMALL PARKS WITH UP TO 20 TURBINES AN OPTIMUM ENERGY OUTPUT SEEMS TO BE GAINED AT A MUTUAL DISTANCE OF ABOUT 5 WIND DIAMETERS; FOR LARGER PARKS ABOVE 60 TURBINES THIS VALUE IS ABOUT 9 DIAMETERS. IN THE CASE OF LARGER PARKS A ROW PATTERN IS PREFERABLE TO A REGULAR PATTERN.

1978-0371 BUSCHULTE W
SEMINAR AND STATUS REPORT ON WIND ENERGY.
NTIS, 1978. 23 P. (IN GERMAN)
SEMINAR AND STATUS REPORT ON WIND ENERGY, JULICH, F.R.G., OCTOBER 23, 1978.
CONF-7810148-1, INKA-CONF-78-012-001, JUL-CONF-27

THE METEOROLOGICAL REQUIREMENTS FOR THE OPERATION OF WIND ENERGY SYSTEMS ARE DESCRIBED, AND DESCRIPTIONS OF SMALL AND LARGER PLANTS, PART OF THEM IN THE PLANNING STAGE AND PART OF THEM ALREADY IN OPERATION, ARE PRESENTED.

1978-0372 BUTLER D A
AMBIENT ENERGY: ECONOMIC APPRAISAL.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 29-38.

SUN, SEA, AND WIND ARE DISCUSSED AS RENEWABLE ENERGY SOURCES. PROBLEMS AND COST FACTORS ARE INTRODUCED. THE FOLLOWING ECONOMIC APPRAISAL TECHNIQUES ARE EXPLORED: COST BENEFIT ANALYSIS, DISCOUNTING, AND PROBABILITY ANALYSIS.

1978-0373 CAHILL T P
TECHNOLOGY DEVELOPMENT OVERVIEW.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 491-501.
CONF-770921/2

A DESCRIPTION IS PRESENTED OF A NUMBER OF TECHNOLOGY DEVELOPMENT PROJECTS THAT ERDA IS FUNDING. SOME OF THE SIGNIFICANT RESULTS TO DATE ARE INDICATED, AND IF THE PROJECT IS A CONTINUING EFFORT, FUTURE PLANS ARE PRESENTED. THE REPORT IS AN OVERVIEW OF THE PROJECT STRUCTURE, TASKS AND OBJECTIVES WHICH WILL BE PURSUED DURING FISCAL YEAR 1978, DEPENDING ON AVAILABLE FUNDING AND ERDA FINAL APPROVAL. THE STUDIES AND PROJECTS DISCUSSED ARE THOSE THAT HAVE BEEN IDENTIFIED AS A RESULT OF THE EXPERIENCE GAINED TO DATE. AS MORE DATA AND EXPERIENCE ARE GAINED, THE SR&T PLAN WILL BE MODIFIED IF REQUIRED TO PROVIDE NEW OR CHANGING EMPHASIS IN SUPPORT OF THE EVOLVING EXPERIENCE OF OVERALL WIND TURBINE DEVELOPMENT.

1978-0374 CALIFORNIA UTILITIES ALLOW WIND SYSTEM HOOK UP.
WIND POWER DIG. NO. 13: 12, FALL 1978.

1978-0375 CALIFORNIA WIND.
WIND POWER DIG. NO. 13: 37-38, FALL 1978.

1978-0376 CAMPBELL J S
THE CAMPBELL CHINESE TYPE WINDMILL.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1978. VOL. III, P. 1790-1795.

A VERTICAL-AXIS WINDMILL WHICH USES AN OLD BASIC OPERATING PRINCIPLE, THAT OF THE CHINESE WINDMILLS, HAS BEEN DEVELOPED. IT HAS BEEN ENGINEERED AIMING PRINCIPALLY AT LOW COSTS AND ABILITY TO UTILIZE A WIDE RANGE OF WIND VELOCITIES INCLUDING LOWER VELOCITY WINDS. A DEVICE FOR STOPPING THE WINDMILL OPERATION, OR ROTATION, WHILE THE WIND IS BLOWING IS INCLUDED. THIS WINDMILL HAS IMPORTANT DISTINCTIVE ADVANTAGES AS FOLLOWS: LOW TOTAL WEIGHT; NO UNUSUAL SIZE LIMITATION; NO STRENGTHENING LIMITATION; HIGH STARTING TORQUE; SATISFACTORY EFFICIENCY; ABILITY TO UTILIZE LOWER VELOCITY WINDS; RELATIVELY LOW SAIL VELOCITIES; AND LOW PRODUCTION COST PER RATED KILOWATT. SIMILAR TYPE EQUIPMENT CAN BE USED IN FLOWING WATER SUCH AS TIDES AND RIVERS.

1978-0377 CAMPBELL J S

CAMPBELL CHINESE TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1755-1778.

A NEW VERTICAL-AXIS WINDMILL WHICH USES AN OLD OPERATING PRINCIPLE, THAT OF THE CHINESE WINDMILLS, HAS BEEN DEVELOPED. IT HAS BEEN ENGINEERED AIMING PRINCIPALLY AT LOW COSTS AND THE ABILITY TO UTILIZE A WIDE RANGE OF WIND VELOCITIES INCLUDING LOWER VELOCITY WINDS. A DEVICE FOR STOPPING THE WINDMILL OPERATION, OR ROTATION, WHILE THE WIND IS BLOWING IS INCLUDED. THIS DEVICE MAY BE USED FOR PROTECTION OF THE WINDMILL. IN ADDITION TO THE ADVANTAGES COMMONLY FOUND WITH ALL VERTICAL-AXIS WIND MACHINES, THIS NEW WINDMILL HAS IMPORTANT DISTINCTIVE ADVANTAGES AS FOLLOWS: LOW TOTAL WEIGHT, NO UNUSUAL SIZE LIMITATIONS, NO STRENGTHENING LIMITATIONS, HIGH STARTING TORQUE, SATISFACTORY EFFICIENCY, ABILITY TO UTILIZE LOWER VELOCITY WINDS, INTERCEPTED WIND AREA IS RECTANGULAR, RELATIVELY LOW SAIL VELOCITIES, SIMILAR TYPE EQUIPMENT CAN BE USED IN FLOWING WATER SUCH AS TIDES AND RIVERS, AND LOW PRODUCTION COST PER RATED KILOWATT.

1978-0378 CANEGHEM A E VON
WIND ENERGY SYSTEM.
GERMAN (FRG) PATENT NO. 2,645,443/A/, APRIL 13, 1978. 8 P. (IN GERMAN)

A WIND POWER PLANT WITH ROTOR, POLE AND GENERATOR IS DESCRIBED WHICH INCLUDES AT LEAST TWO ROTORS ROTATING IN THE SAME DIRECTION FIRMLY MOUNTED ON THE EXTREME ENDS OF A COMMON SHAFT TWO TO THREE METERS APART. THE SHAFT IS SUPPORTED IN THE MIDDLE BY THE POLE, WHICH IS TELESCOPICALLY DISPLACEABLE IN VERTICAL DIRECTION, AND HAS A TRANSMISSION BAND DRIVING BY MEANS OF A DRIVING BELT OR THE LIKE A DRIVE GEAR OF A DRIVING SHAFT OF THE GENERATOR MOUNTED AT GROUND LEVEL.

1978-0379 CARLISLE J W, MARRS R W
AIRFLOW OVER PART OF THE SOUTHERN HIGH PLAINS INTERPRETED FROM LANDSAT IMAGERY. SPECIAL REPORT.
NTIS, JULY 1978. 64 P.
RLO/2343-78/4

AN INTERPRETATION OF EOLIAN FEATURES USING REMOTE SENSING TECHNIQUES FOR PART OF THE SOUTHERN HIGH PLAINS DEMONSTRATES THE USE OF REMOTE SENSING AS AN INEXPENSIVE AND EASILY APPLICABLE TOOL TO ASSESS WIND-ENERGY POTENTIAL. THE MOST USEFUL EOLIAN FEATURES IN SUCH AN INTERPRETATION ARE SAND DUNES, BLOWOUTS, DUST PLUMES, CLAY DUNES, PLAYA PLUMES, AND PLAYA ORIENTATION. ALTHOUGH THE RELIEF IS LOW TO MODERATE IN THIS AREA, TOPOGRAPHIC CHANNELING IS THE MOST IMPORTANT FACTOR IN DETERMINING HIGH WIND-ENERGY AREAS.

1978-0380 CARROLL T O
ENERGY: OPTIONS FOR THE FUTURE. CURRICULUM DEVELOPMENT PROJECT FOR HIGH SCHOOL TEACHERS. FINAL REPORT.
NTIS, APRIL 1978. 385 P.
COO-4278-1

RECENT STATE AND REGIONAL ENERGY CRISES DEMONSTRATE THE DELICATE BALANCE BETWEEN ENERGY SYSTEMS, THE ENVIRONMENT, AND THE ECONOMY. INDEED, THE INTERACTION BETWEEN THESE THREE ELEMENTS OF SOCIETY IS VERY COMPLEX. THIS PROJECT DEVELOPS CURRICULUM MATERIALS THAT WOULD BETTER PROVIDE STUDENTS WITH AN UNDERSTANDING AND AWARENESS OF FUNDAMENTAL PRINCIPLES OF ENERGY SUPPLY, CONVERSION PROCESSES, AND UTILIZATION NOW AND IN THE FUTURE. THE PROJECT HAD TWO SPECIFIC OBJECTIVES: TO TRANSFER KNOWLEDGE OF ENERGY SYSTEMS, ANALYSIS TECHNIQUES, AND ADVANCED TECHNOLOGIES FROM THE ENERGY ANALYST COMMUNITY TO THE TEACHER PARTICIPANTS; AND TO INVOLVE TEACHERS IN THE PREPARATION OF MODULAR CASE STUDIES ON ENERGY ISSUES FOR USE WITHIN THE CLASSROOM. THESE CURRICULUM MODULES ARE INTENDED TO ENHANCE THE TEACHER'S ABILITY TO PROVIDE ENERGY-RELATED EDUCATION TO STUDENTS WITHIN HIS OR HER OWN ACADEMIC SETTING.

1978-0381 CARTER J
WIND POWER SYSTEMS' STORM MASTER.
WIND POWER DIG. NO. 13: 34-35, FALL 1978.

1978-0382 CARTER J
WIND TAX INCENTIVES.
WIND POWER DIG. NO. 13: 36, FALL 1978.

1978-0383 CARTER J
THE "WINDFLOWER".
WIND POWER DIG. NO. 13: 30-32, FALL 1978.

1978-0384 CATANIA P J, DE HOLANDA P R H, HUNT D J
DEVELOPMENT OF WOODEN AIRFOILS FOR A DARRIEUS WIND GENERATOR.
UNION PANAMERICANA DE ASOCIACIONES DE INGENIEROS. CONVENTION 15TH, SANTIAGO, CHILE, OCTOBER 1-7, 1978. SANTIAGO, UPADI, 1978. VOL. 4, P. 263-276.

THE PAPER DESCRIBES AN EXPERIMENTAL RESEARCH PROGRAM CARRIED OUT AT THE LABORATORY OF WIND ENERGY AT THE FEDERAL UNIVERSITY OF PARAIBA, BRAZIL. THE THEORETICAL BACKGROUND LEADING TO THE SPECIFICATIONS FOR A 6 M THREE-BLADE DARRIEUS WIND GENERATOR AND A DETAILED DESCRIPTION OF THE PROCEDURE USED TO CONSTRUCT LOW COST, WOODEN, LAMINATED AIRFOILS IS INCLUDED. THE DARRIEUS WIND GENERATOR HAS THE CAPACITY OF PRODUCING 5 KW AT AN AVERAGE WIND VELOCITY EQUAL TO 9 M/S. THE AERODYNAMIC SHAPE OF THE AIRFOIL WAS NASA 0015.

1978-0385 CENTER FOR THE INTEGRAL DEVELOPMENT OF "LAS GAVIOTAS".
NTIS, 1978. 21 P.
ERDA-TR-288

THE FOLLOWING RESEARCH PROJECTS IN COLOMBIA ARE DESCRIBED BRIEFLY: DEVELOPMENT AND USE OF 0.5 TO 1.0 KW HYDRAULIC TURBINES FOR RURAL HYDROELECTRIC POWER GENERATION; WATER PIPELINE CONSTRUCTION; CONSTRUCTION OF SMALL DAMS; WATER PUMP DESIGN; WIND MILL DESIGN; DEVELOPMENT OF SOLAR WATER HEATERS; TESTING OF HYDRAULIC RAMS; AN EARTH-CEMENT SOLAR REFLECTOR; AND DESIGN OF A CASSAVA SHREDDER.

1978-0386 CHAMIS C C, SINCLAIR J H
ANALYSIS/DESIGN OF STRIP REINFORCED RANDOM COMPOSITES (STRIP HYBRIDS).
COMPOSITE MATERIALS IN THE AUTOMOBILE INDUSTRY, SYMPOSIUM PRESENTED AT ASME WINTER ANNUAL MEETING, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 67-84.

RESULTS ARE DESCRIBED WHICH WERE OBTAINED BY APPLYING ADVANCED ANALYSIS METHODS AND COMPOSITE MECHANICS TO A STRIP-REINFORCED RANDOM COMPOSITE SQUARE PANEL WITH FIXED ENDS. THIS WAS DONE IN ORDER TO ILLUSTRATE THE USE

OF THESE METHODS FOR THE APRIORI ASSESSMENT OF THE COMPOSITE PANEL WHEN SUBJECTED TO COMPLEX LOADING CONDITIONS. THE PANEL WAS ASSUMED TO BE OF E-GLASS/RANDOM COMPOSITE. THE STRIPS WERE ASSUMED TO BE OF THREE ADVANCED UNIDIRECTIONAL COMPOSITES TO COVER A RANGE OF LOW, INTERMEDIATE, AND HIGH MODULUS STIFFNESS. THE PANELS WERE ASSUMED TO BE SUBJECTED TO COMPLEX LOADINGS TO ASSESS THEIR ADEQUACY AS LOAD-CARRYING MEMBERS IN AUTO BODY, AIRCRAFT ENGINE NACELLE, AND WINDMILL BLADE APPLICATIONS. THE RESULTS SHOW THAT STRIP HYBRID PANELS CAN BE SEVERAL TIMES MORE STRUCTURALLY EFFICIENT THAN THE RANDOM COMPOSITE BASE MATERIALS. SOME OF THE RESULTS ARE PRESENTED IN GRAPHICAL FORM AND PROCEDURES ARE DESCRIBED FOR USE OF THESE GRAPHS AS GUIDES FOR PRELIMINARY DESIGN OF STRIP HYBRIDS.

1978-0387 CHANG G C, HIRSCHFELD F
FOR THE LATEST IN ENERGY STORAGE, TRY THE FLYWHEEL.
MECH. ENG. 100(2): 38-45, FEBRUARY 1978.

FROM REGENERATIVE BRAKING IN AUTOMOBILES TO PEAKING POWER FOR UTILITY OPERATIONS, FLYWHEELS HAVE BECOME A KEY ELEMENT IN DEVELOPING PRIMARY AND HYBRID SYSTEMS FOR ENERGY STORAGE. USING NEW COMPOSITE MATERIALS, TOGETHER WITH OTHER SOPHISTICATED ENGINEERING COMPONENTS, THE FLYWHEEL HAS BEEN REDESIGNED TO MEET THE NEEDS OF AN OIL-SHORTAGE ECONOMY. THE MOST IMMEDIATE APPLICATIONS ARE IN TRANSPORT VEHICLES, BUT THERE ARE OTHER PROMISING USES AHEAD IN UTILITIES, SOLAR POWER, AND WIND TURBINE FACILITIES. THE DIRECTION OF RESEARCH ON THE FLYWHEEL ITSELF, ITS CAPABILITY FOR REDUCING FUEL CONSUMPTION IN GASOLINE VEHICLES, THE LOAD ON THE BATTERY IN ELECTRIC VEHICLES, AND THE POSSIBILITY OF AN ALL-FLYWHEEL-POWERED ELECTRIC VEHICLE ARE DISCUSSED.

1978-0388 CHANGERY M J
NATIONAL WIND DATA INDEX: FINAL REPORT.
NTIS, DECEMBER 1978. 280 P.
HCO/T1041-01

THIS INDEX IS A CONCISE LISTING OF THE PERIODS OF RECORD OF ALL AVAILABLE WIND OBSERVATIONS IN THE NATIONAL CLIMATIC CENTER'S METEOROLOGICAL (DATA) ARCHIVES FOR LOCATIONS IN THE UNITED STATES. INCLUDED ARE THE PERIODS WITH VARIOUS TYPES OF MANUSCRIPT RECORDS AND AUTOGRAPHIC CHARTS CONTAINING WIND DATA, THE APPROXIMATE NUMBER OF OBSERVATIONS PER DAY, AND PERIODS FOR WHICH WIND DATA ARE ON MAGNETIC TAPE. A BRIEF HISTORY OF STANDARD U.S. INSTRUMENTATION AND AVAILABLE METEOROLOGICAL RECORD FORMS IS INCLUDED. FOR MOST LOCATIONS, THE ANEMOMETER HEIGHTS ARE INCLUDED TOGETHER WITH DATES OF HEIGHT CHANGES AND THE INSTRUMENT EXPOSURE.

1978-0389 CHASE V D
COMING: SUPER WINDMILLS FOR SUPER POWER.
POP. MECH. 149(5): 116-119, 286-287, MAY 1978.

THE DESIGN CHARACTERISTICS OF WIND TURBINE SYSTEMS ARE DESCRIBED. THE PLANNED DOE WIND TURBINES AND THE FEASIBILITY OF LARGE WIND POWER PLANTS ARE DISCUSSED.

1978-0390 CHATTOPADHYAY S N
INSTRUMENTS FOR SOLAR RADIATION AND WIND POWER MEASUREMENT.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978.
OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 454.

A SUMMARY ONLY IS GIVEN, SUBSTANTIALLY AS FOLLOWS: A PROGRAM FOR THE DESIGN, DEVELOPMENT, AND MANUFACTURE OF INSTRUMENTS HAS BEEN TAKEN UP IN ORDER TO MEET LARGE SCALE RESEARCH PROGRAM NEEDS AND INCREASED OPERATIONAL REQUIREMENTS. THE FIRST PHASE COMPRISES THE DEVELOPMENT OF INSTRUMENTS REQUIRED IN LARGE NUMBERS FOR THE MEASUREMENT OF DURATION OF SUNSHINE AND OF SOLAR RADIATION, COMPLETE WITH AUTOMATIC ELECTRONIC INTEGRATING AND RECORDING DEVICES. THE PAPER DISCUSSES THE DESIGN AND PRODUCT ENGINEERING ASPECTS OF THESE INSTRUMENTS, THEIR ACCURACY AND RELIABILITY, AND THE EXTENSIVE LABORATORY AND FIELD TESTS CARRIED OUT TO DETERMINE THEIR ERRORS. THE CHARACTERISTICS AND PRINCIPLES OF OPERATION OF COMMONLY USED INSTRUMENTS, TYPES OF DATA OBTAINED, OPERATIONAL ADVANTAGES AND DISADVANTAGES, AND THE APPROXIMATE COST OF EACH TYPE OF INSTRUMENT ARE ALSO REVIEWED AND THE INSTRUMENTS EVALUATED.

1978-0391 CHENG E D H
TRADEOFF CONSIDERATIONS BETWEEN WIND POWER POTENTIAL AND SITE SELECTION.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-16-1. (ABSTRACT ONLY)

1978-0392 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE.
SOL. ENERGY 20(3): 233-240, 1978.

THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT HAS CHARACTERISTICS IDEALLY SUITED FOR WIND TURBINE APPLICATIONS. IT ELIMINATES BLADE BEARINGS AND HINGES THROUGH UTILIZATION OF THE STRUCTURAL CHARACTERISTICS OF UNIAXIAL COMPOSITE MATERIALS. DEVELOPED FEATURES ALLOW SELF-STARTING FOR WIND INITIATING FROM ANY DIRECTION AND AUTOMATIC PITCH AND YAW VARIATIONS TO OPTIMIZE PERFORMANCE UNDER ALL NORMAL WIND CONDITIONS. THE WORK DESCRIBED IN THIS REPORT CONSISTS OF THE DESIGN AND FABRICATION OF A 4.5 FT DYNAMICALLY SCALED WIND TURBINE MODEL AND THE SUCCESSFUL TESTING OF THIS MODEL IN THE UNITED TECHNOLOGIES RESEARCH CENTER LOW SPEED WIND TUNNEL.

1978-0393 CHEREMISINOFF P N, REGINO T C
PRINCIPLES AND APPLICATIONS OF SOLAR ENERGY.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, 1978. 255 P.

THE FOLLOWING CHAPTERS ARE INCLUDED: SOLAR ENERGY--HISTORICAL; SOLAR ENERGY AVAILABILITY; THERMAL COLLECTION DEVICES; THERMAL SOLAR ENERGY APPLICATIONS; PHOTOVOLTAIC GENERATION OF ELECTRICITY; ENERGY FROM THE WIND; OCEAN THERMAL GRADIENT POWER; CHEMICAL CONVERSION OF SOLAR ENERGY; AND BIOLOGICAL CONVERSION OF SOLAR ENERGY. INSOLATION DATA TABLES AND MAPS ARE INCLUDED IN THE APPENDIX.

1978-0394 CHIU A N L
WIND ENGINEERING RESEARCH DIGEST. VOLUME 3. 1978.
NTIS, NOVEMBER 1978. 174 P.
PB-290694

RESEARCH ACTIVITY IN WIND ENGINEERING (OR ENVIRONMENTAL AERODYNAMICS) HAS EXPANDED RAPIDLY THROUGHOUT THE UNITED STATES. THE WIND ENGINEERING RESEARCH DIGEST KEEPS TRACK OF THIS FAR FLUNG RESEARCH EFFORT, AND PUBLISHES A SUMMARY OF ON-GOING RESEARCH PROJECTS AT ANNUAL INTERVALS. TOPIC AREAS DISCUSSED INCLUDE THE FOLLOWING: STRUCTURE OF WIND; WIND-WAVE EFFECTS; EFFECTS ON URBAN AREAS; WIND LOADING ON STRUCTURES; SEVERE

STORMS; DESIGN FOR HURRICANES AND TORNADOES; FULL-SCALE TESTING; MODEL TESTING; ENVIRONMENTAL FACTORS; PSYCHO-PHYSICAL FACTORS; LEGAL FACTORS; SPECIAL PROBLEMS; WIND CONSIDERATIONS IN URBAN PLANNING; BUILDING CODES AND REGULATIONS; SOCIO-ECONOMIC EFFECTS; INTERNATIONAL COOPERATION; AND WIND ENERGY.

1978-0395 CHOPRA I, DUGUNDJI J
NONLINEAR DYNAMIC RESPONSE OF A WIND TURBINE ROTOR UNDER GRAVITATIONAL LOADING.
AIAA J. 16(8): 773-774, AUGUST 1978.

THE NONLINEAR EQUATIONS OF MOTION FOR AN ISOLATED 3-DEG FLAPPING-LAGGING-FEATHERING ROTOR BLADE ARE DERIVED USING LAGRANGE'S EQUATIONS FOR ARBITRARY LARGE ANGULAR DEFLECTIONS. THE AERODYNAMIC FORCES AND THE TOWER INTERACTION ARE NOT CONSIDERED HERE. A CONSISTENT SET OF NONLINEAR EQUATIONS IS OBTAINED BY USING NONLINEAR TERMS UP TO THIRD ORDER. THE LIMIT CYCLE ANALYSIS FOR FORCED OSCILLATIONS AND THE PRINCIPAL PARAMETRIC RESONANCE OF THE FLAP-LAG BLADE UNDER A PERIODIC GRAVITY FIELD ARE STUDIED USING THE HARMONIC BALANCE METHOD. FOR A RELATIVELY SMALL INITIAL CONING ANGLE (ABOUT 9 DEG), THE NONLINEARITY BECOMES OF THE SOFTENING SPRING TYPE, AND LARGE COUPLED RESPONSES ARE POSSIBLE FOR ROTATIONAL FREQUENCIES SIGNIFICANTLY LOWER THAN THE LAGGING FREQUENCY.

1978-0396 CHOPRA I
WIND ENERGY CONVERSION. VOLUME 6. NONLINEAR RESPONSE OF WIND TURBINE ROTOR. ASRL-TR-184-12.
NTIS, SEPTEMBER 1978. 231 P.
COO-4131-T1(VOL.6)

THE NONLINEAR EQUATIONS OF MOTION FOR A RIGID ROTOR RESTRAINED BY THREE FLEXIBLE SPRINGS REPRESENTING, RESPECTIVELY, THE FLAPPING, LAGGING, AND FEATHERING MOTIONS ARE DERIVED USING LAGRANGE'S EQUATIONS, FOR ARBITRARY ANGULAR ROTATIONS. THESE ARE REDUCED TO A CONSISTENT SET OF NONLINEAR EQUATIONS USING NONLINEAR TERMS UP TO THIRD ORDER. THE COMPLETE ANALYSIS IS DIVIDED INTO THREE PARTS, A, B, AND C. PART A CONSISTS OF FORCED RESPONSE OF TWO-DEGREE FLAPPING-LAGGING ROTOR UNDER THE EXCITATION OF PURE GRAVITATIONAL FIELD (I.E., NO AERODYNAMIC FORCES). IN PART B, THE EFFECT OF AERODYNAMIC FORCES ON THE DYNAMIC RESPONSE OF TWO-DEGREE FLAPPING-LAGGING ROTOR IS INVESTIGATED. IN PART C, THE EFFECT OF THIRD DEGREE OF MOTION, FEATHERING, IS CONSIDERED.

1978-0397 CHUNG S Y
WIND ENERGY CONVERSION. VOLUME 9. AERODYNAMICS OF WIND TURBINE WITH TOWER DISTURBANCES. ASRL-TR-184-15.
NTIS, SEPTEMBER 1978. 103 P.
COO-4131-T1(VOL. 9)

LIFTING LINE THEORY WHICH IS THE COUNTERPART OF PRANDTL'S LIFTING LINE THEORY FOR ROTATING WING IS EMPLOYED FOR THE OVERALL PERFORMANCE ANALYSIS OF A HORIZONTAL AXIS WIND TURBINE ROTOR OPERATING IN A UNIFORM FLOW. THE WAKE SYSTEM IS MODELED BY A NON-RIGID WAKE WHICH INCLUDES THE RADIAL EXPANSION AND THE AXIAL RETARDATION OF TRAILING VORTICES. FOR THE NON-UNIFORM FLOW WHICH ARE CAUSED BY THE GROUND, THE TOWER REFLECTION, OR THE TOWER SHADOW, THE UNSTEADY AIRLOADS ACTING ON THE TURBINE BLADE ARE COMPUTED, USING LIFTING LINE THEORY AND A NON-RIGID WAKE MODEL. AN EQUATION WHICH GIVES THE WIND PROFILE IN THE TOWER SHADOW REGION IS DEVELOPED. ALSO, THE EQUATIONS TO DETERMINE PITCH ANGLE CONTROL ARE DERIVED TO MINIMIZE THE FLAPPING MOMENT VARIATIONS OR THE THRUST VARIATIONS DUE TO THE NON-UNIFORM FLOW OVER A ROTATION.

1978-0398 CLARK R N
USDA WIND ENERGY PROGRAM.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 92-96.

STUDIES PERFORMED BY THE U.S. DEPARTMENT OF AGRICULTURE ON THE USE OF WIND ENERGY IN FARMING PROCEDURES ARE REVIEWED.

1978-0399 CLARK R N, SCHNEIDER A D
IRRIGATION PUMPING WITH WIND ENERGY.
ASAE PAPER 78-2549, FOR WINTER MEETING, CHICAGO, DECEMBER 18-20, 1978. ST. JOSEPH, MICHIGAN, ASAE, 1978. 16 P.

A 40-KW VERTICAL AXIS WIND TURBINE WAS ERECTED AT THE USDA SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEXAS. OBJECTIVES OF THIS PROJECT WERE TO ASSEMBLE A COMPLETE WIND-POWER PUMPING SYSTEM, ADAPT OR MODIFY EXISTING PUMPING EQUIPMENT SO THAT IT COULD BE EFFECTIVELY POWERED BY A WIND TURBINE AND MAKE ECONOMIC ANALYSIS OF WIND PUMPING SYSTEMS. THE PUMPING SYSTEM USED BOTH A WIND TURBINE AND AN ELECTRICAL MOTOR TO POWER AN EXISTING DEEP WELL IRRIGATION PUMP IN A WIND-ASSIST CONCEPT. THE SYSTEM DELIVERED 104 M**3/H AGAINST A HEAD OF 105 M. ALL COMPONENTS OF THE WIND-ASSISTED PUMPING SYSTEM WORKED SATISFACTORILY.

1978-0400 CLEARLY L D
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1977 SURVEY.
NTIS, FEBRUARY 1978. 133 P.
EPRI-ER-649-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS ARE GIVEN OF 458 PROJECTS BEING CONDUCTED BY 150 UTILITY COMPANIES. ALSO INCLUDED IS A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, AND A LIST OF UTILITIES ORGANIZED BY STATE.

1978-0401 CLEGG R J, JOHNS M D, PATTEMORE S W
WIND POWER SITE EVALUATION. I. WIND ENERGY POTENTIAL.
N. Z. J. SCI. 21(2): 185-193, JUNE 1978.

A FIELD STATION ON THE WHANGAPARAOA PENINSULA HAS PROVIDED DATA ON WIND SPEED AND DIRECTION FOR A 12 MONTH PERIOD. IN ADDITION TO EVALUATING THE INSTRUMENTATION SYSTEM, THE DATA SAMPLING PROCEDURE HAS BEEN STUDIED USING A FAST RESPONSE ANEMOMETER. DATA COVERING A 6 MO. PERIOD HAVE BEEN USED TO DETERMINE THE WIND POWER POTENTIAL OF THE SITE. ANALYSIS REVEALS THAT THE WHANGAPARAOA SITE HAD A MEAN WIND ENERGY FLUX OF 464 W/M**2 AT A HEIGHT OF 10 M FOR THE 6 MONTHS SEPTEMBER 1975 TO FEBRUARY 1976; THE ESTIMATE FOR THE FULL YEAR IS 371 W/M**2.

1978-0402 CLEGG R J, JOHNS M D, PATTEMORE S W
WIND POWER SITE EVALUATION. II. DATA ACQUISITION AND PROCESSING.
N. Z. J. SCI. 21(2): 195-204, JUNE 1978.

SOME ASPECTS OF THE ACQUISITION AND PROCESSING OF DATA RELATING TO WIND POWER SITE EVALUATION ARE DISCUSSED IN DETAIL. THE INSTRUMENTS USED IN ACQUIRING AND LOGGING THE DATA ARE LISTED AND CRITICIZED. THE EFFECT OF WIND SPEED SAMPLING INTERVALS ON THE ACCURACY OF WIND POWER ESTIMATES HAS BEEN MEASURED, AND SOME ALTERNATIVE METHODS OF CALCULATING WIND POWER FROM THE WIND SPEED DATA HAVE BEEN EXPLORED. AN EXPERIMENTAL ASSESSMENT OF THE SIGNIFICANCE OF FLUCTUATIONS IN AIR DENSITY ON THE ESTIMATED WIND POWER IS PRESENTED.

1978-0403 CLIFF W C
FLOW FIELD ANALYSIS.
NTIS, JANUARY 16, 1978. 9 P.
CONF-780153-1, PNL-SA-6739

THE AVERAGE MEAN WIND SPEED INTEGRATED OVER A DISK IS SHOWN TO BE EXTREMELY CLOSE TO THE MEAN VALUE OF WIND SPEED WHICH WOULD BE MEASURED AT THE CENTER OF A DISK FOR MOST GEOMETRIES IN WHICH A WECS (WIND ENERGY CONVERSION SYSTEM) WOULD OPERATE. FIELD TEST RESULTS ARE PRESENTED WHICH COMPARE INSTANTANEOUS RECORDS OF WIND SPEED INTEGRATED OVER A DISK WITH THE WIND SPEED MEASURED AT THE CENTER OF THE DISK.

1978-0404 CLIFF W C
U.S. WIND ENERGY -- 1978.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. TUTORIALS VOL., P. 23-32.

THIS PAPER PRESENTS AN OVERALL VIEW OF THE STATE-OF-THE-ART IN WIND ENERGY IN THE UNITED STATES FOR 1978. THE NATIONAL ASSESSMENT OF WIND ENERGY IS PRESENTED INCLUDING A DISCUSSION OF CURRENT WIND TURBINES READY TO EXTRACT THE WIND ENERGY FOR THE GENERATION OF ELECTRICITY.

1978-0405 COMPREHENSIVE TESTS WITH WIND AS ENERGY SOURCE.
ELEKTRON. INT. NO. 3: 97-98, 1978. (IN GERMAN)

THIS ARTICLE PRESENTS A BRIEF SURVEY OF THE PRESENT STATE OF THE ART. WINDMILL TYPES ARE DIVIDED INTO 2 GROUPS, THOSE ROTATING ROUND A HORIZONTAL-, AND THOSE ROTATING ROUND A VERTICAL-AXIS, AS ILLUSTRATED BY SIMPLE DIAGRAMS. THE DEVELOPMENTS OF THE JOINT DESIGN TEAM OF NTT AND THE UNIVERSITY OF TOKAI ARE SINGLED OUT FOR A MORE DETAILED DESCRIPTION; THEIR GENERATORS SUPPLY 2 KW AT A WINDSTRENGTH OF 7 M/SEC AND ARE CAPABLE OF WITHSTANDING HURRICANES OF 60 M/SEC.

1978-0406 COROTIS R B
STOCHASTIC CONSIDERATIONS IN SITE SURVEY DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 361-380.
CONF-770921/1

A PROGRAM TO COMPUTE BASIC WIND STATISTICS HAS BEEN DEVELOPED. THE FIRST VERSION OF THIS PROGRAM IS CALLED WINDATA, AND THE SECOND VERSION, WINDATB. THE PRIMARY PURPOSE OF THIS PROGRAM IS TO PROVIDE SUMMARY INFORMATION CHARACTERIZING THE WIND VELOCITY AND WIND POWER AT A PARTICULAR SITE DESIGNED TO PROVIDE THE INFORMATION NECESSARY TO DEVELOP SITE SURVEY DURATION REQUIREMENTS.

1978-0407 COROTIS R B, SIGL A B, KLEIN J
PROBABILITY MODELS OF WIND VELOCITY MAGNITUDE AND PERSISTENCE.
SOL. ENERGY 20(6): 483-493, 1978.

HOURLY WIND DATA FROM THE NATIONAL CLIMATIC CENTER ARE USED TO STUDY PROBABILITY DENSITY FUNCTIONS OF WIND VELOCITY AND WIND POWER AND RUN DURATION PERSISTENCE. OBSERVED HISTOGRAMS OF VELOCITY ARE COMPARED WITH THE CHI-2 AND WEIBULL DISTRIBUTIONS USING GOODNESS-OF-FIT STATISTICS, AND WIND POWER HISTOGRAMS ARE COMPARED WITH DISTRIBUTIONS DERIVED FROM THESE. FROM AN ENGINEERING STANDPOINT, THE OBSERVED HISTOGRAMS COMPARE WELL WITH THE MODELS, ALTHOUGH DISCREPANCIES EXIST. OVER THE POWER RANGES OF INTEREST FOR WIND CONVERSION, THE MODELS APPEAR PROMISING.

1978-0408 COROTIS R B
A PROBABILISTIC BASIS FOR WIND POWER SITING.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. 11-18-1. (ABSTRACT ONLY)

1978-0409 COTY U, DUBEY M
THE HIGH POTENTIAL OF THE WIND AS AN ECONOMIC ENERGY SOURCE FOR ELECTRIC POWER GENERATION.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1809.

WIND ENERGY CAN BE ECONOMICALLY CONVERTED TO ELECTRIC ENERGY USING LARGE WIND TURBINE GENERATORS WITH ROTOR DIAMETERS OF ABOUT 100 METERS. THESE WINDMILLS CAN BE RATED AT 2000 TO 5000 KILOWATTS OF POWER FOR AVERAGE ANNUAL WIND SPEEDS OF 5 TO 12 METERS/SECOND. WIND TURBINE GENERATORS CAN BE CONNECTED DIRECTLY TO POWER TRANSMISSION AND DISTRIBUTION WORKS. THEY CAN PROVIDE FROM M 5 TO 15 PERCENT OF THE NETWORK POWER WITHOUT INDUCING INSTABILITIES, DEPENDING ON THE NATURE OF OTHER GENERATING EQUIPMENT FEEDING THE NETWORK.

1978-0410 COUCH J P
MOD-2 WIND GENERATOR PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 92-106.
CONF-770921/1

THE MOD-2 PROJECT WILL LEAD TO THE DEVELOPMENT OF A MACHINE WITH A MINIMUM 300 FOOT DIAMETER ROTOR WHICH IS DESIGNED FOR A SITE HAVING A YEARLY MEAN WIND SPEED OF 14 MPH AND IS WIDELY USEFUL THROUGHOUT THE UNITED STATES. THE PROGRAMMATIC GOAL OF THE MOD-2 PROJECT IS TO PRODUCE AN ELECTRICAL GENERATING SYSTEM THAT WILL BE COST COMPETITIVE WITH CONVENTIONAL FUELED POWERPLANTS. THE COST OF ELECTRICITY TARGET FOR THE ONE-HUNDREDTH MOD-2 WIND TURBINE IS IN THE RANGE OF 2 TO 4 CENT/KW-HR.

1978-0411 COXON L K
ALTERNATE ENERGY INSTALLATIONS ON THE JORDAN COLLEGE CAMPUS.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 2, PAP. 3.1.11. 8 P.

SINCE PLANNING ITS FIRST SOLAR INSTALLATION IN 1974, JORDAN COLLEGE HAS CONSTRUCTED FIVE ALTERNATE ENERGY DEMONSTRATION UNITS WHICH CONTRIBUTE GREATLY TO REDUCING ENERGY EXPENSES. THE TWO LARGEST SOLAR HEATING UNITS RANGE IN COLLECTOR SIZE FROM 1,000 TO 2,080 SQUARE FEET WHILE A RETROFITTED STUDENT RESIDENCE HAS APPROXIMATELY 340 SQUARE FEET OF COLLECTOR. SOLAR HEATED AIR FOR THE HEATING OF SPACE AND SOLAR HEATED WATER FOR BOTH SPACE AND DOMESTIC HOT WATER APPLICATIONS ARE UTILIZED ON THE CAMPUS, BOTH SEPARATELY AND JOINTLY.

1978-0412 CURTIS G B
A WIND POWERED HEAT PUMP IN A DAIRY FARM APPLICATION. FINAL REPORT.
NTIS, 1978. 174 P.
DOE/TIC-10227

A 30-FOOT HIGH, 20-FOOT DIAMETER DARRIEUS WIND TURBINE WAS INSTALLED ON A 120-COW DAIRY FARM. THE WIND TURBINE GENERATED 3-PHASE ELECTRICAL POWER WHICH WAS USED, IN PARALLEL WITH UTILITY POWER, TO OPERATE THE REFRIGERATION EQUIPMENT FOR MILK COOLING AT THE DAIRY FARM. A MILK PRE-COOLER AND HEAT RECOVERY FROM THE REFRIGERATION CONDENSER WERE ALSO INSTALLED TO SUPPLY THE WARM WATER REQUIREMENTS OF THE DAIRY. THE SYSTEM WAS OPERATED FOR 183 DAYS AND ITS PERFORMANCE, ALONG WITH WIND MEASUREMENTS FOR THE SAME PERIOD, WAS ANALYZED TO YIELD PREDICTIONS FOR THE SIZE OF WIND TURBINE REQUIRED TO SUPPLY NEEDED ENERGY AND THE SIZE OF ICE STORAGE UNIT NEEDED TO STORE REFRIGERATION CAPACITY OVER PERIODS OF LOW WIND. THIS "FINAL REPORT" ACTUALLY COMBINES A 15 P. EXECUTIVE SUMMARY AND A 157 P. FINAL REPORT IN ONE VOLUME.

1978-0413 DANIELS P A, SCHROEDER T A
AIR FLOW IN THE CENTRAL VALLEY OF MAUI, HAWAII.
J. APPL. METEOROL. 17(6): 812-818, JUNE 1978.

LOW-LEVEL WINDS IN THE CENTRAL VALLEY OF THE ISLAND OF MAUI WERE INVESTIGATED IN A FIELD PROGRAM DURING AUGUST 1976. FORTY-ONE SITES WERE OCCUPIED USING THREE MOBILE STATIONS DURING A PERIOD OF PERSISTENT TRADE WINDS. CONTEMPORANEOUS DATA FROM THE KAHULUI WEATHER SERVICE OFFICE AS WELL AS OTHER HAWAIIAN STATIONS WERE COLLECTED TO RELATE FIELD OBSERVATIONS TO LARGE-SCALE EVENTS.

1978-0414 DAUVILLIER A
L'ENERGIE THERMIQUE MARINE ET LA COMBINAISON DES ENERGIES SOLAIRE, RADIATIVE ET EOLIENNE. (MARINE THERMAL ENERGY AND THE COMBINATION OF SOLAR, RADIATIVE AND WIND ENERGIES.)
REV. ENERG. 29(302): 142-145, MARCH 1978. (IN FRENCH)

A THERMODYNAMIC PROCESS FOR THE GENERATION OF ENERGY IS PRESENTED WHICH USES METEOROLOGICAL ELEMENTS THROUGH THE CREATION OF A HEAT SOURCE DUE TO DAY-TIME RAYS AND A COLD SOURCE DUE TO NIGHT-TIME RAYS PLUS A MINOR ADDITION OF WIND ENERGY, OBTAINED BY A HEAT PUMP. MARINE THERMAL ENERGY, THE RADIATION PROCESS, WIND ENERGY AND THE PROBLEM OF SITES AND CONSTRUCTION ARE ALL SUCCESSIVELY STUDIED IN THIS ARTICLE.

1978-0415 DAUVILLIER A
MARINE THERMIC ENERGY AND THE COMBINATION OF SOLAR, RADIATIVE AND AEOLIAN ENERGIES.
REV. ENERG. 29(309): 593-597, NOVEMBER 1978. (IN FRENCH)

A THERMODYNAMIC PROCESS FOR THE GENERATION OF ENERGY IS PRESENTED WHICH USES METEOROLOGICAL ELEMENTS THROUGH THE CREATION OF A HEAT SOURCE DUE TO DAY-TIME RAYS AND A COLD SOURCE DUE TO NIGHT-TIME RAYS PLUS A MINOR ADDITION OF WIND ENERGY OBTAINED BY A HEAT PUMP. MARINE THERMAL ENERGY, THE RADIATION PROCESS, WIND ENERGY AND THE PROBLEM OF SITES AND CONSTRUCTION ARE ALL SUCCESSIVELY STUDIED IN THIS ARTICLE.

1978-0416 DAVIS J C, WALKER C
WAGE THE ENERGY WAR AT HOME.
BUCHANAN, NEW YORK, EMERSON BOOKS, INC., 1978. 255 P.

THIS BOOK COVERS THE BASIC TECHNIQUES OF INSTALLING AND SELECTING INSULATION AND STORM WINDOWS, REDUCING HEAT LOSS AND POWER CONSUMPTION AS WELL AS MORE COMPLEX SOLAR AND WIND SYSTEMS. IT COVERS THE GAMUT OF ENERGY-SAVING IDEAS THAT CAN SAVE MONEY WITHOUT COSTING COMFORT. INFORMATIVE AND DETAILED CHAPTERS COVER WINDOWS, DOORS, AND WALLS; INSULATION, CLIMATE CONTROL EQUIPMENT, FIREPLACES AND STOVES; HOUSEHOLD APPLIANCES AND FIXTURES; AND HOUSE DESIGN, CONSTRUCTION, ORIENTATION, AND LANDSCAPING. HOUSEHOLD HINTS AND ENERGY-SAVING ROUTINES OFFER NOVEL IDEAS ON HOW TO STRETCH ENERGY DOLLARS. A CHAPTER ON HOW CONSUMERS CAN INFLUENCE UTILITY RATES IS ALSO INCLUDED.

1978-0417 DAVITIAN H
WIND POWER AND ELECTRIC UTILITIES: A REVIEW OF THE PROBLEMS AND PROSPECTS.
WIND ENG. 2(4): 234-255, 1978.

THE USE OF WINDPOWER POSES A VARIETY OF PROBLEMS FOR UTILITIES PRIMARILY DUE TO THE UNCONTROLLABILITY OF THE POWER SOURCE AND THE HIGH DEGREE OF VARIABILITY OF THE WIND. DIFFERENCES IN THE DYNAMIC BEHAVIOR OF THE WIND AND OF UTILITY LOAD PATTERNS -- AND THE PROBLEMS THAT ARISE FROM THESE DIFFERENCES ARE DESCRIBED IN THIS PAPER. UTILITY CAPACITY EXPANSION METHODS AND MODIFICATIONS TO THEM TO INCORPORATE THE CHARACTERISTICS OF WIND MACHINES INTO THE ANALYTIC PROCEDURE ARE OUTLINED AND RESULTS FROM INITIAL STUDIES EMPLOYING THESE MODIFICATIONS ARE REVIEWED.

1978-0418 DAY J T, LE K D
RELIABILITY ISSUES INCORPORATING NEW GENERATION TECHNOLOGIES WITH PRIORITIES.
POWER SYSTEM RELIABILITY: RESEARCH NEEDS AND PRIORITIES. WORKSHOP ON POWER SYSTEM RELIABILITY-RESEARCH NEEDS AND PRIORITIES, PACIFIC GROVE, CALIFORNIA, MARCH 5, 1978. NTIS, OCTOBER 1978. P. 5.40-5.46.
EPRI-WS-77-60

NEW DIMENSIONS TO THE GENERATION RELIABILITY PROBLEM HAVE BEEN INTRODUCED WITH THE NEW GENERATING TECHNOLOGIES NOW UNDER INVESTIGATION. FOR EXAMPLE, WIND POWER, PHOTOVOLTAICS, AND SOLAR THERMAL CONVERSION PLANTS ARE ALL SUBJECT TO UNCERTAINTY REGARDING AVAILABILITY OF ENERGY AT ANY SPECIFIC TIME. BECAUSE OF THIS VARIABILITY IN AVAILABLE ENERGY, A CONCOMITANT INTEREST HAS BEEN RENEWED IN VARIOUS FORMS OF ENERGY STORAGE. SOME OF THESE STORAGE FORMS ARE DEDICATED IN THAT THEY CAN ONLY BE CHARGED BY THE SINGLE GENERATING PLANT WITH WHICH THEY ARE ASSOCIATED, WHEREAS OTHERS MAY BE CHARGED BY ANY PLANT CONNECTED TO THE SYSTEM.

1978-0419 DE CAMARA TORRES C, GOLDFARB J
ELECTROLYTIC PRODUCTION OF HYDROGEN WITH SOLAR AND WIND ENERGY.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 291-299. (IN FRENCH)

THE PRODUCTION OF ELECTROLYTIC HYDROGEN IS PROPOSED THROUGH A WIND-SOLAR POWER STATION, CONSISTING OF 5

DARRIEUS WIND GENERATORS OF 20 KW, A SOLAR TOWER OF 100 KWTH, WITH HYDROELECTRIC PHASE. STUDIES MADE TO ESTABLISH THE CONDITIONS FOR ECONOMIC VIABILITY OF THE PROCESS ARRIVED AT A PERIOD OF 11 YEARS FOR RECOVERY OF THE INVESTED CAPITAL.

1978-0420 ZATARAIN A M, JANNA W S
ECONOMICS OF WIND GENERATED POWER.
ASME PAPER 78-PET-80, 1978. 8 P.

THE METHOD EXPLAINED IN THE PAPER CONSIDERS THE VARIOUS ECONOMIC AND ENGINEERING VARIABLES THAT ARE NECESSARY TO PLAN PROPERLY A NATURAL ENERGY SYSTEM. THE GOAL OF THE METHOD IS TO PRODUCE AN OPTIMUM SIZE RANGE FOR THE SYSTEM AND TO PROVIDE A MAXIMUM ALLOWABLE COST BASED ON AREA OF THE COLLECTOR THAT CAN BE SPENT WHILE STILL RETAINING AN ECONOMIC ADVANTAGE.

1978-0421 DEMEO E
THE WECS/UTILITY INTERFACE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U. S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 908-911.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0422 DEVINE M, KUMIN H, ALY A
OPERATIONS RESEARCH PROBLEMS IN THE ECONOMIC DESIGN AND OPERATION OF SOLAR ENERGY SYSTEMS.
SYMPOSIUM PAPERS: ENERGY MODELING AND NET ENERGY ANALYSIS. CONFERENCE ON NET ENERGY ANALYSIS AND ENERGY MODELING, COLORADO SPRINGS, COLORADO, AUGUST 21, 1978. CHICAGO INSTITUTE OF GAS TECHNOLOGY, 1978. P. 619-638.

THE ECONOMICS OF ANY SOLAR ENERGY SYSTEM DEPENDS VERY MUCH ON THE PARTICULAR CONDITIONS AT THE SITE AND THE SPECIFIC CHARACTERISTICS OF THE APPLICATION. DESIGNING THE ECONOMICALLY MOST ATTRACTIVE SYSTEM FOR A PARTICULAR APPLICATION PRESENTS A VERY CHALLENGING OPERATIONS RESEARCH OR SYSTEMS ANALYSIS PROBLEM. THIS PAPER PRESENTS A GENERAL SYSTEMS VIEW THAT APPLIES TO A WIDE RANGE OF SOLAR ENERGY OPTIONS AND DISCUSSES HOW OPERATIONS RESEARCH TECHNIQUES CAN BE APPLIED TO THE ECONOMIC DESIGN OF SOLAR-ENERGY SYSTEMS. AFTER A BRIEF REVIEW OF PREVIOUS WORK IN THIS AREA, THREE SPECIFIC CASES ARE DISCUSSED. ONE IS AN OPTIMIZATION MODEL FOR LARGE-SCALE WIND POWER SYSTEMS. THE SECOND IS A STOCHASTIC PROCESS ANALYSIS OF SOLAR ENERGY STORAGE SYSTEMS. THE THIRD EXAMPLE CONCERNS A SET OF COMPUTER SIMULATION AND ECONOMIC ANALYSIS MODELS DEVELOPED BY THE OFFICE OF TECHNOLOGY ASSESSMENT OF THE US CONGRESS THAT CAN BE USED TO ASSESS A WIDE VARIETY OF ON-SITE SOLAR ENERGY SYSTEMS.

1978-0423 DEWINKEL C C
ASSESSMENT OF WIND CHARACTERISTICS AND WIND ENERGY SYSTEMS APPLICATIONS TO ELECTRIC UTILITIES IN WISCONSIN AND SECTIONS OF MINNESOTA, IOWA AND ILLINOIS.
UNIVERSITY OF WISCONSIN, MADISON, WISCONSIN. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 79-02,397, 1978. 313 P.

INTEREST AGAIN TURNS TOWARD APPLICATIONS OF WIND ENERGY IN LIGHT OF PROBLEMS RELATING TO THE USE OF FOSSIL AND NUCLEAR FUELS. THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) REQUIRES AN ACCURATE ASSESSMENT OF WIND CHARACTERISTICS, WHICH IS NOT READILY AVAILABLE. WECS APPLICATIONS TO AN ELECTRIC UTILITY DEMAND A DETAILED ANALYSIS, SINCE THE VARIABILITY IN LOAD AND WIND POWER IS SIGNIFICANTLY DIFFERENT FOR EACH UTILITY AND REGION. THE COMBINATION OF WECS AND THERMAL STORAGE SYSTEMS ACTIVELY CONTROLLED BY A UTILITY MAY OVERCOME SOME OF THE PROBLEMS PERTAINING TO THE VARIABILITY IN WIND POWER.

1978-0424 DHOTARAD M S, GANESAN N, RAO B V A
TRANSMISSION LINE VIBRATIONS.
J. SOUND VIB. 60(2): 217-237, SEPTEMBER 22, 1978.

VARIOUS FORMS OF DAMPERS ARE USED TO SUPPRESS VIBRATIONS IN TRANSMISSION LINES. IN THE PRESENT PAPER A STUDY HAS BEEN MADE ON VIBRATIONS OF TRANSMISSION LINES HAVING ONE OR MORE DAMPERS (STOCKBRIDGE TYPE) NEAR EACH END OF THE SPAN FOR DIFFERENT CABLE LENGTHS. AN ATTEMPT IS MADE HERE TO STUDY THE EFFECT OF THE LOCATION OF DAMPERS ON MAXIMUM STRAINS PRODUCED IN THE LINE.

1978-0425 DINELEY J L, LAKOUTSIS D
THE WHOLE ENERGY PROBLEM ON A FARM.
IEE COLLOQUIUM ON MICROPROCESSORS IN AGRICULTURE, LONDON, DECEMBER 6, 1978. LONDON, IEE, 1978. P. 4-1 TO 4-5.

ONE OF THE MEASURES TO BE TAKEN TO STRETCH THE DURATION OF THE FOSSIL-FUEL RESERVES OF THE WORLD IS TO USE ALL THE RENEWABLE ENERGY RESOURCES THAT ARE AVAILABLE-WIND POWER, SMALL-SCALE HYDRO POWER, SOLAR HEATING ETC., AND THE RURAL ENVIRONMENT, ESPECIALLY THE FARM HEAVILY COMMITTED TO THE USE OF ELECTRICAL ENERGY, OFFERS A VERY GOOD OPPORTUNITY TO STUDY SUCH WHOLE-ENERGY SCHEMES. THIS PAPER BRIEFLY DESCRIBES SUCH A STUDY.

1978-0426 DIVONE L V
WIND POWER TESTS WILL ESTABLISH ROLE ON UTILITY SYSTEMS.
PUBLIC POWER 36(2): 34-37, MARCH 1978.

THE WIND TURBINE DEVELOPMENT PROGRAM UNDER THE DEPARTMENT OF ENERGY AND MANAGED BY THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION IS DESCRIBED. ECONOMIC ASPECTS OF USING WIND POWER PLANTS IN THE U.S. ARE ANALYZED.

1978-0427 YOUSEF H L
ELECTRICAL GENERATOR EMPLOYING NATURAL ENERGY TO POWER SAME.
U.S. PATENT NO. 4,114,046, SEPTEMBER 12, 1978. 16 P.

THIS INVENTION CONCERNS AN IMPROVED TURBO-ELECTRICAL GENERATOR POWERED BY THE CONVERSION OF NATURAL ENERGY INTO MECHANICAL ENERGY IN ORDER TO PROPEL FERROMAGNETIC BLOCKS ABOUT AN IRREGULARLY, NON-CIRCULAR SHAPED CLOSED LOOP TRACK, ALTERNATELY ENTERING AND PASSING THROUGH A PLURALITY OF ELECTROMAGNETS POSITIONED ABOUT THE TRACK. AS THESE BLOCKS ENTER AND PASS THROUGH THESE ELECTROMAGNETS, THEIR MAGNETIC FLUX IS MAXIMIZED AND THEN MINIMIZED AND THIS CHANGE IS CONVERTED INTO USABLE AC VOLTAGE. MEANS ARE TAUGHT FOR THE CONVERSION OF SOLAR ENERGY, WIND ENERGY AND WAVE ENERGY INTO THE NECESSARY MECHANICAL ENERGY TO PROPEL THESE BLOCKS ABOUT THE CLOSED LOOP. AN ALTERNATIVE EMBODIMENT EMPLOYS A ROTATABLE, FERROMAGNETIC CROSS SHAPED DEVICE WHICH IS ROTATED ABOUT A CENTER AXIS BY THE PASSAGE OF THE BLOCKS ABOUT THE TRACK. AS THE DEVICE IS ROTATED, ITS EXTREMITIES ENTER AND PASS THROUGH THE ELECTROMAGNETS POSITIONED ABOUT THE TRACK.

1978-0428 DIVONE L

OVERVIEW OF THE WECS PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 11-31.
CONF-770921/1

THE OBJECTIVE OF THIS PROGRAM IS TO EXPEDITE THE DEVELOPMENT OF RELIABLE AND COST COMPETITIVE WIND ENERGY CONVERSION SYSTEMS, WHICH ARE CAPABLE OF RAPID COMMERCIAL EXPANSION TO PRODUCE SIGNIFICANT QUANTITIES OF ELECTRICAL ENERGY.

1978-0429 DIVONE L
FUTURE FEDERAL PLANS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 921-925.
CONF-770921/2

THIS A REVIEW OF FUTURE PLANS OF THE FEDERAL WIND ENERGY PROGRAM.

1978-0430 DIXIT D K
HARNESSING WIND POWER FOR RURAL DEVELOPMENT.
INDIAN EAST. ENG. 120(3): 65-69, FEBRUARY 1978.

THE ARTICLE MAKES OU . A CASE FOR TAPPING THE WINDS BY USING TECHNICALLY FEASIBLE WINDMILL FOR PUMPING WATER AND GENERATING ELECTRICITY IN INDIA'S RURAL AREAS. A SURVEY OF THE RESEARCHES AND DEVELOPMENTS IN THIS FIELD IS PRESENTED AND ANALYSES GIVEN OF THE IMPACT OF A LOW-COST WINDMILL FOR AGRICULTURAL APPLICATIONS. AN OPTIMUM WIND-WATER POWER-MIX HAD BEEN SUGGESTED TO ACCOMMODATE SEASONAL VARIABILITY AND INCONSISTENCY OF WIND ENERGY. SUITABLE AREAS WITH HIGH WINDSPEEDS THAT HOLD MORE PROMISE HAVE BEEN IDENTIFIED AND DIFFERENT SCHEMES COMPARATIVELY EVALUATED.

1978-0431 DODD C W, EVERS J L
ELECTRICAL ENERGY CONVERSION TECHNIQUES FOR THE VERTICAL AXIS WIND TURBINE.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MO-ROLLA, EXTENSION DIVISION, 1978. P. 65-70.

THE CHARACTERISTICS OF THE VERTICAL AXIS WIND TURBINE MAKE IT POSSIBLE TO USE GENERATING TECHNIQUES NOT SUITABLE FOR HORIZONTAL AXIS WIND TURBINES. METHODS FOR CONVERTING MECHANICAL ENERGY INTO ELECTRICAL ENERGY ARE PRESENTED AND DISCUSSED FOR VERTICAL TURBINES OF THE 250 KW TO 2500 KW SIZE. THIS PAPER WILL ALSO LOOK AT THE PRESENT STATUS OF VERTICAL AXIS WIND TURBINE RESEARCH IN THE UNITED STATES.

1978-0432 DOMAN G S
INVESTIGATION OF DYNAMIC AND STRUCTURAL CHARACTERISTICS OF ROTORS FOR WIND ENERGY CONVERSION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS, WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 603-611.
CONF-770921/2

1978-0433 DRAKE R L
SITE SELECTION TECHNIQUES AND METHODOLOGIES FOR WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 635-645.
CONF-770921/2

THIS PAPER DEALS WITH THE TECHNICAL ASPECTS OF SITING. IF WE CAN IMPROVE THE SITING OF WECS FROM THE METEOROLOGICAL AND THE TOPOGRAPHICAL POINTS OF VIEW, THEN THE OVERALL SITING POLICY CAN BE IMPROVED. THE ECONOMIC BENEFITS OF THESE IMPROVEMENTS WILL BE, AT LEAST, FOURFOLD.

1978-0434 YEOMAN J C
WIND TURBINES.
NTIS, DECEMBER 1978. 61 P.
ANL/CES/TE-78-9

THIS EVALUATION OF WIND TURBINES IS PART OF A SERIES OF TECHNOLOGY EVALUATIONS OF POSSIBLE COMPONENTS AND SUBSYSTEMS OF COMMUNITY ENERGY SYSTEMS. WIND TURBINES, RANGING IN SIZE FROM 200 W TO 10 MW, ARE DISCUSSED AS CANDIDATES FOR PRIME MOVERS IN COMMUNITY SYSTEMS. ESTIMATES OF PERFORMANCE CHARACTERISTICS AND COST AS A FUNCTION OF RATED CAPACITY AND RATED WIND SPEED ARE PRESENTED. DATA CONCERNING MATERIAL REQUIREMENTS, ENVIRONMENTAL EFFECTS, AND OPERATING PROCEDURES ALSO ARE GIVEN AND ARE REPRESENTED EMPIRICALLY TO AID COMPUTER SIMULATION.

1978-0435 DREES H M
THE AMERICAN WIND ENERGY ASSOCIATION AND THE WIND ENERGY INDUSTRY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 183-184.
CONF-770921/1

IN MID 1974, THE AMERICAN WIND ENERGY ASSOCIATION (AWEA) ROSE TO RESPOND TO A NEED OF THE GROWING WIND ENERGY COMMUNITY, BOTH TO THE INDUSTRY AND TO THE CONSUMERS. AWEA EXISTS TO PROMOTE WIND AS A POLLUTIONLESS, RENEWABLE ENERGY SOURCE, AND TO ACT AS A CLEARING HOUSE FOR TECHNICAL, INSTITUTIONAL, AND SOCIAL ISSUES CONCERNING WIND ENERGY UTILIZATION. THE ASSOCIATION IS MODELED AFTER THE MORE TRADITIONAL PROFESSIONAL ORGANIZATIONS SUCH AS THE AIAA AND THE AHS. HOWEVER, THE ASSOCIATION EXISTS AS AN ORGANIZATION TO PROVIDE NEEDED SERVICES NOT ONLY TO THE INDUSTRY, BUT TO THE CONSUMERS AS WELL.

1978-0436 DUBEY M B
CONVERSION AND STORAGE OF WIND ENERGY AS NITROGENOUS FERTILIZER.
NTIS, NOVEMBER 1978. 264 P.
LR-28338, PB-290760

WIND ENERGY, AIR AND WATER CAN BE COMBINED TO MAKE ANHYDROUS AMMONIA AND AMMONIUM NITRATE, TWO IMPORTANT NITROGENEOUS FERTILIZERS THAT ARE USUALLY SYNTHESIZED USING NATURAL GAS AS THE PRIMARY FEEDSTOCK. IN THE STUDY CONCEPT, WIND ENERGY IS CAPTURED BY A WIND TURBINE AND CONVERTED TO ELECTRICITY. THE ELECTRICITY GENERATES HYDROGEN AND OXYGEN BY WATER ELECTROLYSIS. THE HYDROGEN IS STORED IN SUFFICIENT QUANTITY TO SERVE AS CHEMICAL FEEDSTOCK AND ENERGY TO MANUFACTURE ANHYDROUS AMMONIA OR AMMONIUM NITRATE SOLUTION.

1978-0437 DUBEY M
TECHNICAL AND ECONOMIC FEASIBILITY OF MAKING FERTILIZER FROM WIND ENERGY, WATER, AND AIR.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1812-1821.

WIND ENERGY, AIR AND WATER CAN BE COMBINED TO MAKE ANHYDROUS AMMONIA AND AMMONIUM NITRATE, TWO IMPORTANT NITROGENOUS FERTILIZERS THAT ARE USUALLY SYNTHESIZED USING NATURAL GAS AS THE PRIMARY FEEDSTOCK. A PROCESS USING ABUNDANT, REPLENISHABLE SOURCES OF ENERGY AND FEEDSTOCK CHEMICALS IN LIEU OF NATURAL GAS IS ATTRACTIVE AS A CONSERVATION MEASURE.

1978-0438 DUGUNDJI J, LARRABEE E E, BAUER P H
WIND ENERGY CONVERSION. VOLUME 5. EXPERIMENTAL INVESTIGATION OF A HORIZONTAL AXIS WIND TURBINE.
ASRL-TR-184-11.
NTIS, SEPTEMBER 1978. 66 P.
COO-4131-T1(VOL.5)

THE RESULTS ARE PRESENTED OF SOME BRIEF EXPERIMENTS CONDUCTED ON A WIND TURBINE MODEL OF A ROTOR SYSTEM TO VERIFY THE AERODYNAMIC THEORIES DEVELOPED AND TO INVESTIGATE THE DYNAMIC EXCITATION CHARACTERISTICS OF WIND TURBINES.

1978-0439 DUSKIN A
FEDERAL WIND ENERGY COMMERCIALIZATION ACT.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 169-174.
CONF-780357

THE WIND ENERGY COMMERCIALIZATION AND JOB-DEVELOPMENT ACT OF 1978 IS PRESENTED.

1978-0440 EDSINGER R W, WARREN A W, GORDON L H, CHANG G C
SIMWEST--A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2108-2114.

THIS PAPER DESCRIBES A COMPREHENSIVE AND EFFICIENT COMPUTER PROGRAM FOR THE MODELING OF WIND ENERGY SYSTEMS WITH STORAGE. THE LEVEL OF DETAIL OF SIMWEST IS CONSISTENT WITH EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND ENERGY SYSTEMS WITH ENERGY STORAGE OPTIONS. THE SOFTWARE PACKAGE CONSISTS OF TWO BASIC PROGRAMS AND A LIBRARY OF SYSTEM, ENVIRONMENTAL, AND CONTROL COMPONENTS.

1978-0441 EGGLESTON D M
CONSUMER OWNED WIND TURBINE SYSTEMS.
INTERNATIONAL SOLAR ENERGY CONFERENCE AND FAIR, EL PASO, TEXAS, APRIL 13, 1978. EL PASO, TEXAS, 1978. P. 19.
(ABSTRACT)

1978-0442 ELECTRICITY FROM THE WIND--THOUGHTS ON THE PROBLEM OF UTILISATION OF WIND POWER.
ELEKTR. MASCH. 57(1): 11-13, JANUARY 1978. (IN GERMAN)

ATTEMPTS AT UTILISING WIND POWER FOR ELECTRICITY GENERATION HAVE TENDED TO CONCENTRATE ON SOLVING THE PROBLEMS OF CONSTANT FREQUENCY AND CONSTANT VOLTAGE GENERATION OVER A WIDE RANGE OF WIND SPEED WITH CONSEQUENT COMPLEXITY AND HIGH COST. IT IS CONSIDERED THAT VARIABLE VOLTAGE/FREQUENCY APPLICATIONS FOR WATER HEATING USING SMALL, MASS-PRODUCED UNITS HAVE A BETTER CHANCE OF SUCCESS.

1978-0443 ENERGY: A GUIDE TO ORGANIZATIONS AND INFORMATION RESOURCES IN THE UNITED STATES. SECOND EDITION.
CLAREMONT, CALIFORNIA, PUBLIC AFFAIRS CLEARINGHOUSE, 1978. 221 P.

THIS BOOK PROVIDES IN CONVENIENT REFERENCE FORM A CENTRAL SOURCE OF INFORMATION ON KEY ORGANIZATIONS CONCERNED WITH ENERGY IN THE UNITED STATES AND UPDATES AN EARLIER ISSUE (SAME TITLE) (EAPA 1:808).

1978-0444 ENERGY FOR RURAL REQUIREMENTS.
INTERNATIONAL FORUM ON APPROPRIATE INDUSTRIAL TECHNOLOGY. NITS, OCTOBER 17, 1978. 23 P.
INTERNATIONAL FORUM ON APROPRIATE INDUSTRIAL TECHNOLOGY, NEW DELHI, ANAND, INDIA, NOVEMBER 20-30, 1978.
PB80-159296

THIS REPORT DESCRIBES RURAL ENERGY NEEDS AND THE ENERGY SOURCES AND TECHNOLOGICAL OPTIONS INCLUDING BIO-GAS, WATER-MECHANICAL POWER, WIND FOR OPERATION OF HEAT ENERGY, AND STORAGE. PROBLEMS AND CONSTRAINTS ARE DISCUSSED ALONG WITH POLICY IMPLICATIONS, CHOICES AND PRIORITIES, AND A PLAN OF ACTION FOR THE FUTURE.

1978-0445 ENGELKE C E
SELF-CONTAINED COMMUNITY ENERGY SYSTEM.
BULL. AT. SCI. 34(9): 51-53, NOVEMBER 1978.

A COMMUNITY THERMAL ENERGY STORAGE SYSTEM, WHERE HOT WATER COULD BE STORED IN LARGE RESERVOIRS, COULD BE THE IDEAL WAY TO CIRCUMVENT THE SUPPLY AND DEMAND MISMATCH OF SOLAR AND WIND ENERGY OR CO-GENERATION. A COMMUNITY SYSTEM WOULD NEED LESS SOLAR COLLECTOR AREA AND NO BACK-UP EQUIPMENT FOR HEATING AND COOLING. THE STORAGE AREAS, BESIDES PROVIDING HEATING AND COOLING ENERGY, COULD BE USED WITH AMMONIA CYCLE HEAT ENGINES TO GENERATE ELECTRIC POWER FROM WIND AND SOLAR ENERGY AND FROM TEMPERATURE CHANGES. THE SYSTEM WOULD SAVE ON ELECTRICITY COSTS BY DRAWING FREE ENERGY FROM THE STORAGE SYSTEM AND BY USING SMALLER GENERATORS.

1978-0446 ENGSTROM S, GUSTAVSSON B, SMEDMAN-HOEGSTROM A S
EXPERIENCE FROM A YEAR'S RESEARCH INTO WIND POWER.
ERA 51(8): 26-29, 1978. (IN SWEDISH)

IN NOVEMBER 1975 SAAB-SCANIA, AEROPLANE DIVISION, BEGAN WORK ON THE CONSTRUCTION AND OPERATION OF A RESEARCH UNIT FOR WIND POWER, COMMISSIONED BY THE SWEDISH BOARD FOR ENERGY RESEARCH. THE AIM OF THE PROJECT WAS TO GIVE: (1) GENERAL EXPERIENCE OF WIND POWER, (2) PARALLEL STUDY OF REALISTIC WIND POWER GENERATORS ON A COMMERCIAL SCALE, (3) THE OPPORTUNITY OF LOAD MEASUREMENT AND OBSERVATIONS, (4) A PLATFORM FOR THE TESTING OF COMPONENTS. AFTER ONE AND ONE-HALF YEARS WORK THE UNIT WAS MOUNTED ON A TOWER. THE SET WAS CONNECTED IN AND DELIVERED POWER TO THE NETWORK FOR THE FIRST TIME IN APRIL 1977. IT WAS THEN USED FOR MEASUREMENT AND EXPERIMENTS, IN THE FIRST PLACE AS A "LABORATORY". DURING THE MEASUREMENT PERIOD IT WAS RUN ON UNATTENDED AUTOMATIC OPERATION. EVALUATION OF THE FIRST YEAR'S OPERATION WILL BE AVAILABLE IN OCTOBER 1978.

1978-0447 ERIKSSON B, HELGESEN H
CYCLIC VARIATIONS OF THE LOAD ANGLE OF WIND TURBINES WITH TORSION AXIS.
NTIS, AUGUST 1978. 33 P. (IN SWEDISH)
LUTMDN/TMVK-3070/1-31/(1978)

THE CYCLIC VARIATIONS OF THE LOAD ANGLE OF A WIND TURBINE CONNECTED TO A STRONG FIELD HAVE BEEN INVESTIGATED. THE ASSEMBLY IS LOOKED UPON AS TWO MASSES CONNECTED WITH A NON-RIGID SHAFT. A STEP MOMENT IS APPLIED TO THE MASS EQUAL TO THE MASS OF THE WIND ROTOR AND LOAD ANGLE IS STUDIED. THE DIFFERENTIAL EQUATION OF THE SYSTEM IS SOLVED BY APPLYING THE EULER'S MODIFIED METHOD. IN THIS WAY THE EFFECT OF THE SIZES OF THE MASSES AND THE SOFTNESS OF THE SHAFT ON THE CYCLIC VARIATION AT DISTURBANCES COULD BE STUDIED. THE RESULTS ARE PRESENTED IN GRAPHS.

1978-0448 ERIKSSON B, HELGESEN H
DISCUSSION OF DIFFERENT PROBLEMS IN CONNECTION WITH THE CHOICE OF MOMENTUM EXCHANGE DEVICE AT WIND POWER PLANTS.
NTIS, AUGUST 1978. 11 P. (IN SWEDISH)
LUTMDN/TMVK-3069/1-9(1978)

THE AIM OF THE INVESTIGATION IS TO DISCUSS DIFFERENT PROBLEMS WHICH OCCUR IN CONNECTION WITH THE CHOICE OF CHANGE-OVER DEVICE BETWEEN THE ROTOR AND THE GENERATOR AT A WIND POWER PLANT.

1978-0449 ESBENSEN T V, STRABO F
DESIGN OF A LOW-ENERGY HOUSE IN DENMARK HEATED BY A COMBINATION OF SOLAR AND WIND ENERGY.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1454-1458.

THIS PAPER DESCRIBES THE PROJECT FOR A LOW-ENERGY HOUSE CONSTRUCTED IN SKIVE, JUTLAND, IN DENMARK, WITH ENERGY CONSERVATION ARRANGEMENTS SUCH AS HIGH-INSULATED CONSTRUCTIONS, MOBILE INSULATION OF THE WINDOWS AND HEAT RECOVERY IN THE VENTILATING SYSTEM. THE HEAT REQUIREMENT FOR SPACE HEATING IS CALCULATED TO 6000 KWH PER YEAR. THE ENERGY SYSTEM CONSISTS OF A 13 SQ. M. FLAT-PLATE SOLAR COLLECTOR INTEGRATED INTO THE ROOF CONSTRUCTION, A WIND ROTOR WITH A COATED AREA OF 25 SQ. M. AND A WATER STORAGE TANK WITH A CAPACITY OF 4 CUB. M. THE STORAGE TANK IS PROVIDED WITH A WATER BRAKE DRIVEN BY THE WIND ROTOR. THIS ENERGY SYSTEM SUPPLIES THE HOUSE WITH 7200 KWH, WHICH IS 67% OF THE TOTAL HEAT REQUIREMENT FOR SPACE HEATING AND HOT WATER SUPPLY.

1978-0450 ESKINAZI S, BRENNAN P J
SITING AND CONCEPT DESIGN CONSIDERATIONS FOR HYDRO PUMP BACK WIND ENERGY CONVERSION SYSTEM (HPB-WECS).
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-20-1. (ABSTRACT ONLY)

1978-0451 ETZLER C, FRITZSCHE A
THE 230 KW WIND ENERGY CONVERTER WITH VERTICAL ROTATION AXIS AT THE MAGDALEN ISLANDS (CANADA).
BRENNST.-WAERME-KRAFT 30(5): 220-221, MAY 1978. (IN GERMAN)

1978-0452 EVANS M
INTERVIEW WITH RICK KATZENBERG.
WIND POWER DIG. NO. 13: 4-7, FALL 1978.

1978-0453 YEN J T
SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 373-377.

DEVELOPMENTS ARE REVIEWED WITH EMPHASIS ON THE TORNADO-TYPE WIND ENERGY SYSTEM AND THE DYNAMIC DAM SYSTEM. BASIC REQUIREMENTS FOR AN ECONOMICALLY VIABLE WIND AND OCEAN POWER SYSTEM ARE OUTLINED.

1978-0454 YEN J T
SUMMARY OF RECENT PROGRESS ON TORNADO-TYPE WIND ENERGY SYSTEM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 808-818.
CONF-770921/2

THE TORNADO-TYPE WIND ENERGY SYSTEM IS ONE OF SEVERAL ADVANCED AND INNOVATIVE CONCEPTS BEING INVESTIGATED UNDER ERDA'S WIND ENERGY PROGRAM AS POTENTIAL WAYS TO REDUCE THE COST AND BROADEN THE USABILITY OF WIND ENERGY. THIS SYSTEM USES A LARGE HOLLOW TOWER TO FORM AN INTERNAL VORTEX, AND THE LOW PRESSURE AT THE CORE OF THE TOWER PROVIDES AN EFFECTIVE AND LOW-PRESSURE EXHAUST RESERVOIR FOR THE TURBINE, WHICH ACCEPTS A SEPARATE RAM AIR INLET SUPPLY. ANALYTICAL INVESTIGATIONS OF SEVERAL VERY CHALLENGING FLUID MECHANICAL PROBLEMS ARE BEING CARRIED OUT, BUT IT WILL BE SOME TIME BEFORE ALL OF THE FLOW PROCESSES INVOLVED WILL BE WELL KNOWN ENOUGH TO YIELD A HIGHLY ACCURATE ANALYTICAL PREDICTION OF PERFORMANCE AND TO GREATLY IMPROVE EXISTING SCALING LAWS. A VARIETY OF WIND TUNNEL MODELS HAVE BEEN DESIGNED AND BUILT AND SOME TESTING AT SMALL SCALE HAS BEEN CONDUCTED USING SCREENS TO SIMULATE THE TURBINES.

1978-0455 FAXEN T, SMEDMAN-HOEGSTROM A S, HOEGSTROM U
METEOROLOGICAL FIELD PROJECT AT THE WIND ENERGY TEST SITE KALKUGNEN, SWEDEN.
NTIS, 1978. 27 P.
UUIM-51

A METEOROLOGICAL FIELD STATION IS DESCRIBED THAT HAS BEEN SET INTO OPERATION AT A 63 KW WIND ENERGY TEST STATION CALLED KALKUGNEN IN THE MIDDLE OF SWEDEN. THE TEST SITE IS SITUATED NEAR THE COASTLINE OF GAVLEBUKTEN (BALTIC SEA) AT ABOUT 60 DEG. N. THE TEST STATION HAS A HUB HEIGHT OF 24 M. AND A TURBINE DIAMETER OF 18 M. THE METEOROLOGICAL FIELD STATION CONSISTS OF TWO 42 M. MASTS, BOTH EQUIPPED WITH CUP ANEMOMETERS AT 6 LEVELS AND WIND DIRECTION AT TWO LEVELS. TEMPERATURE IS MEASURED AT 6 LEVELS IN ONE OF THE MASTS AND IN ADDITION RADIATION, HUMIDITY AND AIR PRESSURE AT ONE LEVEL. DATA FROM THIS INSTRUMENTATION IS RECORDED CONTINUOUSLY SINCE SEPTEMBER 1977. IN 1978 TURBULENCE MEASUREMENTS AT SEVERAL LEVELS WILL ALSO BE CONDUCTED IN SELECTED SITUATIONS. A PRELIMINARY ANALYSIS OF WIND DATA FROM THE PERIOD OCTOBER--DECEMBER 1977 IS PRESENTED.

1978-0456 THE FEDERAL WIND PROGRAM.
WIND POWER DIG. NO. 13: 40-43, FALL 1978.

EXCERPTS ARE PRESENTED OF A FEDERAL WIND DRAFT PLAN WRITTEN BY L. DIVONE OF THE DOE.

1978-0457 FEJER A A
WIND ENERGY CONVERSION.
ENERGY FROM THE SUN. SYMPOSIUM ON ENERGY FROM THE SUN, CHICAGO, APRIL 3, 1978. CHICAGO, INSTITUTE OF GAS TECHNOLOGY, 1978. P. 399-422.

EFFECTIVE UTILIZATION OF WIND ENERGY REQUIRES SYSTEMATIC STUDIES OF THE SITES AVAILABLE FOR THE LOCATION OF WIND ENERGY CONVERSION SYSTEMS AND CAREFUL EVALUATION OF THE TYPE AND SIZE OF MACHINES TO BE USED. THE PRESENT PAPER DESCRIBES AN APPROACH CURRENTLY IN USE FOR THE SITING OF WIND GENERATORS. IT DESCRIBES ALSO THE AERODYNAMIC FEATURES OF VARIOUS TYPES OF WIND MACHINES AND INDICATES THE PRESENT STATUS OF DEVELOPMENT AND PROSPECTS OF HORIZONTAL AXIS PROPELLER TYPE AND VERTICAL AXIS DARRIEUS TURBINES.

1978-0458 FERBER R
PUBLIC REACTIONS TO WIND ENERGY AND WINDMILL DESIGNS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978, VOL. 1, P. 413-422.
CONF-770921/1

THIS STUDY WAS UNDERTAKEN TO EXPLORE REACTIONS OF THE GENERAL PUBLIC TOWARD DIFFERENT TYPES OF WIND ENERGY DEVICES FOR GENERATING ELECTRIC ENERGY. MORE SPECIFICALLY, THE OBJECTIVES OF THE STUDY WERE TWO-FOLD; TO PROVIDE SUBSTANTIVE INFORMATION ON PUBLIC ACCEPTANCE OF DIFFERENT TYPES OF WIND ENERGY DEVICES IN DIFFERENT SETTINGS; TO FURNISH A METHODOLOGICAL BASE FOR MORE INTENSIVE STUDIES OF PUBLIC ACCEPTANCE OF SUCH DEVICES.

1978-0459 FEUSTEL J
UTILIZABLE ENERGY FROM WIND AND SUN.
M.A.N. FORSCH. PLANEN BAUEN NO. 9: 32-37, 1978. (IN GERMAN)

AFTER A GENERAL SURVEY OF THE EARTH'S POWER ECONOMY AND POSSIBLE WAYS TO UTILIZE REGENERATIVE ENERGY SOURCES, THE PAPER DISCUSSES THE PRESENT TECHNOLOGICAL POTENTIAL IN THESE FIELDS. DISCUSSED ARE: SOLAR PLANTS AND WIND ENERGY CONVERSION PLANTS, WITH SPECIAL REGARD TO PROJECTS OF THE MAN COMPANY.

1978-0460 FEUSTEL J
TAPPING THE ENERGY OF THE WIND AND SUN.
M.A.N. RES. ENG. MANUF. NO. 9: 32-36, APRIL 1978.

VARIOUS SYSTEMS FOR THE UTILIZATION OF SOLAR AND WIND ENERGY ARE DISCUSSED. SUNSHINE HOURS AND WIND SPEEDS FOR GERMANY ARE PRESENTED.

1978-0461 FIRST SEMIANNUAL REPORT, ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. VOLUME I. DESCRIPTION OF THE NATIONAL SMALL WIND SYSTEMS TEST CENTER.
NTIS, SEPTEMBER 28, 1978. 109 P.
RFP-2920/3533/78/6-1

INFORMATION IS PRESENTED CONCERNING THE ROCKY FLATS WIND TURBINE TEST SITE; THE PHILOSOPHY OF TESTING AT ROCKY FLATS; TEST PROCEDURE DEVELOPMENT; ATMOSPHERIC SWECS TESTING; SWECS COMPONENT TESTING; DATA COLLECTION, HANDLING, AND ANALYSIS; REPORTING PROCEDURES; AND FUTURE PLANS.

1978-0462 FIRST SEMIANNUAL REPORT, ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. VOLUME 2. EXPERIMENTAL DATA COLLECTED FROM SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 28, 1978. 107 P.
RFP-2920/3533/78/6-2

VOLUME II OF THE FIRST SEMIANNUAL REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES THE NINE (9) SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TESTED AS OF JUNE 30, 1978 AND PROVIDES THE SIGNIFICANT QUANTITATIVE AND QUALITATIVE DATA COLLECTED TO THAT DATE. METEOROLOGICAL DATA COLLECTED AT ROCKY FLATS ARE ALSO PROVIDED AND DESCRIBED.

1978-0463 FLAIM S J, BUCHANAN D L, CHRISTMAS S
ECONOMIC FEASIBILITY AND MARKET READINESS OF SOLAR TECHNOLOGIES. DRAFT FINAL REPORT. VOLUME I-II.
NTIS, SEPTEMBER 1978. 336 P. (VOL.I), 171 P. (VOL.II).
SERI/TR-52-055D(V.1-2)

SYSTEMS DESCRIPTIONS, COSTS, TECHNICAL AND MARKET READINESS ASSESSMENTS ARE REPORTED FOR TEN SOLAR TECHNOLOGIES: SOLAR HEATING AND COOLING OF BUILDINGS (SHACOB), PASSIVE, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT (A/IPH), BIOMASS, OCEAN THERMAL (OTEC), WIND (WECS), SOLAR THERMAL ELECTRIC, PHOTOVOLTAICS, SATELLITE POWER STATION (SPS), AND SOLAR TOTAL ENERGY SYSTEMS (STES). STUDY OBJECTIVES, SCOPE, AND METHODS ARE PRESENTED. THE COST AND MARKET ANALYSIS WILL BE USED TO MAKE COMMERCIALIZATION ASSESSMENTS IN THE CONCLUSIONS OF THE FINAL REPORT. VOL. II INCLUDES APPENDICES: AGRICULTURAL AND INDUSTRIAL PROCESS HEAT SYSTEMS, BIOMASS, OCEAN THERMAL ENERGY CONVERSION SYSTEMS, WIND ENERGY CONVERSION SYSTEMS, AND SOLAR THERMAL ELECTRIC POWER SYSTEMS.

1978-0464 FOREMAN K M, GILBERT B L
DIFFUSER DESIGNS FOR IMPROVED WIND ENERGY CONVERSION.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 73-91.

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING DEVELOPED TO IMPROVE THE ATTRACTIVENESS OF WIND ENERGY AS AN ENERGY RESOURCE ALTERNATIVE. THIS WORK IS DEDICATED TO INCREASE THE CONCENTRATION OF NATURALLY DIFFUSE WIND ENERGY AND REDUCE THE SPECIFIC COST OF AVAILABLE POWER BY MINIMIZING THE CAPITAL COST OF ENERGY CONVERSION MACHINERY. DIFFUSERS CAN INCREASE TURBINE POWER OUTPUT PRIMARILY BY INCREASING MASS FLOW RATE THROUGH THE BLADES AND SECONDARILY BY REDUCING BLADE TIP LOSSES. A MULTIPHASED INVESTIGATION IS DESCRIBED INVOLVING THREE TEST FACILITIES, OF SEVERAL COMPACT DIFFUSER APPROACHES. SCREENS, TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED AND SOME OF THE KEY ISSUES ARE DISCUSSED THAT CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION.

1978-0465 FOREMAN K M, GILBERT B, OMAN R A
DIFFUSER AUGMENTATION OF WIND TURBINES.
SOL. ENERGY 20(4): 305-311, 1978.

ONE OF THE MORE PROMISING ADVANCED CONCEPTS FOR OVERCOMING THE ECONOMIC DETERRENTS TO WIDESPREAD USE OF

WINDPOWER IS THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) WITH THE OUTPUT POWER MUCH LARGER THAN THAT OF AN UNSHROUDED TURBINE. WIND TUNNEL INVESTIGATION OF MODELS OF TWO DIFFUSER DESIGN CONCEPTS IS DESCRIBED WHICH HAS BEEN DIRECTED TOWARD UNCONVENTIONAL, VERY SHORT, COST-EFFECTIVE CONFIGURATIONS. ONE APPROACH USES THE ENERGETIC EXTERNAL WIND TO PREVENT SEPARATION OF THE DIFFUSER'S INTERNAL BOUNDARY LAYER. ANOTHER METHOD USES HIGH LIFT AIRFOIL CONTOURS FOR THE DIFFUSER WALL SHAPE. DIFFUSER MODEL TESTS HAVE INDICATED ALMOST A DOUBLING OF WIND POWER EXTRACTION CAPABILITY FOR DAWTS COMPARED TO CONVENTIONAL TURBINES. THE SPECIFIC POWER COSTS ($/KW) FOR A REALISTIC DAWT CONFIGURATION ARE FOUND TO BE LOWER THAN CONVENTIONAL WIND TURBINES FOR VERY LARGE SIZE ROTORS, ABOVE 50 M DIAMETER, AND FOR ROTOR DIAMETERS LESS THAN ABOUT 20 M.

1978-0466 YEN J T
SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS.
SAE PREPR. NO. 780690, 1978. 9 P.

SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS ARE REVIEWED WITH EMPHASIS ON THE TORNADO-TYPE WIND ENERGY SYSTEM AND THE DYNAMIC DAM SYSTEM. BASIC REQUIREMENTS FOR AN ECONOMICALLY VIABLE WIND AND OCEAN POWER SYSTEM ARE OUTLINED. HOW THE SYSTEMS TO BE DISCUSSED WILL BE ABLE TO MEET THESE REQUIREMENTS IS DESCRIBED IN SOME DETAIL. THE TORNADO-TYPE WIND ENERGY SYSTEM IS ALSO SHOWN WITH MEANS FOR STORING SOLAR ENERGY AND FIRING COAL, OIL SHALE, OR GARBAGE TO AUGMENT ITS ENERGY. THE DYNAMIC DAM CONCEPT IS SHOWN IN CONFIGURATIONS SUITABLE FOR UTILIZING RIVER OR OCEAN CURRENTS AND/OR TIDES.

1978-0467 FRANK MEDINA'S WINDMILL.
WIND POWER DIG. NO. 13: 38, FALL 1978.

1978-0468 FRANKLIN R
WIND-DRIVEN REFRIGERATION SYSTEM. PROGRESS REPORT.
LE MARS, IOWA, WESTMAR COLLEGE, NOVEMBER 9, 1978. 4 P.

SPECIFICATIONS ARE PRESENTED FOR A WIND TURBINE POWERED REFRIGERATION SYSTEM. THE SYSTEM WAS A MECHANICAL LINKAGE FOR INTERFACING THE TURBINE WITH THE 3-CYLINDER REFRIGERATION COMPRESSOR.

1978-0469 FRIEDMANN P P
AEROELASTIC RESPONSE AND STABILITY OF HORIZONTAL AXIS WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 517-527.
CONF-770921/2

THE PURPOSE OF THIS PAPER IS TO REVIEW SOME CURRENT RESEARCH BEING DONE AT UCLA ON AEROELASTIC EFFECTS IN LARGE WIND TURBINES.

1978-0470 FROST W, NOWAK D
TECHNOLOGY DEVELOPMENT FOR ASSESSMENT OF SMALL-SCALE TERRAIN EFFECTS ON AVAILABLE WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2 P. 654-663.
CONF-770921/2

THE PURPOSE OF THE RESEARCH BEING CONDUCTED IS TO ESTABLISH GUIDELINES AND GATHER INFORMATION PERTAINING TO THE SITING OF WIND TURBINE GENERATORS RELATIVE TO SMALL-SCALE TERRAIN FEATURES. THE INFORMATION COLLECTED IS INTERPRETED IN AN ENGINEERING MANUAL. THE MANUAL HAS THE TITLE "TECHNOLOGY DEVELOPMENT FOR ASSESSMENT OF SMALL-SCALE TERRAIN EFFECTS ON AVAILABLE WIND ENERGY." A THREE-YEAR PROGRAM IS BEING CARRIED OUT. THE FIRST YEAR EFFORT WILL INCLUDE THE EFFECT OF TWO-DIMENSIONAL TERRAIN FEATURES ON WIND TURBINE SITING.

1978-0471 FROST W
ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 563-573.
CONF-770921/2

AN ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT IS BEING WRITTEN. THE PURPOSE OF THE HANDBOOK IS TO PROVIDE IN AN ENGINEERING FORMAT THE ATMOSPHERIC DESIGN INPUTS FOR WIND ENERGY CONVERSION MACHINES. THE HANDBOOK DOES NOT ADDRESS THE PROBLEM OF SITING WIND TURBINE GENERATORS BUT PROVIDES INPUTS FOR STRUCTURAL AND DYNAMIC ANALYSES SUCH AS DATA ON WIND LOADING, TURBULENCE LEVEL, SNOW AND ICE LOADINGS, ETC.

1978-0472 FROST W, LONG B H, TURNER R E
ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT.
NTIS, DECEMBER 1978. 372 P.
NASA-TP-1359

THE ENVIRONMENTAL DESIGN CRITERIA NECESSARY TO DEVELOP A WIND TURBINE GENERATOR (WTG) ARE PROVIDED. ALL CRITERIA ARE PROVIDED IN A WORKING ENGINEERING FORMAT. MORE SPECIFICALLY, THE REPORT PROVIDES INPUTS FOR STRUCTURAL AND DYNAMIC ANALYSIS, SUCH AS DATA ON WIND LOADING, TURBULENCE LEVEL, SNOW AND ICE LOADING, ETC., BUT IT DOES NOT DIRECTLY ADDRESS THE GENERAL PROBLEM OF SITING WIND TURBINE GENERATORS.

1978-0473 FROST W
ANALYSIS OF THE EFFECT OF TURBULENCE ON WIND TURBINE GENERATOR ROTATIONAL FLUCTUATIONS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977.
ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1703-1734.

THREE METHODS OF INTRODUCING TURBULENCE INTO ANALYSES OF ROTOR RESPONSE TO FLUCTUATIONS IN THE WIND ARE CONSIDERED. THE SPECTRAL APPROACH, THE DISCRETE GUST APPROACH, AND THE TURBULENCE SIMULATION TECHNIQUE ARE APPLIED TO A SIMPLE UNLOADED, RIGID, ROTOR HAVING A CONSTANT LIFT-TO-DRAG RATIO. THE ROTATIONAL FLUCTUATIONS ABOUT THE MEAN DUE TO TURBULENCE OF ROTORS OF THE SAME DIMENSIONS BUT OF DIFFERENT MATERIALS IS INVESTIGATED. THE THREE METHODS OF ANALYZING TURBULENT EFFECTS ON ROTOR PERFORMANCE ARE SUMMARIZED AND COMPARED. THE EFFECT OF THESE FLUCTUATIONS ON POWER GENERATION AND ON SYNCHRONIZATION OF THE GENERATORS IS DISCUSSED.

1978-0474 FURLONG D B
FEASIBILITY OF PRE-STRESSED CONCRETE ROTOR BLADES FOR WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 552-562.

CONF-770921/2

THE FEASIBILITY OF PRE-STRESSED CONCRETE AS A MATERIAL FOR WIND TURBINE BLADES IS BEING STUDIED. A CONCRETE BLADE FOR A 125-FOOT DIAMETER ROTOR HAS BEEN DESIGNED AND COMPARED WITH THE ALUMINUM ALLOY BLADES NOW IN OPERATION AT PLUMBROOK. THE CONCRETE BLADES ARE ABOUT TWICE THE WEIGHT OF ALUMINUM BLADES, BUT ARE STIFFER TO PROVIDE THE SAME BENDING VIBRATION FREQUENCIES. THE CENTRIFUGAL FORCES ON CONCRETE BLADES ARE TWICE AS MUCH, BUT THE CONING ANGLE CAN BE REDUCED SO THAT BENDING MOMENTS FROM CENTRIFUGAL FORCES NEUTRALIZE THOSE FROM NORMAL AIRLOADS. THE CYCLICAL CHORDWISE GRAVITY LOADS ARE PROPORTIONAL TO BLADE WEIGHTS, BUT THE BLADES ARE MUCH STRONGER IN THE CHORDWISE BENDING DIRECTION, SO THAT AIRLOAD BENDING IN THE BEAM DIRECTION PRODUCES HIGHER STRESSES. FABRICATION TECHNIQUE FOLLOWS CONVENTIONAL PRE-STRESSED CONCRETE PRACTICE. THE GOAL OF THE PROJECT WAS TO DEVELOP A BLADE WITH A RECURRING COST OF UNDER $15,000. THE PROJECTED COSTS OF THE CONCRETE BLADE ACHIEVE THIS GOAL. TOOLING COSTS ARE ALSO VERY LOW IN COMPARISON TO AIRCRAFT PRACTICE. DETAILED COST ESTIMATES HAVE BEEN MADE FOR ALL BLADE PARTS. STUDIES OF TOWER MODIFICATIONS REQUIRED FOR THE HEAVIER BLADES ARE IN PROGRESS.

1978-0475 GAIA M, GIGLIOLI G
WINDPOWERED THERMOCOMPRESSION DESALINATION.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 365-375.

WIND POWER DESALINATION BY THERMOCOMPRESSION IS DISCUSSED, WITH REFERENCE TO THE POSSIBILITY OF USING A HYDRAULIC TRANSMISSION TO PROVIDE THE OPTIMUM ANGULAR VELOCITY TO BOTH THE WIND TURBINES AND THE COMPRESSOR AT VARYING WIND VELOCITIES.

1978-0476 GAIA M, MACCHI E
A COMPARISON BETWEEN SUN AND WIND AS ENERGY SOURCES IN IRRIGATION PLANTS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 265-272.

IN ORDER TO INVESTIGATE THE CONSTRUCTION COSTS, THE ENGINE PERFORMANCE AT VARIOUS LOADS AND THE RELIABILITY, TWO PROTOTYPES OF RANKINE CYCLE ENGINES USING TETRACHLOROETHYLENE AS THE WORKING FLUID WERE BUILT, HAVING A POWER OUTPUT OF ABOUT 4 KW. ENGINE DATA AND MEASURED PERFORMANCE ARE REPORTED. OPTIMUM COLLECTING TEMPERATURES FOR COMMERCIAL CYLINDRO-PARABOLIC AND FLAT-PLATE COLLECTORS ASSOCIATED WITH ORGANIC FLUID ENGINES ARE DISCUSSED. ENGINE COSTS FOR 10 KW AND 100 KW UNITS ARE EXTRAPOLATED. A 4 M DIAMETER DARRIEUS WIND TURBINE WAS ALSO BUILT AND THE COST FOR SMALL SERIES PRODUCTION WAS COMPUTED AS A FUNCTION OF TURBINE DIAMETER. A COMPARISON OF THE USEFUL ENERGY COST FOR THE SOLAR ENGINE AND THE WIND TURBINE IS REPORTED AND THE PROBLEM OF PUMP/ENGINE MATCHING ARE DISCUSSED FOR DEEP AND SHALLOW WELLS.

1978-0477 GARATE J A
WIND ENERGY MISSION ANALYSIS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 209-221.
CONF-770921/1

THE PRINCIPAL OBJECTIVES OF THIS STUDY WERE TO ASSESS THE POTENTIAL FOR WIND ENERGY CONVERSION SYSTEMS ON A NATIONAL SCALE AND TO IDENTIFY HIGH POTENTIAL APPLICATIONS FOR WECS. THE STUDY CONCENTRATED ON BROAD APPLICATIONS OF WECS OVER LARGE GEOGRAPHIC AREAS WITHIN THE CONTINENTAL UNITED STATES. EMPHASIS WAS PLACED ON IDENTIFYING AND EXPLORING HIGH AGGREGATE ENERGY USERS WHO HAVE SIGNIFICANT POTENTIAL TO UTILIZE WIND ENERGY IN PLACE OF OTHER ALTERNATIVES. ATTRACTIVE APPLICATIONS WERE FOUND TO BE ELECTRIC UTILITIES, RESIDENCES, THE PAPER INDUSTRY, AGRICULTURE, AND REMOTE COMMUNITIES. KEY CHARACTERISTICS OF THESE APPLICATIONS ARE SHOWN. FOR PURPOSES OF BREVITY, THIS DISCUSSION IS LIMITED TO THE ELECTRIC UTILITY CASE, BY FAR THE LARGEST APPLICATION.

1978-0478 WYLDE A F
WIND MACHINES FOR LARGE-SCALE ELECTRICITY PRODUCTION.
N.Z. ENG. 33(10): 218-223, OCTOBER 15, 1978.

THE VARIABILITY OF THE WIND AND ITS LOW-ENERGY DENSITY ARE IMPORTANT FACTORS IN THE DESIGN AND OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS FOR ELECTRICITY PRODUCTION. ON A WORLD SCALE TWO TYPES ARE CURRENTLY RECEIVING MOST ATTENTION. A SOPHISTICATED EXPERIMENTAL MODEL OF THE HORIZONTAL SHAFT PROPELLER TYPE STARTED OPERATION IN LATE 1975. THE DARRIEUS VERTICAL AXIS MACHINE, UNLIKE THE PROPELLER TYPE, HAS NOT BEEN INVESTIGATED TO ANY EXTENT PREVIOUSLY. IN OPERATION, BOTH TYPES EXPERIENCE CYCLICALLY VARYING STRUCTURAL LOADS. CONSIDERABLE FURTHER DEVELOPMENT IS REQUIRED BEFORE EITHER CAN BE MARKETED COMMERCIALLY.

1978-0479 GARSTANG M
COASTAL ZONE WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 381-392.
CONF-770921/1

AN IMPORTANT PART OF THE COASTAL ZONE WIND ENERGY STUDY BEING CARRIED OUT AT THE UNIVERSITY OF VIRGINIA IS TO DETERMINE THE VELOCITY FIELD IN THE LOWEST 100 METERS OF THE ATMOSPHERE ALONG A LINE WHICH IS NORMAL TO THE COAST EXTENDING LANDWARD AND SEAWARD. THE COASTLINE FROM MAINE TO TEXAS IS BEING CONSIDERED IN THE U. VA. STUDY. DETERMINATION OF THE LOW LEVEL VELOCITY FIELD AS A FUNCTION OF HEIGHT AND DISTANCE NORMAL TO THE SHORE AT EVERY POINT ALONG THIS COASTLINE WOULD NOT BE PRACTICAL. TO DEAL WITH THIS DIFFICULTY TIMES AND REGIONS ALONG THE COAST WITH COMMON WIND REGIMES ARE DETERMINED. A SIMPLIFIED 2-DIMENTIONAL MODEL IS USED IN EACH REGION. THIS WILL BE FOLLOWED WITH A MORE DETAILED STUDY USING A 3-DIMENSIONAL MODEL TO INCLUDE COASTLINE CONFIGURATION. IN THIS PAPER RESULTS OBTAINED USING THE 2-DIMENSIONAL MODEL FOR ONE OF THE FIVE REGIONS OF THE EAST AND GULF COAST ARE REPORTED.

1978-0480 GEWEHR H W
THE 150-FOOT WIND TURBINE BLADE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 528-539.
CONF-770921/2

THE OBJECTIVE OF THE 150 FT WIND TURBINE BLADE PROGRAM IS TO DEMONSTRATE THAT CURRENT DESIGN AND FABRICATION METHODS ARE CAPABLE OF PRODUCING A BLADE OF THIS SIZE, AND HAVE THE POTENTIAL FOR LOW COST MANUFACTURE OF SUCH BLADES IN PRODUCTION QUANTITIES. THE PROGRAM INCLUDES DESIGN, FABRICATION, TEST AND EVALUATION OF ONE 150 FT LONG PROTOTYPE TEST BLADE. THIS PAPER DESCRIBES THE BLADE DESIGN AND ITS FABRICATION, AND INCLUDES A BRIEF SUMMARY OF LOADS, STRESSES AND NATURAL FREQUENCIES OBTAINED DURING THE PRELIMINARY DESIGN ANALYSIS.

1978-0481 GILBERT B L, FOREMAN K M
EXPERIMENTAL DEMCNSTRATION OF THE DIFFUSER AUGMENTED WIND TURBINE CONCEPT.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2082-2089.

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). VERY COMPACT DIFFUSERS USING BOUNDARY LAYER CONTROL HAVE BEEN EXAMINED EXPERIMENTALLY. SMALL SCALE MODEL TESTING WITH SCREENS AND CENTERBODIES TO SIMULATE A REAL TURBINE WAS USED TO CHOOSE A BASELINE DIFFUSER CONFIGURATION. THIS DESIGN IS A CONICAL, 60 DEGREES INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THE CONFIGURATION ALSO HAS BEEN TESTED AT TEN TIMES GREATER PHYSICAL SIZE AND UP TO 3.5 TIMES GREATER WIND SPEED USING SCREENS AND A REAL TURBINE. THIS FIRST GENERATION, NONOPTIMIZED DAWT CONFIGURATION SHOULD PROVIDE ABOUT FOUR TIMES THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE EFFICIENCY, DIAMETER, AND WIND AT OPTIMUM TURBINE DISK LOADING.

1978-0482 GILBERT B L, OMAN R A, FOREMAN K M
FLUID DYNAMICS OF DIFFUSER-AUGMENTED WIND TURBINES.
J. ENERGY 2(6): 368-374, NOVEMBER-DECEMBER 1978.

THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). APPLICATION OF MODERN BOUNDARY-LAYER CONTROL TECHNIQUES HAS REDUCED THE SURFACE AREA REQUIREMENTS OF AN EFFICIENT DIFFUSER BY AN ORDER OF MAGNITUDE. MANY PARAMETERS THAT AFFECT THE PERFORMANCE OF THE DIFFUSER SYSTEM HAVE BEEN EXAMINED IN SMALL-SCALE WIND TUNNEL TESTS WITH A FAMILY OF COMPACT DIFFUSERS, USING SCREENS AND CENTERBODIES TO SIMULATE THE PRESENCE OF A TURBINE. FLOWFIELD SURVEYS, OVERALL PERFORMANCE, THE EFFECT OF GROUND PROXIMITY, AND THE PROSPECTS FOR FURTHER IMPROVEMENT ARE DESCRIBED. THE BASELINE CONFIGURATION IS A CONICAL, 60 DEGREES INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THIS FIRST-GENERATION DAWT CAN PROVIDE ABOUT TWICE THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE DIAMETER AND WIND. ECONOMIC ESTIMATES SHOW THAT THIS DAWT CAN BE AS MUCH AS 50% CHEAPER THAN CONVENTIONAL WECS FOR THE SAME RATED POWER.

1978-0483 GILMORE E
EVOLUTION OF THE WEST TEXAS STATE UNIVERSITY: AMARILLO COLLEGE WIND ENERGY PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 8-12.
CONF-780357

FEASIBILITY STUDIES AND RESEARCH PROGRAMS STRUCTURED FOR WIND POWER DEVELOPMENT IN TEXAS ARE REVIEWED. ECONOMIC ASPECTS OF LARGE WIND POWER PLANTS FOR ELECTRIC POWER GENERATION ARE DISCUSSED.

1978-0484 GINOSAR M
LARGE SCALE WIND ENERGY PROGRAM FOR THE STATE OF CALIFORNIA. PH.D. THESIS.
UNIVERSITY OF CALIFORNIA, LOS ANGELES. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 79-15,662, 1978. 164 P.

WIND-ELECTRIC ENERGY IS A SLEEPING GIANT. ITS LARGE ENERGY CAPABILITIES, COMPETITIVE ECONOMICS AND ITS SOCIAL AND ENVIRONMENTAL ADVANTAGES ARE NOT GENERALLY KNOWN. WIND-ELECTRIC ENERGY, HOWEVER, CAN AND SHOULD BE ONE OF THE MAJOR RENEWABLE ENERGY SUPPLIES IN CALIFORNIA. THIS DOCUMENT PROPOSES AND PROVIDES THE RATIONALE FOR A LARGE-SCALE WIND-ELECTRIC ENERGY PROGRAM FOR CALIFORNIA. IT IS WRITTEN FOR DECISION MAKERS; THEREFORE, SIMPLIFIED CALCULATIONS AND EXPLANATIONS ARE USED THROUGHOUT. IT IS NOT INTENDED TO BE A TECHNICAL DOCUMENT, ALTHOUGH MANY TECHNICAL ITEMS ARE PRESENTED IN SUPPORT OF THE PROGRAM. THIS PLAN IS BASED ON THE IDEA THAT TIME IS ONE OF THE MOST CRITICAL ELEMENTS IN DEVELOPING RENEWABLE ENERGY SUPPLIES.

1978-0485 GLASGOW J C, BIRCHENOUGH A G
DESIGN AND OPERATING EXPERIENCE ON THE U.S. DEPARTMENT OF ENERGY EXPERIMENTAL MOD-0 100 KW WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2052-2059.

THE TURBINE WAS DESIGNED AND FABRICATED BY NASA, AS PART OF THE FEDERAL WIND ENERGY PROGRAM, TO ASSESS TECHNOLOGY REQUIREMENTS AND ENGINEERING PROBLEMS OF LARGE WIND TURBINES. THE MACHINE BECAME OPERATIONAL IN OCTOBER 1975 AND HAS DEMONSTRATED SUCCESSFUL OPERATION IN ALL OF ITS DESIGN MODES. DURING THE COURSE OF ITS OPERATIONS THE MACHINE HAS GENERATED A WEALTH OF EXPERIMENTAL DATA AND HAS SERVED AS A PROTOTYPE DEVELOPMENTAL TEST BED FOR THE MOD-0A OPERATIONAL WIND TURBINES WHICH ARE CURRENTLY USED ON UTILITY NETWORKS. THIS PAPER DESCRIBES THE MECHANICAL AND CONTROL SYSTEMS AS THEY EVOLVED IN OPERATIONAL TESTS AND DESCRIBES SOME OF THE EXPERIENCE WITH VARIOUS SYSTEMS IN THE DOWNWIND ROTOR CONFIGURATION.

1978-0486 GLASGOW J C, BIRCHENOUGH A G
MECHANICAL AND CONTROL SYSTEM DESIGN OF THE US DEPARTMENT OF ENERGY EXPERIMENTAL MOD-0 100 KW WIND TURBINE.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3 REG 2, 1978. P. 106-111.

THE MACHINE BECAME OPERATIONAL IN OCTOBER 1975 AND HAS DEMONSTRATED SUCCESSFUL OPERATION IN ALL OF ITS DESIGN MODES. DURING THE COURSE OF ITS OPERATIONS THE MACHINE HAS GENERATED A WEALTH OF EXPERIMENTAL DATA AND HAS SERVED AS A PROTOTYPE DEVELOPMENTAL TEST BED FOR THE MOD-0A OPERATIONAL WIND TURBINES WHICH ARE USED CURRENTLY ON UTILITY NETWORKS. THIS PAPER DESCRIBES THE MECHANICAL AND CONTROL SYSTEMS AS THEY EVOLVED IN OPERATIONAL TESTS AND SOME OF THE TEST RESULTS WITH THE POWER CONTROLLER.

1978-0487 GLASSEY C R, MOYER G F
METHODS OF ESTIMATING THE RELIABILITY OF WIND ENERGY SYSTEMS WITH STORAGE.
NTIS, 1978. 61 P.
UCRL-15005

SOME PRELIMINARY RESULTS OBTAINED IN ANALYZING THE RELIABILITY OF WIND GENERATOR-STORAGE SYSTEMS ARE PRESENTED. THE INVESTIGATION TAKES TWO SEPARATE APPROACHES--SIMULATION AND PROBABILISTIC MODELLING--TO REVEAL THE TRADE-OFFS WHICH CAN BE MADE BETWEEN GENERATING CAPACITY AND STORAGE CAPACITY TO ATTAIN A DESIRED LEVEL OF RELIABILITY. THE PERFORMANCE CRITERION USED THROUGHOUT THIS WORK IS THE FREQUENCY OF OCCURRENCE OF EMPTY STORAGE. THIS CRITERION IS ESSENTIALLY THE SAME AS THE FREQUENCY OF LOSS OF LOAD.

1978-0488 GLOWER D D, COON H L
WORKSHOP ON ENERGY RESOURCES AND ELECTRIC POWER GENERATION FOR HIGH SCHOOL SCIENCE TEACHERS. FINAL REPORT.
NTIS, SEPTEMBER 1978. 345 P.

WORKSHOP PARTICIPANTS SPENT 15 DAYS STUDYING VARIOUS ASPECTS OF THE NATIONAL ENERGY PROBLEM AND PREPARING INSTRUCTIONAL MATERIALS FOR USE IN THEIR CLASSROOMS. ATTENTION WAS GIVEN TO SHORT- AND LONG-TERM RESOURCES AVAILABLE; TO CONVERSION SYSTEMS; TO ECONOMIC, SOCIAL AND PHILOSOPHICAL PROBLEMS ASSOCIATED WITH ENERGY PRODUCTION AND USE; AND THE IMPORTANCE OF CONSERVATION.

1978-0489 GNECCO A J, WHITEHEAD G T
MICROPROCESSOR CONTROL OF A WIND TURBINE GENERATOR.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3 REG 2, 1978. P. 4-10.

THIS PAPER DESCRIBES A SYSTEM USED TO CONTROL THE UNATTENDED OPERATION OF A WIND TURBINE GENERATOR. THE TURBINE AND ITS MICROCOMPUTER SYSTEM ARE DESCRIBED FULLY WITH SPECIAL EMPHASIS ON THE WIDE VARIETY OF TASKS PERFORMED BY THE MICROPROCESSOR FOR THE SAFE AND EFFICIENT OPERATION OF THE TURBINE. THE FLEXIBILITY, COST AND RELIABILITY OF THE MICROPROCESSOR WERE MAJOR FACTORS IN ITS SELECTION.

1978-0490 GOHARD J C
WIND ENERGY CONVERSION. VOLUME 8. FREE WAKE ANALYSIS OF WIND TURBINE AERODYNAMICS. ASRL-TR-184-14.
NTIS, SEPTEMBER 1978. 294 P.
COO-4131-T1(VOL.8)

THE UNDERLYING THEORY IS PRESENTED FOR DETERMINING BLADE AND ROTOR/TOWER VIBRATION AND DYNAMIC STABILITY CHARACTERISTICS AS WELL AS THE BASIC DYNAMIC (AS OPPOSED TO AERODYNAMIC) OPERATING LOADS. STARTING WITH A SIMPLE CONCEPT OF EQUIVALENT HINGED ROTORS, THE EQUATIONS OF MOTION FOR THE BLADE INCLUDING PITCH, FLAP AND LAG MOTIONS ARE DEVELOPED. THE NONLINEAR EQUATIONS ARE DERIVED FIRST AND LINEARIZED ABOUT A FINITE DISPLACEMENT OF THE BLADE OUT OF THE PLANE OF ROTATION. THIS IS IMPORTANT SINCE WIND TURBINES TEND TO OPERATE AT RELATIVELY HIGH CONING ANGLES. THE EFFECT OF DISTRIBUTED FLEXIBILITY, AS OPPOSED TO THE EQUIVALENT HINGE CONCEPT, IS THEN DISCUSSED.

1978-0491 GOKHMAN A, OZBOYA N
MULTISTAGE TURBINE-PUMP WITH CONTROLLED FLOW RATE.
NTIS, 1978. P. 316-327.
CONF-781046

ANALYSIS OF THE TURBINE PUMP SHOWS THAT THIS NEW MACHINE HAS THE UNIQUE FEATURE TO REGULATE THE FLOW RATE EVEN IN THE PUMP MODE. THIS UNIQUE FEATURE MAKES THE NEW TURBINE-PUMP ESPECIALLY ATTRACTIVE FOR THE PUMPED-STORAGE PLANT APPLICATIONS TO STORE THE ENERGY PRODUCED BY THE PLANTS UTILIZING NON-CONTROLLABLE NATURAL ENERGY SOURCES SUCH AS SOLAR ENERGY, WIND ENERGY, ETC. A DESCRIPTION OF THE DESIGN AND A HYDRAULIC ANALYSIS ARE GIVEN.

1978-0492 GOSLICH H D
FURTHER DEVELOPMENT OF A HIGH-SPEED CONVERTER WITH A SPECIAL BALL-AND SOCKET TYPE JOINT.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 141-155. (IN GERMAN)

THE DEVELOPMENT AND CONSTRUCTION OF THE BLADES OF THE 70 KW TWIN ROTOR WIND POWER PLANT ON SYLT AND THE TWO BLADE HIGH SPEED ROTOR PLANT PRESENTED TO THE SOLAR FORUM 1977 ARE DESCRIBED. THREE BLADE ROTOR CONFIGURATIONS ARE DISCUSSED WITH DIFFERENT BLADE STARTING POSITION DUE TO DIFFERENT SPRING PRELOADING CHARACTERISTICS AND OVER-ALL RUNNING BEHAVIOR OF THE ENTIRE ROTOR SYSTEM. THE ADVANTAGE OF APPLICATIONS OF THE WIND POWER PLANT SYSTEM GOSLICH IN THIRD WORLD COUNTRIES IS SHOWN.

1978-0493 GOVINDA RAJU S P, NARASIMHA R
WINDMILLS FOR RURAL USE.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1796-1802.

THIS PAPER DISCUSSES THE INDIAN DEVELOPMENT OF WINDMILLS USING THE "SOFT" DESIGN APPROACH. THE DESIGN AND PERFORMANCE OF TWO PROTOTYPE WINDMILLS BASED ON THE SAIL-TYPE SAVONIUS ROTOR ARE DESCRIBED.

1978-0494 GRIFFITHS R T, WOOLLARD M G
PERFORMANCE OF THE OPTIMAL WIND TURBINE.
APPL. ENERGY 4(4): 261-272, OCTOBER 1978.

THE PERFORMANCE OF A TYPICAL WIND TURBINE, DESIGNED TO GIVE MAXIMUM POWER COEFFICIENT AT A TIP SPEED RATIO OF 5, HAS BEEN ESTIMATED OVER A RANGE OF SPEED RATIOS AND PITCH ANGLES USING BLADE ELEMENT THEORY. INFORMATION IS GIVEN ON THE POWER, TORQUE, AND THRUST DEVELOPED AND ON THE NATURE OF THE FLOW OVER THE BLADES.

1978-0495 GRUENBAUM R
ALTERNATIVE ENERGY IN THE USSR.
ENVIRONMENT 20(7): 25-30, SEPTEMBER 1978.

ALTHOUGH RENEWABLE ENERGY SOURCES HAVE A RELATIVELY LOW PRIORITY IN THE RESOURCE-RICH SOVIET UNION, RESEARCH AND DEVELOPMENT IN NEW ENERGY-CONVERSION SYSTEMS WILL BE EXPANDED TO EXPLOIT WIND AND SOLAR ENERGY. WIND RESEARCH PROJECTS WILL INCLUDE DESALINATION AND PUMPING WATER, CATHODIC PROTECTION OF PIPELINES, AND LARGE-SCALE POWER GENERATION. SOLAR PROJECTS WILL INCLUDE DESERT IRRIGATION, SOLAR-POWERED HOUSES AND APPLIANCES, AND PULSED SOLAR IRRADIATION. IN ADDITION, TIDAL POWER PLANTS ARE BEING INSTALLED ALONG THE COASTS AND GEOTHERMAL PLANTS FOR BOTH POWER GENERATION AND LOCAL HEATING WILL OPERATE AT SEVERAL SITES.

1978-0496 WURTZ F R, HAWKINS T J
WIND GENERATOR SYSTEM.
U.S. PATENT NO. 4,113,408, SEPTEMBER 12, 1978. 8 P.

A WIND OPERATED GENERATOR IS DESCRIBED WHICH HAS A STATIONARY FRAME OR BASE ROTATABLY SUPPORTING AT LEAST FOUR SETS OF PIVOTAL BLADES INTENDED TO BE DRIVEN BY IMPINGING WIND CURRENTS. EACH SET OF BLADES OPERATE IN UNISON FOR OPENING AND CLOSING AIR PASSAGEWAYS BETWEEN ADJACENT ONES OF THE BLADES AS THE SETS OF BLADES ROTATE ABOUT A COMMON VERTICAL AXIS. A WIND DIRECTION SENSOR IS PROVIDED WHICH MOVES INTO THE DIRECTION OF THE WIND AND ELECTRIC-MECHANICAL OR ELECTRICAL INTERFACE NETWORKS OPERABLY COUPLE THE WIND DIRECTION SENSOR TO THE RESPECTIVE SETS OF BLADES WHEREBY THE BLADES ARE RESPONSIVE TO WIND DIRECTION SO AS TO BE PROPERLY FEATHERED TO PROPEL THE SETS OF BLADES. BY EMPLOYMENT OF THE INTERFACE NETWORK, THOSE BLADES THAT ARE IN POSITION TO ACTUATE OR ROTATE THE WINDMILL WILL RECEIVE THE FULL FORCE OF THE WIND WHILE OTHER BLADES WHICH ARE NOT IN A

POSITION TO ACCOMPLISH THE PROPER OPERATION WILL BE TURNED TO PERMIT PASSAGE OF THE WIND.

1978-0497 GUPTA R P, CHANDRA S K
DEVELOPMENT OF A 1 KW VERTICAL AXIS WIND GENERATOR.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1803-1808.

THE DESIGN AND DEVELOPMENT ACTIVITIES ON A 1 KW VERTICAL AXIS WIND GENERATOR ARE GIVEN. IT IS A TWO-BLADED DARRIEUS TYPE DESIGN WITH A COMBINATION OF VERTICAL AND INCLINED BLADES. BLADES OF FIBREGLASS REINFORCED WITH A MILD STEEL STRIP HAVE BEEN USED AND THEY ARE ANALYSED THEORETICALLY FOR MECHANICAL STRENGTH AND TESTED EXPERIMENTALLY IN ACTUAL RUNNING CONDITION FOR STRESS LEVELS USING A PHOTOELASTIC COATING AND REFLECTION POLARISCOPE. THE CENTRAL ROTATING SHAFT HAS BEEN DESIGNED TO CARRY THE BUCKLING LOAD AND THE BLADE SHAFT COMBINATION IS ANALYSED FOR BOTH TORSIONAL AND BENDING MODES OF VIBRATION.

1978-0498 WORTMANN F X
WIND ENERGY PLANT WITH AERODYNAMIC INHERENT CONTROL.
GERMAN (FRG) PATENT NO. 2,715,584/A/, OCTOBER 19, 1978. 17 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND POWER MACHINE IN WHICH THE ROTOR BLADES ARE CONNECTED ELASTICALLY OR VIA JOINTS WITH THE ROTOR HUB, INDEPENDENTLY OF EACH OTHER. ACCORDING TO THE INVENTION A SMALL IMPACT MOVEMENT, I.E. A CHANGE OF THE CONE ANGLE BETWEEN THE PLANE OF ROTATION AND THE CONE PRODUCED BY ROTATION OF THE BLADES LEADS VIA A VERY HIGH TRANSMISSION (RATIO) TO A GREAT CHANGE IN ANGLE OF INCIDENCE. THIS SUPPRESSES THE CORIOLIS FORCE, AND THE AMOUNT OF AIR POWER REMAINS CONSTANT FOR EACH BLADE INDIVIDUALLY AND INDEPENDENTLY OF WIND STRENGTH AND DIRECTION.

1978-0499 GUSTAVSSON B
WIND ENERGY TEST PLANT OPERATION: RESULTS AND FINDINGS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 480-488.
CONF-770921/1

THE 75 KW TEST PLANT IS PART OF THE NATIONAL SWEDISH WIND ENERGY PROGRAM. IT WAS DESIGNED TO SUPPORT THEORETICAL WECS-STUDIES IN THE FOLLOWING AREAS; LOADS AND OTHER ENGINEERING DATA, AND CORRESPONDENCE BETWEEN WIND DATA AND ENERGY PRODUCTION.

1978-0500 GUSTAVSSON B
THE WIND POWER STATION AT KALKUGNEN (SWEDEN).
SVEN. KRAFTVERKSFOEREN. PUBL. NO. 571: 40-51, 1978. (IN SWEDISH)

AN EXPERIMENTAL WIND POWER STATION IS DESCRIBED.

1978-0501 GUSTAVSON M R
WIND ENERGY RESOURCE PARAMETERS.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 148-152.
CONF-780357

THE GLOBAL WIND ENERGY RESOURCES ARE ANALYZED.

1978-0502 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, SEPTEMBER 1978. 228 P.
NTIS/PS-78/0998/1ST

1978-0503 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, SEPTEMBER 1978. 263 P.
NTIS/PS-78/0997/3ST

1978-0504 HALL D C, CARLSON A, FULLER D, REYER R, MA'LNER C
USAF TERRESTRIAL ENERGY STUDY. VOLUME III. PART I. SUMMARY DATA DISPLAY. FINAL REPORT, APRIL 1, 1976-FEBRUARY 1, 1978.
NTIS, MAY 1978. 393 P.
AD-A061071

THIS REPORT WAS PREPARED TO SERVE AS A GUIDE FOR THE U.S. AIR FORCE IN SELECTING TYPES OF ENERGY CONVERSION SYSTEMS TO MEET THEIR FUTURE GROUND POWER REQUIREMENTS. THE ELECTRIC POWER REQUIREMENTS INCLUDED IN THIS REPORT RANGE FROM 10 KILOWATTS TO 50 MEGAWATTS. TWENTY-ONE TYPES OF SYSTEMS, CONVENTIONAL AS WELL AS ADVANCED, ARE CONSIDERED. EACH SYSTEM IS CHARACTERIZED IN TERMS OF A SET OF ECONOMIC, PHYSICAL AND PERFORMANCE PARAMETERS INCLUDING ACQUISITION COSTS, LIFE CYCLE COSTS, SIZE, EFFICIENCY AND ENVIRONMENTAL CONSTRAINTS.

1978-0505 HALL F F
FREE-WHEELING HYDRAULIC POWER MILLS.
NTIS, OCTOBER 1978. 10 P.
CONF-781214-3, SLAC-PUB-2204

FREE-WHEELING POWER PLANTS USING FREE REPLENISHABLE HYDRAULIC FORCES OF WINDS AND WATER CURRENTS WOULD CONSIST OF MOST OR ALL OF THE FOLLOWING: FORE AND AFTER CONES TO INCREASE THROUGHPUT; DUPLEX IMPELLERS; ROTORS WITH DC/AC EXCITATION, AC/DC INVERTERS AND DC FIELD COILS; STATORS WITH AC OUTPUT OF VARYING FREQUENCY, VOLTAGE AND POWER; SOLID-STATE AC/DC INVERTERS, DC ELECTROLYTIC CELL BANKS FOR GH2 AND GO2 PRODUCTION; AND NEON REFRIGERATORS FOR REDUCING THESE TO LOX AND CHILLED GH2 FOR EASE IN SHIPMENT OR STORAGE.

1978-0506 HAMMOND G
CASH BOOST FOR ALTERNATIVE ENERGY.
PHYS. TECHNOL. 9(4): 139-140, JULY 1978.

FOLLOWING THE INCREASE IN GOVERNMENT SPENDING ON ALTERNATIVE ENERGY SOURCES, THE LEVEL OF FUNDING FOR WAVE POWER, GEOTHERMAL SOURCES, WIND POWER, TIDAL (SEVERN ESTUARY), AND SOLAR ENERGY ARE DISCUSSED.

1978-0507 WORKSHOP ON SOLAR ENERGY FOR THE VILLAGES OF TANZANIA, HELD AT DAR ES SALAAM, TANZANIA ON AUGUST 11-19, 1977.

NTIS, 1978. 177 P.
WORKSHOP ON SOLAR ENERGY FOR THE VILLAGES OF TANZANIA, DAR ES SALAAM, TANZANIA, AUGUST 11-19, 1977.
PB-282941

THE SEMINAR/WORKSHOP'S PURPOSES WERE: (1) TO REVIEW THE STATE-OF-THE-ART OF SMALL-SCALE SOLAR ENERGY DEVICES, INCLUDING BOTH THE TECHNICAL AND ECONOMIC ASPECTS OF THEIR UTILIZATION; AND (2) TO SUGGEST SHORT- AND LONG-RANGE PROJECTS USING SOLAR DEVICES IN THE VILLAGES, WITH PARTICULAR EMPHASIS ON RECOMMENDATIONS FOR IMPLEMENTATION.

1978-0508 HARDY D
WIND ENERGY ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. SYMPOSIUM VOL., P. 99-104.

WIND ENERGY PROJECT ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE ARE COLLECTIVELY REVIEWED. OVERALL OBJECTIVES OF EACH MAJOR ACTIVITY AREA ARE DISCUSSED IN RELATION TO THE BROADER OBJECTIVES OF THE INSTITUTE IN FURTHERING WIND ENERGY UTILIZATION. ALSO DISCUSSED IS SERI'S ROLE IN SUPPORTING THE PRIVATE SECTOR IN WIND ENERGY DEVELOPMENT, AND EFFORTS TO PROMOTE INFORMATION TRANSFER THROUGHOUT THE WIND ENERGY COMMUNITY.

1978-0509 HARDY D M
NUMERICAL AND MEASUREMENT METHODS OF WIND ENERGY ASSESSMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 664-676.
CONF-770921/2

A SITE SELECTION METHODOLOGY DEVELOPED BY THE LAWRENCE LIVERMORE LABORATORY AS PART OF THE FEDERAL WIND ENERGY PROGRAM IS DESCRIBED. IT HAS FOUR KEY ELEMENTS: (1) COLLECTION OF METEOROLOGICAL OBSERVATIONS; (2) STATISTICAL ANALYSIS OF VECTOR WIND MEASUREMENTS; (3) USE OF A NUMERICAL OBJECTIVE-ANALYSIS MODEL; AND (4) COORDINATED APPLICATION OF THE NUMERICAL ANALYSIS AND FIELD MEASUREMENT EFFORTS.

1978-0510 HARDY D M
WIND RESOURCE ANALYSIS. ANNUAL REPORT.
NTIS, DECEMBER 1978. 20 P.
SERI/TR-36-088

THIS REPORT DESCRIBES FY78 RESULTS OF THE WIND RESOURCE ANALYSES TASK OF THE ERAB (ENERGY RESOURCE ASSESSMENT BRANCH OF THE SOLAR ENERGY RESEARCH INSTITUTE). INITIAL STEPS WERE TAKEN TO ACQUIRE MODERN ATMOSPHERE MODELS OF NEAR-SURFACE WIND FLOW AND PRIMARY DATA SETS USED IN PREVIOUS STUDIES OF NATIONAL AND REGIONAL WIND RESOURCES. BECAUSE NUMEROUS ASSUMPTIONS ARE NECESSARY TO INTERPRET AVAILABLE DATA IN TERMS OF WIND ENERGY POTENTIAL, CONCLUSIONS OF PREVIOUS STUDIES DIFFER CONSIDERABLY. THESE DATA ANALYSES MAY BE IMPROVED BY FUTURE SERI RESEARCH. STATE-OF-THE-ART ATMOSPHERE MODELS ARE A NECESSARY COMPONENT OF THE SERI WIND RESOURCE ANALYSES CAPACITY. HOWEVER, THESE METHODS ALSO NEED TO BE TESTED AND VERIFIED IN DIVERSE APPLICATIONS. THE PRIMARY DATA SETS AND PRINCIPAL FEATURES OF THE MODELS ARE DISCUSSED IN THE REPORT.

1978-0511 HARDY W E, HASSAN U
LARGE WIND TURBINES GAIN FAVOUR IN THE UK.
INT. POWER GENERATION 1(7): 25-31, OCTOBER/NOVEMBER 1978.

A BRITISH DESIGNED WIND TURBINE GENERATOR IS DESCRIBED IN DETAIL. IT IS A 3.7 MW HORIZONTAL AXIS DEVICE, WITH A TWO BLADED ROTOR 60 M IN DIAMETER MOUNTED ON A 45 M HIGH CONCRETE OR STEEL LATTICE TOWER. REVOLVING AT 34.1 RPM, CUT-IN SPEED WILL BE 7 M/S WITH A MAXIMUM SPEED OF 27 M/S. IT IS INTENDED FOR USE ON THE SUMMITS OF HILLS, PARTICULARLY IN NORTH WESTERN SCOTLAND, AND A MAP OF THE ANNUAL MEAN WIND SPEED CONTOURS FOR THE UPLAND AREAS OF THE UK IS GIVEN TO ILLUSTRATE SITE SELECTION CRITERIA.

1978-0512 HASSEL W F
INDIRECT FOREIGN OIL REQUIREMENTS FOR ALTERNATE ENERGY SOURCES.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4: GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1978. P. 84-95.

AN ANALYSIS IS CONDUCTED ON THE EXTERNAL ENERGY REQUIREMENTS OF VARIOUS BASELOAD ELECTRIC POWER SYSTEMS, INCLUDING CONVENTIONAL, NUCLEAR AND SYNTHETIC FUEL PLANTS, SOLAR AND WINDPOWER, AND FUSION POWER. THESE ENERGY REQUIREMENTS ARE TRANSFORMED INTO ADDITIONAL NEEDS FOR IMPORTED OIL DURING THE CONSTRUCTION AND EARLY OPERATIONAL PERIODS OF THE POWER SYSTEMS.

1978-0513 HAUSMANN H, HAUSMANN K H
ENERGY SAVING IN THE TEXTILE INDUSTRY.
INT. TEXT. BULL. DYEING PRINT. FINISH. NO. 2: 11 PAGES BETWEEN P. 109 AND 139, 1978.

THE AUTHORS SHOW HOW THE COST OF PRODUCING WARM PROCESS WATER IN THE TEXTILE INDUSTRY CAN BE REDUCED BY USING SOLAR HEAT COLLECTORS, WIND ENERGY, HEAT PUMPS AND HEAT RECOVERY INSTALLATIONS. REGENERATIVE AND RECUPERATIVE HEAT RECOVERY SYSTEMS ARE SUITABLE. THE ADVANTAGES AND DISADVANTAGES OF BOTH ARE DISCUSSED. SEVERAL DIFFERENT EXAMPLES OF HEAT RECOVERY PLANTS IN THE TEXTILE INDUSTRY ARE DESCRIBED.

1978-0514 HEALY J V
INFLUENCE OF BLADE THICKNESS ON THE OUTPUT OF VERTICAL AXIS WIND TURBINES.
WIND ENG. 2(1): 1-9, 1978.

THE AMOUNT OF DATA REQUIRED TO COMPUTE THE OUTPUT OF STRAIGHT-BLADE TURBINES IS ONLY A FRACTION OF WHAT IS NEEDED FOR CURVED-BLADE ONES. USING THE DATA IN NACA TR 586, THE POWER COEFFICIENTS FOR NACA PROFILES 0009, 0012, 0015, AND 0018 HAVE BEEN COMPUTED FOR A WIDE RANGE OF TURBINE REYNOLDS NUMBERS AND TIP SPEED RATIOS FROM 2.25 UPWARDS. LIFT AND DRAG MATRICES ARE SET UP FROM THE DATA AND A STANDARD SUBROUTINE USED TO INTERPOLATE FOR THE LIFT AND DRAG COEFFICIENTS FOR GIVEN VALUES OF ANGLE OF ATTACK AND BLADE REYNOLDS NUMBER. THE COMPUTER PROGRAM IS BASED ON THE MULTIPLE-STREAMTUBE MODEL AND TAKES INFLOW INTO ACCOUNT.

1978-0515 HEALY J V
INFLUENCE OF BLADE CAMBER ON THE OUTPUT OF VERTICAL-AXIS WIND TURBINES.
WIND ENG. 2(3): 146-155, 1978.

THIS STUDY REPRESENTS AN EXTENSION TO CAMBERED AIRFOILS OF A PREVIOUS WORK ON SYMMETRIC ONES. THE MODEL USED IS

THE MULTIPLE-STREAMTUBE ONE AND THE AIRFOILS HAVE GOTTINGEN PROFILES--THE ONLY ONES FOR WHICH SUFFICIENT DATA IS AVAILABLE. IT IS FOUND THAT AIRFOILS WITH HIGH LIFT CAN ABSTRACT MORE THAN THE OPTIMUM AMOUNT OF ENERGY FROM EACH STREAMTUBE. THIS HIGH LIFT CAN BE GENERATED BY USING CAMBER OR BY PRESETTING SYMMETRIC PROFILES AT SOME INITIAL ANGLE OF INCIDENCE. IN GENERAL, THE CLOSER THE AIRFOIL IS TO SYMMETRIC, THE MORE SATISFACTORY ITS POWER OUTPUT. CAMBERING OR PRESETTING THE ANGLE OF INCIDENCE SEEMS A LIKELY WAY TO AVOID EXCESSIVE TURBINE SPEEDS.

1978-0516 HEALY J V
AN INVERSE PROBLEM FOR VERTICAL-AXIS WIND TURBINES.
J. ENERGY 2(6): 382-384, NOVEMBER-DECEMBER 1978.

VERTICAL AXIS TURBINES DRAG AND LIFT COEFFICIENTS WERE STUDIED AND IT WAS DETERMINED THAT VERTICAL-AXIS TURBINES CANNOT EQUAL HORIZONTAL-AXIS MACHINES IN EFFICIENCY BECAUSE THE ANGLE OF ATTACK OF THE HORIZONTAL-AXIS TURBINE CAN BE VARIED TO SUIT CONDITIONS. THE BEST HOPE FOR VERTICAL-AXIS WIND TURBINES LIES IN CONCENTRATING ON THE REGIONS WHERE COMPLETE EXTRACTION IS THEORETICALLY POSSIBLE AND LOOKING FOR A BLADE PROFILE THAT WILL MOST NEARLY MATCH THE LIFT AND DRAG CURVES.

1978-0517 HEALY T J
DEVELOPMENT AND TEST OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS).
INTERNATIONAL SOLAR ENERGY CONFERENCE AND FAIR, EL PASO, TEXAS, APRIL 13, 1978. EL PASO, TEXAS, 1978. P. 20.
(ABSTRACT)

1978-0518 HENNESSEY J P
COMPARISON OF THE WEIBULL AND RAYLEIGH DISTRIBUTIONS FOR ESTIMATING WIND POWER POTENTIAL.
WIND ENG. 2(3): 156-164, 1978.

FOR POTENTIAL WIND POWER SITES WHERE THE WEIBULL MODEL OF THE WIND SPEED DISTRIBUTION IS APPLICABLE, SOME GENERAL GUIDANCE IS PROVIDED WHICH WILL HELP INVESTIGATORS DECIDE: WHETHER OR NOT THE RAYLEIGH DISTRIBUTION WILL BE A SATISFACTORY APPROXIMATION TO THE WEIBULL; WHICH SITES ARE THE MOST PRODUCTIVE AND RELIABLE FOR AN AEROGENERATOR OF A SPECIFIC SIZE; AND WHICH SIZE OF AEROGENERATOR SHOULD BE USED GIVEN THE WIND SPEED CHARACTERISTICS OF A CERTAIN SITE.

1978-0519 HENRY G E
CLEAN ENERGY: SOME BITS AND PIECES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977.
ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1947-1961.

ONE SEEKS TO IDENTIFY POSSIBLE NOVEL APPLICATIONS OF EXISTING TECHNOLOGY, TO ACHIEVE, ON A LIMITED SCALE, ECONOMICALLY REWARDING SUBSTITUTIONS OF CLEAN ENERGY FOR THE USUAL CHEMICAL-TO-THERMAL CONVERSIONS. MAIN EMPHASIS IS ON WIND POWER. TWO POSSIBILITIES ARE TREATED IN SOME DETAIL: DESALTING SEAWATER (WINDMILL DIRECT COUPLED TO DRIVE A VAPOR COMPRESSION DISTILLATION SYSTEM) AND, SPACE HEATING (HEAT PUMP OPERATED BY WIND POWER). PRELIMINARY EVALUATION OF ECONOMIC FEASIBILITY IS MILDLY ENCOURAGING. FINALLY, THERE IS AN EXAMINATION OF THE MERITS AND THE DRAWBACKS INHERENT IN THE "BITS AND PIECES" APPROACH TO THE ENERGY PROBLEM.

1978-0520 HENSING P C
FLUTTER ANALYSIS OF SMALL WINDTURBINE. DESIGNED FOR MANUFACTURE AND USE IN DEVELOPING COUNTRIES.
NTIS, AUGUST 1978. 29 P.
UTH-LR-272, N80-18415/3

THE FLUTTER BEHAVIOR OF A WIND TURBOROTOR DESIGNED FOR MANUFACTURE AND USE IN DEVELOPING COUNTRIES WAS INVESTIGATED. POSSIBLE IMPROVEMENTS ARE DISCUSSED. THE EFFECT OF SCALING IS CONSIDERED. RESULTS SHOW THAT THE ADDITION OF SMALL TIP-MASSES HAS A CURATIVE INFLUENCE ON FLUTTER SENSITIVE ROTOR DESIGNS.

1978-0521 HERTER E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,721,450/A/, NOVEMBER 16, 1978. 49 P. (IN GERMAN)

THE PATENT CONCERNS A WIND TURBINE WITH VERTICAL ROTOR SHAFT. THE ROTOR HAS SEVERAL BLADES WHICH IN THEIR SIMPLEST FORM ARE SECTORS OF A HOLLOW SPHERE, SO THAT THE GAIN OF THE ANGLES SUBTENDED AT THE CENTRE OF THE INDIVIDUAL SECTORS IS 360 DEGREES. THE PART OF EACH SECTOR AT THE FRONT IN THE DIRECTION OF ROTATION HAS AN AXIS OF ROTATION FIXED BY TWO ARMS ON THE ROTOR AXIS, ROUND WHICH THE BLADE CAN BE ADJUSTED IN ANGULAR POSITION AND MOVED OUTWARDS, IN ORDER TO SET THE OPTIMUM ROTOR EFFICIENCY AT EACH WIND SPEED. A ROTOR WITH THIS FORM OF BLADES WAS TRIED IN A SMALL EXPERIMENTAL MODEL WITH 3 BLADES IN A WIND TUNNEL AND FOUND VERY USEFUL. APART FROM THIS TYPE OF BLADE, A LARGE NUMBER OF OTHER SHAPES OF BLADES IS PROPOSED.

1978-0522 HEWSON E W, BARBER D A, CHILOCOTE W W
PANEL II: BIOLOGICAL WIND PROSPECTING.
ECOLOGISTS/METEOROLOGISTS WORKSHOP, 1976, DOUGLAS LAKE, MICHIGAN, AUGUST 16, 1976. NTIS, FEBRUARY 1978. P. 43-89.
CONF-7608116

THE USE OF WIND AS AN ALTERNATE SOURCE OF ENERGY GENERATION IS DISCUSSED AND METEOROLOGICAL AND BIOLOGICAL ASPECTS OF WIND ARE CONSIDERED. EFFECTS OF WIND ON PLANTS ARE DISCUSSED WITH REGARD TO WATER BALANCE, PHOTOSYNTHESIS, HORMONE DISTRIBUTION, DESTRUCTION OF BUDS, AND DISTRIBUTION OF SHED PARTS. RECOMMENDATIONS FOR RESEARCH PROJECTS ON BIOLOGICAL WIND PROSPECTING ARE DESCRIBED.

1978-0523 HEWSON E W, WADE J E, BAKER R W, HEALD R C
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. WIND POWER POTENTIAL IN THE PACIFIC NORTHWEST COASTAL REGION. FINAL REPORT, FEBRUARY 15, 1978-JUNE 14, 1978.
NTIS, JUNE 1978. 92 P.
RLO/2227-T24-78-2

METHODOLOGIES FOR EVALUATING WIND POWER POTENTIAL OVER A REGIONAL AREA ARE DESCRIBED AS ARE THE ANALYSES PERFORMED UPON THE DATA FOR THE REGION DEFINED AS THE PACIFIC NORTHWEST COASTAL REGION (PNWCR). THIS REGION IS COMPOSED OF THE AREA WEST OF THE CASCADE MOUNTAINS IN WASHINGTON AND OREGON. THE ANALYSES UTILIZE EXISTING SUMMARIZED DATA, VEGETATIVE INDICATORS OF WIND VELOCITY, AND INFERRED WINDFLOW PATTERNS OVER CHARACTERISTIC COASTAL REGION TERRAIN FORMS.

1978-0524 HEWSON E W, WADE J H

BIOLOGICAL WIND PROSPECTING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 335-348.
CONF-770921/1

THE OBJECTIVE OF BIOLOGICAL WIND PROSPECTING IS TO DEVELOP METHODS OF USING WIND DEFORMED VEGETATION FOR SELECTING OPTIUM SITES FOR UTILIZATION OF WIND ENERGY. FIVE DIFFERENT INDICES OF WIND EFFECTS ON TREES HAVE BEEN DEVELOPED AND ARE BEING CALIBRATED IN TERMS OF VARIOUS WIND CHARACTERISTICS.

1978-0525 HIGHTOWER S J, WATTS A W
A PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 107-121.
CONF-770921/1

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST, AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED BY THE BUREAU OF RECLAMATION FOR A HIGH WIND REGION IN SOUTHERN WYOMING. THE BUREAU OPERATES AN EXTENSIVE TRANSMISSION SYSTEM, WITH NUMEROUS INTERCONNECTIONS WITH OTHER UTILITIES AND DELIVERY POINTS THROUGHOUT THE WESTERN UNITED STATES. THE ADVANTAGE OF THIS CAPABILITY IS THAT WIND TURBINES CAN BE INSTALLED AT OPTIMUM SITES OF KNOWN HIGH AVERAGE ANNUAL WINDPOWER AND STILL USE THE ENERGY STORAGE CAPABILITIES OF HYDROELECTRIC FACILITIES WHICH MAY BE KILOMETERS AWAY.

1978-0526 HIGHTOWER S J, WATTS A W
PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.
INST. ENVIRON. SCI. PROC., 1978, P. 307-309D.

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST, AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED BY THE BUREAU OF RECLAMATION FOR A HIGH WIND REGION IN SOUTHERN WYOMING. APPROXIMATELY 49 WIND TURBINES WOULD BE INSTALLED IN AN ARRAY AT A SITE NEAR MEDICINE BOW, WYOMING, ONE OF THE WINDIEST AREAS IN THE UNITED STATES. POWER OUTPUT FROM THE WIND TURBINES WOULD BE INTEGRATED WITH THE EXISTING HYDROELECTRIC SYSTEM WITHIN THE COLORADO RIVER STORAGE PROJECT, WHICH SERVES AS THE ENERGY STORAGE SYSTEM, AND HAS FACILITIES TO REGENERATE THE CAPACITY AND ENERGY IN A PRESCRIBED PATTERN AS DETERMINED BY THE MARKETING PLAN. TO STORE THE ENERGY FROM THE WIND TURBINES, GENERATION AT THE HYDRO POWER PLANTS WOULD BE REDUCED AN AMOUNT EQUAL TO THE WIND-TURBINE GENERATION. THUS, THE WATER THAT WOULD HAVE BEEN USED BY THE HYDRO POWER PLANTS REMAINS IN THE RESERVOIRS AND IS STORED FOR LATER USE. THE LOADS THAT WOULD HAVE BEEN SERVED BY THE HYDROGENERATORS WILL BE SERVED BY THE CAPACITY AND ENERGY PROVIDED BY THE WIND TURBINES.

1978-0527 HINSLEY A J A, SMITH D A D
APPLICATION OF SMALL WIND POWERED GENERATORS IN TELECOMMUNICATIONS AND OTHER HIGH RELIABILITY SYSTEMS.
WIND ENG. 2(2): 115-126, 1978.

A GREAT DEAL OF RESEARCH HAS BEEN AND IS STILL BEING CARRIED OUT TO DEVISE PROGRESSIVELY MORE EFFICIENT MEANS OF USING WIND ENERGY. IN THIS PAPER THE AUTHORS DISCUSS THE PRACTICAL AND ECONOMIC CONSIDERATIONS OF USING EXISTING 2 KW WIND POWERED GENERATORS, OF WELL PROVEN DESIGN, TO PROVIDE A HIGHLY RELIABLE SOURCE OF POWER FOR RADIO COMMUNICATION AND OTHER SYSTEMS OF A CRITICAL NATURE.

1978-0528 SFORZA P M
FLUID FLOW ENERGY CONVERSION SYSTEMS.
U.S. PATENT NO. 4,111,594, SEPTEMBER 5, 1978. 20 P.

FLUID FLOW ENERGY CONVERSION SYSTEMS EMPLOYING AERODYNAMIC FLOW-SEPARATION VORTEX GENERATION FOR FOCUSING THE KINETIC ENERGY OF FLOW IN THE WORKING AREA OF THE TURBINE ARE DISCLOSED IN THE CONTEXT OF WIND POWER PLANTS. AS A CONSEQUENCE OF THIS AUGMENTATION, FLUID VELOCITY ACTING ON THE ROTOR IS INCREASED BY A SUBSTANTIAL AMOUNT OVER THE FREE STREAM VELOCITY, RESULTING IN SUBSTANTIAL INCREASES IN POWER OUTPUT FOR A GIVEN TURBINE CONFIGURATION. PROVISIONS FOR VARYING THE ANGLE OF ATTACK OF THE AUGMENTOR SURFACE FOR CONTROL PURPOSES ARE ALSO DESCRIBED AS ARE CONFIGURATIONS EMPLOYING MULTIPLE AUGMENTOR SURFACES AND BOTH SLENDER BODY AND BLUFF BODY AUGMENTORS. ALSO DISCLOSED ARE VORTEX MIXING TECHNIQUES FOR CONTROLLING THE WIND GRADIENT TO ACHIEVE A MORE OPTIMUM WIND VELOCITY DISTRIBUTION AND MAGNITUDE RELATIVE TO THE WIND CONVERTER.

1978-0529 HOLDREN J P, MORRIS G, TANENBAUM G
ENVIRONMENTAL ASPECTS OF ALTERNATIVE ENERGY TECHNOLOGIES FOR CALIFORNIA.
NTIS, NOVEMBER 1978. 167 P.
UCRL-15002

THE FOLLOWING TOPICS ARE DISCUSSED: COST-BENEFIT ANALYSIS OF ENERGY IMPACTS ON BIOLOGICAL, GEOPHYSICAL, AND SOCIAL ENVIRONMENTS; IMPACTS OF SOFT AND TRANSITION TECHNOLOGIES SUCH AS SOLAR HEAT, ON-SITE/CENTRAL WIND SYSTEMS, WASTE/FARM BIOMASS SYSTEMS, GEOTHERMAL HEAT/ELECTRICITY, HYDROELECTRIC DAMS, AND FLUIDIZED-BED COAL BURNERS; OBSERVATIONS ON INCREASED EFFICIENCY; AND NEEDS FOR FURTHER WORK. AN APPENDIX ON BIOMASS INCLUDES DISCUSSIONS OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE CONVERSION OF BIOMASS TO SECONDARY ENERGY FORMS, ENVIRONMENTAL IMPACTS ASSOCIATED WITH USE OF FUELS, AND SYSTEMS IMPLICATIONS OF BIOMASS ENERGY USE. ENVIRONMENTAL EFFECTS OF HYDROPOWER ARE DISCUSSED IN A SECOND APPENDIX.

1978-0530 HOLLAND M B
POWER FROM THE WIND.
CHART. MECH. ENG. 25(5): 39-45, MAY 1978.

THE ADVENT OF MECHANICAL POWER WHICH COULD BE GENERATED AT WILL BY THE COMBUSTION OF CHEAP FOSSIL FUELS MADE THE WINDMILL UNECONOMIC AND FEW NOW REMAIN IN THE UNITED KINGDOM. NOWADAYS, FOSSIL FUEL IS NO LONGER CHEAP AND THE ECONOMICS OF WIND POWER ARE ONCE AGAIN BEGINNING TO LOOK ATTRACTIVE.

1978-0531 WORKSHOP ON MECHANICAL STORAGE OF WIND ENERGY. PROCEEDINGS.
NTIS, DECEMBER 14, 1978. 150 P.
WORKSHOP ON MECHANICAL STORAGE OF WIND ENERGY.
SAND-79-0001

A SUMMARY OF THE PAPERS PRESENTED AT THE MEETING INCLUDES INFORMATION ON FLYWHEEL INTERFACE AND STORAGE TECHNOLOGY FOR PHOTOVOLTAIC APPLICATIONS; A SIMULATION MODEL FOR WIND ENERGY SYSTEMS, STORAGE FACTORS; PLANNED FY 79 SERI TASKS IN STORAGE AND WIND; ENERGY STORAGE TECHNOLOGY DEVELOPMENT TO SUPPORT THE DOE WIND ENERGY

PROGRAM; ROCKY FLATS PRESENT AND PLANNED POWER MANAGEMENT SYSTEM; WIND ENERGY CONVERSION SYSTEM STORAGE NEEDS; ENERGY CONSERVATION AND STORAGE; AND SLA SYSTEMS ANALYSIS RESULTS.

1978-0532 HOWELL W E
ENVIRONMENTAL IMPACT OF LARGE WINDPOWER FARMS.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-21-1. (ABSTRACT ONLY)

1978-0533 HSU C T, MELLOR G L, YEN J T
SOME FLOW ANALYSES FOR TORNADO-TYPE WIND TURBINES.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 59-72.

THE POWER COEFFICIENT OF A TORNADO-TYPE WIND TURBINE IS ANALYZED FOR AN INCOMPRESSIBLE AND INVISCID FLUID WITH THE ASSUMPTION OF RADIALLY EQUILIBRIUM FLOW. A POWER COEFFICIENT BASED ON THE TOWER BASE AREA WAS CHOSEN FIRST. IT IS FOUND THAT THIS COEFFICIENT MAINLY DEPENDS ON THE AXIAL VELOCITY ALLOWED TO BE PRODUCED AT THE TURBINE OUTLET. A POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA IS ALSO COMPUTED.

1978-0534 HUGHES W L
SOME PRACTICAL TECHNICAL AND ECONOMIC ASPECTS OF SMALL WIND POWER SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 202-208.
CONF-770921/1

BECAUSE THE COST OF CONVENTIONALLY GENERATED ELECTRICITY IS INCREASING SIGNIFICANTLY DUE TO THE CAPITAL AND FUEL COST INCREASE, THERE HAS BEEN AN INTENSE CONSUMER INTEREST IN WIND ENERGY FOR THE INDIVIDUAL HOME. THIS INTEREST IN COMMERCIAL WIND AND SOLAR ENERGY CREATES EXPECTATIONS THAT CANNOT BE REASONABLY FULFILLED. THE BACKLASH OF THAT CAN DESTROY THE GREAT POTENTIAL THAT WIND AND SOLAR ENERGY HAVE FOR MAKING SIGNIFICANT CONTRIBUTIONS TO ALLEVIATING THE LONG-TERM ENERGY CRISIS.

1978-0535 WOOD A
WINDMILLS SHOW MECHANICAL PROBLEMS BUT DEPT. OF ENERGY ISN'T DISCOURAGED.
ENERGY RES. REP. 4(18): 3-5, OCTOBER 2, 1978.

AN ECONOMICALLY VIABLE WIND TURBINE SYSTEM PRODUCING ELECTRICITY AT TWO CENTS PER KILOWATT HOUR IS STILL PROJECTED FOR 1985 IN SPITE OF RECENT MECHANICAL PROBLEMS IN EXISTING MACHINES. A 100-HR INSPECTION OF A WINDMILL AT CLAYTON, N. MEX. DISCLOSED, E.G., LOOSE AND MISSING RIVETS AND PROPELLOR-BLADE CRACKS DUE TO DEFICIENCIES IN THE DESIGN AND CONSTRUCTION OF THE YAW MECHANISM. THE DOE WIND-SYSTEMS DIVISION HAS REPAIRED THE DAMAGE AND PLANS THREE NEW MACHINES FOR TESTING AT HAWAII, PUERTO RICO, AND BLOCK ISLAND, R.I.

1978-0536 HUGOSSON S
THE SWEDISH WIND ENERGY PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 474-479.
CONF-770921/1

THIS REPORT SUMMARIZES THE RESULTS FROM THE NATIONAL SWEDISH WIND ENERGY PROGRAM. IT OUTLINES THE FAVOURABLE CONDITIONS, LOCATIONS, TIME PERIODS, AND AVAILABILITY OF WIND ENERGY. SYSTEM ANALYSIS OF LARGE WIND POWER UNITS IS DISCUSSED AS WELL AS THE SITING POSSIBILITIES FOR WIND POWER UNITS AND THE IMPACT ON SOCIETY AND ENVIRONMENT.

1978-0537 HUNNICUTT C L, LINSCOTT B, WOLF R A
AN OPERATING 200-KW HORIZONTAL AXIS WIND TURBINE.
NATIONAL SAMPE SYMPOSIUM AND EXHIBITION, ANAHEIM, CALIFORNIA, MAY 2-4, 1978. NTIS, MAY 1978. 26 P.
DOE/NASA/1004-78/14, NASA-TM-79034

THE MOD-0A WIND TURBINE BLADES, MANUFACTURED BY LOCKHEED AIRCRAFT SERVICE COMPANY (LAS), ONTARIO, CALIFORNIA, ARE NOW OPERATING IN CLAYTON, NEW MEXICO. THESE BLADES, ROTATED FOR THE FIRST TIME ON NOVEMBER 30, 1977, ESTABLISH THE MOD-0A AS THE FIRST WIND-DRIVEN GENERATOR IN 35 YEARS TO BE CONTINUALLY TIED INTO AN ELECTRICAL POWER SYSTEM WHICH SERVICES A COMMUNITY.

1978-0538 HUSAIN S A
WIND POWER FOR BIRD SCARER TO BE USED IN ORCHARDS AND GRAIN-FIELDS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1858-1862.

IN TROPICAL COUNTRIES IT HAS BEEN OBSERVED THAT BIRDS SPOIL THE MAJOR PORTION OF GRAINS AND FRUITS. PARROTS EAT LESS BUT BITE MORE. SIMILARLY SPARROWS DESTROY THE CROPS LIKE LOCUSTS. EVEN CROWS, PEACOCKS, DUCKS AND GEESE CAUSE HEAVY DESTRUCTION TO CROPS. IN ORDER TO GET RID OF SUCH ENEMIES THE PEASANTS SHOUT THROUGHOUT THE DAY IN THEIR FIELDS AND ORCHARDS. THE NUMBER OF SUCH LABORERS INCREASES ACCORDING TO THE AREA TO BE CONTROLLED. THE CHEAPEST ENERGY AVAILABLE TO BE USED FOR THIS PURPOSE IS UNDOUBTEDLY WIND POWER.

1978-0539 HUTTER U
WIND ENERGY.
SCHWEIZ. TECH. Z. NO. 37-38: 1137-1140, SEPTEMBER 21, 1978. (IN GERMAN)

THE EXTENSIVE DATA ON THE TIME AND SPACE DISTRIBUTION OF WIND VELOCITY THROUGHOUT EUROPE AVAILABLE TO EUROPEAN METEOROLOGICAL OFFICES SHOWS THAT IN SWITZERLAND TOO THERE IS CONSIDERABLE WIND ENERGY POTENTIAL. THE ADVANTAGES OF LARGER WIND POWER ELECTRICITY GENERATING UNITS ARE DISCUSSED WITH THE AID OF TYPICAL DIMENSIONS, SOME OF THE MECHANICAL PROBLEMS WHICH NEED CONSIDERATION ARE DETAILED AND REFERENCE IS MADE TO THREE EXISTING INSTALLATIONS, WHICH INCLUDE A GERMAN 100 KW UNIT UNDER EVALUATION FOR 10 YEARS, AND TO SOME PROJECTS BEING CONSIDERED.

1978-0540 HUTTER U
WIND ENERGY CONVERTER.
GERMAN (FRG) PATENT NO. 2,655,026/B/, MAY 18, 1978. 11 P. (IN GERMAN)

THE PROBLEM WITH WIND WHEELS IS THE OCCURRENCE OF INSTABILITIES OF MOTION BY DIFFERENT FLOW VELOCITIES IN THE WING BLADE REGION. ACCORDING TO THE INVENTION DESCRIBED HERE, BETTER STABILITY OF MOTION THAN IN THE CURRENT DESIGNS IS ACHIEVED BY MEANS OF PROPER ROTOR BEARING.

1978-0541 HWANG H H, GILBERT L J
SYNCHRONIZATION OF WIND TURBINE GENERATORS AGAINST AN INFINITE BUS UNDER GUSTING WIND CONDITIONS.
IEEE TRANS. POWER APPAR. SYST. PAS-97(2): 536-544, MARCH-APRIL 1978.

STUDIES OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS ARE PERFORMED ON A DIGITAL COMPUTER. IN THE DIGITAL SIMULATION, WIND GUSTS OF DIFFERENT MAGNITUDES AND DURATIONS ARE HYPOTHESIZED. PRIOR TO THE SYNCHRONIZATION, DIFFERENCES OF THE FREQUENCY AND PHASE POSITION BETWEEN VOLTAGES OF THE ALTERNATOR AND THE BUS ARE ALSO INCLUDED IN THE SIMULATION. SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE SIMULATED AND PRESENTED GRAPHICALLY. THE ERDA-NASA 100-KW WIND TURBINE IS USED AS A CASE STUDY.

1978-0542 HWANG H H, GUO T, MOZEICO H V
TECHNIQUES FOR STABILIZING WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 29-FEBRUARY 3, 1978. NEW YORK, IEEE, 1978. P. 280-290.

PRESENTED IS AN ANALYTICAL REPRESENTATION OF A WIND TURBINE GENERATOR WHICH EMPLOYS BLADE PITCH ANGLE FEEDBACK CONTROL. A MATHEMATICAL MODEL IS FORMULATED. WITH THE FUNCTIONING MOD-0 WIND TURBINE SERVING AS A PRACTICAL CASE STUDY, RESULTS OF A COMPUTER SIMULATION OF THE MODEL AS APPLIED TO THE PROBLEM OF DYNAMIC STABILITY AT RATED LOAD IS PRESENTED.

1978-0543 WOLFF B
STANDARDS AND TESTING OF WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 898-902.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0544 INGLIS D R
WIND POWER AND OTHER ENERGY OPTIONS.
ANN ARBOR, MICHIGAN, UNIVERSITY OF MICHIGAN PRESS, 1978. 308 P.

THIS BOOK PRESENTS A BROAD LOOK AT WIND POWER AND AT THE ALTERNATIVE ENERGY SOURCES WITH WHICH ITS PROSPECTS ARE COMPARED: SOLAR, GEOPHYSICAL AND NUCLEAR. LARGE-SCALE WIND POWER IS SHOWN TO BE THE ONE OF THE SOLAR-RELATED SOURCES THAT IS TECHNICALLY AND ECONOMICALLY MOST READY TO GO NOW IN A BIG ENOUGH WAY TO CONTRIBUTE SUBSTANTIALLY TO NATIONAL ENERGY NEEDS SOON, LACKING MAINLY POLITICAL PRIORITY DECISIONS TO INITIATE THE NEEDED ENGINEERING EFFORT AND FINANCIAL BACKING. COST ESTIMATES OF LARGE WIND FARMS WITH STORAGE, BASED ON VARIED EXPERIENCE, COMPARE FAVORABLE WITH FUTURE NUCLEAR COSTS. THE BOOK IS LARGELY DESCRIPTION, HISTORY, ECONOMICS AND POLITICS BUT ALSO EXPLAINS THE SIMPLE PHYSICS OF HOW THINGS WORK.

1978-0545 INGLIS D R
POWER FROM THE OCEAN WINDS.
ENVIRONMENT 20(8): 17-20, OCTOBER 1978.

NO ONE HAS BEEN WILLING TO TRY TO MOOR TENS OF THOUSANDS OF FLOATING, MEGAWATT-SCALE WINDMILLS ABOVE THE MODERATE DEPTHS OF THE CONTINENTAL SHELF OFF THE US ATLANTIC SEABOARD. THE WIND AVERAGES FROM 400 TO 700 WATTS PER SQUARE METER WHERE ON LAND IN NEW ENGLAND THE WIND AVERAGES ONLY ABOUT 150 WATTS PER SQUARE METER. WILLIAM E. HERONEMUS PROPOSED SUCH A DESIGN IN 1972. HE ALSO PROPOSED THAT POWER FROM THOUSANDS OF THESE UNITS COULD BE CONVERTED TO HYDROGEN AT SEA AND PART OF THE HYDROGEN COULD BE PUT ASIDE FOR WINDLESS PERIODS IN EXPANDABLE STORAGE TANKS UNDER THE PRESSURE OF THE DEEP SEA AND IT WOULD ALL BE CONDUCTED ASHORE BY PIPELINE, EITHER TO BE USED DIRECTLY OR TO BE CONVERTED INTO ELECTRIC POWER STORED IN FUEL CELLS.

1978-0546 INHABER H
IS SOLAR POWER RISKIER THAN NUCLEAR?
AM. NUCL. SOC. TRANS. 30: 11-12, 1978.

1978-0547 INHABER H
IS SOLAR POWER MORE DANGEROUS THAN NUCLEAR?
NEW SCI. 78(1103): 444-446, MAY 18, 1978.

THE AUTHOR COMPARES THE DANGERS TO HUMAN HEALTH AND SAFETY INHERENT IN THE PRODUCTION OF ENERGY FROM UNCONVENTIONAL SYSTEMS SUCH AS WIND, METHANOL, SOLAR AND OCEAN THERMAL SYSTEMS, WITH CONVENTIONAL SYSTEMS SUCH AS COAL, OIL, NUCLEAR AND NATURAL GAS SYSTEMS.

1978-0548 INHABER H
RISK OF ENERGY PRODUCTION. SECOND EDITION.
NTIS, MAY 1978. 169 P.
AECB-1119(REV.1)

EVERY FORM OF HUMAN ACTIVITY INVOLVES RISK OF ACCIDENT OR DISEASE, RESULTING IN INJURY OR DEATH. GENERATION OF ENERGY IS NO EXCEPTION. ALTHOUGH SUCH RISK HAS PREVIOUSLY BEEN CONSIDERED FOR CONVENTIONAL SYSTEMS (COAL, OIL AND NUCLEAR), A SIMILAR ANALYSIS FOR THE SO-CALLED ALTERNATIVE OR NON-CONVENTIONAL SYSTEMS (SOLAR, WIND, OCEAN THERMAL AND METHANOL) HAS BEEN LACKING. THIS PAPER PRESENTS AN EVALUATION OF THE RISK, BOTH OCCUPATIONAL AND TO THE PUBLIC, OF THESE NON-CONVENTIONAL ENERGY SYSTEMS.

1978-0549 ISAACS N
NEW ZEALAND DIRECTORY OF ENERGY RESEARCHERS.
NTIS, 1978. 16 P.
NP-23453

1978-0550 JACOB A, VEILLETTE D, RAJAGOPALAN V
CONTROL STRATEGY FOR A VARIABLE-SPEED WIND ENERGY CONVERSION SYSTEM.
NEW YORK INST. ELECTR. ENG. PROC.: 528-531, 1978. (IN FRENCH) TRANSL.: NTIS, NOVEMBER 1979. 10 P.
NASA-TM-75512, N80-18558/0

A CONTROL CONCEPT FOR A VARIABLE-SPEED WIND ENERGY CONVERSION SYSTEM IS PROPOSED, FOR WHICH A SELF-EXCITED ASYNCHRONOUS CAGE GENERATOR IS USED ALONG WITH A SYSTEM OF THYRISTOR CONVERTERS. THE CONTROL LOOPS ARE THE FOLLOWING: (1) REGULATION OF THE ENTRAINMENT SPEED AS FUNCTION OF AVAILABLE MECHANICAL ENERGY BY ACTING ON THE

RESISTANCE COUPLE OF THE ASYNCHRONOUS GENERATOR; (2) CONTROL OF ELECTRIC POWER DELIVERED TO THE ASYNCHRONOUS MACHINE, FUNCTIONING AS A MOTOR, FOR START-UP OF THE VERTICAL AXIS WIND CONVERTER; AND (3) LIMITATION OF THE SLIP VALUE, AND BY CONSEQUENCE, OF THE INDUCTION CURRENTS IN THE PRESENCE OF SUDDEN VARIATIONS OF INPUT PARAMETERS.

1978-0551 JACOB A, VEILLETTE D, RAJAGOPALAN V
A COMMAND STRATEGY FOR AN ENERGY CONVERSION SYSTEM USING VARIABLE SPEED WIND POWER.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 528-531.

THE PAPER DESCRIBES A CONTROL SYSTEM WHICH USES AN ASYNCHRONOUS CAGE TYPE GENERATOR, SELF EXCITED, WITH AN ASSEMBLY OF THYRISTOR CONVERTORS. THE OVERALL AIMS ARE CONTROL OF POWER (BY CLUTCHING), CONTROL OF DRIVE SPEED, AND LIMITING SLIP. A DESCRIPTION IS GIVEN OF THE SCHEME FOR POWER CONTROL, THE ASYNCHRONOUS MACHINE AND ITS TRANSFER FUNCTION. FURTHER INFORMATION FOLLOWS ON THE THYRISTOR CONVERTORS, WITH SOME OF THE MATHEMATICS. THE DESIGN OF A DIGITAL OPTIMAL CONTROLLER IS CONSIDERED.

1978-0552 JARASS L
INTEGRATION OF WIND ENERGY IN NATIONAL ENERGY SUPPLY SYSTEMS--COMPARISON OF CONVENTIONAL AND WIND POWER PLANTS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 444-455.
CONF-770921/1

THIS STUDY PROPOSES A METHOD TO EVALUATE THE PERFORMANCE OF ALTERNATIVE POWER GENERATING TECHNOLOGIES AND ASSUMES FOR SIMPLICITY THAT THE POWER DEMAND EXCEEDS THE ENTIRE PRODUCTION OF THE CONSIDERED INDIVIDUAL POWER PLANT AT ALL TIMES.

1978-0553 JARASS L
ELECTRICITY GENERATION BY WIND POWER: AN OLD DREAM CAN BECOME REALITY.
ENERGIEWIRTSCH. TAGESFRAGEN 28(6): 357-366, JUNE 1978. (IN GERMAN)

THIS ARTICLE SUMMARISES BRIEFLY THE MAIN EQUATIONS RELATING TO WIND POWER, REVIEWS THE PROGRESS MADE IN WIND POWER GENERATION, DETAILS THE PRINCIPAL TECHNICAL CHARACTERISTICS OF INSTALLATIONS BUILT, UNDER CONSTRUCTION AND UNDER CONSIDERATION AND SUMMARISES THE EXPERIENCE GAINED, PROBLEMS ENCOUNTERED AND FINANCIAL INVESTMENT. THE STUDY, PART OF A FEDERAL GERMAN GOVERNMENT CONTRACT, CONCLUDES THAT WIND POWER GENERATION HAS AN IMPORTANT AND COMPETITIVE ROLE TO PLAY, DETAILS SOME PROBLEM AREAS AND RECOMMENDS GREATER R AND D EFFORT IN WEST GERMANY WHICH COULD LEAD TO SEVERAL PROTOTYPE INSTALLATIONS BY 1980 INSTEAD OF THE SINGLE PROTOTYPE PLANNED AT PRESENT.

1978-0554 JARASS L
POWER GENERATION FROM WIND ENERGY: AN ANCIENT DREAM CAN COME TRUE.
ENERGIEWIRTSCH. TAGESFRAGEN 28(6): 357-367, JUNE 1978. (IN GERMAN)

IN THE FIRST PART OF THE ARTICLE, THE PHYSICAL FUNDAMENTALS OF WIND ENERGY UTILIZATION ARE EXPLAINED. AFTER THIS, A SURVEY IS GIVEN ON WIND ENERGY UTILIZATION IN THE PAST AND ON MODERN WIND ENERGY PROJECTS. THE FOLLOWING COUNTRIES ARE CONSIDERED: DENMARK, FRANCE, SOVIET UNION, GREAT BRITAIN, NETHERLANDS, SWEDEN, WEST GERMANY. THE MAIN PLANTS ARE LISTED IN A DETAILED TABLE.

1978-0555 JARASS L
DETERMINATION OF WIND ENERGY PRODUCTION BY GUARANTEED PERFORMANCE (CAPACITY EFFECT) AND TOTAL PERFORMANCE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 389-402. (IN GERMAN)

FOR THE DETERMINATION OF WIND ENERGY PRODUCTION TWO MEASURES ARE CRUCIAL: GUARANTEED PERFORMANCE AS A MEASURE OF CAPACITY CREDIT AND TOTAL PERFORMANCE AS A MEASURE OF TOTAL ENERGY PRODUCTION. BOTH MEASURES ARE DEFINED SUCH THAT THEY CAN BE USED FOR COMPARISON OF CONVENTIONAL AND ALTERNATIVE POWER PLANTS. EXPLANATION OF RELATIONS BETWEEN GUARANTEED PERFORMANCE, TOTAL PERFORMANCE, INSTALLED CAPACITY, MAINTENANCE AND LOSS OF LOAD OF CONVENTIONAL AND ALTERNATIVE POWER PLANTS, STORAGE SIZE, MEAN WIND SPEED, NOMINAL FREQUENCY AND ITS VARIATION, ARE DISCUSSED.

1978-0556 JARASS A, JARASS L
STORMY DEVELOPMENT OF WIND ENERGY.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 14-17, NOVEMBER-DECEMBER 1978. (IN GERMAN)

THE ARTICLE GIVES A SURVEY OF THE DEVELOPMENT OF SOLAR POWER PLANTS IN RECENT YEARS. AFTER A SURVEY OF GENERAL POWER SUPPLY SYSTEMS THE METEOROLOGICAL AND TOPOGRAPHICAL CONDITIONS FOR THE USE OF WIND ENERGY ARE EXPLAINED. THE TECHNOLOGY AND POSSIBILITIES OF PRODUCING OR SAVING ENERGY BY USING WIND POWER PLANTS ARE EXPLAINED WITH EXAMPLES.

1978-0557 JAYADEV T S, PERKINS F, PERCIVAL D
OVERVIEW ASSESSMENT OF POTENTIAL SMALL ELECTRIC UTILITY APPLICATIONS OF WIND ENERGY SYSTEMS.
NTIS, NOVEMBER 1978. 63 P.
SERI/TR-35-086

A SURVEY OF SMALL MUNICIPAL AND RURAL ELECTRIC COOPERATIVE (REC) UTILITIES WAS ACCOMPLISHED. THE RELATIONSHIP BETWEEN THESE SMALL UTILITIES AND THE MEAN WIND POWER AT THEIR LOCATIONS WAS FOUND BY LOCATING THEM ON APPROPRIATE MAPS OF MEAN WIND POWER DENSITY. SOME OF THE SAFETY, SYSTEMS AND ECONOMIC IMPLICATIONS OF WECS DEPLOYMENT BY THESE UTILITIES WERE DISCUSSED. IT IS CONCLUDED THAT CERTAIN FINANCING ADVANTAGES AND GEOGRAPHICAL CONSIDERATIONS MAKE THE GREAT PLAINS REGION A STRONG CANDIDATE FOR THE EARLY COMMERCIALIZATION OF WECS.

1978-0558 WIND POWERED COMPOST.
WIND POWER DIG. NO. 13: 12-13, FALL 1978.

1978-0559 JESCH L F, WALTON D
DESIGN ANALYSIS OF A VERTICAL AXIS WIND TURBINE.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 2(5): 157-168, 1978. ALSO: INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 157-168.

AERODYNAMIC AND STRUCTURAL DESIGN ANALYSIS OF A DARRIEUS ROTOR IS PRESENTED. THE COMPUTER MODEL USES PUBLISHED EXPERIMENTAL DATA FOR THE NACA 0012 AEROFOIL. THE ANALYSIS OF THE RELATIVE CONTRIBUTIONS OF THE

TROPOSKIEN BLADE ELEMENTS LEADS TO A SUGGESTED CUTTING OFF OF BLADE PARTS WHICH WIDENS THE USEFUL VELOCITY RANGE. THE EFFECTS OF BLADE NUMBERS ON PERFORMANCE AND STRESSES ARE ANALYZED.

1978-0560 JIRLOW K
ENERGY ANALYSIS OF WIND POWER.
NTIS, MARCH 6, 1978. 24 P. (IN SWEDISH)
STUDSVIK-78/2

THE ENERGY INVESTMENTS IN WIND TURBINES HAVE BEEN ANALYZED FOR SOME SPECIFIC SWEDISH DESIGNS WITH ROTOR DIAMETERS OF 50, 100 AND 112 M. TYPICAL ENERGY PAYBACK TIMES FOR UNITS OF 1-4 MW NOMINAL POWER ARE 1 TO 2 YEARS AT A MEDIAN WIND SPEED OF 7.5 M/SEC. (100 M ABOVE GROUND) AND 0.75 TO 1.5 YEARS AT 8.5 M/SEC. FOR COMPARISON THE PAYBACK TIME FOR A NUCLEAR POWER STATION CALCULATED WITH THE SAME METHOD IS A FACTOR OF 5 LOWER.

1978-0561 WIND ENERGY SYSTEMS. PROGRAM SUMMARY.
NTIS, DECEMBER 1978. 135 P.
DOE/ET-0093

THIS SUMMARY REPORT OUTLINES THE PROJECTS FUNDED BY THE FEDERAL WIND ENERGY PROGRAM DURING FY 1978, AS WELL AS THE PROGRAM'S GENERAL ORGANIZATION AND SPECIFIC PROGRAM ELEMENTS.

1978-0562 JOHANSON E E
SUMMARY OF CURRENT COST ESTIMATES OF LARGE WIND ENERGY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 273-285.
CONF-770921/1

THE FEDERAL WIND ENERGY PROGRAM HAS FUNDED A NUMBER OF STUDIES TO EXAMINE WECS ECONOMICS AND POTENTIAL UTILIZATION ON A NATIONAL AND REGIONAL BASIS. THESE STUDIES INCLUDE TWO MACHINE DESIGN EFFORTS, TWO MISSION ANALYSES, AND FOUR REGIONAL ANALYSES. IN ADDITION, THE COSTS FOR THE SECOND GE MOD 1 MACHINE, FROM THE ORIGINAL CONTRACT, ARE PRESENTED. THIS PAPER IS A SUMMARY OF THE STUDY CONDUCTED BY JBF SCIENTIFIC CORPORATION TO PULL TOGETHER THE RESULTS OF THESE EIGHT STUDIES IN THE AREA OF LARGE WIND ENERGY SYSTEM ECONOMICS AND PUT THEM ON A COMMON ECONOMIC BASIS FOR COMPARISON PURPOSES.

1978-0563 JOHANSON E E
INSTITUTIONAL BARRIERS TO WECS GROWTH.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 893-897.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0564 JOHANSON E E, GOLDENBLATT M K
ASSESSMENT OF THE POTENTIAL FOR USING LARGE WIND TURBINES IN NEW ENGLAND.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 222-236.
CONF-770921/1

PRESENTED IN THIS PAPER IS A DESCRIPTION OF A GENERIC PLANNING PROCESS FOR EVALUATING THE FEASIBILITY OF WECS AS PART OF THE FUTURE POWER GENERATING MIX OF A UTILITY. THE DESCRIPTION IS SUFFICIENTLY GENERIC SO THAT IT CAN BE USED EITHER BY ELECTRIC UTILITIES THAT ARE PARTICIPANTS IN A POOLING ARRANGEMENT OR UTILITIES THAT HAVE STAND ALONE OPERATIONS.

1978-0565 JOHANSON E E, GOLDENBLATT M K
ECONOMIC MODEL TO ESTABLISH THE VALUE OF WECS TO A UTILITY SYSTEM.
SOLAR DIVERSIFICATION. AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, MEETING, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 580-587.

AN ECONOMIC MODEL IS DESCRIBED WHICH WAS DEVELOPED TO ALLOW DETERMINATION OF THE LIFE CYCLE VALUE OF A WECS INSTALLATION TO A UTILITY. THE MODEL WAS DESIGNED SO THAT IT IS COMPATIBLE WITH EXISTING UTILITY PRODUCTION COST MODELS AND PLANNING TECHNIQUES. IT ALLOWS THE UTILITY TO EVALUATE THE ECONOMIC EFFECT A STOCHASTIC SOURCE, SUCH AS A WECS, WOULD HAVE IF USED AS A FUEL SAVER. MORE IMPORTANT, HOWEVER, THE MODEL ALSO PROVIDES THE UTILITY WITH THE CAPABILITY OF REOPTIMIZING ITS CONVENTIONAL SOURCE MIX SO THAT THE MAXIMUM TOTAL COST SAVINGS AND CAPACITY CREDIT CAN BE OBTAINED.

1978-0566 JOHANSSON M
THE DANISH WIND ENERGY PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 432-437.
CONF-770921/1

A NUMBER OF ASSESSMENTS AND STUDIES, MOSTLY CONCERNING THE ECONOMICAL POSSIBILITIES, AND SOME PRACTICAL EXPERIMENTS HAVE BEEN CARRIED OUT. A TWO YEARS DEVELOPMENT PROGRAM FOR LARGER WIND TURBINE GENERATORS (WTGS) WAS INITIATED BY THE GOVERNMENT IN DECEMBER 1976. THIS PROGRAM IS THE FIRST STAGE OF A LARGE PROGRAM, WHICH SHOULD CLARIFY THE QUESTION OF A POSSIBLE EXPLOITATION OF WIND POWER IN THE DANISH ELECTRICITY SUPPLY SYSTEM. THE TWO YEARS PROGRAM IS SPONSORED WITH 14,260,000 KR. ($2,400,000) BY THE MINISTRY OF COMMERCE AND WITH 3,000,000 KR ($500,000) BY THE ELECTRIC UTILITIES, WHO ARE ALSO MANAGING THE PROGRAM.

1978-0567 JOHANSSON T B, STEEN P
SOLAR SWEDEN.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 3, P. 1453-1468.

THE AUTHORS OUTLINE A CONCEIVABLE RENEWABLE ENERGY SYSTEM FOR THE YEAR 2015 USING BIOMASS, SOLAR HEATING, HYDRO-ELECTRIC POWER, WIND POWER AND SOLAR CELLS.

1978-0568 JOHANSSON T B, STEEN P
SOLAR SWEDEN: AN OUTLINE TO A RENEWABLE ENERGY SYSTEM.
NTIS, 1978. 134 P.
NP-23513

A SWEDISH ENERGY SUPPLY BASED COMPLETELY ON SOLAR ENERGY (INCLUDING BIOMASS AND WIND POWER) FOR THE YEAR 2015 IS STUDIED. THE TECHNICAL, ECONOMIC, AND ORGANIZATIONAL CHARACTERISTICS OF SUCH A SYSTEM ARE DISCUSSED.

1978-0569 JOHN V I, SONES J
A VARIABLE SPEED CONSTANT FREQUENCY (VSCF) WIND GENERATOR FOR LOW POWER APPLICATIONS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 382-385.

A POLYPHASE COMMUTATOR MOTOR OF THE SCHRAGE TYPE IS USED. AN AUTOMATIC CONTROL SYSTEM WHICH MAINTAINS CONTINUOUS GENERATOR OPERATION FOR A WIDE RANGE OF SPEEDS IS DESCRIBED. TEST-RESULTS AND COMPUTED RESULTS (BASED ON AN EQUIVALENT CIRCUIT) ARE OBTAINED FOR EFFICIENCY, POWER OUTPUT, POWER FACTOR AND MECHANICAL TORQUE FOR DIFFERENT OPERATING SPEEDS.

1978-0570 JOHNSON G L
ECONOMIC DESIGN OF WIND ELECTRIC SYSTEMS.
IEEE TRANS. POWER APPAR. SYST. PAS-97(2): 554-562, MARCH - APRIL 1978.

LONG TERM WIND RECORDS ARE USED TO SELECT THE RATED WIND SPEED FOR WIND ELECTRIC GENERATORS. THE WIND IS CHARACTERIZED BY A WEIBULL DENSITY FUNCTION. DETAILED RESULTS ARE PRESENTED FOR WESTERN KANSAS. GRAPHS ARE PRESENTED WHICH CAN BE USED TO DESIGN A WIND SYSTEM FOR MAXIMUM SPECIFIC OUTPUT FOR A SPECIFIED LOAD FACTOR AT A GIVEN SITE. IT IS SHOWN THAT A WIND TURBINE RATED AT A WIND SPEED OF 9 M/S HAS A SPECIFIC OUTPUT WITHIN 80 PERCENT OF THE MAXIMUM FOR A WIDE RANGE OF WIND CONDITIONS.

1978-0571 JORDAN G A, MARSH W D, OPLINGER J L
APPLICATION OF WIND AND PHOTOVOLTAIC POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 345-350.

THIS PAPER GIVES A BRIEF REPORT OF THE PROCEDURES AND RESULTS OF TWO STUDIES PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE. ONE OF THE STUDIES CONCERNED WIND POWER PLANTS AND THE OTHER PHOTOVOLTAIC POWER PLANTS. THE MAJOR OBJECTIVE OF EACH WAS TO DEVELOP A METHODOLOGY FOR STUDYING THE PERFORMANCE AND ECONOMIC REQUIREMENTS OF THE PLANT WHEN APPLIED TO ELECTRIC UTILITY POWER SYSTEMS.

1978-0572 JORDAN P F
SELF-ADJUSTING WIND TURBINE ROTORS: A CONCEPT.
ENERGY 3(4): 25-26, FALL 1978.

IT IS POINTED OUT THAT THE LARGER THE ROTOR, THE LESS UNIFORM WILL BE THE DISTRIBUTION OF THE WIND SPEED OVER THE ROTOR PLANE. IDEALLY, THEREFORE, ONE WOULD LIKE TO HAVE ROTOR BLADES WHICH ADJUST THEMSELVES AUTOMATICALLY AND LOCALLY TO THE INSTANTANEOUS WIND SPEED DISTRIBUTIONS ALONG EACH BLADE. SUCH BLADES WOULD ELIMINATE NOT ONLY THE NEED FOR PITCH DRIVES BUT ALSO WOULD ELIMINATE THE STRUCTURALLY CUMBERSOME REQUIREMENT TO FASTEN THE BLADES TO THE TURBINE HUB IN SUCH A MANNER THAT THE BLADE CAN BE ROTATED IN PITCH. A BRIEF DESCRIPTION IS GIVEN OF A CONCEPTUAL DESIGN OF SUCH A SELF-ADJUSTING ROTOR BLADE, THE MAIN RESULTS OF AN INVESTIGATION SUPPORTED BY ERDA FROM MAY 1975 THROUGH APRIL 1976. THE BASIC CONCEPT WAS THAT THE ROTOR BLADE SHOULD REACT TO CHANGING WIND SPEEDS AEROELASTICALLY, WITH SUITABLE CHANGES OF ITS LOCAL PITCH ANGLES, SUCH THAT THE LOCAL CONTRIBUTIONS OF THE BLADE'S AERODYNAMIC LIFT TO THE TOTAL ROTOR TORQUE WOULD REMAIN INVARIANT, HAVING ALWAYS THEIR IDEAL VALUES AS CALCULATED FOR THE DESIGN SPEEDS. OF THE DESIGN APPROACHES THAT WERE CONSIDERED, A SEGMENTED BLADE DESIGN APPEARED THE MOST PROMISING AND WAS INVESTIGATED IN CONSIDERABLE DETAIL.

1978-0573 JUSTUS C G
WINDS AND WIND SYSTEM PERFORMANCE.
PHILADELPHIA, FRANKLIN INSTITUTE PRESS, 1978. 120 P.

1978-0574 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE WECS ARRAYS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 297-306.
CONF-770921/1

WIND POWER PERFORMANCE OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN FOUR REGIONS OF THE COUNTRY HAVE BEEN STUDIED (NEW ENGLAND, GREAT LAKES, CENTRAL U.S., AND PACIFIC COAST REGIONS). THE LARGE ARRAYS OF WECS PERFORM DIFFERENTLY THAN A SINGLE WECS AT AN INDIVIDUAL SITE WOULD, ESPECIALLY WITH REGARD TO DISTRIBUTIONS OF POWER OUTPUT AND PROBABILITIES OF POWER CHANGES. A SIMPLE MODEL HAS BEEN DEVELOPED, BASED ON THE NUMBER OF WECS SITES IN THE ARRAY AND AVERAGE SPATIAL CORRELATION ACROSS THE ARRAY, WHICH REPRODUCES WELL CERTAIN OF THE OBSERVED ARRAY PERFORMANCE CHARACTERISTICS.

1978-0575 JUSTUS C G, MANI K, MIKHAIL A
INTERANNUAL AND MONTH-TO-MONTH VARIATIONS OF WIND SPEED. TECHNICAL REPORT.
NTIS, APRIL 1978. 100 P.
RLO-2439-78/2

SPATIAL CROSS-CORRELATIONS AND INTERANNUAL AND MONTH-TO-MONTH VARIATION OF MONTHLY AND ANNUAL MEAN WIND SPEED WERE STUDIED AT 40 SITES THROUGHOUT THE U.S. RESULTS INDICATE THAT FOR CANDIDATE SITE EVALUATION, ONSITE DATA MUST BE RELIED UPON MORE THAN ORIGINALLY CONSIDERED, AND CLIMATOLOGICAL DATA RELIED UPON LESS. OTHER ASPECTS ADDRESSED CONCERN THE DEGREE OF VARIABILITY TO BE EXPECTED IN CANDIDATE SITE DATA AND THE PROBABILITIES OF OBSERVING CONSECUTIVE HIGH PERIODS OR CONSECUTIVE LOW PERIODS OF ONSITE WIND SPEEDS. THESE FACTORS ALLOW MORE THOROUGH EVALUATION OF CANDIDATE SITE WIND POTENTIAL FROM LIMITED ONSITE DATA (E.G., ON YEAR).

1978-0576 JUSTUS C G, MIKHAIL A S
ENERGY STATISTICS FOR LARGE WIND TURBINE ARRAYS.
WIND ENG. 2(4): 184-202, 1978.

RESULTS OF STUDIES OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS ARE SUMMARIZED AND SYNTHESIZED INTO A METHODOLOGY WHEREBY ARRAY WIND SPEED DISTRIBUTIONS AND ARRAY POWER OUTPUT DISTRIBUTIONS CAN BE CALCULATED FOR ARRAY OF ANY NUMBER OF SITES AND ANY SPATIAL SIZE. REQUIRED INPUT FOR THE METHOD CONSISTS OF: ARRAY MEAN WIND SPEED; MAXIMUM DISTANCE BETWEEN SITES WITHIN AN ARRAY; NUMBER OF SITES IN THE ARRAY; AND STANDARD DEVIATION (OR WEIBULL SCALE FACTOR), EITHER MEASURED OR INFERRED FROM REFERENCE STATISTICAL DATA.

1978-0577 JUSTUS C G, SALES A T
SOLAR ENERGY METEOROLOGICAL RESEARCH AND TRAINING AT GEORGIA TECH.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 509-512.

THE GEORGIA INSTITUTE OF TECHNOLOGY HAS BEEN SELECTED BY THE DEPARTMENT OF ENERGY AS THE SOUTHEASTERN (REGION 3) SOLAR ENERGY METEOROLOGICAL RESEARCH AND TRAINING SITE. A COMPREHENSIVE MONITORING PROGRAM FOR SOLAR RADIATION AND METEOROLOGICAL PARAMETERS WILL BE DEVELOPED FOR TWO SITES: (1) AN ON CAMPUS SITE ADJACENT TO THE DEPARTMENT OF ENERGY 400 KWTH ADVANCED COMPONENTS TEST FACILITY AND WIND TURBINE TEST SITE, (2) AN OFF-CAMPUS SITE ADJACENT TO THE SHENANDOAH SOLAR TOTAL ENERGY SITE.

1978-0578 JUSTUS C G, MIKHAIL A S
ENERGY STATISTICS FOR LARGE WIND TURBINE ARRAYS. ANNUAL PROGRESS REPORT, MAY 1, 1977-APRIL 30, 1978.
NTIS, MAY 1978. 127 P.
RLO-2439-78/3

WIND ENERGY STATISTICS OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS (WECS) HAVE BEEN STUDIED IN FOUR REGIONS OF THE COUNTRY: THE NEW ENGLAND AND CENTRAL UNITED STATES REGIONS (JUSTUS, 1976) AND THE GREAT LAKES AND PACIFIC COAST REGIONS (JUSTUS AND HARGRAVES, 1977). RESULTS OBTAINED FROM MULTIREGIONAL ARRAYS OF SELECTED SITES FROM THESE FOUR PREVIOUSLY STUDIED REGIONS ARE PRESENTED.

1978-0579 JUUL N H
OPTIMUM DESIGN POINT GEOMETRY AND PERFORMANCE OF PROPELLER TYPE WIND TURBINES.
WIND ENG. 2(2): 86-102, 1978.

THE SIMPLE STRIP THEORY IS USED TO DEVELOP THE EQUATIONS WHICH ARE REQUIRED TO DETERMINE THE OPTIMUM DESIGN POINT GEOMETRY AND PERFORMANCE PARAMETERS OF PROPELLER TYPE WIND TURBINES. THE OPTIMUM DESIGN POINT IS DEFINED BY THE CONDITIONS WHICH MAXIMIZE THE POWER ABSORBED BY EACH BLADE ELEMENT ALONG THE BLADE. A COMPUTER PROGRAM IS DEVELOPED TO CALCULATE, FOR A GIVEN AIRFOIL, THE DIMENSIONLESS OPTIMUM DESIGN POINT PERFORMANCE.

1978-0580 KADLEC E G
CHARACTERISTICS OF FUTURE VERTICAL-AXIS WIND TURBINES.
NTIS, JULY 1978. 22 P.
SAND-79-1068

AS A DOE FACILITY, SANDIA LABORATORIES IS DEVELOPING DARRIEUS VERTICAL-AXIS WIND TURBINE (VAWT) TECHNOLOGY. THE OBJECTIVE OF THIS TECHNOLOGY IS TO ASSESS THE PRACTICALITY OF WIND-ENERGY SYSTEMS FOR LOW-COST PRODUCTION AND COMMERCIAL MARKETING BY PRIVATE INDUSTRY. THIS REPORT DESCRIBES THE CHARACTERISTICS OF CURRENT TECHNOLOGY DESIGNS AND ASSESSES THEIR COST-EFFECTIVENESS. BETTER AERODYNAMICS AND FUTURE STRUCTURAL REQUIREMENTS COMBINE FOR POTENTIAL ENERGY COST REDUCTIONS OF 35 TO 40%.

1978-0581 KALSER H W
WIND POWERED TURBINE AND AIRFOIL CONSTRUCTION.
U.S. PATENT NO. 4,130,380, DECEMBER 19, 1978.

THIS PATENT COVERS A WIND POWERED TURBINE COMPRISING IN COMBINATION A TOWER, AND A ROTOR STRUCTURE SUPPORTED BY SAID TOWER INCLUDING OUTWARDLY EXTENDING ARMS, AN AIRFOIL BLADE SUPPORTED IN AN UPRIGHT MANNER AT THE OUTER END OF EACH OF SAID ARMS, EACH BLADE BEING OF CURVILINEAR SHAPE WITH BLADE END SEGMENTS DIRECTED OUTWARDLY AWAY FROM THE AXIS OF ROTOR ROTATION, EACH BLADE BEING OF AN AERODYNAMIC SHAPE AND HAVING A LEADING EDGE, TENSIONED ELONGATE MEANS EXTENDING INTERMEDIATE EACH BLADE END SEGMENT AND ITS SUPPORTING ARM TO RECEIVE BLADE IMPARTED LOADS TO INHIBIT BLADE DISTORTION UNDER DYNAMIC LOADS.

1978-0582 KEAST D N
NOISE-CONTROL NEEDS IN THE DEVELOPING ENERGY TECHNOLOGIES.
NTIS, MARCH 1978. 250 P.
COO-4389-1

THE NOISE CHARACTERISTICS OF EXISTING ENERGY CONVERSION TECHNOLOGIES, E.G., FROM OBTAINING AND PROCESSING FOSSIL FUELS TO POWER PLANT OPERATIONS, AND OF DEVELOPING ENERGY TECHNOLOGIES (WIND, GEOTHERMAL SOURCES, SOLAR ENERGY OR FUSION SYSTEMS) ARE DISCUSSED IN TERMS OF THE EFFECTS OF NOISE ON HUMANS, ANIMALS, STRUCTURES, AND EQUIPMENT AND METHODS FOR NOISE CONTROL.

1978-0583 KELLY D A
COMBINED HIGH DENSITY SOLAR PANELS AND VERTICAL WIND TURBINES.
U.S. PATENT NO. 4,119,863, OCTOBER 10, 1978. 10 P.

THE COMBINED HIGH DENSITY SOLAR PANELS AND VERTICAL WIND TURBINES CONSIST OF MULTIPLE SOLAR PANELS WITH CLOSELY SPACED SOLAR CELLS ON BOTH SIDES WHICH ARE SUPPORTED BY AN OPEN FRAMEWORK AND VERTICAL POSTS. THE ADOPTION OF AN ELEVATED, ROOFTOP SOLAR PANEL ARRAY, SUPPORTED BY VERTICAL POSTS MAKES THE BASIC STRUCTURE ATTRACTIVE FOR THE INCLUSION OF MULTIPLE VERTICAL WIND TURBINES, AS A SUPPLEMENTARY POWER SOURCE. THIS COMBINED NATURAL POWER CONVERSION ARRANGEMENT IS INTENDED FOR MOUNTING ON THE FLAT ROOFS OF CITY BUILDINGS AND OTHER SIMILAR FLAT, LIMITED AREA SITES.

1978-0584 KENTFIELD J A C
PREDICTION OF THE OPTIMUM PERFORMANCE OF VENTURI-TYPE WIND-ENERGY CONCENTRATORS.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MO-ROLLA, EXTENSION DIVISION, 1978. P. 57-64.

A SIMPLE THEORETICAL ANALYSIS IS PRESENTED WHICH ALLOWS THE OPTIMUM PERFORMANCE TO BE PREDICTED FOR VENTURI-TYPE WIND-ENERGY CONCENTRATORS. THE RESULTS OF THE ANALYSIS ARE PRESENTED IN CONVENIENT PARAMETRIC FORM IN SUCH A MANNER THAT, FOR EXAMPLE, THE INFLUENCE ON OPTIMUM PERFORMANCE OF REDUCING THE OUTLET AREA OF THE EXIT DIFFUSER, AN OBVIOUS MEANS OF REDUCING THE BULK AND COST OF A VENTURI-TYPE CONCENTRATOR, CAN BE ESTABLISHED DIRECTLY FROM THE CURVES.

1978-0585 KERRIGAN T C
SPECTRAL ESTIMATES OF A WIND FLUCTUATION STATISTIC PERTAINING TO WIND ENERGY GENERATORS.
NTIS, SEPTEMBER 1978. 40 P.
PNL-2511

AN ESTIMATE IS DEVELOPED FOR THE FREQUENCY WITH WHICH A VOLUME AVERAGE OF THE LONGITUDINAL COMPONENT OF WIND VELOCITY CHANGES BY A GIVEN AMOUNT IN A GIVEN TIME.

1978-0586 KERRIGAN T C
VERIFICATION STATISTIC FOR NUMERICAL WIND MODELS.
NTIS, SEPTEMBER 1978. 81 P.
PNL-2510

A GENERALIZED WIND ESTIMATE BASED ON A LIMITED NUMBER OF UNCERTAIN FIELD MEASUREMENTS IS COMPUTED AT EACH POINT IN A GIVEN GEOGRAPHICAL REGION. A POINT-BY-POINT COMPARISON WITH A NUMERICAL MODEL PREDICTION OF THE WIND FIELD IS THEN DESCRIBED. THIS COMPARISON RESULTS IN NUMERICAL ASSESSMENTS OF THE PROBABILITY THAT THE MODEL SUCCEEDED IN PREDICTING THE ACTUAL WIND FIELD AND THAT THE FIELD MEASUREMENTS CONTAIN SUFFICIENT INFORMATION ON WHICH TO BASE SUCH A COMPARISON.

1978-0587 KHAN M H
MODEL AND PROTOTYPE PERFORMANCE CHARACTERISTICS OF SAVONIUS ROTOR WINDMILL.
WIND ENG. 2(2): 75-85, 1978.

MODEL TESTS WERE CONDUCTED IN A WIND TUNNEL TO ARRIVE AT AN OPTIMUM CONFIGURATION OF SAVONIUS ROTOR WINDMILL. EFFECTS OF THREE DESIGN PARAMETERS, NAMELY ROTOR SHAPE, OVERLAP BETWEEN ROTOR BLADES, AND SEPARATION GAP BETWEEN ROTOR BLADES, ON THE OPERATING CHARACTERISTICS WERE STUDIED. ROTOR MODELS WITH DIFFERENT COMBINATIONS OF THE VARIABLE PARAMETERS WERE TESTED UNDER THREE WIND VELOCITIES TO DETERMINE THE CONFIGURATION WHICH WOULD PROVIDE THE BEST RELATIVE PERFORMANCE.

1978-0588 KILAR L A
OFFSHORE WIND ENERGY CONVERSION SYSTEMS -- PREVIEW OF A FEASIBILITY STUDY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 712-722.
CONF-770921/2

IN AUGUST 1976, THE ADVANCED SYSTEMS TECHNOLOGY DIVISION OF WESTINGHOUSE POWER SYSTEMS COMPANY INITIATED WORK ON AN ERDA-SPONSORED STUDY TO ASSESS THE TECHNICAL FEASIBILITY AND COSTS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS SITED IN THE U.S. OFFSHORE. SUBCONTRACTORS FOR THE 14-MONTH INVESTIGATION ARE GLOBAL MARINE DEVELOPMENT INCORPORATED, OCEANOGRAPHIC SERVICES INCORPORATED, KAMAN AEROSPACE CORPORATION AND WESTINGHOUSE RESEARCH LABS. PUBLIC SERVICE ELECTRIC & GAS OF NEW JERSEY AND THE INSTITUTE OF GAS TECHNOLOGY ARE CONTRIBUTING AS CONSULTANTS.

1978-0589 KING R J
STATE OF TEXAS SUPPORT FOR WIND ENERGY.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 4-7.
CONF-780357

A BRIEF SUMMARY IS PRESENTED OF THE TEXAS STATE GOVERNMENT COMMITMENTS TO THE DEVELOPMENT OF WIND ENERGY PROGRAMS.

1978-0590 KING S M, DUFFY M
ANALYSIS AND TESTING OF A TOWER STRUCTURE FOR APPLICATION TO WIND TURBINE SYSTEMS.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 97-106.

A TOWER IS AN ESSENTIAL PART OF ALL WIND TURBINE SYSTEMS. ALTHOUGH LARGE TURBINES CAN AFFORD TO INCORPORATE CUSTOM DESIGNED TOWERS, SMALL TURBINES CANNOT. MARKET ECONOMICS FORCE SUPPLIERS OR USERS OF SMALL TURBINES TO ADOPT EXISTING TOWERS DESIGNED FOR OTHER APPLICATIONS. THERE APPEARS TO BE A NEED FOR A RELATIVELY SMALL TOWER FOR WIND TURBINES TYPICALLY USED IN CONNECTION WITH INDIVIDUAL RESIDENCES AND SMALL FARMS. A NEW TOWER DESIGN, THE OCTAHEDRON TOWER, HAS BEEN CARRIED TO A STAGE WHICH IS CLOSE TO BEING ENTIRELY CERTIFIABLE TO EIA (ELECTRONICS INDUSTRY ASSOCIATION) STANDARDS. A SIGNIFICANT PART OF THIS EFFORT INVOLVED COMPUTER ANALYSIS AND THE PHYSICAL TESTING OF AN ACTUAL TOWER. RESULTS OF MANUAL CALCULATION, COMPUTER ANALYSIS AND LOAD TESTING SHOWED GOOD AGREEMENT.

1978-0591 KIRCHHOFF R H, MODARRESI K, MURPHY P
THE INTERACTION OF THE WIND FIELD WITH A HORIZONTAL AXIS WIND TURBINE.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 45-57.

A STEADY STATE, AXISYMMETRIC, POTENTIAL FLOW MODEL OF THE WIND FIELD UPSTREAM OF A HORIZONTAL AXIS WIND TURBINE IS PRESENTED. THE BLADE DISC IS MODELED BY A DISTRIBUTION OF SOURCES IN ITS PLANE OF ROTATION. AN ANALYTICAL EXPRESSION FOR THE POTENTIAL FUNCTION IS DEVELOPED. SAMPLE FLOW FIELD CALCULATIONS FOR THE UMASS SOLAR HABITAT I 25 KW WIND TURBINE ARE PRESENTED. THE DYNAMIC INTERACTION BETWEEN THE HORIZONTAL GUSTINESS OF THE WIND FIELD AND THE INSTANTANEOUS POWER GENERATED BY THIS 25 KW WIND TURBINE IS INVESTIGATED BY MEASURING THE TRANSFER FUNCTION BETWEEN WIND SPEED AND THE GENERATOR VOLTAGE.

1978-0592 KLEIN H, WAGNER H F, FREIDRICH F J, HEINZELMANN P J
FEDERAL REPUBLIC OF GERMANY PROGRAMME TECHNOLOGIES FOR THE UTILIZATION OF SOLAR ENERGY.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 45-50.

THE PROGRAMME WAS LAUNCHED AT THE BEGINNING OF 1974 AS PART OF THE NON-NUCLEAR R AND D PROGRAMME. A NEW PROGRAMME BASED UPON EXPERIENCE GAINED DURING THE LAST 3 YEARS WAS LAUNCHED IN SEPTEMBER 1977. THE MAJOR OBJECTIVES ARE THERMAL UTILIZATION, ELECTRICAL UTILIZATION (THERMAL ENGINES AND PHOTOCELLS, WIND ENERGY, WATER POWER AND WAVE ENERGY), BIOLOGICAL AND CHEMICAL UTILIZATION, GENERAL MEASURES (DATA COMPILATION AND EVALUATION, STANDARDIZATION OF COMPONENTS AND SYSTEMS, AND SYSTEMS ANALYSIS) AND INTERNATIONAL COOPERATION.

1978-0593 KOHLOSS F H
HAWAIIAN ENERGY HOUSE.
MIL. ENG. 70(455): 170-172, 1978.

A DESCRIPTION IS GIVEN OF THE HAWAIIAN ENERGY HOUSE, WHICH WAS DESIGNED TO ACHIEVE COMFORTABLE HOUSING USING LOW-COST MATERIALS AND CONSTRUCTION METHODS CONSISTENT WITH CURRENT IDEALS OF LOW ENERGY CONSUMPTION, USE OF

ALTERNATE ENERGY SOURCES, AND CONSERVATION AND RECYCLING OF WATER. TOPICS DISCUSSED INCLUDE THE VENTILATION SYSTEM, THE SOLAR HOT WATER SYSTEM, SEASONAL SUN POSITION AND SHADING DESIGN, THE WIND POWER GENERATION SYSTEM, AND HOUSEHOLD APPLIANCES.

1978-0594 KOIDE G T, TAKAHASHI P K
SOLAR AND WIND ENERGY APPLICATIONS IN HAWAII.
SOL. ENERGY 21(4): 297-305, 1978.

THE OBJECTIVE OF THE STUDY DESCRIBED WAS TO STIMULATE THE DEVELOPMENT OF SOLAR ENERGY BY ASSISTING IN THE FIRST CRUCIAL STEPS OF THE PLANNING PROCESS. THIS INVESTIGATION SELECTED PROJECTS WHICH HAD POTENTIAL FOR IMMEDIATE IMPLEMENTATION IN THE STATE OF HAWAII. VARIETY IN FORM OF APPLICATION, TYPE OF ENGINEERING ANALYSIS AND LOCATION WITHIN THE STATE WAS SOUGHT. TO A LARGE EXTENT THESE BASIC PREMISES WERE WELL MET, AS APPLICATIONS RANGE FROM AGRICULTURE TO AQUACULTURE TO TOURISM TO EDUCATION ON THREE ISLANDS.

1978-0595 KORNREICH T R, TOMPKINS D M
AN ANALYSIS OF THE ECONOMICS OF CURRENT SMALL WIND ENERGY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 156-172.
CONF-770921/2

THIS REPORT PRESENTS A REVIEW OF THE PERFORMANCE AND ECONOMICS OF CURRENTLY AVAILABLE SMALL WECS AND PROVIDES AN INDICATION OF HOW WELL THESE SYSTEMS COMPETE WITH ALTERNATIVE ENERGY SOURCES IN CERTAIN APPLICATIONS AT TODAY'S TECHNOLOGY AND COMMERCIAL STATUS. IT SHOULD BE POINTED OUT THAT WECS COSTS DO NOT INCLUDE THE EFFECTS OF R&D WHICH MIGHT LEAD TO BETTER MACHINES AS MEASURED BY PERFORMANCE AND COST.

1978-0596 KORNREICH T R
THIRD WIND ENERGY WORKSHOP. PROCEEDINGS OF THE THIRD BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. 2 VOLS. 1009 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, WASHINGTON, D.C., SEPTEMBER 19-21, 1977.
CONF-770921/1, CONF-770921/2

SEPARATE ABSTRACTS ARE INCLUDED FOR 34 PAPERS PRESENTED CONCERNING TECHNOLOGY DEVELOPMENT, METEOROLOGICAL SITING CONSIDERATION, MULTI-UNIT APPLICATIONS, AND INNOVATIVE AND ADVANCED SYSTEMS CONCEPTS.

1978-0597 KOS J M
ON-LINE CONTROL OF A LARGE HORIZONTAL AXIS WIND ENERGY CONVERSION SYSTEM AND ITS PERFORMANCE IN A TURBULENT WIND ENVIRONMENT.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2064-2073.

THIS PAPER DESCRIBES A CLOSED LOOP, SHAFT TORQUE CONTROL FOR CONTROLLING THE POWER OF A LARGE (2 MEGAWATT), VARIABLE PITCH, HORIZONTAL AXIS WIND TURBINE, DRIVING A SYNCHRONOUS GENERATOR CONNECTED TO A LARGE POWER SYSTEM (ON-LINE OPERATION). A CONTROL MODE IS PRESENTED WHICH PROVIDES A STABLE, RESPONSIVE CONTROL SYSTEM BY SENSING SHAFT TORQUE AND ROTOR ROTATIONAL SPEED. DYNAMIC PERFORMANCE RESULTS FROM A DIGITAL SIMULATION OF THE SYSTEM OPERATING ON-LINE IN A TURBULENT WIND ENVIRONMENT ARE PRESENTED.

1978-0598 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
LOS ANGELES, UNIVERSITY OF CALIFORNIA, SCHOOL OF ENGINEERING AND APPLIED SCIENCE, MECHANICS AND STRUCTURES DEPARTMENT, 1978. 154 P.
UCLA-ENG-7880

THE COUPLED FLAP-LAG-TORSION EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE ARE FORMULATED. QUASI-STEADY BLADE-ELEMENT STRIP THEORY IS APPLIED TO DERIVE THE AERODYNAMIC OPERATOR WHICH ACCOUNTS FOR BOUNDARY-LAYER TYPE GRADIENT WINDS. THE FINAL EQUATIONS HAVE PERIODIC COEFFICIENTS. A NEW METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION (REQUIRED FOR THE SUBSEQUENT STABILITY ANALYSIS) IS IMPLEMENTED. DIFFERENCES IN STABILITY AND RESPONSE FOR TWO MODES OF OPERATION OF THE BLADE ARE INVESTIGATED.

1978-0599 WILSON R E
VORTEX SHEET ANALYSIS OF THE GIROMILL.
ASME TRANS. J. FLUIDS ENG. 100(3): 340-342, SEPTEMBER 1978.

A TWO-DIMENSIONAL ANALYSIS OF THE PERFORMANCE AND FLOWFIELD OF THE GIROMILL IS PRESENTED. THE GIROMILL IS A VERTICAL-AXIS WIND TURBINE WITH STRAIGHT BLADES THAT ARE ARTICULATED TO PRODUCE MAXIMUM ENERGY EXTRACTION FROM THE WIND. IT IS FOUND THAT THE POWER COEFFICIENT AND WINDWISE FORCE COEFFICIENT FOR THE GIROMILL HAVE THE SAME LIMIT AS OBTAINED FOR THE HORIZONTAL-AXIS WIND TURBINE. A CROSS-WIND FORCE IS ALSO OBTAINED WITH THIS TYPE OF WIND TURBINE. THE CROSS-WIND FORCE IS OF SECOND ORDER AND DECREASES WITH TIP SPEED. STREAMLINES AND VELOCITY PROFILES ARE ILLUSTRATED FOR SEVERAL LOADING CONDITIONS.

1978-0600 KRAUSS O, PARK G L, LINVILL D E, CURTICE D H, MANNER D, MATSON R, LAWLER J, ASMUSSEN J
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 11 P.
COO-2992-78/1-T1

SEVERAL GENERATION-EXPANSION ALTERNATIVES FOR SMALL ELECTRIC UTILITIES WHICH INCLUDE WINDPOWER WERE EVALUATED USING THE MUNICIPAL ELECTRIC SYSTEM OF HART, MICHIGAN, AS AN EXAMPLE. ASSUMED WIND TURBINE CONFIGURATIONS WITH MACHINES RATED AT 500-KW AND 1,500-KW TOGETHER WITH A 1,000-KW HYDROELECTRIC FACILITY WERE COMBINED WITH CONVENTIONAL HART DIESEL GENERATION PLUS BULK PURCHASE AND THEN EVALUATED. FOR COMPARISON, A NEW 3,600-KW OIL-FUELED DIESEL GENERATOR WAS ALSO EVALUATED.

1978-0601 LARGE WIND ENERGY FOCUS GROUP RESULTS.
NTIS, AUGUST 1978. 35 P.
DOE/TIC-10038

A REPORT IS PRESENTED OF THE FOCUS GROUP RESEARCH ON LARGE WIND ENERGY SYSTEMS PREPARED FOR THE DEPARTMENT OF ENERGY AS PART OF THE COMMERCIALIZATION PROGRAM. THE PURPOSE OF THIS RESEARCH IS TO EVALUATE THE POTENTIAL FOR COMMERCIALIZATION OF WIND ENERGY, TO DETERMINE THE BARRIERS TO DEVELOPMENT OF THIS RESOURCE, AND TO JUDGE WHAT

ACTIONS ARE REQUIRED BY THE FEDERAL GOVERNMENT TO PROMOTE COMMERCIALIZATON. THE RESEARCH DISCUSSES THE ISSUES OF COMMERCIALIZATION AS EXAMINED BY A FOCUS GROUP CONSISTING OF KEY INDIVIDUALS FROM VARIOUS ORGANIZATIONS INVOLVED IN LARGE WIND ENERGY SYSTEMS DEVELOPMENT.

1978-0602 LARSSON L
LARGE-SCALE INTRODUCTION OF WIND POWER STATIONS IN THE SWEDISH GRID: A SIMULATION STUDY.
WIND ENG. 2(4): 221-233, 1978.

A SIMULATION STUDY ON THE FACTORS TO BE CONSIDERED IF WIND POWER WERE TO BE INTRODUCED TO THE SOUTH SWEDISH POWER GRID ON A LARGE SCALE IS DESCRIBED. THE HEURISTIC TECHNIQUE REFLECTS THE ACTUAL RUNNING STRATEGIES OF A BIG POWER COMPANY WITH SUITABLE ACCURACY. ALL SIMULATIONS REFER TO CERTAIN TYPICAL DAYS IN 1976 TO WHICH ALL WIND DATA AND SYSTEM CHARACTERISTICS ARE RELATED.

1978-0603 LAWRENCE K A
REVIEW OF THE ENVIRONMENTAL EFFECTS OF THREE SOLAR ENERGY TECHNOLOGIES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 592-595.

THIS PAPER REVIEWS AND SUMMARIZES DATA ON THE ENVIRONMENTAL EFFECTS OF THREE SOLAR TECHNOLOGIES: PHOTOVOLTAIC CELLS, WIND ENERGY CONVERSION (WEC), AND THE SOLAR THERMAL CENTRAL RECEIVER. POTENTIAL EFFECTS ARE IDENTIFIED FOR EACH OF THE LIFE CYCLE PHASES: RESOURCE EXTRACTION AND COMPONENT MANUFACTURE, PLANT CONSTRUCTION, OPERATION AND DECOMMISSION. THE SOLAR ENERGY TECHNOLOGIES ARE ASSUMED TO BE DEPLOYED AS A CENTRALIZED ENERGY PRODUCTION FACILITY.

1978-0604 LAWS K L
ENERGY IN THE ATMOSPHERE.
PHYS. TEACH. 16(2): 101-103, FEBRUARY 1978.

AN EXERCISE FOR STUDENTS TO CALCULATE CRUDE ORDERS OF MAGNITUDE OF THE QUANTITY OF ENERGY EXISTING IN VARIOUS FORMS IN THE ATMOSPHERE IN ADDITION TO DIRECT INSOLATION IS PRESENTED. FIVE DIFFERENT FORMS OF ENERGY ARE CONSIDERED: DIRECT SOLAR, WIND, ELECTRICITY FROM THE ATMOSPHERE, USE OF THE HEAT CAPACITY OF AIR, AND LATENT HEAT OF VAPORISATION OF WATER VAPOUR IN THE AIR.

1978-0605 LAWSON M O
A LOW COST AERODYNAMIC HEATER REPRESENTING A FULLY MATCHED LOAD FOR WIND ENERGY SYSTEMS.
NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, NAECON '78, DAYTON, OHIO, MAY 16-18, 1978. NEW YORK, IEEE, 78CH1336-7, 1978. P. 874-880.

THIS PAPER PRESENTS A LOW COST ALTERNATIVE FOR REPLACEMENT OF THE ALTERNATOR. IT IS CALLED THE AERODYNAMIC HEATER AS IT OPERATES ON FLUID DYNAMIC PRINCIPLES AS DOES THE WIND TURBINE. ALTHOUGH AN AIR CHURN COULD BE APPLIED, IT WOULD BE VERY LARGE DUE TO THE LOW DENSITY OF AIR, WHILE A CONVERTER BASED ON FLUID DYNAMIC PRINCIPLES IS REASONABLE IN SIZE AND HAS A MAJOR ADVANTAGE OVER A CHURN. IT OPERATES ON THE SAME PRINCIPLES AS A WIND TURBINE. THIS CAN MAKE POSSIBLE THE OPERATION OF THE WIND TURBINE AT ITS OPTIMUM TIPSPEED TO WIND VELOCITY RATIO UP TO THE WIND TURBINES RATED VALUE.

1978-0606 LEICESTER R J, NEWMAN V G, WRIGHT J K
RENEWABLE ENERGY SOURCES AND STORAGE.
NATURE 272(5653): 518-521, APRIL 6, 1978.

A FEATURE OF WIND, WAVE AND SOLAR ENERGY SOURCES IS THE UNPREDICTABLE VARIABILITY OF THE STRENGTH OF THE SOURCE DUE TO THE VAGARIES OF THE CLIMATE. THERE ARE TWO MAIN WAYS OF EXPLOITING THESE SOURCES. IN THE FIRST A BACK-UP SUPPLY IS PROVIDED. THUS, WITH SOLAR WATER HEATING, IT IS CUSTOMARY TO RELY ON ELECTRICAL IMMERSION HEATERS OR BOILERS BURNING GAS, OIL OR SOLID FUEL TO SUPPLEMENT THE SOLAR ENERGY INPUT DURING THE WINTER MONTHS AND AT OTHER TIMES WHEN THE INSOLATION LEVEL IS LOW. IT IS GENERALLY ACCEPTED THAT LARGE WIND GENERATORS WOULD FEED THEIR ELECTRICAL OUTPUT INTO THE NATIONAL GRID. THE SECOND WAY OF EXPLOITING RENEWABLE ENERGY SOURCES IS TO COUPLE THEM WITH SOME FORM OF STORAGE. IF THE STORAGE CAPACITY IS SUFFICIENT THERE IS A GUARANTEED OUTPUT FROM THE RENEWABLE ENERGY SOURCE PLUS STORAGE SYSTEM AT THE TIMES WHEN IT IS REQUIRED. RYLE (SEE NATURE VOL. 267, P. 111, 1977) HAS SUGGESTED THAT A FORM OF STORAGE IS AVAILABLE IN CONNECTION WITH WIND POWER. THE VALIDITY OF THIS CLAIM IS ANALYZED.

1978-0607 LEMASOV B I, SAVCHENKO I G, SMIRNOVA A N, TARNIZHEVSKII B V
EXPERIMENTAL INVESTIGATION OF THE JOINT OPERATION OF WIND AND SOLAR PLANTS.
GELIOTEKHNIKA 14(2): 46-49, 1978. TRANSL.: APPL. SOL. ENERGY 14(2): 33-35, 1978.

RESULTS ARE REPORTED FOR AN ANNUAL CYCLE OF TESTS OF A WIND-POWERED ELECTRIC PLANT AND SOLAR PHOTOELECTRIC PLANT OPERATING INTO A COMMON LOAD. THE RATED CAPACITIES OF THESE INVESTIGATIONS WAS TO DETERMINE STORAGE-DEVICE CAPACITIES FOR SEPARATE AND JOINT UTILIZATION OF THESE UNITS.

1978-0608 LERNER J
WIND PROGRAM PRIORITIES.
WIND POWER DIG. NO. 13: 16-18, FALL 1978.

1978-0609 LERNER J
WIND - ELECTRIC POWER: A RENEWABLE ENERGY RESOURCE FOR CALIFORNIA.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1978. 21 P.

INFORMATION ON THE USE OF WIND ENERGY IN CALIFORNIA IS PRESENTED CONCERNING WIND TURBINE TECHNOLOGY; AVAILABILITY; MARKET POTENTIAL; SYSTEM INTEGRATION; LIMITS TO WIND SYSTEMS DEVELOPMENT; AND GOVERNMENT PROGRAMS IN WIND ENERGY.

1978-0610 LEWIS J O
SOLAR ENERGY DEVELOPMENTS IN IRELAND.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 118-122.

THE WORK BEING DONE IN IRELAND TO REALIZE THE POTENTIAL OF AMBIENT SOURCES OF ENERGY BY A VARIETY OF AGENCIES IN BOTH THE PUBLIC AND PRIVATE SECTORS IS DESCRIBED. THERE IS PARTICULAR INTEREST IN AGRICULTURAL APPLICATIONS, AND WIND POWER, PHOTOVOLTAICS AND SOLAR THERMAL APPLICATIONS ARE OTHER AREAS BEING ADVANCED. GIVEN THAT THE FINANCIAL RESOURCES AVAILABLE ARE SMALL, A PROMISING AMOUNT OF ACTIVITY IS UNDERWAY.

1978-0611 LIEBLEIN S, ROSS R S, FERTIS D G
EVALUATION OF URETHANE FOR FEASIBILITY OF USE IN WIND TURBINE BLADE DESIGN.
NTIS, APRIL 1978. 158 P.
DOE/NASA/7653-79/1, NASA-CR-159530

A PRELIMINARY EVALUATION WAS CONDUCTED OF THE USE OF CAST URETHANE AS A POSSIBLE MATERIAL FOR LOW-COST BLADES FOR WIND TURBINES. SPECIMEN TEST DATA ARE PRESENTED FOR ULTIMATE TENSILE STRENGTH, ELASTIC MODULUS, FLEXURAL STRAIN, CREEP, AND FATIGUE PROPERTIES OF A NUMBER OF URETHANE FORMULATIONS

1978-0612 LILJEDAHL L A
WIND POWER USES IN AGRICULTURE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 141-155.
CONF-770921/1

AGRICULTURE PRESENTS A NUMBER OF INTERESTING, AND POTENTIALLY VALUABLE, OPPORTUNITIES FOR THE USE OF WIND POWER. THE OPPORTUNITY FOR WIND POWER USE COMES FROM THE FACT THAT SEVERAL OPERATIONS IN AGRICULTURE WHICH USE APPRECIABLE AMOUNTS OF ENERGY ARE INTERRUPTIBLE FOR SHORT PERIODS OF TIME AND A NUMBER OF OTHERS ARE CAPABLE OF STORING ENERGY IN INEXPENSIVE FORMS, OR CAN STORE WORK DONE FOR FUTURE USE. PLANNING WIND ENERGY RESEARCH IN AGRICULTURE THEN, HAS BEEN TO REVIEW AGRICULTURAL OPERATIONS BY BROAD CATEGORIES, AND ESTIMATE THE EXTENT TO WHICH IT MEETS THE CRITERIA OF CHARACTERISTICS.

1978-0613 LILLEY G M
AERODYNAMIC EFFICIENCY OF WINDMILLS.
AERONAUT. Q. 29(1): 1-17, FEBRUARY 1978.

THE PAPER REPRODUCES THE RESULTS OF AN EARLIER REPORT ON THE VORTEX THEORY OF WINDMILLS AND FOLLOWS THAT THEORY THROUGH TO ESTABLISH THE AERODYNAMIC DESIGN PROCEDURE FOR A HORIZONTAL AXIS WINDMILL. THE RESULTS ARE SHOWN TO DIFFER CONSIDERABLY FROM THOSE GIVEN IN RECENT PAPER BY GRIFFITH AND THE DIFFERENCES ARE EXPLAINED.

1978-0614 LINDGREN M
SINGLE PERSON INSTALLATION OF SMALL WINDPLANTS.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 149-155.
CONF-780754

THE PROCEEDINGS FOR REMOVING OR INSTALLING A 600 POUND WIND GENERATOR ATOP A 65 FOOT TOWER ARE PRESENTED.

1978-0615 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 262-272.
CONF-770921/1

THE CALIFORNIA AQUEDUCT IS A 648 MILE LONG WATER SYSTEM THAT CAPTURES AND STORES SURPLUS WATER FROM THE STATE'S NORTHERN MOUNTAIN REGIONS AND DELIVERS IT TO THE CENTRAL AND SOUTHERN ARID REGIONS FOR AGRICULTURE, INDUSTRY, AND URBAN USES. MOST OF ITS TRIP IS UPHILL, AND REQUIRES LARGE AMOUNTS OF ELECTRICAL PUMPING POWER. THE RISING COST OF ENERGY AND POTENTIAL FUEL SHORTAGES HAVE LED TO A SERIOUS CONCERN OVER HOW TO INSURE THE AVAILABILITY OF ADEQUATE ENERGY AT REASONABLE PRICES. THIS STUDY WAS INITIATED IN THE HOPE THAT A MAJOR WATER PUMPING JOB WOULD PROVE A NATURAL MATCH FOR THE INTERMITTENT SUPPLY OF ENERGY AVAILABLE FROM THE WIND. THERE WAS SOME CONCERN WHETHER AN ADEQUATE WIND RESOURCE COULD BE FOUND IN THE AREA.

1978-0616 LINDLEY C A, MELTON W C
WIND ENERGY SYSTEMS APPLICATIONS IN HAWAII.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 237-250.
CONF-770921/1

THIS STUDY IS INTENDED TO ASSESS THE POTENTIAL FOR APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) ON OAHU, AND TO GENERALIZE TO GENERICALLY SIMILAR SITUATIONS ELSEWHERE, AS A GUIDE TO ERDA'S FUTURE DESIGN AND APPLICATION PLANNING. AT THIS REPORTING, THE STUDY IS NOT COMPLETE.

1978-0617 LINDLEY D, CHIN S W
WIND ENERGY POTENTIAL IN NEW ZEALAND-ASPECTS OF THE RESOURCE ASSESSMENT AND ITS UTILIZATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 456-466.
CONF-770921/1

A WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND IS BRIEFLY DESCRIBED WHILST COMPUTATIONS OF CAPACITY FACTOR FOR SEVERAL WIND TURBINE DESIGNS DEMONSTRATE A SIMPLE WAY OF ASSESSING SPECIFIC OUTPUT GIVEN ONLY THE ANNUAL MEAN WIND SPEED FOR THE SITE. COMPARISONS ARE MADE OF POWER DEMAND VERSUS WIND ENERGY AVAILABILITY ON A DIURNAL AND SEASONAL BASIS FOR NEW ZEALAND'S FOUR LARGEST POPULATION CENTRES AND SOME PRELIMINARY WORK ON THE MEASUREMENT OF WIND STRUCTURE AND TOPOGRAPHICAL EFFECTS AS THEY AFFECT TURBINE DESIGN AND PERFORMANCE IS DESCRIBED.

1978-0618 LINDQUIST O H, MALVER F S
MINNESOTA UTILITY APPLICATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 251-261.
CONF-770921/1

THE OVERALL OBJECTIVE OF THIS STUDY WAS TO ASSESS CURRENT WECS VIABILITY FOR A UTILITY APPLICATION AND TO DEFINE THE ATTRIBUTES AND PERFORMANCE REQUIREMENTS OF A SYSTEM CAPABLE OF YIELDING A SATISFACTORY RETURN ON INVESTMENT TO A UTILITY COMPANY.

1978-0619 LINKE S, TESHOME A, YEHSAKUL P D
A STUDY OF TRANSMISSION AND PROTECTION ELEMENTS FOR WIND ENERGY GENERATING SYSTEMS. VOLUME 1.
NTIS, APRIL 1978. 36 P.
BNL-50851

RESULTS ARE REPORTED OF A STUDY AT CORNELL UNIVERSITY ON TRANSMISSION, DISTRIBUTION, AND PROTECTION SYSTEMS FOR

LARGE WIND-ENERGY GENERATORS (WEG) CONNECTED TO AN ELECTRIC UTILITY GRID. CONFIGURATIONS FOR WIND FARMS ON FLAT TERRAIN, MOUNTAIN-PEAK CLUSTERS, AND INSTALLATIONS ALONG A RIDGE WERE EXAMINED. COMPUTER STUDIES OF LOAD-FLOW AND SHORT-CIRCUIT BEHAVIOR CONFIRMED THE TECHNICAL FEASIBILITY OF THE PROPOSED SYSTEMS. REALISTIC UNIT COSTS FOR THE PROJECTED TRANSMISSION AND PROTECTION SCHEMES RANGE FROM $109 TO $317 PER KW, DEPENDING UPON CHOICE OF CONFIGURATION AND DISTANCE FROM THE GRID. COST OF PROTECTIVE EQUIPMENT IS FOUND TO BE A MAJOR FACTOR IN MOST CASES, TENDING TO BE EQUAL TO OR GREATER THAN TRANSMISSION LINE COSTS WHEN THE WEG UNITS ARE LOCATED FIVE MILES OR LESS FROM THE GRID. SEVERAL ALTERNATIVES ARE SUGGESTED FOR FUTURE STUDY. AN ALTERNATE, LESS EXPENSIVE, PROTECTION DESIGN INVOLVING THE USE OF HIGH-CAPACITY FUSES INSTEAD OF OIL CIRCUIT BREAKERS, COUPLED WITH A DISREGARD FOR THE DISCONNECTION OF ONE OR MORE WEG UNITS FOR CONSIDERABLE PERIODS OF TIME, IS DISCUSSED.

1978-0620 LISSAMAN P B S, WALKER S N
DEVELOPMENT OF DYNAMIC INDUCER ROTOR SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 595-603.
CONF-770921/2

THE TIPVANE CONCEPT IS AT AN EXPLORATORY STATE. THE CURRENT RESEARCH IS FUNDED UNDER ERDA AND INVOLVES THEORETICAL STUDIES DESIGNED TO ESTIMATE THE PERFORMANCE AND OPTIMAL GEOMETRY OF TIPVANES, PRELIMINARY ENGINEERING ESTIMATES OF SYSTEM COST BENEFITS, AND FIELD TESTING OF A NUMBER OF DIFFERENT TIPVANES ON AN INSTRUMENTED TWO METER PROPELLER TYPE WIND TURBINE MOUNTED ON A MOVING PLATFORM.

1978-0621 LISSAMAN P B S
TECHNICAL IMPROVEMENTS IN SMALL SYSTEM DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 878-880.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0622 LISSAMAN P B S, WALKER S N
DYNAMIC INDUCER RESEARCH PROGRAM. FINAL REPORT.
NTIS, JUNE 1978. 170 P.
RLO/1021-77/1

THE DYNAMIC INDUCER ROTOR (DIR) IS A NOVEL TYPE OF WIND TURBINE ROTOR WHICH HAS THE THEORETICAL POTENTIAL OF PRODUCING AS MUCH AS 160% OF THE POWER OUTPUT OF A CONVENTIONAL PROPELLER-TYPE HORIZONTAL AXIS ROTOR (HAR) OF THE SAME DIAMETER. THE RESEARCH DESCRIBED HERE CONSTITUTES THREE SECTIONS: AN ANALYTICAL DEVELOPMENT OF DIR DESIGN PROCEDURE AND PERFORMANCE PREDICTION TECHNIQUES; INSTRUMENTED FIELD TESTS OF A 3.7-METER DIAMETER DIR SYSTEM; AND A COST-EFFECTIVENESS ANALYSIS OF THE DIR COMPARED TO THE HAR.

1978-0623 LITTLER J G F, THOMAS R B
WIND GENERATION OF ELECTRICITY FOR A NOVEL DWELLING INDEPENDENT OF SERVICING NETWORKS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1822-1825.

THE PROTOTYPE DWELLING DESIGNED WITHIN THE AUTARKIC HOUSING PROJECT IS DISCONNECTED FROM ALL MAIN SERVICES. ELECTRICITY IS SUPPLIED BY A VERTICAL AXIS WIND TURBINE, GENERATOR, BATTERIES AND INVERTER. THE CONSIDERATIONS WHICH DETERMINED THE SYSTEM DESIGN ARE SUMMARIZED. EXPERIMENTAL OPERATION INDICATES THAT A 24 SQUARE METER VERTICAL AXIS WIND TURBINE CAN PROVIDE THE ELECTRICAL NEEDS (APART FROM HEATING AND COOKING) OF A FOUR PERSON HOUSE IN A SEMI-URBAN SITUATION IN EAST ANGLIA, PROVIDED A LARGE BATTERY STORE IS AVAILABLE. THERE IS ALSO A SUBSTANTIAL CONTRIBUTION TO THE SPACE HEATING LOAD IN MANY YEARS.

1978-0624 WILSON R E
VORTEX SHEET ANALYSIS OF THE GIROMILL.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 33-43.

A TWO-DIMENSIONAL ANALYSIS OF THE PERFORMANCE AND FLOWFIELD OF THE GIROMILL IS PRESENTED. THE GIROMILL IS A VERTICAL-AXIS WIND TURBINE WITH STRAIGHT BLADES THAT ARE ARTICULATED TO PRODUCE MAXIMUM ENERGY EXTRACTION FROM THE WIND. IT IS FOUND THAT THE POWER COEFFICIENT AND WINDWISE FORCE COEFFICIENT FOR THE GIROMILL HAVE THE SAME LIMIT AS OBTAINED FOR THE HORIZONTAL-AXIS WIND TURBINE. A CROSS-WIND FORCE IS ALSO OBTAINED WITH THIS TYPE OF WIND TURBINE. THE CROSS-WIND FORCE IS OF SECOND ORDER AND DECREASES WITH TIP SPEED. STREAMLINES AND VELOCITY PROFILES ARE ILLUSTRATED FOR SEVERAL LOADING CONDITIONS.

1978-0625 LODGE M
PRINCE EDWARD ISLAND WIND ENERGY PROGRAM.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.5. 13 P.

THIS PAPER DESCRIBES THE WIND ENERGY PROGRAM OF THE INSTITUTE OF MAN AND RESOURCES. WORK ON THIS PROGRAM COMMENCED IN JUNE OF 1977. THE WIND ENERGY PROGRAM IS COMPOSED OF FOUR SUB-PROGRAMS. THE FIRST SUB-PROGRAM IS AN ANALYSIS OF SIX YEARS OF HISTORICAL WIND DATA AVAILABLE FROM EIGHT MONITORING SITES OPERATED FOR THE ATMOSPHERIC ENVIRONMENT SERVICE (A.E.S.) OF CANADA BY THE P.E.I. DEPARTMENT OF AGRICULTURE. SUBSEQUENTLY, SPATIAL CORRELATION OF DATA FROM PAIRS OF THESE SITES IS PERFORMED. A PRELIMINARY DESCRIPTION OF THE APPLICATION OF A DARRIEUS VAWT FOR DIRECT HEAT GENERATION FOR SPACE HEATING OF A GREENHOUSE AND RESIDENCE IS GIVEN. PRELIMINARY OBJECTIVES AND DESCRIPTION OF THE ATLANTIC WIND TEST SITE ARE OUTLINED.

1978-0626 LOEB A
WIND DRIVEN ENERGY SYSTEM.
U.S. PATENT NO. 4,124,182, NOVEMBER 7, 1978. 20 P.

A METHOD AND APPARATUS USING PARAKITES, OR MODIFIED PARACHUTES, FOR CAPTURING WIND ENERGY AND FOR CONVERTING THE CONSEQUENT WIND-INDUCED LINEAR MOTION TO SHAFT ROTATION ARE DESCRIBED. THE PARAKITE APPARATUS INCLUDES A PLURALITY OF TRAINS OF PARAKITES, WITH EACH TRAIN COMPRISING A POWER LINE HAVING A PLURALITY OF SERIALLY COUPLED PARAKITES SECURED THERETO. THE POWER LINES ARE OF SUFFICIENT LENGTH TO ALLOW THE PARAKITES TO REACH AN ALTITUDE ABOVE THE EARTH AT WHICH PREVAILING WINDS ARE STRONGER AND MORE UNIFORM THAN AT THE EARTH'S SURFACE. EACH TRAIN IS SECURED AT ITS EARTHBOUND END TO A DRUM OR WINDLASS SELECTIVELY ROTATABLE IN BOTH CLOCKWISE AND COUNTER-CLOCKWISE DIRECTIONS TO EITHER REEL IN THE POWER LINES ATTACHED THERETO, OR TO ENABLE THE POWER LINES TO BE PULLED UPWARDLY AND OUTWARDLY BY THE ACTION OF THE WINDS ON THE PARAKITES.

1978-0627 LORMAN W R
DIGEST OF EQUIPMENT FOR CONVERTING SOLAR, WIND AND GEOTHERMAL ENERGY INTO ELECTRIC POWER FOR USN APPLICATION ASHORE. FINAL REPORT, MAY 1977-MARCH 1978.
NTIS, NOVEMBER 1978. 103 P.
AD-A066221

THIS DOCUMENT ENUMERATES PRINCIPAL REQUIREMENTS OF SELF-SUFFICIENT ELECTRIC POWER CONVERSIONAL EQUIPMENT UNDER ACTIVE CONSIDERATION BY CEL. DATA PERTAIN TO FINANCIAL REQUIREMENTS, PHYSICAL CHARACTERISTICS, AND POTENTIAL OUTPUTS OF SOLAR, WIND, AND GEOTHERMAL ENERGY CONVERSION SYSTEMS; THESE SYSTEMS ARE PART OF USN SHORE ENERGY RESEARCH AND DEVELOPMENT PROGRAM. DATA ARE INTENDED FOR USE BY CEL SYSTEMS ANALYSTS AS INPUT TO MATHEMATICAL MODEL FOR PLANNING AND OPTIMIZING POWER SYSTEMS THROUGHOUT THE NAVAL SHORE ESTABLISHMENT.

1978-0628 LOTH J L
BETZ TYPE LIMITS FOR VORTEX WIND MACHINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 794-802.
CONF-770921/2

IN A SHROUDED WIND TURBINE THE LOCAL HIGH INVISCID WIND VELOCITY INCREASES THE MAXIMUM OBTAINABLE POWER. THE INCREASE IN POWER OUTPUT IS DUE TO THE INCREASE IN VELOCITY. SUCH A DEVICE IS CALLED A WIND ENERGY CONCENTRATOR. THE USE OF A VORTEX HAS BEEN CONSIDERED BY SEVERAL INVESTIGATORS. IN THIS STUDY THE THEORETICAL MAXIMUM POWER COEFFICIENT OF TWO VORTEX INGESTING WIND TURBINE CONFIGURATIONS HAVE BEEN COMPUTED, AND TWO CONFIGURATIONS, WHICH USE LOW PRESSURE IN THE VORTEX CORE TO EXHAUST INTO, HAVE ALSO BEEN ANALYZED.

1978-0629 LOTKER M
ECONOMIC CHALLENGES OF WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 881-892.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0630 LOTKER M, SHAW R W, ADOLFSON W F, BERNARDI R P, DAVIDOFF P H, ECKHART M T, GUNWALDSEN D S, METTAM P J, NARAYANAN P, SILLIN J O
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION. FINAL REPORT.
NTIS, AUGUST 1978. 36 P.
DOE/ET/4053-78/1, EG-77-C-01-4053

THIS ASSESSMENT OF ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION IS AN ANALYSIS OF THE QUANTITATIVE AND QUALITATIVE IMPACTS OF A VARIETY OF GOVERNMENT FUNDED ECONOMIC INCENTIVES ON WIND ENERGY CONVERSION SYSTEMS (WECS). THE PURPOSE OF THIS STUDY IS TO ACHIEVE BETTER UNDERSTANDING OF THE RELATIONSHIP BETWEEN IMPLEMENTATION OF SPECIFIC ECONOMIC INCENTIVES FOR WECS, AND THE FACTORS SURROUNDING WECS COMMERCIAL INTRODUCTION.

1978-0631 LOTKER M, SHAW R W, ADOLFSON W F, DAVIDOFF P H, BERNARDI R P, ECKHART M T, GUNWALDSEN D S, METTAM P J, NARAYANAN P, SILLIN J O
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 34 P.
DOE/ET/4053-78/1(EXEC. SUMM.)

THIS ASSESSMENT OF "ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION" IS AN ANALYSIS OF THE QUANTITATIVE AND QUALITATIVE IMPACTS OF A VARIETY OF GOVERNMENT FUNDED ECONOMIC INCENTIVES ON WIND ENERGY CONVERSION SYSTEMS (WECS). THE PURPOSE OF THIS STUDY IS TO ACHIEVE BETTER UNDERSTANDING OF THE RELATIONSHIP BETWEEN IMPLEMENTATION OF SPECIFIC ECONOMIC INCENTIVES FOR WECS, AND THE FACTORS SURROUNDING WECS COMMERCIAL INTRODUCTION.

1978-0632 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
AMERICAN METEOROLOGICAL SOCIETY. SYMPOSIUM ON TURBULENCE, DIFFUSION, AND AIR POLLUTION, 4TH, RENO, JANUARY 15-18, 1979. BOSTON, AMERICAN METEOROLOGICAL SOCIETY, 1978. PREPRINT. P. 160-166.

THE OVERALL OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM OF THE UNITED STATES IS "TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS." TO ACHIEVE THIS OBJECTIVE, THE PROGRAM IS ORGANIZED INTO DISCRETE, YET INTERRELATED PROGRAM ELEMENTS.

1978-0633 LOWY S H
WIND POWER AS A VIABLE ENERGY SOURCE.
SOLAR ARCHITECTURE. WORKSHOP ON SOLAR ENERGY APPLICATIONS, ASPEN, COLORADO, MAY 27, 1977. ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, INC., 1978. P. 227-240.

THE DEVELOPMENT OF WIND TURBINES IS REVIEWED AND THE PLANNED EXPANSION OF WIND POWER PLANTS IN THE US IS DETAILED. TECHNICAL AND ECONOMIC CONSIDERATIONS FOR WIND POWER PLANTS ARE DISCUSSED

1978-0634 WILSON D E
AEROELASTIC PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1925-1946.

THE IDEA OF USING THE GALLOPING OR FLUTTER MODE OF A SUSPENDED CABLE AS A SIMPLE INEXPENSIVE WIND ENERGY SOURCE HAS PREVIOUSLY MET WITH FAILURE DUE TO THE DIFFICULTY INHERENT IN EXTRACTING ENERGY FROM THE CABLE. HOWEVER, THIS STUDY HAS DEMONSTRATED AT LEAST IN THEORY THAT WHEN THE CABLE IS OF A HOLLOW CONFIGURATION AND FILLED WITH A FLUID, IT CAN BE EMPLOYED AS A PERISTALTIC PUMP.

1978-0635 LYSEN L H
MEGAWATTS AND MEMOWATTS.
INGENIEUR 90(32-33): 602-605, AUGUST 10, 1978. (IN DUTCH)

THIS ARTICLE DESCRIBES WORK ON THE DEVELOPMENT OF 10-100 KW WINDMILLS OF WHICH 10,000 WOULD PROVIDE 1% OF THE ANNUAL POWER CONSUMPTION IN THE NETHERLANDS. BRIEF DESCRIPTIONS ARE GIVEN OF 18, 22, 30, 45, AND 132 KW MODELS

MADE IN DENMARK, 1.5 AND 4 KW MODELS MADE IN THE UK, 0.25 TO 15 KW MODELS MADE IN GERMANY, 0.1 TO 6 KW MODELS MADE IN FRANCE, AND A 1.6 KW MODEL MADE IN BELGIUM. FINANCIAL CALCULATIONS SHOW THAT WIND POWER IS NOT CHEAP.

1978-0636 MCCORMICK M E
WIND-WAVE POWER AVAILABLE TO A WAVE ENERGY CONVERTOR ARRAY.
OCEAN ENG. 5(2): 67-74, APRIL 1978.

A THEORETICAL EXPRESSION OF THE WAVE POWER STRIKING A RECTILINEAR ARRAY OF WAVE ENERGY CONVERSION DEVICES IN A RANDOM SEA IS DERIVED. THE THEORY IS THEN APPLIED TO A LINEAR ARRAY WHICH IS 1 KM IN LENGTH. FOR PURPOSES OF ILLUSTRATION, THE PIERSON-HEUMANN-JAMES DIRECTIONAL SPECTRUM IS USED TO REPRESENT THE RANDOM SEA. COMPARISON OF THE RESULTS OBTAINED BY USING THE PRESENT THEORY WITH THOSE OBTAINED FROM THE PREVIOUSLY ACCEPTED THEORY SHOWS SIGNIFICANT DIFFERENCES.

1978-0637 MACCREADY P B
ASSESSING THE LOCAL WIND FIELD FOR SITING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 689-696.
CONF-770921/2

THIS REPORT DESCRIBES A PROGRAM TO DETERMINE IF DOPPLER ACOUSTIC WIND MEASUREMENTS PROVIDE ADEQUATE DATA AND ARE OPERATIONALLY SATISFACTORY FOR WIND GENERATOR SITING. THE PROGRAM INCLUDED ACTUAL FIELD EXPERIENCE IN ACQUIRING ACOUSTIC WIND DATA IN COMPLEX TERRAIN.

1978-0638 MCGOWAN J G, SARKISIAN P H
ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND AGRICULTURAL HEATING AND ELECTRICAL SUPPLY APPLICATONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2074-2081.

THIS PAPER SUMMARIZES THE RESULTS OF AN ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF THREE ADVANCED WIND FURNACE HEATING SYSTEMS. THE WORK REPRESENTS AN EXTENSION OF PREVIOUS WORK ON WIND POWERED HEATING SYSTEMS AND EXTENDS THIS WIND ENERGY APPLICATION TO THE SUPPLY OF ELECTRICITY AS WELL AS SPACE AND HOT WATER ENERGY LOADS FOR RURAL RESIDENCES AND FARMS. DETAILS OF THE PROPOSED SYSTEMS AND THE ANALYTICAL MODELING OF THE OVERALL SYSTEM AND SUBCOMPONENTS ARE PRESENTED, AS WELL AS TYPICAL SYSTEM ENERGY AND ECONOMIC PERFORMANCE.

1978-0639 MCGREW P O
PALEONTOLOGICAL POTENTIAL OF FIVE WIND ENERGY SITES IN ALBANY AND CARBON COUNTIES, WYOMING.
NTIS, APRIL 14, 1978. 10 P.
PB80-125586

PALEONTOLOGICAL INVESTIGATION WAS CARRIED OUT AT FIVE PROPOSED SITES. NO PALEONTOLOGICAL RESOURCES WERE FOUND. NO ADVERSE EFFECTS WILL OCCUR.

1978-0640 MCKEE J S C
ELECTRICAL POWER FROM SUN AND WIND IN MANITOBA.
J. ENVIRON. SCI. HEALTH A13(8): 585-594, 1978.

THE POTENTIAL USEFULNESS OF SOLAR AND WIND ENERGY AS SOURCES OF ELECTRICAL POWER IS EXAMINED IN THE CONTEXT OF THE PROJECTED NEEDS OF THE PROVINCE OF MANITOBA. IT IS SUGGESTED THAT AS THE CAPITAL COSTS OF SOLAR, WIND AND NUCLEAR POWER PLANT CONSTRUCTION ARE LIKELY TO BECOME COMPARABLE WITHIN THE NEXT TWENTY YEARS, A REAL CHOICE EXISTS FOR THE CONSUMER, BECAUSE OF PURELY REGIONAL FACTORS.

1978-0641 MCVEIGH J C, PONTIN G W W
WIND/SOLAR PROJECT IN LOCAL AUTHORITY HOUSING.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 91-101.

THE INTEGRATION OF SOLAR HEATING AND A BANK OF FIXED DUCTED WINDMILLS TO PROVIDE PART OF THE ELECTRICITY DEMAND FOR A LOCAL HOUSING AUTHORITY SCHEME IS CONSIDERED. BASIC DESIGN PARAMETERS AND SPECIFICATIONS FOR THE SYSTEM ARE REVIEWED.

1978-0642 MACKLIS S L
SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. APPENDICES. FINAL REPORT.
NTIS, FEBRUARY 1978. 284 P.
DSE-2332-T3

FLUCTUATION IN WIND SPEED CAUSES A VARIABILITY IN WIND POWER OUTPUT WHICH IS UNIQUE AMONG UTILITY LEVEL POWER SOURCES. IT IS IMPORTANT THAT THE FEASIBILITY AND THE CONSTRAINTS OF INSTALLING A SIGNIFICANT NUMBER OF WIND TURBINE GENERATORS INTO THE NATIONAL POWER SYSTEM BE INVESTIGATED. THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0643 MACKLIS S L
SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 697-711.
CONF-770921/2

THE PURPOSE OF THE STUDY IS TO PROVIDE DESIGN INFORMATION FOR THE WECS MACHINE AND FOR THE ELECTRICAL UTILITY POWER SYSTEM INTERFACE WHICH WOULD ALLOW A SIGNIFICANT NUMBER OF WECS TO BE INCORPORATED INTO THE POWER SYSTEM. THE BASIC INGREDIENTS OF THE STUDY ARE WIND CHARACTERISTICS, WTG MACHINE CHARACTERISTICS, PROTECTION AND CONTROL FOR BOTH THE WECS AND THE UTILITY AND REPRESENTATIVE POWER SYSTEM CHARACTERISTICS.

1978-0644 MAGDALEN TURBINE FAILS.
WIND POWER DIG. NO. 13: 14, FALL 1978.

THE LARGEST WIND TURBINE ERECTED IN CANADA TO DATE, A 230 KW DAF DARRIEUS TURBINE, BROKE FREE OF ITS SUPPORTING GUY WIRES ON JULY 6, 1978, AND TWISTED INTO THE GROUND AT ITS TEST SITE ON MAGDALEN ISLAND, QUEBEC. THE TURBINE HAD BEEN OPERATING SINCE MAY 1977, PROVIDING AN AVERAGE 100 KW OF PEAK POWER FOR THE MAGDALEN ISLAND COMMUNITY IN THE GULF OF ST. LAWRENCE. THE ACCIDENT OCCURRED AS THE RESULT OF REPAIR WORK ON THE TURBINE'S BEARINGS THE DAY BEFORE. DURING THE REPAIR THE DISC BRAKES WERE REMOVED, AND REMAINED DISASSEMBLED OVERNIGHT SO

THAT REPAIRS COULD CONTINUE THE NEXT DAY. UNDER UNUSUAL CONDITIONS, A 25 MPH WIND CAUSED THE TURBINE TO SELF-START, PRECIPITATING THE ACCIDENT.

1978-0645 MALET L M
ON THE CONSIDERATION OF WIND ENERGY IN BELGIUM.
INST. R. METEOROL. BELG. PUBL. SER. G. NO. 95: 3-25, 1978. (IN FRENCH)

AFTER SOME GENERALITIES RELATIVE TO THE BEHAVIOUR OF THE WIND WITHIN THE PLANETARY BOUNDARY LAYER, A CHAPTER IS DEVOTED TO THE ANNUAL VARIATION OF THE MONTHLY MEAN WIND SPEED COMPUTED FROM THE OBSERVATIONS MADE AT BELGIAN CLIMATOLOGICAL AND SYNOPTIC STATIONS AS WELL AS ON TALL METEOROLOGICAL MASTS. THE FOLLOWING CHAPTER DEALS WITH THE DISTRIBUTIONS OF THE MEAN WIND SPEEDS AND GIVES THE PROPORTION OF WEAK AND STRONG WINDS. THE LAST CHAPTER TREATS THE PROBLEM OF THE AVAILABLE POWER FROM THE WIND AND OF ITS GEOGRAPHICAL VARIATION. THE POWERS HAVE BEEN COMPUTED FROM THE ANNUAL MEAN WIND SPEEDS AND DO NOT TAKE THE TURBULENT ENERGY INTO ACCOUNT; THE INFLUENCE OF THIS LATTER IS HOWEVER ROUGHLY ESTIMATED.

1978-0646 MARKS A M
CHARGED AEROSOL WIND/ELECTRIC POWER GENERATOR.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 854-864.
CONF-770921/2

THE WIND/ELECTRIC POWER GENERATOR IS A CHARGED AEROSOL ELECTROGASDYNAMIC GENERATOR AT ATMOSPHERIC PRESSURE WHICH IS POWERED DIRECTLY BY THE WIND. IT COMPRISES A LARGE AREA ELECTRODE SCREEN OF SPECIAL CONSTRUCTION MOUNTED IN A VERTICAL PLANE TO INTERCEPT THE WIND, WHICH EMITS CHARGED WATER DROPLETS INTO THE WIND STREAM AS A WIND/ELECTRIC POWER TRANSDUCER. WIND/ELECTRIC POWER GENERATORS WILL BE INSTALLED AT SUITABLE GEOGRAPHICAL LOCATIONS (UPDRAFTS AT MOUNTAIN RANGES, ALONG SEASHORE FRONTS, ETC.) WHERE THERE IS A STEADY FLOW OF AIR IN ONE DIRECTION IN THE 5 TO 20 M/SEC VELOCITY RANGE. A CHARGED AEROSOL WIND/ELECTRIC POWER RESEARCH AND DEVELOPMENT PROGRAM RELATES TO THE DIRECT CONVERSION OF WIND POWER TO ELECTRIC POWER THROUGH THE MEDIUM OF CHARGED WATER DROPLETS. THEORETICAL AND EXPERIMENTAL WORK WAS DONE TO DETERMINE AN EFFICIENT CHARGING METHOD.

1978-0647 MARRS R W
EOLIAN FEATURES AS INDICATORS OF HIGH-WIND AREAS IN THE PACIFIC NORTHWEST. PROGRESS REPORT.
NTIS, MAY 1978. 8 P.
RLO/2343-78/5

COLOR COMPOSITE LANDSAT IMAGES OF THE FIVE-STATE PACIFIC NORTHWEST AREA (WASHINGTON, OREGON, IDAHO, MONTANA, AND WYOMING) WERE INTERPRETED TO IDENTIFY EOLIAN LANDFORMS THAT MIGHT SERVE AS INDICATORS OF AREAS OF HIGH WIND ENERGY WITHIN THAT REGION. EOLIAN LANDFORMS IDENTIFIED INCLUDED SAND DUNES, PLAYAS, AND SCOUR FEATURES. THESE FEATURES WERE IDENTIFIED AND THEIR LOCATIONS WERE THEN PLOTTED. SEVERAL SMOKE PLUMES WERE ALSO IDENTIFIED ON THE LANDSAT IMAGES. THESE ARE INDICATED AS AEROSOLS. THE FEATURES HAVE NOT YET BEEN MAPPED IN DETAIL OR FIELD CHECKED; THEREFORE, THE MAP PRESENTS NO QUANTITATIVE ESTIMATES OF WIND ENERGY AND MUST BE CONSIDERED A PRELIMINARY MAP. THE MAP SERVES AS AN INVENTORY OF PROMINENT EOLIAN FEATURES, MOST OF WHICH OCCUR IN THE ARID BASIN AREAS. THE BROAD DISTRIBUTION OF THESE FEATURES GIVES AN INDICATION OF THE USEFULNESS OF EOLIAN LANDFORMS AS INDICATORS OF WIND CHARACTERISTICS IN THE PACIFIC NORTHWEST.

1978-0648 MARRS R W, MARWITZ J
LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATION OF EOLIAN GEOMORPHOLOGY AND TOPOGRAPHY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 307-320.
CONF-770921/1

EOLIAN LANDFORMS ARE PRESENT OVER MUCH OF THE WORLD. THEY FORM ON ANY LAND SURFACE WHERE THE CLIMATE IS WINDY AND RECORD THE EFFECT OF WIND ACTION. THEY ALSO RECORD FLUCTUATIONS IN CLIMATE AND THE INFLUENCE OF MAN ON THE LAND SURFACE. THE PURPOSE OF THIS RESEARCH IS TO DEVELOP AN EFFICIENT PROCEDURE FOR INFERRING WIND CHARACTERISTICS THROUGH INTERPRETATION OF EOLIAN LANDFORMS.

1978-0649 MARSH W D
TECHNICAL AND ECONOMIC ASPECTS OF WIND GENERATION IN ELECTRIC UTILITY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 723-727.
CONF-770921/2

THE OVERALL OBJECTIVES OF THIS STUDY WERE TO PERFORM TECHNICAL AND ECONOMIC ANALYSES OF A WIDE RANGE OF WIND ENERGY SYSTEMS (WES) AS THEY WOULD BE EXPECTED TO PERFORM IF INSTALLED IN A SPECIFIC ELECTRIC UTILITY SYSTEM IN THE YEAR 1990. TO THAT END, SEVERAL SPECIFIC OBJECTIVES WERE DEFINED: (1) DEVELOP A METHODOLOGY FOR EVALUATING WES GENERATION CAPABILITY AS AN INTEGRAL PART OF AN ELECTRIC UTILITY SYSTEM; (2) EXERCISE THE METHODOLOGY IN A REAL ELECTRIC UTILITY SYSTEM TO EVALUATE A NUMBER OF ALTERNATIVE WES DESIGNS; (3) ESTIMATE THE VALUE OF WES CAPABILITY IN A REAL ELECTRIC UTILITY SYSTEM; (4) RECOMMEND R AND D ACTIVITIES TO ACHIEVE VIABILITY OF WES GENERATION ON ELECTRIC UTILITY SYSTEMS; AND (5) ESTIMATE PENETRATIONS AND ASSOCIATED IMPACTS IF VIABILITY IS ACHIEVED.

1978-0650 MARSH W D
UTILITY APPLICATIONS OF WIND POWER PLANTS.
ENERGY TECHNOLOGY CONFERENCE, 5TH, WASHINGTON, D.C., FEBRUARY 27-MARCH 1, 1978. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., APRIL 1978. P. 83-96.

THE PROCEDURES AND PRELIMINARY RESULTS ARE REPORTED OF A STUDY BEING PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE, ENTITLED "REQUIREMENTS ASSESSMENT OF WIND ENERGY SYSTEMS." THE OBJECTIVES OF THIS STUDY WERE AS FOLLOWS: (1) TO DEVELOP A METHODOLOGY FOR THE EVALUATION OF WIND ENERGY SYSTEMS (WES) OPERATING AS PARTS OF ELECTRIC UTILITY SYSTEMS; (2) TO UTILIZE THIS METHODOLOGY IN EVALUATING WIND POWER PLANTS IN ACTUAL UTILITY SYSTEMS; (3) TO RECOMMEND SUITABLE DIRECTIONS FOR RESEARCH AND DEVELOPMENT WORK TO ATTAIN ECONOMIC AND OPERATIONAL VIABILITY OF WIND POWER PLANTS IN UTILITY SYSTEMS; AND (4) TO MAKE PRELIMINARY PENETRATION AND IMPACT ANALYSES OF WIND ENERGY. THREE AREAS OF THE COUNTRY HAVE BEEN SELECTED FOR THIS STUDY: WESTERN KANSAS, NORTHERN NEW YORK, AND WESTERN OREGON. THE WORK ON THE WESTERN KANSAS AREA HAS BEEN COMPLETED AND WORK IS CONTINUING ON THE OTHER TWO AREAS.

1978-0651 MARSTON C H
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS.
NEW YORK, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1978.

FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. 246 P.

THE FOLLOWING TOPICS WERE DEALT WITH: WIND TURBINES; MAGNETOHYDRODYNAMIC CONVERTORS; COMPRESSED AIR ENERGY STORAGE; AND OCEAN THERMAL ENERGY CONVERSION.

1978-0652 MARTINEZ-SANCHEZ M, LABUSZEWSKI T
WIND ENERGY CONVERSION. VOLUME 4. DRIVE SYSTEM DYNAMICS. ASRL-TR-184-10.
NTIS, SEPTEMBER 1978. 197 P.
COO-4131-T1(VOL.4)

THE DYNAMICS OF THE DRIVE SYSTEM AND VARIOUS APPROACHES TO POWER TRANSMISSION ARE DESCRIBED. THE EFFECTS ON PERFORMANCE OF USING A CONSTANT ROTOR SPEED AS OPPOSED TO A ROTOR SPEED VARYING WITH THE WIND SPEED ARE DISCUSSED FOR VARIOUS ROTOR OPERATING SCHEDULES AND TYPICAL WIND DISTRIBUTIONS. THE DYNAMICS OF THE COMBINED ROTOR, ALTERNATOR, AND DRIVE SYSTEM ARE ANALYZED. CONDITIONS WHICH COULD LEAD TO ELECTRO-DYNAMIC INSTABILITIES AND DESYNCHRONIZATION ARE DISCUSSED AS WELL AS MEANS FOR STABILIZING THE SYSTEM. THE DYNAMICS OF THE DRIVE SYSTEM AND IMPORTANT DESIGN CONDITIONS FOR VARIOUS DRIVE SYSTEMS ARE DISCUSSED, SUCH AS LOCATION OF THE ALTERNATORS, USE OF HYDRAULIC DRIVE SYSTEMS AND SMOOTHING TECHNIQUES.

1978-0653 WILSON R E
DARRIEUS ROTOR AERODYNAMICS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 584-594.
CONF-770921/2

OREGON STATE UNIVERSITY IN PARTNERSHIP WITH AEROVIRONMENT HAS BEEN ENGAGED IN THE DEVELOPMENT OF PERFORMANCE ANALYSIS OF WIND POWERED MACHINES SINCE 1973. UNIQUE PERFORMANCE MODELS HAVE BEEN DEVELOPED FOR VARIOUS TURBINES. THIS REPORT IS DEVOTED TO THE DARRIEUS ROTOR AERODYNAMICS.

1978-0654 MATZEN R, MOELLER F
HOT-WATER GENERATORS, WATER BRAKES, FOR WIND POWER PLANTS.
NTIS, FEBRUARY 1978. 61 P. (IN DANISH)
NP-23622

HOT WATER GENERATORS FOR CONVERTING MECHANICAL POWER FROM A WIND-POWER PLANT TO HOT WATER MAY BE OF VERY SIMPLE DESIGN. THE CHARACTERISTIC FOR THE POWER COMSUMPTION FOLLOWS THE 3RD POWER OF THE ROTOR SPEED, AND THE ROTOR DIAMETER IS THE MAIN FACTOR IN SETTING THE CONSUMPTION LEVEL. BASICALLY WATER IS USED AS THE BRAKE FLUID. IF HIGHER TEMPERATURES ARE DESIRED, OIL MAY BE USED. EXPERIMENTS ON SIMPLE NONADJUSTABLE GENERATORS BUILT IN A 135 LITRE TANK ARE DESCRIBED. IT IS SHOWN THAT FOR THIS SIZE THE TANK MAY BE OPEN IN THE TOP WITHOUT ANY SPECIAL AXLE-TIGHTENING AND EXPANSION SYSTEMS FOR POWER CONSUMPTIONS UP TO 25 KW. AN OPEN UNIT FOR USE IN A HEAT-BUFFERTANK OR A HIGHLY INSULATED HOT-WATER ACCUMULATOR TANK IS ALSO DESCRIBED.

1978-0655 MAYER D
NORTH WIND'S KW HIGH RELIABILITY WTG PROGRAM.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 50-52.

SPECIFICATIONS ARE PRESENTED FOR A 1-2 KW HIGH RELIABILITY HORIZONTAL-AXIS PROPELLER-TYPE WIND TURBINE.

1978-0656 MAYER-SCHWINNING W
GROSS WIND POWER OF CENTRAL EUROPE AND ITS MAXIMUM UTILIZATION THROUGH OPTIMUM DEVELOPMENT OF WIND POWER PLANTS.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 169-185. (IN GERMAN)

WHEN THE INCREASING STRAIN ON THE ENVIRONMENT AND THE DECREASING STORED ENERGY DEPOSITS ARE TAKEN INTO CONSIDERATION THE WIND ENERGY THROUGHOUT CENTRAL-EUROPE WILL BE REESTIMATED AND THE MOST EFFICIENT TECHNICAL POSSIBILITIES WILL BE SHOWN FOR ITS MAXIMUM UTILIZATION AS WELL AS THE ENERGY POTENTIAL OF AREAS WITH HIGH WINDS.

1978-0657 MAYO L H
SOME LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS).
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 393-401.
CONF-770921/1

WHILE THERE ARE A GREAT NUMBER OF LEGAL CONCERNS RELEVANT TO THE IMPLEMENTATION OF LAND-BASED WECS, RELATIVELY FEW OF THESE ARE SERIOUS OVERALL IMPEDIMENTS. SUCH SERIOUS CONSTRAINTS AS DO EXIST ARE OFTEN CLOSELY RELATED TO SOCIAL, ECONOMIC AND TECHNICAL PROBLEMS INVOLVED WITH WECS, AND USUALLY ONLY WORK TO INHIBIT CERTAIN PARTICULAR WECS APPLICATIONS. THIS REPORT OUTLINES THE MORE SUBSTANTIAL IMPEDIMENTS, AND JUSTIFIES VARIOUS CONCLUSIONS.

1978-0658 MELISS M
REGENERATIVE SOURCES OF ENERGY.
BRENNST.-WAERME-KRAFT 30(4): 151-156, APRIL 1978. (IN GERMAN)

THE MAIN INTERESTS IN SHORT- OR MEDIUM-TERM DEVELOPMENT ARE HEAT PUMPS, LOW TEMPERATURE COLLECTOR PLANTS, AND THE CONVERSION OF WIND ENERGY. BEYOND THESE, AND TO BE TREATED AS LONG-TERM PROJECTS, ARE HOT-DRY-ROCK, PHOTOLYSIS, SOLAR ENERGY, BIOGAS AND HIGH-TEMPERATURE COLLECTOR PLANTS. A COMPREHENSIVE ANALYSIS IS GIVEN OF THE VARIOUS POSSIBILITIES, PROBABLE DEVELOPMENT TIME, AND COSTS AS APPLYING TO THE GERMAN DEMOCRATIC REPUBLIC.

1978-0659 MELTON W C
LOSS OF LOAD PROBABILITY AND CAPACITY CREDIT CALCULATIONS FOR WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 728-744.
CONF-770921/2

THE NET CONCLUSION IN DISCUSSIONS OF WECS IMPLEMENTATIONS HAS OFTEN BEEN THAT THE INSTALLATION OF A WECS WILL NOT DISPLACE THE INSTALLATION OF ANY AMOUNT OF CONVENTIONAL CAPACITY. HOWEVER, USING THE SAME GENERATING SYSTEM RELIABILITY INDICES THAT UTILITY PLANNERS RELY ON, IT CAN BE SHOWN THAT TYPICAL WECS INSTALLATIONS WILL INDEED INCREASE THE OVERALL SYSTEM RELIABILITY AND, THEREFORE, THAT THERE IS SOME CONVENTIONAL CAPACITY

DISPLACEMENT DUE TO WECS. TO DO THIS CREDIBLY REQUIRES THAT THE INDEX BE AN HOURLY INDEX AND THAT THE WECS FORCED OUTAGE RATE DEPEND ON BOTH TIME OF DAY AND TIME OF YEAR. IN THIS PAPER, A METHOD OF CALCULATING THE CAPACITY EQUIVALENCY OF A WECS USING LOSS OF LOAD PROBABILITY (LOLP) AS THE INDEX IS EXPLAINED AND AN EXAMPLE IN THE CONTEXT OF THE OAHU SYSTEM OF THE HAWAIIAN ELECTRIC COMPANY IS PRESENTED.

1978-0660 MERCADIER Y
CALCULATION OF THE GEOMETRY AND PERFORMANCE OF A HIGH-SPEED WIND ROTOR.
WIND ENG. 2(1): 25-36, 1978.

WIND ROTOR DESIGN HAS HITHERTO BEEN BASED, PARTICULARLY FOR LOWER POWERS, UPON A COMPROMISE BETWEEN HIGH EFFICIENCY AND SIMPLICITY OF CONSTRUCTION. MODERN MATERIALS AND FABRICATION TECHNIQUES, HOWEVER, PERMIT THE ELIMINATION OF THIS COMPROMISE AND THE CONSTRUCTION OF ROTORS OF MAXIMUM EFFICIENCY. THE PRIMARY CONSIDERATION IN A WIND POWER INSTALLATION BEING THE PROPORTION OF ENERGY EXTRACTED FROM THE WIND RATHER THAN THE ACTUAL POWER OUTPUT, IT BECOMES NECESSARY TO ASSESS THE PERFORMANCE OF THE TURBINE OVER ITS WHOLE RANGE OF OPERATING CONDITIONS. IT IS THEN POSSIBLE TO DESIGN A TRANSMISSION SYSTEM APPROPRIATE TO THE FUNCTION OF THE INSTALLATION AND TO SPECIFY OPERATING LIMITS. THIS SEQUENCE DEPENDS UPON THE ACCURATE INITIAL CALCULATION OF ROTOR GEOMETRY AND PERFORMANCE.

1978-0661 MERONEY R N, BOWEN A J, LINDLEY D, PEARSE J R
WIND CHARACTERISTICS OVER COMPLEX TERRAIN: LABORATORY SIMULATION AND FIELD MEASUREMENTS AT RAKAIA GORGE, NEW ZEALAND.
AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, OCTOBER 1978. 237 P.
NZERDC--P5

BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION IN NEW ZEALAND WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1:5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS--A SURFACE TEXTURED TO REPRESENT TYPICAL PADDOCK GRASS ROUGHNESS ONLY, THE SAME SURFACE WITH ZERO-POROSITY SHELTERBELTS ADDED, AND THE SAME SURFACE WITH POROUS SHELTERBELTS ADDED.

1978-0662 MERONEY R N, BOWEN A J, LINDLEY D, PEARSE J R
WIND CHARACTERISTICS OVER COMPLEX TERRAIN: LABORATORY SIMULATION AND FIELD MEASUREMENTS AT RAKAIA GORGE, NEW ZEALAND. PART II. FINAL REPORT.
NTIS, MAY 1978. 243 P. ALSO: FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, CER77-78RNM29, MAY 1978. 239 P.
RLO/2438-77/2

A SURVEY PROGRAM IS DESCRIBED WHICH UTILIZES LABORATORY SIMULATION OF THE RELEVANT WIND CHARACTERISTICS IN A METEOROLOGICAL WIND TUNNEL. TO EVALUATE THE VALIDITY OF LABORATORY SIMULATION METHODS AND PROVIDE A CONFIDENCE MEASUREMENT BOUND FOR LABORATORY DATA, A LIMITED FIELD MEASUREMENT PROGRAM WAS SIMULTANEOUSLY CONDUCTED. IN THIS STUDY BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1:5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS: A SURFACE TEXTURED TO REPRESENT TYPICAL PADDOCK GRASS ROUGHNESS ONLY, THE SAME SURFACE WITH ZERO-POROSITY SHELTERBELTS ADDED, AND THE SAME SURFACE WITH POROUS SHELTERBELTS ADDED.

1978-0663 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, CHIEN H C, RIDER M
SITES FOR WIND-POWER INSTALLATIONS: PHYSICAL MODELING OF THE INFLUENCE OF HILLS, RIDGES AND COMPLEX TERRAIN ON WIND SPEED AND TURBULENCE. PART 1. EXECUTIVE SUMMARY.
NTIS, JUNE 1978. 102 P.
RLO/2438-78/1

WIND-TUNNEL MODEL MEASUREMENTS HAVE BEEN PERFORMED TO STUDY THE INFLUENCE OF TOPOGRAPHY PROFILE, SURFACE ROUGHNESS AND STRATIFICATION ON THE SUITABILITY OF VARIOUS COMBINATIONS OF THESE VARIABLES FOR WIND-POWER SITES. FOR THE RANGE OF EXAMINED CASES (LARGE TURBULENCE INTEGRAL SCALES WITH RESPECT TO SURFACE FEATURE SCALES) THE FLOW IS DOMINATED BY INVISCID DYNAMICS. DETAILED TABLES OF VELOCITY, TURBULENCE INTENSITY, PRESSURE, SPECTRA, ETC., HAVE BEEN PREPARED TO GUIDE NUMERICAL MODEL DESIGN AND EXPERIMENTAL RULE OF THUMB CONSTRUCTIONS. CASES INCLUDE HILL ASPECT RATIOS RANGING FROM 1/2 TO 1/20, NEUTRAL AND STRATIFIED FLOWS, TWO- AND THREE-DIMENSIONAL SYMMETRIC RIDGES, SIX ALTERNATE HILL AND ESCARPMENT SHAPES, AND A VARIETY OF WINDWARD VERSUS LEEWARD SLOPE COMBINATIONS TO EVALUATE RIDGE SEPARATION CHARACTERISTICS.

1978-0664 MERONEY R N, SANDBORN V A
SITES FOR WIND POWER INSTALLATIONS: PHYSICAL MODELING OF THE INFLUENCE OF HILLS, RIDGES AND COMPLEX TERRAIN ON WIND SPEED AND TURBULENCE.
NTIS, JUNE 1978. 211 P.
RLO/2438-78/3

A SYSTEMATIC WIND-TUNNEL STUDY OF FLOW OVER TWO-DIMENSIONAL HILLS WAS MADE. THE FLOW OVER SIX DIFFERENT TWO-DIMENSIONAL HILLS WAS EVALUATED FOR IDENTICAL APPROACH CONDITIONS. THE RESULTS INDICATED THAT THE TRIANGULAR AND SINUSOIDAL HILLS PRODUCED THE GREATEST SPEEDUP OF THE AIRSTREAM IN THE REGION NEAR THE SURFACE. THE MORE ABRUPT MODELS PRODUCED LESS OF AN INCREASE IN LOCAL VELOCITY.

1978-0665 MERRIAM M F
WIND ENERGY IN DENMARK.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P 53-61.

WIND ENERGY DEVELOPMENT PROGRAMS IN DENMARK ARE REVIEWED.

1978-0666 MERRIAM M F
WIND, WAVES, AND TIDES.
ANNU. REV. ENERGY 3: 29-56, 1978.

THIS PAPER REVIEWS THE PRESENT STATE OF KNOWLEDGE AND EXPERIENCE WITH WIND, WAVE, AND TIDAL ENERGY, AND ESTIMATES THE MAGNITUDE, IN ENERGY TERMS, OF POSSIBLE FUTURE USE. THE THREE SOURCES ARE COMPARED QUALITATIVELY. IN THE MEDIUM TERM THE SOURCE WITH THE BEST PROSPECT FOR A SUBSTANTIAL CONTRIBUTION IS WIND.

1978-0667 MILBORROW D J
PERFORMANCE PREDICTION METHODS FOR HORIZONTAL AXIS WIND TURBINES.
WIND ENG. 2(3): 165-175, 1978.

A METHOD OF ASSESSING THE PERFORMANCE CHARACTERISTICS OF HORIZONTAL AXIS WIND TURBINES HAS BEEN DEVELOPED,

USING THE AEROFOIL THEORY WHICH IS APPLIED TO AXIAL FLOW FANS. THE CAPABILITIES OF THE METHOD ARE COMPARED WITH THOSE OF THE PROPELLER THEORY NORMALLY USED FOR WINDMILL PERFORMANCE ASSESSMENT. WEAKNESSES IN THE PROPELLER THEORY ARE IDENTIFIED AND IT IS CONCLUDED THAT THE FAN ANALYSIS TECHNIQUE HAS CERTAIN ADVANTAGES AND LENDS ITSELF TO FURTHER REFINEMENT. BOTH THEORIES HAVE BEEN APPLIED TO A PARTICULAR WINDMILL DESIGN FOR WHICH FIELD MEASUREMENTS ARE AVAILABLE (THE LT CO. AEROGENERATOR AT ALDBOROUGH). FAN THEORY PREDICTS RATHER HIGHER PEAK PERFORMANCE IN AGREEMENT WITH LT CO. OBSERVATIONS THAT DESIGN PERFORMANCE HAS BEEN EXCEEDED.

1978-0668 MILLER C A
LATEST AND BIGGEST IN WINDCHARGERS.
MECH. ILLUS. 74(601): 106-107, JUNE 1978.

INFORMATION ON THE 200 KW WIND TURBINE SPONSORED BY DOE AND NASA AND LOCATED NEAR CLAYTON, NEW MEXICO, IS PRESENTED.

1978-0669 MILLER D W
WIND DRIVEN POWER MECHANISM.
U.S. PATENT NO. 4,093,398, JUNE 6, 1978. 4 P.

A BASE MEMBER IS DISPOSED LONGITUDINALLY IN THE DIRECTION OF WIND MOVEMENT AND HAS A PAIR OF PARALLEL ENDLESS CARRIERS ON OPPOSITE SIDES THEREOF. THESE CARRIERS ARE ARRANGED TO MOVE OVER AN UPPER ARCUATE RUN AND ALONG A LOWER STRAIGHT RETURN RUN. THE UPPER ENDS OF A NUMBER OF SAIL-TYPE VANES ARE CONNECTED BETWEEN THE TWO ENDLESS CARRIERS, AND THE LOWER ENDS OF THE VANES ARE LIFTED AT THE ARCUATE PORTION OF THE CARRIERS TO FORM SAILS AND ARE COLLAPSED IN THE RETURN RUN, THE UPPER ENDS OF THE VANES MOVING AROUND THE LOWER ENDS THEREOF WITH THE LATTER ENDS ROTATING WITH THE IDLERS.

1978-0670 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M
DESIGN TRADE-OFFS AS INFLUENCED BY ROTOR, TOWER, AND DRIVE DYNAMICS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 574-583.
CONF-770921/2

THIS RESEARCH REPORT BUILDS ON THE ANALYTICAL BASIS AND IS PRIMARILY CONCERNED WITH REDUCING THE COMPLEX ANALYSES TO A FORM IN WHICH THEY CAN BE READILY USED FOR TRADE-OFF ANALYSES, IN RELATION TO THE DEVELOPMENT OF A METHOD FOR ANALYZING WIND TURBINE AERODYNAMICS IN THE PRESENCE OF WIND SHEAR, THE DEVELOPMENT OF A THEORY FOR THE DYNAMICS OF A COUPLED WIND TURBINE/SYNCHRONOUS ALTERNATOR; AND A METHOD FOR ANALYZING THE AEROELASTIC STABILITY OF A ROTOR IN THE PRESENCE OF GUSTS AND OTHER LARGE DISTURBANCES.

1978-0671 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M, GOHARD J, CHUNG S
METHODS FOR DESIGN ANALYSIS OF HORIZONTAL AXIS WIND TURBINES. WIND ENERGY CONVERSION.
NTIS, SEPTEMBER 1978. 259 P.
COO-4131-T1(VOL.1)

THE MATERIAL IS PRESENTED AS FAR AS POSSIBLE IN THE FORM OF CHARTS, EITHER TABLES OR GRAPHS, FROM WHICH SPECIFIC DESIGN INFORMATION MAY BE SELECTED OR TRENDS DETERMINED WITHOUT THE NEED FOR COMPUTATIONAL FACILITIES. FOR DESIGN PURPOSES, OR WHEN ATTEMPTING TO CORRECT A DESIGN DEFICIENCY, TRENDS ARE FREQUENTLY MORE USEFUL THAN ABSOLUTE INFORMATION. SINCE IT IS IMPOSSIBLE TO COVER ALL POSSIBLE CONFIGURATIONS FOR A SYSTEM WITH AS MANY PARAMETERS AS A WIND TURBINE, INTERPOLATION WILL BE NECESSARY IN MANY CASES.

1978-0672 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M, GOHARD J, CHUNG S, HUMES T
WIND ENERGY CONVERSION. VOLUME 2. AERODYNAMICS OF HORIZONTAL AXIS WIND TURBINES. ASRL-TR-184-8.
NTIS, SEPTEMBER 1978. 213 P.
COO-4131-T1(VOL.2)

THE BASIC AERODYNAMIC THEORY OF THE WIND TURBINE IS PRESENTED, STARTING WITH THE SIMPLE MOMENTUM THEORY BASED ON UNIFORM INFLOW AND AN INFINITE NUMBER OF BLADES. THE BASIC VORTEX THEORY IS THEN DEVELOPED. FOLLOWING THESE BASICS, THE MORE COMPLETE MOMENTUM THEORY, INCLUDING SWIRL, NON-UNIFORM INFLOW, THE EFFECT OF A FINITE NUMBER OF BLADES, AND EMPIRICAL CORRECTION FOR THE VORTEX RING CONDITION IS PRESENTED. THE MORE COMPLETE VORTEX THEORY IS PRESENTED WHICH INCLUDES UNSTEADY AERODYNAMIC EFFECTS BUT BASED ON A SEMI-RIGID WAKE. METHODS OF APPLYING THIS THEORY FOR PERFORMANCE ESTIMATION ARE DISCUSSED AS WELL AS FOR THE PURPOSE OF COMPUTING TIME VARYING AIRLOADS DUE TO WINDSHEAR AND TOWER INTERFERENCE.

1978-0673 MILLER R, DUGUNDJI J, CHOPRA I, SHEU D, WENDELL J
WIND ENERGY CONVERSION. VOLUME 3. DYNAMICS OF HORIZONTAL AXIS WIND TURBINES. ASRL-TR-184-9.
NTIS, SEPTEMBER 1978. 149 P.
COO-4131-T1(VOL.3)

THE UNDERLYING THEORY IS PRESENTED FOR DETERMINING BLADE AND ROTOR/TOWER VIBRATION AND DYNAMIC STABILITY CHARACTERISTICS. THE DYNAMIC ANALYSIS OF HORIZONTAL AXIS TURBINES MAY BE DIVIDED INTO TWO CONVENIENT AREAS, NAMELY, (A) THE INVESTIGATION OF THE AEROELASTIC AND RESPONSE OF A SINGLE BLADE ON A RIGID TOWER, AND (B) THE INVESTIGATION OF THE MECHANICAL STABILITY AND VIBRATIONS OF THE ROTOR SYSTEM ON A FLEXIBLE TOWER. WITH A REASONABLE UNDERSTANDING OF THE BEHAVIOR IN THESE TWO AREAS, THE COMPLETELY COUPLED BLADE-TOWER AEROELASTIC SYSTEM CAN BE BETTER UNDERSTOOD, AND DYNAMIC PROBLEMS CAN BE BETTER ASSESSED.

1978-0674 MINARDI J E, LAWSON M O
PROGRESS IN ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR RESEARCH.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 843-853.
CONF-770921/2

THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT POSSIBLY FOR DIVERTING IT INTO THE WIND. IN AN EFD GENERATOR CHARGES OF ONE POLARITY ARE SEEDED INTO A FLOWING NEUTRAL GAS. VISCOUS INTERACTIONS DRIVE THE CHARGED PARTICLES AGAINST AN ELECTRICAL POTENTIAL AND PRODUCE D.C. POWER. THIS REPORT DIAGRAMS A SIMPLE EFD WIND GENERATOR WITH A BREAKDOWN ON THE ACTUAL EXPERIMENTAL PROGRAM.

1978-0675 MINARDI J E, LAWSON M O
RESEARCH IN THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR.
NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, NAECON '78, DAYTON, OHIO, MAY 16-18, 1978. NEW YORK, IEEE 78CH1336-7, 1978. P. 869-873.

THE ELECTROFLUID DYNAMIC WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING 300 TO 400 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE AND FAR LARGER POWERS THAN CONVENTIONAL SYSTEMS CAN BE REALIZED.

1978-0676 MOHAN N, RIAZ M
WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATORS FOR RESIDENTIAL ELECTRIC HEATING.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 29-FEBRUARY 3, 1978. NEW YORK, IEEE, 1978. P. 50-57.

A SCHEME USING A WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATOR IS DESCRIBED TO SUPPLY FREQUENCY-INSENSITIVE HEATING LOADS. DESPITE THE WIDE VARIATION IN ROTOR SPEED, THE SLIP REMAINS SMALL, THEREBY PROVIDING A HIGH EFFICIENCY OPERATION. THE ELECTRIC POWER OUTPUT CAN BE CONTROLLED OVER A SUBSTANTIAL RANGE TO MATCH THE WIND-TURBINE SPEED-POWER CHARACTERISTIC BY ADJUSTING THE EXCITATION-CAPACITANCE. A STEADY-STATE ANALYSIS OF SELF-EXCITATION IS PRESENTED. COMPARISON OF THE PREDICTED BEHAVIOR WITH THE EXPERIMENTAL RESULTS SHOWS GOOD AGREEMENT BETWEEN THE TWO.

1978-0677 MOHR E
WINDPOWER PLANT IN OPERATION.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 18-22, NOVEMBER-DECEMBER 1978. (IN GERMAN)

THE ARTICLE GIVES A SURVEY OF THE WINDPOWER PLANTS WHICH ARE ALREADY IN OPERATION, WHICH DOES NOT CLAIM TO BE COMPLETE. THE VARIOUS PLANTS IN GERMANY AND DENMARK ARE DESCRIBED WITH REGARD TO THEIR OUTPUT, THEIR CONSTRUCTION AND THEIR MANUFACTURING COSTS. THERE ARE REFERENCES TO THE MANUFACTURERS OF INDIVIDUAL PLANTS. THE RANGE OF APPLICATION OF THE PLAN IS POWER GENERATION, E.G. FOR SPACE HEATING, AND ALSO FOR DRIVING WATER PUMPS AND COMPRESSORS.

1978-0678 MOLLY J P
WINDENERGIE IN THEORIE UND PRAXIS. GRUNDLAGEN UND EINSATZ. (WIND ENERGY IN THEORY AND PRACTICE. BASICS AND APPLICATIONS.)
KARLSRUHE, GERMANY, F.R., C.F. MUELLER, 1978. 138 P. (IN GERMAN)

THE FIRST CHAPTER OF THE BOOK DEALS WITH THE THEORY OF WIND TURBINES. AFTER AN OUTLINE OF THE DISTRIBUTION OF WIND CURRENTS ON THE EARTH AND CHARACTERISTIC FEATURES OF WIND CURRENTS, THE THIRD CHAPTER THEN DISCUSSES THE DESIGN OF WIND ENERGY CONVERTERS. THE 4TH AND 5TH CHAPTERS GIVE A SURVEY OF PROJECTS REALIZED AND OF THE RESULTS OF RESEARCH PROGRAMS IN THIS FIELD. FINALLY, THE AUTHOR DEALS WITH THE PROBLEM OF INVESTMENT AND OPERATING COSTS OF WIND POWER PLANTS.

1978-0679 MOMENT R L
SYSTEMS DEVELOPMENT AND TEST CENTER ACTIVITIES IN THE WIND SYSTEMS PROGRAM AT ROCKY FLATS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 131-140.
CONF-770921/1

THE OVERALL OBJECTIVE OF THIS PROGRAM IS TO STIMULATE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. TO MEET THE OVERALL OBJECTIVES OF THIS PROGRAM TWO MAJOR AREAS OF EFFORT ARE PLANNED. THE FIRST ONE IS TO ESTABLISH AND OPERATE A NATIONAL WIND SYSTEMS TEST CENTER WHERE SWECS WOULD BE TESTED, THEREBY HELPING TO ESTABLISH THE CURRENT STATE OF THE TECHNOLOGY AND TO EVALUATE TECHNOLOGY IMPROVEMENTS. FUNDING NECESSARY RESEARCH AND DEVELOPMENT TO ADVANCE THE TECHNOLOGY AND ASSIST EVOLUTION OF MORE ECONOMICAL AND RELIABLE SWECS IS THE SECOND MAJOR ACTIVITY. ACTIVITIES IN BOTH THE AREAS OF TEST CENTER ESTABLISHMENT AND FUNDING OF TECHNOLOGY DEVELOPMENT PROGRAMS ARE DESCRIBED.

1978-0680 MONTES J S
IMPROVEMENT OF WINDMILL EFFICIENCY BY BOUNDARY LAYER CONTROL.
WIND ENG. 2(2): 103-114, 1978.

THE POSSIBILITY OF EMPLOYING BOUNDARY LAYER SUCTION TO INCREASE THE EFFICIENCY OF CONVENTIONAL WINDMILLS IS DISCUSSED. THE ROTATION OF THE WINDMILL BLADES PROVIDES A SOURCE OF INTERNAL FLOW WHICH MAY BE UTILIZED AS A SIMPLE PUMP FOR THE BOUNDARY LAYER SUCTION. A SIMPLIFIED MATHEMATICAL MODEL OF THE INTERNAL FLOW IS DESCRIBED. THE RESULTING EQUATIONS ARE INTEGRATED NUMERICALLY FOR SOME ASSUMED VALUES OF THE WINDMILL GEOMETRICAL PARAMETERS. IT IS SHOWN THAT ADVANTAGES OF SOME 20% IN THE OPERATIONAL EFFICIENCY OF A VARIABLE PITCH WINDMILL AND 33% FOR THE FIXED PITCH WINDMILL MAY BE OBTAINED.

1978-0681 MORAN K E, KORZENIEWSKI E C
LOAD CONTROL FOR WIND-DRIVEN ELECTRIC GENERATORS.
U.S. PATENT NO. 4,095,120, JUNE 13, 1978. 26 P.

A GENERATOR LOAD CURVE IS PRECISELY MATCHED TO A WINDDRIVEN MOTOR CHARACTERISTIC BY MEANS OF A ROTOR SPEED-RESPONSIVE TACHOMETER EFFECTING STEPWISE CONTROL OF FIELD CURRENT IN THE GENERATOR. SEVERAL VARIATIONS OF THE TACHOMETER CIRCUIT ARE DESCRIBED. FIELD CURRENT IS CONTROLLED BY AN AMPLIFIER, AND VOLTAGE REGULATION IS EFFECTED BY AN OVERRIDE CIRCUIT DISABLING THE AMPLIFIER.

1978-0682 MORRISON B A
HARNESSING THE WIND FOR GENERATING ELECTRICAL POWER AND PUMPING WATER.
ENG. STAT. RES. INST., AGRIC. CAN., RES. BRANCH, REPORT 1-13, APRIL 1978. 12 P.

1978-0683 MOSS J
WIND POWER GETS ITS FEET WET.
ELECTR. REV. 203(3): 16-17, JULY 21, 1978.

DEPARTMENT OF ENERGY FUNDING OF WIND POWER SCHEMES HAS INCREASED, AND THE CEGB IS CO-OPERATING IN STUDYING POSSIBLE MAJOR SCHEMES BASED ON A CLUSTER OF 2.5 MW WINDMILLS IN SHALLOW WATER OF THE NORTH SEA. THE AUTHOR HAS FOUND ENTHUSIASM FOR SUCH LARGE SCHEMES GROWING, AND SOME INTERESTING SMALLER ONES ARE BEING DEVELOPED BY INCREASING NUMBERS OF WIND POWER SPECIALISTS.

1978-0684 MURPHY R D
WIND MOTOR MACHINE.
U.S. PATENT NO. 4,127,356, NOVEMBER 28, 1978.

IN A WIND MACHINE TO EXTRACT ENERGY FROM THE WIND HAVING A HOUSING, AN IMPELLER IN THE HOUSING, A SHAFT ON THE IMPELLER JOURNALED TO THE HOUSING, VANES ON THE IMPELLER WHICH CAUSE THE IMPELLER TO TURN IN THE WIND, A FUNNEL

FORMING A PORTION OF THE HOUSING TO INCREASE THE WIND AT THE IMPELLER, AND MOUNTING MEANS ON THE HOUSING FOR ROTATING THE HOUSING ABOUT A VERTICAL AXIS, THE IMPROVED STRUCTURE FOR REGULATING THE SPEED OF THE WHEEL COMPRISING AT LEAST ONE FLAP MOUNTED FOR MOVEMENT OF AND CONNECTED TO THE FLAP FOR REDUCING THE WIND ON THE IMPELLER, AND SAID FLAP IS MOUNTED UPON THE FUNNEL PORTION OF THE HOUSING, AND SAID FLAP ACTS TO ROTATE THE ENTIRE HOUSING SO THAT THE FUNNEL NO LONGER FACES DIRECTLY INTO THE WIND BUT AT AN ANGLE THERETO, THUS REDUCING THE WIND ON THE IMPELLER.

1978-0685 MUSGROVE P J
VERTICAL AXIS WIND TURBINES.
U.S. PATENT NO. 4,087,202, MAY 2, 1978. 8 P.

A VERTICAL AXIS WIND TURBINE COMPRISES ONE OR MORE AEROFOIL SECTION BLADES ATTACHED TO A SUPPORT STRUCTURE. THE BLADE HAS AT LEAST ONE PART THEREOF WHICH IS ACTED ON BY CENTRIFUGAL FORCES AS THE BLADE ROTATES WITH THE SUPPORT STRUCTURE AND THEREBY CAUSED TO INCREASE ITS ANGLE OF INCLINATION TO THE VERTICAL AXIS WHEN THE SPEED OF ROTATION INCREASES BEYOND THE NORMAL OPERATING RANGE, WHEREBY THE RATE OF INCREASE OF ROTATIONAL SPEED WITH WIND SPEED IS REDUCED.

1978-0686 WILLEM R A
A WIND ENERGY REVIEW: LOW-COST MACHINES FOR AGRICULTURAL AND RURAL APPLICATIONS.
NTIS, 1978. 11 P.
PB-297858

SMALL-SCALE IRRIGATION APPEARS TO BE THE MOST EFFECTIVE USE OF WIND ENERGY IN THE THIRD WORLD. THIS COINCIDES WITH THE FACT THAT IMPROVING THE AGRICULTURAL OUTPUT AND LIVING STANDARDS OF THE SMALL SCALE FARMER IS ONE OF THE MOST PRESSING DEVELOPMENTAL GOALS IN THESE AREAS. SEVERAL WIND-POWERED WATER-PUMPING SYSTEMS OF AN INTERMEDIATE-TECHNOLOGY LEVEL ARE REVIEWED AND SOURCES OF FURTHER INFORMATION ARE INDICATED.

1978-0687 MUSGROVE P
OFFSHORE WIND ENERGY SYSTEMS.
PHYS. EDUC. 13(4): 210-213, MAY 1978.

WIND ENERGY SYSTEMS DEPLOYED IN THE SHALLOW BUT WINDY WATERS OF THE SOUTHERN NORTH SEA HAVE THE POTENTIAL TO PROVIDE MORE THAN 30 PERCENT OF UK ELECTRICITY NEEDS. WITH EXISTING EXPERIENCE OF WINDMILLS, AND OF AIRCRAFT AND OFFSHORE STRUCTURES, SUCH WIND ENERGY SYSTEMS COULD BE DEVELOPED WITHIN A RELATIVELY SHORT TIMESCALE. A PRELIMINARY ASSESSMENT OF THE ECONOMICS OF OFFHORE WIND ENERGY SYSTEMS IS ENCOURAGING.

1978-0688 MUSGROVE P
WIND ENERGY PROSPECTS IN THE UK.
COAL ENERGY Q. NO. 16: 15-21, SPRING 1978.

THE AUTHOR CLAIMS THAT CONVERTING WIND ENERGY TO ELECTRICITY ON A LARGE SCALE IS A MUCH MORE PRACTICABLE PROPOSITION THAN THE LARGE-SCALE CONVERSION OF SOLAR RADIATION TO ELECTRICITY, AND THEN EXPLORES WIND ENERGY'S POTENTIAL TO CONTRIBUTE VERY SIGNIFICANTLY TO THE U.K. ENERGY NEEDS. THE ECONOMICS OF SUCH A CONVERSION ARE FOUND TO BE ENCOURAGING. IF ENVIRONMENTAL REASONS PRECLUDED HILL TOP WINDMILLS THEY COULD BE DEPLOYED IN SHALLOW WATERS OFF THE COAST, PROVIDING AT LEAST 25% OF THE COUNTRY'S ELECTRICITY NEEDS. THE BASIC TECHNOLOGY FOR THE DEVELOPMENT OF LARGE WINDMILLS IS SAID TO BE ALREADY AVAILABLE IN THE ENGINEERING INDUSTRY.

1978-0689 NELSON V
PROCEEDINGS OF THE NATIONAL CONFERENCE: AMERICAN WIND ENERGY ASSOCIATION.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. 187 P.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978.

1978-0690 NEUMANN R, WINDHEIM R
WIND ENERGY R & D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY AND MAIN LINES OF DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 438-443.
CONF-770921/1

THE WIND ENERGY R & D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY FOLLOWS TWO LINES; ADAPTION OF SMALL WECS WITH HORIZONTAL OR VERTICAL AXIS TO SPECIAL USES, AND ELECTRICITY GENERATION BY LARGE WECS FOR THE NATIONAL GRID: THE ACTIVITIES OF THESE LINES ARE EXPLAINED IN STEPS WITHIN THIS REPORT.

1978-0691 NEWMAN B G, NGAGO T M
THE DESIGN AND TESTING OF A VERTICAL-AXIS WIND TURBINE USING SAILS.
ENERGY CONVERS. 18(3): 141-154, 1978.

A VERTICAL-AXIS WIND TURBINE USING SAILS RATHER THAN SOLID BLADES HAS BEEN DESIGNED AND TESTED AT LARGE MODEL SCALE IN A 15 FT. DIAMETER WIND TUNNEL. THE TURBINE HAS A RELATIVELY HIGH SOLIDITY, THREE BLADES AND AN OPERATING RANGE OF TIP SPEED RATIOS FROM ZERO TO ABOUT 2.5. TWO TYPES OF SAIL HAVE BEEN TESTED-A DOUBLE SAIL CONSISTING OF TWO LAYERS OF CLOTH WRAPPED ROUND A CIRCULAR LEADING EDGE DOWEL, AND A JIB SAIL CONSISTING OF A SINGLE LAYER OF CLOTH WITH LEADING EDGE HELD BY A TAUT WIRE.

1978-0692 NILSSON K, SCHIBBYE B, SELLBERG C, SKAERBAECK E
VINDKRAFTEN I LANDSKAPET. (WINDPOWER IN THE LANDSCAPE.)
ALNARP, SWEDEN, SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES, 1978. 132 P. (IN SWEDISH)

THE ENVIRONMENTAL CONSEQUENCES OF THE CONSTRUCTION OF A LARGE NUMBER OF WINDPOWER STATIONS IN SWEDEN ARE DISCUSSED, IN PARTICULAR THE EFFECTS ON THE LANDSCAPE, I.E. THE VISUAL EFFECTS. IT IS CONCLUDED, AMONG OTHER THINGS, THAT A PERSON'S ATTITUDE TOWARD WIND POWER IS OF HIGH IMPORTANCE FOR HIS OPINIONS ABOUT THESE MATTERS.

1978-0693 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
ENERGY FROM HUMID AIR.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 865-872.
CONF-770921/2

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. A VAST AMOUNT OF ENERGY IS CONTAINED IN THE LATENT HEAT OF VAPORIZATION OF THE WATER VAPOR IN HUMID AIR. IF THE WATER VAPOR IS MADE TO

CONDENSE, THE LATENT HEAT IS RELEASED INTO THE SURROUNDING AIR. THE MECHANIZATIONS FOR CONVERTING THE ENERGY IN HUMID AIR WHICH ARE BEING CONSIDERED IN THIS PROJECT CAN BE THOUGHT OF AS HEAT ENGINES IN WHICH THE AIR ITSELF SERVES AS THE WORKING FLUID. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1978-0694 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
CLEAN ENERGY FROM HUMID AIR.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977.
ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978.
VOL. 4, P. 1887-1900.

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1978-0695 OMAN R A
TECHNICAL AND ECONOMIC CHALLENGES IN ADVANCED SYSTEMS DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 912-920.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0696 OMAN R A, FOREMAN K M, GILBERT B L
A PROGRESS REPORT ON THE DIFFUSER AUGMENTED WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 319-328.
CONF-770921/2

GRUMMAN AEROSPACE HAS BEEN INVESTIGATING COST-EFFECTIVE DIFFUSERS TO OBTAIN AUGMENTED POWER FROM WIND TURBINES. THE PRIMARY ASPECTS OF THE PROBLEM THAT HAVE BEEN EXAMINED IN THIS WORK ARE DESIGN CONCEPTS AND AERODYNAMIC PERFORMANCE OF COMPACT DIFFUSERS, AND THE COMPARATIVE ECONOMICS OF POWER PRODUCED BY DIFFUSER AUGMENTED WIND TURBINES (DAWT) TO THOSE OF CONVENTIONAL, HORIZONTAL AXIS, WIND ENERGY CONVERSION SYSTEMS (WECS). THE BASIC TECHNICAL FEASIBILITY OF THE DAWT CONCEPT HAS BEEN EXPERIMENTALLY CONFIRMED, AND A RATIONAL CASE FOR DAWT ECONOMIC VIABILITY IN THE 50 TO 100 KW AND MW POWER RATING RANGES PRESENTED. A 46 CM (18 IN.) DIAMETER TURBINE WILL SOON BE TESTED IN THE BASELINE DIFFUSER CONFIGURATION.

1978-0697 OPPENGARD M
WIND POWER (FOR TEACHERS).
PHYS. TEACH. 16(5): 299-300, MAY 1978.

AN EXPERIMENTAL ARRANGEMENT IS DESCRIBED FOR TESTING A KINETIC THEORY PREDICTION FOR THE POWER ABSORBED BY A PROPELLER PLACED IN A WIND STREAM. THE PROPELLER IS ATTACHED TO A PERMANENT FIELD DC MOTOR. THE POWER DELIVERED TO THE PROPELLER IS ASSESSED AS THE AMOUNT OF ELECTRICAL ENERGY REQUIRED TO STILL THE PROPELLERS ROTATION.

1978-0698 OSSENBRUGGEN P, PREGENT G
COASTAL AND OFFSHORE WINDS.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-17-1. (ABSTRACT ONLY)

1978-0699 OTTENS H H, ZWAAN R J
INVESTIGATIONS ON THE AEROELASTIC STABILITY OF LARGE WIND TURBINES.
NTIS, APRIL 10, 1978. 21 P.
N79-32731/8, NPL-MP-78014-U

THE AEROELASTIC STABILITY OF WIND TURBINES WITH VERTICAL AXIS (VAWT) AND WITH HORIZONTAL AXIS (HAWT) IS DISCUSSED. RESULTS ARE GIVEN FOR AN EXISTING 5 M VAWT TEST-BED WITH AND WITHOUT A TIE-DOWN SYSTEM. FINALLY, DIFFICULTIES ARE DISCUSSED IN INTERPRETING PRELIMINARY RESULTS FOR A HORIZONTAL AXIS WIND TURBINE. STABILITY DIAGRAMS ARE SHOWN.

1978-0700 WHITFORD D H, MINARDI J E, WEST B S, DOMINIC R J
AN ANALYSIS OF THE MADARAS ROTOR POWER PLANT -- AN ALTERNATE METHOD FOR EXTRACTING LARGE AMOUNTS OF POWER FROM THE WIND. VOLUME 1. EXECUTIVE SUMMARY.
NTIS, JUNE 1978. 50 P.
DSE-2554-78/2(VOL.1)

THE PURPOSE OF THIS PROGRAM WAS TO ANALYZE AND UP-DATE THE DESIGN OF THE MADARAS ROTOR POWER PLANT CONCEPT THAT HAD BEEN DEVELOPED IN THE 1930'S TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF THIS SYSTEM TO BE COMPETITIVE WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES. THE MADARAS CONCEPT USES ROTATING CYLINDERS, VERTICALLY MOUNTED ON FLAT CARS, TO REACT WITH THE WIND LIKE A SAIL AND PROPEL AN ENDLESS TRAIN OF CONNECTED CARS AROUND A CLOSED TRACK AT CONSTANT SPEED. ELECTRICITY IS GENERATED BY ALTERNATORS ON EACH CAR THAT ARE GEARED TO THE WHEELS. ELECTRICAL POWER IS TRANSMITTED FROM EACH CAR TO THE POWER HOUSE BY A TROLLEY SYSTEM. THE OBJECTIVE OF THIS PROGRAM IS TO DEMONSTRATE THE DEGREE IN WHICH MADARAS POWER PLANTS HAVING CAPACITIES IN THE 10 MW TO 200 MW RANGE ARE COMPETITIVE WITH HORIZONTAL AXIS WIND TURBINES.

1978-0701 PAL D
FIELD TESTING OF 5-KW COMMERCIAL WIND GENERATOR WITH AN AUTOMATIC LOAD-MATCHING DEVICE FOR UTILIZING ITS OUTPUT.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1833-1837.

THE CONCEPT, DESIGN, AND FIELD TESTING OF AN AUTOMATIC LOAD-MATCHING SYSTEM FOR UTILIZING THE OUTPUT OF A COMMERCIAL 5-KW WIND-DRIVEN AC GENERATOR ARE DESCRIBED IN DETAIL. BOTH SYSTEMS WERE TESTED AT THREE SITES LOCATED AT PORT HUENEME, LAGUNA PEAK, AND SAN NICOLAS ISLAND; THESE SITES HAVE AVERAGE ANNUAL WIND SPEEDS OF 2.88, 4.33, AND 5.1 M/SEC. RESPECTIVELY.

1978-0702 PAL D, PARKER C E
TECHNIQUE FOR LONGITUDINAL CORRELATION OF WIND DATA--THEORY AND ITS APPLICATIONS TO SITING OF WIND POWER PLANTS.

SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1854-1857.

AN ACCURATE ESTIMATE OF WIND POWER POTENTIAL AT A PROSPECTIVE SITE IS VERY IMPORTANT TO ECONOMICALLY JUSTIFY THE INSTALLATION OF WIND POWER GENERATING EQUIPMENT. SINCE THE INSTANTANEOUS POWER AVAILABLE IN THE WIND AT A SITE IS PROPORTIONAL TO THE CUBE OF THE PREVAILING WIND SPEED, A SMALL CHANGE IN WIND SPEED CAN CORRESPOND TO A LARGER CHANGE IN THE AVAILABLE POWER. THUS, TO OBTAIN THE MAXIMUM OUTPUT FROM A WIND PLANT, IT IS NECESSARY TO LOCATE IT AT THE WINDIEST SITE POSSIBLE. TAKING LONG-TERM WIND SPEED AND DIRECTION MEASUREMENTS AT PROSPECTIVE SITES MAY NOT BE ECONOMICALLY FEASIBLE. HENCE, RELIABLE AND INEXPENSIVE METHODS FOR OPTIMUM SITING OF WIND POWER GENERATORS ARE REQUIRED FOR COST-EFFECTIVE UTILIZATION OF THIS LOCAL ENERGY SOURCE. THE REPORT SHOWS THAT BY APPLYING THE STATISTICAL THEORY OF TURBULENCE TO THE SURFACE LAYERS IN THE ATMOSPHERE, A SIMPLE FORMULA FOR THE ENERGY PATTERN FACTOR CAN BE DERIVED.

1978-0703 PALMA F N
DOUBLE WIND TURBINE WITH FOUR FUNCTION BLADE SET.
U.S. PATENT NO. 4,129,787, DECEMBER 12, 1978. 8 P.

A FREE STANDING, VERTICAL AXIS ROTOR EMPLOYS BOTH FIXED AND PIVOTED AIRFOIL BLADES ASSEMBLED ON A TRIANGULAR ROTOR FRAME. THE ANGLE OF ATTACK OF THE PIVOTED BLADES IS CONTROLLED WITH REFERENCE TO THE PREVAILING WINDS. THE ROTOR BASE TERMINATES ON A RING SHAPED TOWER MOUNTED ON GUIDING WHEELS DISPOSED IN A CIRCULAR PATTERN ON PILLARS. THE REVOLVING RING SHAPED BASE FORMS THE ARMATURE OF AN ENERGY CONVERTER BY ELECTROMAGNETIC INDUCTION ALLOWING THEREBY THE CONVERSION OF ROTARY MOTION TO ELECTRIC ENERGY AT GROUND LEVEL.

1978-0704 PANTALONE D K, FOUAD A A
MODES OF OSCILLATIONS OF WIND GENERATORS IN LARGE POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, JULY 16-21, 1978. NEW YORK, IEEE, 1978. P. 579-585.

THIS PAPER DEALS WITH A POTENTIAL PROBLEM RESULTING FROM THE PRESENCE OF MANY LARGE WIND GENERATORS TIED TO AN INTERCONNECTED POWER SYSTEM. THIS PROBLEM IS ASSOCIATED WITH DYNAMIC STABILITY FOR WHICH POORLY DAMPED NATURAL FREQUENCIES OF OSCILLATION OF THE POWER SYSTEM ARE OF CONCERN. THESE FREQUENCIES MAY BE EXCITED WHEN THE NATURAL MODES OF OSCILLATION OF THE WIND GENERATOR SYSTEMS COINCIDE WITH THOSE OF THE POWER SYSTEM. A PARAMETRIC EIGENVALUE ANALYSIS OF THREE CONCLUSIONS ARE DRAWN WITH RESPECT TO WIND GENERATOR SYSTEM DESIGN AND NETWORK CONFIGURATION.

1978-0705 PARASCHIVOIU I, BILGEN E, DA MATHA SANT'ANNA F
THEORETICAL STUDY OF A HYBRID WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1693-1702.

IN THIS PAPER, A THEORETICAL STUDY IS PRESENTED ON A HYBRID WIND TURBINE WHICH CONSISTS OF TWO VERTICAL AXIS COAXIAL TURBINES, ONE OF SAVONIUS TYPE AND THE OTHER A SCREW TYPE. THE SAVONIUS TYPE TURBINE HAS N//1 HELIOCOIDAL BLADES AND ROTATES IN A UNIFORM VELOCITY FIELD WHILE THE SECOND, THE SCREW TYPE CONVERTS THE KINETIC ENERGY OF THE VORTEX FLOW GENERATED IN THE CENTER OF THE FIRST TURBINE. EACH SYSTEM IS SEPARATELY TREATED FROM THE AERODYNAMICS POINT OF VIEW AND THE CORRESPONDING DEVELOPED POWERS AND EFFICIENCIES ARE CALCULATED. THEN THE TWO TYPES ARE COMBINED TOGETHER AS ONE UNIT TO GIVE THE FINAL RESULTS FOR A HYBRID TURBINE.

1978-0706 PARK J, SCHWIND D
WIND POWER FOR FARMS, HOMES, AND SMALL INDUSTRY.
NTIS, SEPTEMBER 1978. 229 P.
RFP-2841/1270/78/4

INFORMATION IS PRESENTED CONCERNING BASIC WIND TURBINE ENERGY CONVERSION; WIND BEHAVIOR AND SITE SELECTION; POWER AND ENERGY REQUIREMENTS; THE COMPONENTS OF A WIND ENERGY CONVERSION SYSTEM; SELECTING A WIND ENERGY CONVERSION SYSTEM AND SYSTEM ECONOMICS; AND LEGAL ASPECTS.

1978-0707 WHITFORD D H, MINARDI J E, WEST B S, DOMINIC R J
ANALYSIS OF THE MADARAS ROTOR POWER PLANT -- AN ALTERNATE METHOD FOR EXTRACTING LARGE AMOUNTS OF POWER FROM THE WIND. VOLUME 2. TECHNICAL REPORT.
NTIS, JUNE 1978. 423 P.
DSE-2554-78/2(VOL.2)

THE PURPOSE OF THE PROGRAM WAS TO ANALYZE AND UP-DATE THE DESIGN OF THE MADARAS ROTOR POWER PLANT CONCEPT THAT HAD BEEN DEVELOPED IN THE 1930'S TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF THIS SYSTEM TO BE COMPETITIVE WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES. A FOUR-TASK PROGRAM CONSISTING OF A SERIES OF WIND TUNNEL TESTS, AND ELECTRO-MECHANICAL ANALYSIS, A PERFORMANCE ANALYSIS, AND A COST ANALYSIS WAS CONDUCTED.

1978-0708 PEARSON E
VERTICAL-ACCESS WINDMILL PASSES ITS COLLEGE TESTS.
ENERGY USER NEWS 3(49): 15, DECEMBER 4, 1978.

RECENT DEMONSTRATION OF A VERTICAL-ACCESS WINDMILL AT CLARKSON COLLEGE IN NEW YORK HAS ENCOURAGED DOE TO EXPAND ITS ESTIMATE OF POSSIBLE APPLICATIONS. THE SILO-MOUNTED WINDMILL OPERATES ON 12-MILE-PER-HOUR OR MORE WIND AND CAN BE USED FOR LIGHT INDUSTRY, DAIRY FARMS, SHOPPING CENTERS, SCHOOLS, AND SIMILAR FACILITIES. ALCOA ALLIED IS DEVELOPING FIVE BASIC COMMERCIAL MODELS THAT WILL BE COST-EFFECTIVE AND WILL PROBABLY QUALIFY FOR THE NEW TAX CREDIT. THE WINDMILLS WILL RANGE FROM 12 TO 500 KILOWATT CAPACITY AND CAN OPERATE IN CONJUNCTION WITH A UTILITY SO THAT UNUSED ELECTRICITY IS PUT INTO THE POWER GRID. THE NEW CANTILEVERED DESIGN ELIMINATES THE NEED FOR A CLEAR GROUND AREA AND ALLOWS ADDITIONAL WIND TO BE UTILIZED BECAUSE OF ITS HEIGHT.

1978-0709 PELKA D G, PARK R T, SINGH R
ENERGY FROM THE WIND.
AM. J. PHYS. 46(5): 495-498, MAY 1978.

THE SUBJECT OF THE UTILIZATION OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE IS PRESENTED FOR A COURSE IN ENERGY SCIENCE. A GENERALIZED WIND MACHINE MODEL IS USED TO CALCULATE THE AVAILABLE WIND ENERGY AND A WIND ENERGY UTILIZATION SCHEME IS DESCRIBED. THE FRACTION OF THE AVAILABLE WIND POWER WHICH CAN BE EXTRACTED FOR USE BY A WIND TURBINE IS CALCULATED. THE AVERAGE ANNUAL ELECTRICAL POWER GENERATED FROM A WIND TURBINE FIELD IS ALSO ESTIMATED.

1978-0710 PETERSON J N
WIND GENERATORS AND ENERGY STORAGE.
ELECTRONICS FOR RESOURCES MANAGEMENT, IEEE REGION 6 CONFERENCE, ALAMOGORDO, N.M., APRIL 12-14, 1978.
CONFERENCE RECORD. NEW YORK, IEEE, 1978. P. 9-14.

WIND SPEED DATA OVER ONE YEAR FROM SIX LOCATIONS IN THE PACIFIC NORTHWEST ARE ANALYZED TO DETERMINE ENERGY STORAGE AMOUNTS SUFFICIENT TO SMOOTH THE FLUCTUATIONS IN WIND-GENERATED ELECTRICAL POWER. HYDROPOWER RESERVOIRS ARE CONSIDERED AS THE ENERGY STORAGE METHOD AND A DEFINITE RELATIONSHIP IS DETERMINED BETWEEN THE NUMBER OF WIND GENERATORS AND AMOUNT OF HYDRO STORAGE.

1978-0711 WIND POWER IN THE UNITED KINGDOM: PROCEEDINGS OF A ONE DAY SYMPOSIUM.
LONDON, MULTI-SCIENCE PUBLISHING CO., LTD., 1978. 112 P.
BWEA WIND ENERGY WORKSHOP, 1ST, LONDON, JULY 13, 1978.

PAPERS PRESENTED AT THE CONFERENCE COVERED TOPICS SUCH AS DESIGN AND PERFORMANCE CHARACTERISTICS OF VARIOUS TYPES OF WIND TURBINES; WIND TURBINE APPLICATIONS IN TELECOMMUNICATIONS; AND FEASIBILITY OF WIND POWER UTILIZATION IN THE UNITED KINGDOM.

1978-0712 PIEPERS G G, SENS P F
THE NETHERLANDS RESEARCH PROGRAM ON WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 467-473.
CONF-770921/1

A ROUGH ESTIMATION OF THE POTENTIALITY OF WIND ENERGY IN THE NETHERLANDS INDICATES THAT ABOUT 20% OF THE PRESENT DAY ELECTRICITY PRODUCTION COULD BE OBTAINED FROM THE WIND IN AREAS WITH HIGH WIND ENERGY DENSITY. THE PURPOSE OF THIS PROGRAM IS TO INVESTIGATE THE FEASIBILITY OF APPLICATION OF WIND ENERGY ON A LARGE SCALE TO PRODUCE ELECTRICITY THAT CAN BE FED INTO THE EXISTING GRID.

1978-0713 PLACE T W
RESIDENTIAL FLYWHEEL WITH TURBINE SUPPLY.
NTIS, 1978. P. 228-233
CONF-781046

THIS PAPER EXAMINES A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE. THE TYPICAL RESIDENCE HAS A 1500-SQ. FT. FLOOR AREA WITH A MAXIMUM POWER LEVEL OF 5 KW. THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE COST/BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE STUDY EXAMINES THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE FOR REDUCING THE INITIAL COST. THE PAPER PRESENTS THE PROGRESS TO DATE ON THIS PROGRAM AND DESCRIBES THE WORK PLANNED TO COMPLETE THE STUDY.

1978-0714 PLANTES W J
IMPLEMENTATION OF MOD-0A INSTALLATIONS TO NASA'S SPECIFICATIONS.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 7[illegible]-84
CONF-780357

TO OBTAIN EXPERIENCE WITH THE OPERATION OF WIND TURBINES IN UTILITY POWER SYSTEMS, THREE 200 KW MACHINES (MOD-0A) WILL BE CONSTRUCTED AND OPERATED IN EXISTING UTILITY POWER SYSTEMS. NASA STUDIES WERE CONDUCTED TO DEFINE COST EFFECTIVE CONFIGURATIONS FOR LARGE HORIZONTAL AXIS WIND TURBINES. THESE STUDIES SHOWED THAT 200 KW AND LARGER WIND TURBINES SHOULD BE COST EFFECTIVE IF PRODUCED IN SUFFICIENT QUANTITY. UPGRADING OF A 100 KW WIND TURBINE PREVIOUSLY TESTED AND EVALUATED APPEARED TO BE A SATISFACTORY APPROACH FOR OBTAINING EARLY EXPERIENCE WITH THIS TYPE CONFIGURATION IN UTILITY SYSTEMS. THE ROTOR BLADE DESIGN FOR THE 200 KW TURBINE IS THE SAME AS FOR THE 100 KW PLUMBROOK MOD-0 TURBINE, EXCEPT FOR MINOR STRUCTURAL CHANGES TO IMPROVE BLADE FATIGUE LIFE; THE DRIVE TRAIN DESIGN WAS UPRATED FOR THE HIGHER POWER; A HIGHER POWER GEAR BOX WAS SELECTED; THE TOWER WAS DESIGNED TO USE PIPE INSTEAD OF STRUCTURAL SHAPES, AND A 200 KW ALTERNATOR WITH ASSOCIATED ELECTRICAL EQUIPMENT WAS SELECTED.

1978-0715 PLEN A
WIND ENERGY ACCUMULATOR.
U.S. PATENT NO. 4,109,465, AUGUST 29, 1978. 2 P.

A DEVICE IS PROPOSED WHICH ACCUMULATES AND STORES ENERGY OF BLOWING WIND. ROTATABLE MEANS TURN THE DEVICE INTO THE DIRECTION OF THE BLOWING WIND, SO THAT ARTICULATED FLAPS ARE FULLY EXPOSED TO THE WIND. THESE FLAPS ARE CONNECTED WITH AIR PUMPING MEANS WHICH DELIVERS A QUANTITY OF AIR INTO A STORAGE CONTAINER, THE AIR BEING SUCCESSIVELY COMPRESSED WITHIN THE CONTAINER.

1978-0716 PLUNKETT J
PRESENT STATUS AND FUTURE OF WIND ENERGY DEVELOPMENT IN MONTANA.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 162-166.
CONF-780357

RESEARCH AND DEVELOPMENT PROGRAMS IN MONTANA CONCERNING THE UTILIZATION OF WIND ENERGY ARE REVIEWED.

1978-0717 PREUSS R D, SMOLKA S A, SUCIU E O, MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR-WINDS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 624-634.
CONF-770921/2

PRESENTED HERE IS A SUMMARY OF RESEARCH PERFORMED FOR THE DEVELOPMENT OF COMPUTER PROGRAMS DESIGNED FOR STUDYING THREE DIMENSIONAL NONPOTENTIAL INCOMPRESSIBLE STEADY AND UNSTEADY FLOW AROUND COMPLEX HORIZONTAL-AXIS WINDMILL CONFIGURATIONS.

1978-0718 PURPER G
WIND ENERGY PLANTS FOR PRODUCTION OF POWER: ECONOMIC SIGNIFICANCE AND TEST EXAMPLE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY. FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 377-387. (IN GERMAN)

IN ORDER TO SAVE ENERGY, THE USE OF WIND-ENERGY PRESENTS ITSELF. ITS USE FOR ENERGY PRODUCTION DOES NOT PLAY A ROLE ANYMORE, BECAUSE THE NATURAL AND ECONOMIC RESTRICTIONS ARE ESTIMATED TO BE TOO HIGH. NEVERTHELESS THE EXAMPLE WILDHAEUSER HOF IN BRAKEL/WESTPHALIA SHOWS THAT WIND-ENERGY HAS BEEN AND STILL IS IN A POSITION TO COMPETE IN CERTAIN AREAS.

1978-0719 PYTLINSKI J T
ASSESSMENT OF ENERGY CONSERVATION USING SOLAR ENERGY IN KANSAS.
J. ENERGY 2(4): 250-253, JULY 1978.

TABLES OF MEASURED AND CALCULATED DATA WHICH INDICATE THE AMOUNT OF FOSSIL ENERGY THAT COULD BE CONSERVED BY USING SOLAR AND WIND ENERGY IN KANSAS ARE PRESENTED. DATA INCLUDE SOLAR ENERGY RECEIVED; ESTIMATED ENERGY CONSUMPTION; ENERGY AVAILABLE DAILY FROM DIRECT USE OF SOLAR ENERGY FOR AN AVERAGE HOME; MINIMUM POTENTIAL DAILY AND ANNUAL ENERGY SAVINGS USING SOLAR ENERGY FOR SPACE HEATING, SPACE COOLING, AND WATER HEATING; ENERGY CONSUMPTION IN PUMPING IRRIGATION WATER; POSSIBLE ENERGY CONSERVATION IN PUMPING IRRIGATION WATER USING WIND OR SOLAR ENERGY; ESTIMATED ENERGY CONSERVATION USING SOLAR ENERGY FOR SPACE HEATING; ESTIMATED ENERGY CONSERVATION USING WINDMILLS FOR WATER PUMPING; ESTIMATED ENERGY CONSERVATION USING BIOMASS FOR ELECTRICITY GENERATION OR SPACE HEATING; AND THE POTENTIAL CONTRIBUTION OF SOLAR ENERGY TO THE TOTAL ENERGY DEMAND IN THE U.S.

1978-0720 QAZI A Q, RAMAKUMAR R
ON THE USE OF EDDY-CURRENT COUPLINGS IN WIND-DRIVEN SYNCHRONOUS MACHINES.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 242-246.

THIS PAPER DISCUSSES THE SUITABILITY OF EDDY-CURRENT COUPLINGS IN THE MECHANICAL INTERFACES OF WIND-DRIVEN SYNCHRONOUS MACHINES. BASED ON THE COMPUTER SIMULATION RESULTS PRESENTED UNDER GUSTING WIND CONDITIONS, RECOMMENDATIONS ARE MADE FOR CHOOSING THE COUPLING DESIGN PARAMETERS FOR SATISFACTORY OPERATION. EDDY-CURRENT COUPLINGS TURN OUT A VERY GOOD PERFORMANCE EVEN UNDER SEVERE GUSTING AND HIGHLY VARIABLE WIND REGIMES AND THEREFORE ARE STRONGLY RECOMMENDED FOR APPLICATION IN WIND-ELECTRIC CONVERSION SYSTEMS.

1978-0721 RAGHAVA A K, AGRAWAL D P
A VERTICAL AXIS WIND TURBINE.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1832.

THIS IS AN ABSTRACT OF A PAPER PRESENTED AT THE CONFERENCE. THE RAGHAVA WIND TURBINE IS DESCRIBED, WHICH HAS POTENTIAL ADVANTAGES OF STRONG STRUCTURE, LARGE WIND COLLECTION AREA, HIGH EFFICIENCY, HIGH WIND POWER OUTPUT, SELF-GOVERNING AND SELF-STARTING PROPERTY AND SMALLER AND LESS EXPENSIVE ROTOR.

1978-0722 RAJAGOPALAN V, SANKARA RAO K, SWAMY M N S
EFFICIENT USE OF WIND ENERGY BY USING STATIC SLIP RECOVERY SYSTEMS-A SIMULATOR STUDY.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 250-254.

A WIND ENERGY SYSTEM USING STATIC SLIP RECOVERY SCHEME IS PROPOSED. A DIGITAL SIMULATOR, WESS, WHICH CAN SIMULATE WIND ENERGY SYSTEMS IS ALSO PROPOSED IN THIS PAPER. WESS IS CAPABLE OF SIMULATING NORMAL OPERATING CONDITIONS OF THE SYSTEM AS WELL AS FAULT CONDITIONS, LIKE, COMMUTATION FAILURE, FIRING CONTROL FAILURE, FAILURE OF AN SCR ETC. EXPERIMENTAL RESULTS ON A 2 KW SCHEME TOGETHER WITH RESULTS OBTAINED FROM SIMULATOR RUN ARE PRESENTED AND COMPARED.

1978-0723 RAJAGOPALAN V, VEILLETTE D
CONTRIBUTION TO THE DEVELOPMENT OF WIND ENERGY SYSTEMS USING STATIC POWER ELECTRONIC CONVERTERS.
IEEE POWER ELECTRON. SPEC. CONF., SYRACUSE, N.Y., JUNE 13-15, 1978. PESC RECORD. NEW YORK, IEEE, NO. 78CH1337-5AES, 1978. P. 69-75.

A WIND ENERGY SYSTEM, USING A SQUIRREL CAGE INDUCTION MACHINE AND A STATIC POWER ELECTRONIC CONVERSION EQUIPMENT, INCORPORATING A NOVEL AND ECONOMICAL PULSE FREQUENCY MODULATED THREE PHASE AUXILIARY IMPULSE COMMUTATED INVERTER, IS DESCRIBED. A COMPLETE DESCRIPTION OF THE PROPOSED POWER AS WELL AS CONTROL SCHEMES IS GIVEN, WITH SPECIAL REFERENCE TO ITS POSSIBLE APPLICATION IN VARIABLE SPEED WIND POWER CONVERSION SCHEME.

1978-0724 RAMAKUMAR R
WIND-ELECTRIC CONVERSION UTILIZING FIELD MODULATED GENERATOR SYSTEMS.
SOL. ENERGY 20(2): 109-117, 1978.

VARIABLE-SPEED CONSTANT-FREQUENCY WIND ELECTRIC SYSTEMS OPERATE AT A CONSTANT TIP SPEED RATIO WITH VARYING WIND SPEEDS AND ENABLE THE EXTRACTION OF A PART OF THE ENERGY SPILLED BY CONSTANT-SPEED CONSTANT-FREQUENCY SYSTEMS. THIS PAPER DESCRIBES THE VARIABLE-SPEED CONSTANT-FREQUENCY WIND-DRIVEN FIELD MODULATED GENERATOR SYSTEM, UNDER DEVELOPMENT AT OKLAHOMA STATE UNIVERSITY. SUCH SYSTEMS APPEAR TO BE MOST ATTRACTIVE IN THE "SMALL" (10-50 KW) AND "100 KW SCALE" (50-250 KW) SIZES AND FOR USE IN LARGE CAPACITY "MULTIROTOR ON ONE TOWER" CONCEPTS.

1978-0725 RAMSDELL J V
TECHNICAL OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM ELEMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 291-296.
CONF-770921/1

BATTELLE, PACIFIC NORTHWEST LABORATORIES (PNL), HAS BEEN PROVIDING TECHNICAL AND MANAGEMENT SUPPORT FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE WIND ENERGY CONVERSION PROGRAM SINCE APRIL 1976. WITHIN THE WIND ENERGY CONVERSION PROGRAM, THE WCPE IS A SERVICE ELEMENT TO PROVIDE PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS) SELECTION OF SITES FOR INSTALLATION OF WECS, AND OPERATION THEREOF.

1978-0726 RAMSDELL J V
WIND SHEAR FLUCTUATIONS DOWNWIND OF LARGE SURFACE ROUGHNESS ELEMENTS.
J. APPL. METEOROL. 17(4): 436-443, APRIL 1978.

WIND MEASUREMENTS IN THE LOWEST 50 M OF THE ATMOSPHERE APPROXIMATELY 1 MILE DOWNWIND OF AN URBAN AREA ARE EXAMINED TO PROVIDE ESTIMATES OF THE SHORT-TERM FLUCTUATIONS OF THE VERTICAL AND LATERAL SHEAR OF THE LONGITUDINAL COMPONENT OF THE WIND DURING SIX PERIODS OF SLIGHTLY TO MODERATELY UNSTABLE ATMOSPHERIC CONDITIONS. THE FLUCTUATIONS ARE DESCRIBED BY A PEARSON TYPE IV PROBABILITY DISTRIBUTION. MODELS ARE PRESENTED FOR THE STANDARD DEVIATION, SKEWNESS, AND KURTOSIS OF THE DISTRIBUTIONS. THE DISTRIBUTIONS ARE SLIGHTLY SKEWED AND MORE PEAKED THAN GAUSIAN BUT TEND TOWARD GAUSIAN AS SEPARATION INCREASES. TIME SCALES FOR THE SHEAR FLUCTUATIONS ARE DESCRIBED. THESE RESULTS ARE RELEVANT TO THE DESIGN AND CONSTRUCTION OF LARGE EXPERIMENTAL

WIND ENERGY CONVERSION SYSTEMS.

1978-0727 RANGARAJAN S, DESIKAN V
WIND POWER AS A SUPPLEMENT TO SOLAR POWER IN INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1810-1811.

EXTENSIVE DATA ON SURFACE WINDS FROM A NETWORK OF 340 STATIONS IN INDIA WERE STUDIED WITH A VIEW TO IDENTIFY THE MAJOR REGIONS WELL SUITED FOR THE LARGE SCALE APPLICATION OF WIND ENERGY. THE STUDY BROUGHT OUT THE FACT THAT THE ENTIRE COUNTRY COULD BE DIVIDED INTO THREE REGIONS FROM POINT OF VIEW OF UTILIZATION OF WIND ENERGY USING WINDMILLS WITH A CUT-IN SPEED OF 8 KILOMETERS/HOUR. IT IS SUGGESTED BEFORE SITING ARRAYS OF WINDMILLS OVER THE FAVORED AREAS IT WOULD BE ADVANTAGEOUS TO CONDUCT A MESO-SCALE WIND SURVEY USING PORTABLE INSTRUMENTS SO AS TO YIELD ONE YEAR'S DATA AT EACH PROSPECTIVE SITE.

1978-0728 RANGI R S, SOUTH P, TEMPLIN R J
NRC'S WIND ENERGY PROGRAM.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.2. 15 P.

THIS PAPER DESCRIBES CURRENT WORK ON WIND POWER ASSESSMENT AND ON THE VERTICAL AXIS WIND TURBINES AT THE NATIONAL RESEARCH COUNCIL (NRC) OTTAWA. A MAP SHOWING THE ANNUAL AVERAGE WIND POWER DENSITY IS PRESENTED. THE ELECTRICAL WIND POWER POTENTIAL FOR ALL OF CANADA AND INDIVIDUAL PROVINCES HAS BEEN CALCULATED FROM THE WIND POWER DENSITY. THE WIND POWER POTENTIAL IS ALSO ASSESSED FOR: (A) ALL LAND AREA, (B) EXISTING ELECTRICAL NETWORK + 300 KM. (C) EXISTING ELECTRICAL NETWORK + 150 KM.

1978-0729 REED J W
METEOROLOGICAL STUDIES FOR WIND POWER -- A PROGRESS REPORT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 371-380.
CONF-770921/1

. TEN-YEAR TIME SERIES OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED STATIONS HAVE BEEN USED TO GENERATE TIME SERIES OF AVAILABLE WIND POWER. THESE HAVE BEEN RUN THROUGH COMPUTER-SIMULATED TURBINE SYSTEMS TO STUDY LONG TERM, PARTICULARLY ANNUAL AND LONGER, VARIATIONS IN POTENTIAL SUPPLY. THESE VARIATIONS WERE SO LARGE THAT STAND-ALONE GENERATING SYSTEMS WOULD REQUIRE HUGE, UNECONOMICAL STORAGE CAPACITIES TO PROVIDE RELIABLE SERVICE.

1978-0730 REED J W
AVAILABILITY OF WIND POWER.
NTIS, 1978. 15 P.
CONF-780253-1, SAND-78-0548C

METEOROLOGICAL STUDIES OF AVAILABLE WIND POWER WERE BEGUN AT SANDIA IN 1973 TO SUPPORT THE DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (VAWT, "EGG-BEATER"). THIS PRESENTATION REVIEWS WORK TO DATE. COPIES OF SEVEN SOURCE REPORTS WERE PROVIDED TO ELETROBRAS; SCIENTIA, LTDA., HAS INCLUDED THEM IN AN EXTENSIVE BIBLIOGRAPHY THAT WAS DISTRIBUTED AT THE SEMINAR. THIS REPORT SUMMARIZES THOSE CLIMATOLOGICAL STUDIES THAT ARE NEEDED TO ASSIST AND PROMOTE WIND ENERGY EXPLOITATION IN BRAZIL.

1978-0731 REED J W
WIND TIME SERIES ANALYSES FOR WECS APPLICATIONS.
NTIS, DECEMBER 1978. 44 P.
SAND-77-1701

A METHODOLOGY FOR WIND POWER ANALYSES OF WIND SPEED TIME SERIES IS DESCRIBED, INCLUDING COMPUTATION FLOW DIAGRAMS AND A FORTRAN PROGRAM LISTING. EXAMPLES OF RESULTS ARE PRESENTED BUT COMPLETE OUTPUTS WILL FOLLOW IN SPECIALIZED REPORTS. PRIMARY CALCULATION STAGES ARE (A) DATA HOMOGENIZATION FOR MOVED ANEMOMETERS, (B) EXTRAPOLATIONS TO SELECTED STANDARDIZED HEIGHTS, (C) DISTRIBUTION SMOOTHING FOR OBSERVATION BIAS, (D) POWER DISTRIBUTION FUNCTION CALCULATION, (E) TURBINE SPEED LIMIT EFFECTS ANALYSIS, (F) TIME VARIABILITY ASSESSMENT, AND (G) ANALYSIS OF LIGHT WIND DURATIONS.

1978-0732 REGAR K N
WIND POWER STATION FOR ELECTRICITY GENERATION.
GERMAN (FRG) PATENT NO. 2,722,990/A/, NOVEMBER 23, 1978. 28 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND POWER STATION FOR POWER GENERATION WITH A WIND DRIVEN ROTOR AND AN ELECTRICAL GENERATOR, WHICH IS COUPLED TO THE ROTOR. ACCORDING TO THE INVENTION A FLY WHEEL STORE IS PROVIDED, WHICH IS COUPLED TO THE GENERATOR AND THE ROTOR VIA A DEVICE FOR SETTING THE ENERGY INTAKE AND OUTPUTS, WHICH ARE CONNECTED TO THE ROTOR, THE ELECTRICAL GENERATOR, THE FLYWHEEL STORE AND A DEVICE WHICH CAN ACT AS A MOTOR OR GENERATOR WHICH IS COUPLED TO A PNEUMATIC ENERGY STORE. A FREEWHEEL IS SITUATED BETWEEN THE SUMMATION GEARING AND THE ROTOR.

1978-0733 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: WESTERN REGION.
NTIS, DECEMBER 1978. 442 P.
LBL-7821, DOE/TIC-10114/2

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE WEST. ITS INTENDED USES ARE TO PROVIDE DATA FOR POLICY ANALYSIS AND GENERIC IMPACT ASSESSMENTS; ASSIST THE LABS IN DEVELOPING RELEVANT DATA TO BE USED IN GROUPS AND INSTITUTIONS; AND IDENTIFY THE GAPS IN REGIONAL DATA BASES SO THAT THE DEPARTMENT OF ENERGY (DOE) MAY BE BETTER ABLE TO ALLOCATE RESOURCES FOR DATA AND PROGRAM DEVELOPMENT.

1978-0734 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: SOUTHERN REGION.
NTIS, DECEMBER 1978. 854 P.
ORNL-5443, DOE/TIC-10114/4

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE SOUTH.

1978-0735 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: MIDWEST REGION.
NTIS, DECEMBER 1978. 870 P.
ANL/EES-TM-25, DOE/TIC-10114/6

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE MIDWEST.

1978-0736 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: NORTHEAST REGION.*
NTIS, DECEMBER 1978. 715 P.
BNL-24867, DOE/TIC-10114/3

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE NORTHEAST.

1978-0737 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: NORTHWEST REGION.
NTIS, DECEMBER 1978. 849 P.
PNL-RAP-28, DOE/TIC-10114/5

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE NORTHWEST.

1978-0738 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: ROCKY MOUNTAIN REGION.
NTIS, DECEMBER 1978. 902 P.
DOE/TIC-10114/1

REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE ROCKY MOUNTAINS ARE COMPILED.

1978-0739 WEISBRICH A L
TORIODAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2099-2107.

A TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) DESIGN FOR WIND ENERGY CONVERSION SYSTEMS (WECS) APPLICATION IS PRESENTED. A TARP WECS IS ANALYZED FOR PERFORMANCE AND ECONOMIC VIABILITY USING BOTH EXPERIMENTAL RESULTS AND ANALYTICAL APPROACHES. RESULTS INDICATE A TARP WECS TO HAVE UNUSUAL PROMISE AND POTENTIAL FOR MEETING THE DIVERSE PREREQUISITES FOR A WECS TO BECOME A VIABLE ENERGY SYSTEM ALTERNATIVE. THESE ARE REDUCED ENERGY COST, APPLICABILITY AND INTERFACE ADAPTABILITY TO A BROAD RANGE OF USES, ENVIRONMENTS AND STRUCTURES, AS WELL AS AESTHETIC DESIGN WITH MINIMAL ENVIRONMENTAL IMPACT.

1978-0740 RENEWABLE ENERGY RESOURCE AND TECHNOLOGY ASSESSMENT: SOUTHERN TIER CENTRAL REGION, NEW YORK, NEW YORK. RENEWABLE ENERGY RESOURCE INVENTORY: RENEWABLE ENERGY TECHNOLOGY HANDBOOK: TECHNOLOGY ASSESSMENT WORKBOOK.
NTIS, DECEMBER 1978. 191 P.
ORNL/SUB-7549/1

THE RENEWABLE ENERGY RESOURCE INVENTORY CONTAINS REGIONAL MAPS THAT RECORD THE LOCATION OF RENEWABLE ENERGY RESOURCES SUCH AS INSOLATION, WIND, BIOMASS, AND HYDROPOWER IN THE SOUTHERN TIER CENTRAL REGION OF NEW YORK STATE. IT CONTAINS AN OUTLINE OF A PROCESS BY WHICH COMMUNITIES CAN PREPARE LOCAL RENEWABLE ENERGY RESOURCE INVENTORIES USING MAPS AND OVERLAYS. THE PROCESS STARTS WITH THE MAPPING OF THE RESOURCES AT A REGIONAL SCALE AND TELESCOPES TO AN ANALYSIS OF RESOURCES AT A SITE-SPECIFIC SCALE. THE RESOURCE INVENTORY PRESENTS A SITE ANALYSIS OF SULLIVAN STREET INDUSTRIAL PARK, ELMIRA, NEW YORK.

1978-0741 RENNE D S, ELLIOTT D L
OVERVIEW OF TECHNIQUES FOR ANALYZING THE WIND ENERGY POTENTIAL OVER LARGE AREAS.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 176-184.
CONF-780754

ADDITIONAL WIND DATA AND OBSERVATIONAL AND ANALYTICAL METHODS PROVIDE A MORE THOROUGH LARGE-AREA ANALYSIS OF WIND ENERGY POTENTIAL. PROCEDURES ARE DESCRIBED FOR IDENTIFYING AND ANALYZING VARIOUS TYPES OF DATA. OBSERVATIONAL AND ANALYTICAL METHODOLOGIES, WHICH AID IN ESTIMATING WIND CHARACTERISTICS IN REGIONS LACKING SUFFICIENT WIND DATA, ARE PRESENTED. IN THE PACIFIC NORTHWEST PNL IS TESTING AND DEMONSTRATING TECHNIQUES FOR LARGE-AREA ANALYSIS. THE PRELIMINARY ANALYSIS FOR THE NORTHWEST HAS REVEALED SIGNIFICANTLY GREATER DETAIL IN WIND ENERGY PATTERNS THAN DID THE NATIONAL WIND ENERGY ASSESSMENTS. OVER REGIONS WHERE WIND DATA ARE LACKING OR LIMITED AND OVER AREAS OF COMPLEX TERRAIN, ADDITIONAL MEASUREMENTS ARE NEEDED TO DETERMINE THE BEST AREAS FOR SITING.

1978-0742 REUTER R C
TOPICS ON THE DYNAMICS OF VERTICAL AXIS WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 759-766.
CONF-770921/2

ROTATING MACHINERY COMPONENTS ARE GENERALLY EXAMINED CLOSELY FOR DYNAMIC PROBLEMS BECAUSE OF EVER PRESENT, PERIODIC, BODY AND/OR EXTERNAL FORCES. DARRIEUS VERTICAL AXIS WIND TURBINES, WITH THEIR LONG, SLENDER BLADES, ROTATING SHAFTS AND TIE-DOWN CABLES ARE NO EXCEPTION. RELATIVELY LOW OPERATING FREQUENCIES AND MULTIPLE FREQUENCY EXCITATION FORCES MAKE VIBRATIONS AND DYNAMIC INSTABILITIES OF VAWTS A CONSTANT CONCERN TO THE DESIGNER. THIS PAPER BRIEFLY DISCUSSES SEVERAL DYNAMICS PROBLEMS THAT WERE TREATED WITH A VIEW TOWARD INFLUENCING DESIGN AND OPERATION OF THE SANDIA 17 METER VAWT, PRESENTLY OPERATING IN ALBUQUERQUE, NEW MEXICO.

1978-0743 REUTER R C, WORSTELL M H
TORQUE RIPPLE IN A VERTICAL AXIS WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2090-2098.

TORQUE RIPPLE IS A NAME GIVEN TO TIME VARIATIONS IN TORQUE WHICH ARE PROPAGATED THROUGH THE DRIVE TRAIN OF WIND ENERGY CONVERSION SYSTEMS. THIS PAPER COVERS AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF TORQUE RIPPLE IN A DARRIEUS VERTICAL AXIS WIND TURBINE. AN ANALYTICAL MODEL OF THE TURBINE IS DESCRIBED AND NUMERICAL RESULTS FROM A SOLUTION TO THE EQUATIONS OF THIS MODEL ARE COMPARED TO EXPERIMENTAL RESULTS OBTAINED FROM THE EXISTING DOE/SANDIA 17 METER VERTICAL AXIS WIND TURBINE. DISCUSSIONS ON THE SOURCES OF TORQUE RIPPLE, THEORETICAL AND EXPERIMENTAL CORRELATION, AND MEANS OF SUPPRESSING ITS MAGNITUDE ARE INCLUDED.

1978-0744 RICHARDS T R, NEUSTADTER H E
DOE/NASA MOD-0A WIND TURBINE PERFORMANCE.

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2060-2063.

AS PART OF THE NATIONAL WIND ENERGY PROGRAM UNDER THE DIRECTION OF THE DEPARTMENT OF ENERGY, THE NASA-LEWIS RESEARCH CENTER HAS DESIGNED AND BUILT, AND IS NOW OPERATING, A LARGE WIND TURBINE AT CLAYTON, N.M. DESIGNATED THE MOD-0A-1, THIS IS THE FIRST OF THREE IDENTICAL 200-KW WIND TURBINES TO BE OPERATED ON ELECTRIC UTILITY NETWORKS. THIS MACHINE WAS INSTALLED AT CLAYTON IN NOVEMBER 1977. THIS PAPER PRESENTS A COMPARISON BETWEEN ITS PREDICTED AND MEASURED POWER VERSUS WIND SPEED PERFORMANCE.

1978-0745 ROBBINS W H, SHOLES J E
ERDA/NASA 200 KW MOD-0A WIND TURBINE PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 59-75.
CONF-770921/1

THIS PAPER PRESENTS AN OVERVIEW OF THE MOD-0A PROGRAM. THE MOD-0A PROGRAM IS DIRECTED TO THE DESIGN, MANUFACTURE, INSTALLATION AND OPERATION OF 200 KW WIND TURBINES IN UTILITY POWER SYSTEMS TO DEFINE AND RESOLVE PROBLEMS ASSOCIATED WITH WIND TURBINES IN USER SYSTEMS. A MOD-0A SYSTEM DESCRIPTION, DEVELOPMENT PROGRAM AND PROGRAMMATIC STATUS IS INCLUDED.

1978-0746 ROBINSON J W
GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, 1978.
LOS ANGELES COUNCIL OF ENGINEEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4. NORTH HOLLYWOOD, CAL., WESTERN PERIODICAL CO., 1978. 293 P.
GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978.

THE PROCEEDINGS INCLUDE 53 PAPERS DEVOTED TO ENERGY PROBLEMS, INCLUDING: SOLAR, ALTERNATIVE ENERGY SOURCES, CONVENTIONAL, AND NUCLEAR POWER; CITIZENS WORKSHOP; CONSERVATION AND ENVIRONMENTAL ASPECTS; CO-GENERATION; ECONOMIC AND POLITICAL ASPECTS.

1978-0747 ROGERS P
WIND ENERGY GENERATION WITH HYPERBOLIC COOLING TOWERS.
LOS ANGELES COUNCIL OF ENGINEEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4: GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978. NORTH HOLLYWOOD, WESTERN PERIODICAL CO., 1978. P. 68-72.

THE METHOD DESCRIBED IN THIS ARTICLE PERTAINS TO THE SECONDARY UTILIZATION OF THE EXTERIOR OF HYPERBOLIC COOLING TOWER SHELLS FOR SUPPORTING WIND-ROTORS, AND FOR PRODUCING ELECTRIC ENERGY DIRECTLY AND AT A VERY REDUCED COST.

1978-0748 ROGERS S E
WIND ENERGY CONVERSION--ENVIRONMENTAL EFFECTS ASSESSMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 402-406.
CONF-770921/1

A BIOPHYSICAL IMPACT ASSESSMENT WAS UNDERTAKEN TO EVALUATE THE POSSIBLE ENVIRONMENTAL EFFECTS OF THE EMERGING WIND ENERGY CONVERSION TECHNOLOGY. THE MICROMETEOROLOGICAL FIELD PROGRAM SOUGHT TO MEASURE THE EFFECT OF THE 100 KW WTG ON THE DOWNSTREAM WAKE. THE PARAMETERS STUDIED WERE: THE HORIZONTAL VARIATION IN INCIDENT PRECIPITATION AND IN INCIDENT RADIATION, AND THE HORIZONTAL AND VERTICAL DISTRIBUTIONS OF AIR/SURFACE TEMPERATURE, WIND SPEED, AND ATMOSPHERIC CARBONE DIOXIDE CONCENTRATIONS.

1978-0749 ROOT D H
SURVEY AND APPRAISAL OF PRIMARY FUTURE ENERGY SOURCES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 10, P. 4667-4695.

SOME BASIC DATA AND A CONSIDERATION OF CERTAIN PHYSICAL LAWS MAY BE USED TO ESTIMATE THE MAGNITUDE OF THE FOLLOWING ENERGY SOURCES: WINDPOWER, WATERPOWER, LOW-TEMPERATURE SOLAR ENERGY, SOLAR POWER THROUGH PHOTOSYNTHESIS, TIDAL POWER, GEOTHERMAL ENERGY AND FISSION ENERGY (WITHOUT BREEDERS), COAL, SOLAR ELECTRIC GENERATION, AND FISSION WITH BREEDERS. THE PRINCIPAL CONCLUSION IS THAT IF THE U.S. WERE TO DEVELOP DOMESTICALLY THE ABOVE SOURCES, AND IF GEOTHERMAL ENERGY AND FISSION ENERGY (WITHOUT BREEDERS) WERE MADE TO LAST 50 YEARS, THEN THE FIRST SEVEN ENERGY SOURCES WOULD SUPPLY ENERGY AT ABOUT 50 PERCENT OF THE 1973 U.S. CONSUMPTION RATE. HENCE, WITHOUT OIL AND GAS, HALF THE U.S. ENERGY WOULD HAVE TO COME FROM ONE OR MORE OF THE THREE SOURCES: NUCLEAR FISSION WITH BREEDERS, SOLAR ELECTRIC GENERATION, AND COAL.

1978-0750 ROSEN A, FRIEDMANN P P
NONLINEAR EQUATIONS OF EQUILIBRIUM FOR ELASTIC HELICOPTER OR WIND TURBINE BLADES UNDERGOING MODERATE DEFORMATION.
NTIS, DECEMBER 1978. 105 P.
DOE/NASA/3082-78/1, NASA-CR-159478, UCLA-ENG-7718, N79-19414

A SET OF NONLINEAR EQUATIONS OF EQUILIBRIUM FOR AN ELASTIC WIND TURBINE OR HELICOPTER BLADE IS PRESENTED. THESE EQUATIONS ARE DERIVED FOR THE CASE OF SMALL STRAINS AND MODERATE ROTATIONS (SLOPES). THE DERIVATION INCLUDES SEVERAL ASSUMPTIONS WHICH ARE CAREFULLY STATED. FOR THE CONVENIENCE OF POTENTIAL USERS THE EQUATIONS ARE DEVELOPED WITH RESPECT TO TWO DIFFERENT SYSTEMS OF COORDINATES, THE UNDEFORMED AND THE DEFORMED COORDINATES OF THE BLADE. FURTHERMORE, THE LOADS ACTING ON THE BLADE ARE GIVEN IN A GENERAL FORM SO AS TO MAKE THEM SUITABLE FOR A VARIETY OF APPLICATIONS. THE EQUATIONS OBTAINED IN THE PRESENT STUDY ARE COMPARED WITH THOSE OBTAINED IN PREVIOUS STUDIES. FINALLY, IT SHOULD BE NOTED THAT THIS REPORT REPRESENTS THE FIRST IN A SERIES OF THREE REPORTS DOCUMENTING THE RESEARCH PERFORMED UNDER THE GRANT THE SECOND REPORT (UCLA-ENG-7880) DEALS WITH THE AEROELASTIC STABILITY AND RESPONSE OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE. THE THIRD REPORT (UCLA-ENG-7881) DEALS WITH THE AEROELASTIC STABILITY AND RESPONSE OF THE COMPLETE COUPLED ROTOR/TOWER SYSTEM SIMULATING ESSENTIALLY THE DYNAMICS OF THE NASA/DOE MOD-0 CONFIGURATION.

1978-0751 ROTATING ENERGY TRANSFORMER AND DEVICE FOR THE EXTRACTION OF ENERGY FROM SURFACE WAVES.
GERMAN (FRG) PATENT NO. 2,750,616/A/, MAY 24, 1978. 15 P. (IN GERMAN)

ROTATING ENERGY CONVERTER WITH AN IMPELLER HAVING A NUMBER OF VANES, WHICH CAN BE DRIVEN BY AIR FLOWING THROUGH, IS CHARACTERISED BY THE FACT THAT EACH VANE HAS AN AEROFOIL CROSS SECTION AND IS FIXED WITH ITS ZERO DRIVE AEROFOIL AT RIGHT ANGLES TO AXIAL DIRECTION, PRODUCING A ROTATION OF THE SAME IN THE SAME DIRECTION.

EQUIPMENT FOR EXTRACTING ENERGY FROM SURFACE WAVES, PARTICULARLY SEA WAVES, IS CHARACTERISED BY THE FACT THAT A LIMITER IS PRESENT WHICH MARKS OUT AN AREA OF THE SURFACE OF THE WAVE MEDIUM, AND THAT A ROTATING ENERGY CONVERTER IS ARRANGED SO THAT IT CAN BE DRIVEN BY THE AIR MOVEMENT PRODUCED IN THE AREA OF THE EXISTING WAVE MOVEMENT.

1978-0752 WHITFORD D H, MINARDI J E, WEST B S
AN EVALUATION OF THE MADARAS ROTOR POWER PLANT CONCEPT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 829-842.
CONF-770921/2

THE OBJECTIVE OF THIS PROGRAM IS TO DEMONSTRATE THE DEGREE THAT MADARAS POWER PLANTS HAVING CAPACITIES IN THE 10 MW TO 100 MW RANGE ARE COST COMPETITIVE WITH HORIZONTAL-AXIS WIND GENERATORS AND FOSSIL-FUEL-FIRED POWER PLANTS. THE PROGRAM CONSISTS OF FOUR PHASES: A PERFORMANCE ANALYSIS, AN AERODYNAMIC STUDY, A STRUCTURAL, ELECTRO-MECHANICAL SYSTEM STUDY, AND AN ECONOMIC STUDY. THE RESULTS OBTAINED TO DATE ARE PRESENTED.

1978-0753 ROTHMAN E A
COMPOSITE BLADES FOR MOD-0.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 540-551.
CONF-770921/2

ON THE BASIS OF THE DATA AND ARGUMENTS IN THE PAPER "MATERIALS AND PROCESSING APPROACHES TO COST COMPETITIVE WIND TURBINE ROTOR BLADES", PRESENTED AT THE 8TH ANNUAL SAMPE TECHNICAL CONFERENCE IN OCTOBER 1976, IT WAS CONCLUDED THAT A FIBERGLASS FILAMENT-WOUND WIND TURBINE BLADE WOULD REDUCE FIRST COST AND COULD REDUCE OPERATING COST AS WELL BY WAY OF LONGER LIFE AND LOWER MAINTENANCE. AS A FIRST STEP, A PROTOTYPE FIBERGLASS BLADE WAS DESIGNED, BUILT AND GROUND-TESTED UNDER A CONTRACT FROM NASA/LEWIS RESEARCH CENTER TO HAMILTON STANDARD. THIS REPORT IS A BRIEF SUMMARY OF THIS FIRST STEP.

1978-0754 RUHLMANN T E
SELECTION AND APPLICATION OF PASTED PLATE LEAD-ACID BATTERIES FOR WIND AND SOLAR POWER ENERGY STORAGE.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 85-91.

THE OPTIMUM COMPONENT CHARACTERISTICS OF LEAD-ACID BATTERIES REQUIRED FOR 5 AND 20 DAY ENERGY RESERVES ARE PRESENTED AND COMPARED WITH THE CHARACTERISTICS OF: STANDARD AUTOMOTIVE-LIGHTING-IGNITION (SLI) BATTERIES; MAINTENANCE FREE AUTOMOTIVE SLI BATTERIES; STANDARD HEAVY DUTY SLI AND MARINE BATTERIES; ELECTRIC VEHICLE (EV) BATTERIES; INDUSTRIAL LIFT TRUCK BATTERIES; AND STATIONARY BATTERIES. IN ADDITION, BRIEF REMARKS ARE PRESENTED RELATED TO PERSONAL AND EQUIPMENT SAFETY WITH RESPECT TO HANDLING AND USING LEAD-ACID BATTERIES.

1978-0755 RUP R
EXPERIMENTAL INVESTIGATIONS OF A PHYSICAL SYSTEM CAPABLE OF USING SOLAR ENERGY.
J. PHYS. D11(18): L207-L209, DECEMBER 21, 1978.

A PHYSICAL SYSTEM CAPABLE OF USING LOW TEMPERATURE DIFFERENCES IS INVESTIGATED. IN AN EARLIER PUBLICATION, BASED ON A SIMPLE THEORETICAL MODEL, THE AUTHOR, IN COLLABORATION WITH OTHERS, OBTAINED THE DYNAMICS OF A SYSTEM WITH TWO WORKING FLUIDS, VIZ. DRY AIR (DRY SYSTEM) AND AIR SATURATED WITH WATER VAPOR (WET SYSTEM). THIS NOTE REPORTS A COMPARISON BETWEEN THE EXPERIMENTAL AND THEORETICAL RESULTS, BOTH FOR THE DRY SYSTEM AND THE WET SYSTEM. THE RESULTS ARE FOUND TO BE IN GOOD AGREEMENT.

1978-0756 WHITE H O
WIND MOTOR.
U.S. PATENT NO. 4,097,190, JUNE 27, 1978. 14 P.

A WIND DRIVEN BLADE IS PIVOTALLY CARRIED BY A ROTATABLE CRANK ARM. THE BLADE ROTATES RELATIVE THE CRANK ARM FROM A POSITION PERPENDICULAR TO THE WIND DURING THE POWER STROKE TO A POSITION PARALLEL TO THE WIND DURING THE RETURN STROKE. THE MOVING MASS IS DYNAMICALLY BALANCED TO PROVIDE A SELF-CONTAINED SINGLE BLADE MODULAR UNIT. A SELECTED NUMBER OF THE MODULAR UNITS ARE ADJOINABLE TO FORM A MULTI-BLADE WIND MOTOR IN WHICH ANY GIVEN MODULE MAY BE FUNCTIONALLY DISCONNECTED.

1978-0757 SAIFUL M R
COMPARATIVE COSTS OF WATER PUMPING WITH SOLAR ENERGY, WIND POWER, PETROL ENGINE AND ELECTRIC WATER PUMP.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 2143-2146.

WITH RENEWED INTEREST IN SOLAR ENERGY UTILIZATION, CERTAIN COMMERCIAL FIRMS ARE CLAIMING OPTIMISTIC AND UNREALISTICALLY HIGH PERFORMANCE FIGURES AND COMPETITIVE ECONOMICS FOR THEIR SOLAR WATER PUMPING UNITS AND OTHER POWER DEVICES. TO KEEP THE CONSUMER, ENGINEER, AND THE GOVERNMENT AGENCIES INFORMED OF THE PRESENT STATE OF SOLAR WATER PUMPING TECHNOLOGY AND COMPARATIVE ECONOMICS OF SUCH DEVICES, THE NEED FOR STANDARDIZATION, PERFORMANCE ANALYSIS, AND ECONOMIC ASSESSMENT IS SELF-EVIDENT.

1978-0758 SALIEVA R B
SELECTION OF METHOD FOR CALCULATING THE PARAMETERS OF WIND AND SOLAR POWER STATION STORAGE FACILITIES.
GELIOTEKHNIKA 14(1): 67-71, 1978. TRANSL.: APPL. SOL. ENERGY 14(1): 55-58, 1978.

IT IS SHOWN THAT WHEN USING THE CALENDAR METHOD TO DETERMINE THE PARAMETERS OF WIND AND SOLAR POWER STATION STORAGE FACILITIES IT IS NECESSARY TO UTILIZE AS THE BASIC DATA FOR SEASONAL REGULATION CALCULATIONS, A 20-YEAR SERIES OF ACTUAL STANDARD OBSERVATIONS OF THE WIND AND SOLAR RADIATION REGIMES FOR VALID DETERMINATION OF THE STORAGE FACILITY PARAMETERS. A TEN-YEAR OBSERVATION PERIOD CAN BE USED ONLY FOR THE SUMMER SEASON. COMPARATIVE EVALUATION OF THE PARAMETERS CALCULATED ON THE BASIS OF STANDARD AND HOURLY OBSERVATIONS YIELDS A BASIS TO CONSIDER THAT RELIABLE INFORMATION CAN BE OBTAINED FROM THE DATA OF STANDARD OBSERVATIONS IF THE OVERALL SAMPLE SIZE IS SUFFICIENT.

1978-0759 SALTER E L
WIND-DRIVEN GENERATOR.
U.S. PATENT NO. 4,110,631, AUGUST 29, 1978. 16 P.

A WIND-DRIVEN GENERATOR IS DESCRIBED WHICH HAS A PLURALITY OF ROTORS EACH HAVING A RIM IN FRICTIONAL ENGAGEMENT WITH A POWER TAKE-OFF DRUM WHICH IS MOUNTED ON THE SHAFT OF AN ELECTRICAL GENERATOR, AND IN WHICH THE ROTOR RIMS ARE PRESSED AGAINST THE DRUM BY THE WIND FORCE ON THE ROTORS AND WITH A REDUCED FORCE WHICH VARIES AS A

POSITIVE FUNCTION OF THE WIND FORCE.

1978-0760 SAMPSON A R
WIND POWERED HYDRAULIC HEATING SYSTEM.
U.S. PATENT NO. 4,114,809, SEPTEMBER 19, 1978. 6 P.

A HEATING APPARATUS IS DESCRIBED WHICH INCLUDES A CIRCULATION SYSTEM FOR HYDRAULIC FLUID, A PUMP FOR PUMPING THE FLUID, A WINDMILL FOR DRIVING THE PUMP, AN ADJUSTABLE PRESSURE RESPONSIVE RELIEF VALVE FOR RESTRICTING THE FLOW OF HYDRAULIC FLUID IN THE CIRCULATION SYSTEM AND ESTABLISHING THEREIN AN ADJUSTABLE FLUID PRESSURE REDUCTION, A SENSOR RESPONSIVE TO THE WIND VELOCITY ENCOUNTERED BY THE WINDMILL, A VALVE CONTROL MECHANISM RESPONSIVE TO THE SENSOR FOR AUTOMATICALLY ADJUSTING THE FLUID PRESSURE REDUCTION PROVIDED BY THE RELIEF VALVE AND A HEAT EXCHANGER FOR REMOVING HEAT FROM THE HYDRAULIC FLUID. THE WORK PERFORMED BY THE WIND IN PUMPING THE HYDRAULIC FLUID THROUGH THE RELIEF VALVE IS CONVERTED DIRECTLY INTO HEAT THAT IS CONVEYED TO THE HEAT EXCHANGER FOR CONVERSION INTO A USEFUL FORM. BY ADJUSTING THE RELIEF VALVE TO ESTABLISH INCREASING PRESSURE REDUCTIONS WITH INCREASING WIND VELOCITY, THE SYSTEM OPTIMIZES THE RATE OF WIND ENERGY UTILIZATION.

1978-0761 SCHENZLE P
WIND-POWERED SHIPS: POSSIBILITIES OF MODERN WIND-POWERED SEA TRANSPORT SYSTEMS.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 325-345. (IN GERMAN)

DURING THOUSANDS OF YEARS THE EXTENSIVE WIND SYSTEMS OF THE OCEANS SERVED AS THE NATURAL ENERGY SOURCE FOR SEA TRANSPORTATION. TODAY THE TECHNICAL MEANS ARE AVAILABLE FOR A FAR MORE EFFICIENT UTILIZATION OF THE WIND FOR SHIP PROPULSION. WITH THE GROWING AWARENESS OF THE SERIOUS ECOLOGICAL PROBLEMS OF THE OCEANS A GREAT VARIETY OF PROPOSALS FOR COMMERCIAL WIND PROPULSION SYSTEMS WAS PUBLISHED. HERE A STANDARD PERFORMANCE PREDICTION MODEL IS PRESENTED AS A BASIS FOR A FAIR COMPARISON OF DIFFERENT SYSTEMS. RESULTS ARE PRESENTED FOR DIFFERENT TYPES OF WINDPROPELLED CARGOSHIPS.

1978-0762 SCOTT D
HYDRAULIC WINDMILLS SMOOTH THE CHANGING WINDS.
POP. SCI. 212(4): 6, 10, 192, APRIL 1978.

TWO BRITISH CONCEPTS FOR WIND TURBINE POWER CONVERSION SYSTEMS UTILIZING HYDRAULIC SYSTEMS ARE DESCRIBED. ONE SYSTEM IS USED TO GENERATE ELECTRICITY AND THE OTHER SYSTEM GENERATES HEAT FOR SPACE HEATING.

1978-0763 SEIDEL R C
POWER OSCILLATIONS OF A 100 KW WIND TURBINE GENERATOR.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3REG 2, 1978. P. 112-113.

PROGRESS IN EXPLAINING A 100 KW EXPERIMENTAL WIND TURBINE GENERATOR'S POWER OSCILLATION AT A FREQUENCY OF TWICE PER ROTOR REVOLUTION (2P) IS REPORTED. THE 2P POWER CONTENT IS ON AVERAGE SOME FOUR TIMES MORE THAN PREDICTED, ASSUMING LINEAR WIND SHEAR AND NEGLECTED EXCITATION FROM RANDOM LOCAL TURBULENCES.

1978-0764 SEIDEL M
WIND ENERGY. A CONTRIBUTION TO ENSURING THE ENERGY SUPPLY OF THE FEDERAL REPUBLIC OF GERMANY.
TECH. BAU. 9(8): 653-658, 1978. (IN GERMAN)

INCLUDED WITHIN IS A HISTORICAL REVIEW OF THE USE OF WIND ENERGY, AND AN ESTIMATION OF THE AVAILABLE ENERGY AMOUNT USING THE EXAMPLE OF WEST GERMANY AND A STATION NEAR AACHEN. THE TYPES OF WIND ENERGY PLANTS, AVAILABLE EFFICIENCIES, AND SPECIFIC LOSS-FACTORS ARE ALSO INCLUDED. THE REPORT CONTAINS A FORECAST OF THE USE OF WIND ENERGY FOR ELECTRIC POWER GENERATION AND THE PRODUCTION OF HEAT ENERGY.

1978-0765 SELECTING WATER-PUMPING WINDMILLS.
NTIS, JANUARY 1978. 19 P.
PB80-149776

THIS SHORT PAPER IS AN INTRODUCTORY GUIDE FOR THOSE CONSIDERING A WINDMILL FOR WATER PUMPING. TOPICS DISCUSSED INCLUDE: PARTS AND ASSEMBLY, THE TOWER, THE WELL SEAL AND PUMP ROD ASSEMBLY, THE PACKERHEAD, THE DROP PIPE, THE CYLINDER AND SCREEN, THE DISCHARGE PIPE, BOOSTER MILL AND STORAGE TANKS. ALSO MENTIONED ARE SUGGESTIONS FOR WINDMILL SIZE SELECTION AND PROPER SITE INSTALLATION.

1978-0766 SEMINAR UND STATUSREPORT WINDENERGIE. (SEMINAR AND STATUS REPORT ON WIND ENERGY.)
BONN, GERMANY, FR, BMFT, 1978. 490 P. (IN GERMAN)
SEMINAR AND STATUS REPORT ON WIND ENERGY, JUELICH, GERMANY, FR, OCTOBER 23-24, 1978.

THIS REPORT CONTAINS PAPERS ON THE METEOROLOGICAL REQUIREMENTS FOR THE OPERATION OF WIND ENERGY SYSTEMS AND DESCRIPTIONS OF SMALL AND LARGER PLANTS, PART OF THEM IN THE PLANNING STAGE AND PART OF THEM ALREADY IN OPERATION.

1978-0767 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE TO TV RECEPTION CAUSED BY WINDMILLS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 407-412.
CONF-770921/1

THE PAPER INVESTIGATES THE INTERFERENCE TO TV RECEPTION CAUSED BY THE SCATTERING OF TV SIGNALS BY WINDMILLS. IN THE VICINITY OF AN APPROPRIATELY ORIENTED WINDMILL, A TV RECEIVER WILL RECEIVE THE WINDMILL SCATTERED SIGNALS IN ADDITION TO THE DIRECT SIGNALS. THE SCATTERING BY THE ROTATING BLADES OF THE WINDMILL WILL PRODUCE BOTH AMPLITUDE AND PHASE MODULATIONS OF THE SIGNALS AT THE RECEIVER; IN PRACTICE THE FORMER EFFECTS DOMINATE. SINCE THE VIDEO INFORMATION IN TV SIGNALS IS TRANSMITTED BY AMPLITUDE MODULATION, ANY EXTRANEOUS AMPLITUDE MODULATION WILL, IF SUFFICIENTLY STRONG, DISTORT THE VIDEO RECEPTION.

1978-0768 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE BY WIND TURBINE GENERATORS. FINAL REPORT.
NTIS, MARCH 1978. 169 P.
TID-28828

THE INTERFERENCE PRODUCED BY HORIZONTAL AXIS WIND TURBINE GENERATORS ON A NUMBER OF ELECTROMAGNETIC SYSTEMS HAS BEEN EXHAUSTIVELY STUDIED, AND A METHOD HAS BEEN DEVELOPED TO APPROXIMATE THE INTERFERENCE ZONE OF A WTG.

1978-0769 SENIOR T B A, SENGUPTA D L
WIND TURBINE GENERATOR SITING AND TV RECEPTION HANDBOOK. TECHNICAL REPORT NO. 1.
NTIS, JANUARY 1978. 39 P.
COO-2846-1

THE ROTATING BLADES OF A HORIZONTAL AXIS WIND TURBINE GENERATOR (WTG) CAN DISTORT THE VIDEO PORTION OF A TV SIGNAL AND THEREBY INTERFERE WITH TV RECEPTION IN THE VICINITY OF THE WTG. THE NATURE OF THIS INTERFERENCE IS DISCUSSED AND METHODS ARE DESCRIBED FOR CALCULATING THE APPROXIMATE ZONE WITHIN WHICH THE INTERFERENCE IS JUDGED SEVERE.

1978-0770 SFORZA P M
VORTEX AUGMENTORS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 803-807.
CONF-770921/2

A DISCUSSION OF RESEARCH, DESIGN AND DEVELOPMENT ON AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH POWER DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF RELATIVELY LOW POWER DENSITY. PROPERLY DESIGNED TURBINES ARE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED VORTEX FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT.

1978-0771 SFORZA P M, STASI W, PAZIENZA J, SMORTO M
FLOW MEASUREMENTS IN LEADING-EDGE VORTICES.
AIAA J. 16(3): 218-224, MARCH 1978.

AN EXPERIMENTAL STUDY OF THE VORTEX FLOWFIELD OVER SLENDER DELTA PLANFORMS WITH SHARP LEADING EDGES IS PRESENTED. COMPLETE VELOCITY MEASUREMENTS IN THIS THREE-DIMENSIONAL FLOWFIELD ARE OBTAINED BY MEANS OF A CONRAD-TYPE PROBE USED IN CONJUNCTION WITH A FIVE-DEGREE-OF-FREEDOM TRAVERSING MECHANISM, AND FLOW VISUALIZATION IS ACHIEVED BY AN OIL FOG TECHNIQUE. EFFECTS OF ANGLE OF ATTACK, CAMBER, SWEEPBACK, ETC. ARE DESCRIBED.

1978-0772 SFORZA P M, STASI W
WIND POWER DISTRIBUTION, CONTROL, AND CONVERSION IN VORTEX AUGMENTORS.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 45-57.

THE VORTEX AUGMENTOR CONCEPT (VAC) FOR FLUID POWER CONVERSION EMPLOYS SEVERAL BASIC ASPECTS OF FLUIDS ENGINEERING. THE FOLLOWING FEATURES OF VAC ARE DISCUSSED: THE GENERATION OF AN ALTERED POWER DISTRIBUTION IN SPACE BY AERODYNAMIC INTERACTION BETWEEN THE NATURAL WIND AND AN AERODYNAMIC INTERACTION BETWEEN THE NATURAL WIND AND AN AUGMENTOR SURFACE, THE CONTROL OF THIS POWER DISTRIBUTION BY MEANS OF CONFIGURATIONAL CHANGES IN THE AUGMENTOR SURFACE, AND THE DEVELOPMENT OF SUITABLE TURBOMACHINERY FOR EXTRACTING POWER FROM THE TRANSFORMED FLOW FIELD.

1978-0773 SHAW E
NORTHEAST YELLOW PAGES OF SOLAR ENERGY RESOURCES.
BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1978. 74 P.

THIS IS A DIRECTORY OF SOLAR AND OTHER ALTERNATE ENERGY PRODUCTS AND SERVICES AVAILABLE TO THE CONSUMER TODAY. BECAUSE OF INCREASING INTEREST IN CONSERVING ALL TYPES OF ENERGY, THE SECTION ON INSULATION WAS EXPANDED, AND A SECTION ON ENERGY SAVING DEVICES WAS ADDED. ALTHOUGH THIS DIRECTORY DOES NOT ATTEMPT TO BE COMPREHENSIVE IN ITS COVERAGE, WE HOPE OUR READERS WILL FIND THIS A VALUABLE RESOURCE FOR LOCATING PRODUCTS AND SERVICES IN THE FIELDS OF ENERGY CONSERVATION AND ALTERNATE ENERGY RESOURCES. THE DIRECTORY IS ARRANGED IN THREE BASIC SECTIONS: ALPHABETICAL, GEOGRAPHICAL, AND CLASSIFIED. CODES IN THE ALPHABETICAL AND GEOGRAPHICAL SECTIONS DIRECT THE READER TO THE APPROPRIATE CLASSIFIED CATEGORIES.

1978-0774 SHEIH C M
WINDMILL IMBALANCE MOMENT INDUCED BY VERTICAL GRADIENTS OF WIND SPEED AND DIRECTION.
NTIS, 1978. P. 113-119.
ANL-78-65(PT.4)

AN IMPORTANT FACTOR TO CONSIDER IN DESIGNING A HORIZONTAL-AXIS WINDMILL IS THE IMBALANCE MOMENT CAUSED BY THE WINDMILL BLADES EXPERIENCING VERTICAL GRADIENTS OF HORIZONTAL WIND SPEED AND DIRECTION. ROTATING WINDMILL BLADES ARE SUBJECT TO LIFT FORCES IN THE DIRECTION OF ROTATION AND DRAG FORCES IN THE DIRECTION OF THE WIND. LIFT FORCES ARE THE PRIMARY SOURCES OF THE NET TURNING MOMENT; DRAG FORCES DO NOT CONTRIBUTE TO THE EXTRACTION OF WIND ENERGY AND MAY CAUSE STRUCTURAL DESIGN PROBLEMS. IF THE WIND IS CONSTANT IN SPACE AND TIME, THEN THE DRAG WILL APPEAR ONLY AS A PRESSURE OR TENSION FORCE BETWEEN THE BLADES AND THE SUPPORTING STRUCTURE. HOWEVER, IF THE WIND VELOCITY IS NOT UNIFORM, AS IS USUALLY THE CASE, DIFFERENT DRAG FORCES WILL ACT ON DIFFERENT BLADES AND WILL RESULT IN AN IMBALANCE MOMENT WITH RESPECT TO THE AXIS OF ROTATION, IN ADDITION TO THE PRESSURE FORCE MENTIONED EARLIER. SINCE THE RADIUS OF THE MOMENT EXERTED BY THE WIND ON THE BLADES COULD BE TWO ORDERS OF MAGNITUDE LARGER THAN THAT OF THE BEARING ASSEMBLY SUPPORTING THE BLADES, THE CORRESPONDING IMBALANCE DRAG FORCE COULD BE AMPLIFIED BY TWO ORDERS OF MAGNITUDE WHEN TRANSMITTED TO THE BEARINGS. FURTHER, THIS DIFFERENCE IN DRAG FORCE OSCILLATES SINUSOIDALLY AS THE BLADES ROTATE THROUGH REGIONS OF HIGHER AND LOWER WIND SPEED, PLACING EVEN MORE STRAIN ON THE STRUCTURE. THE IMBALANCE MOMENT AS A FUNCTION OF VERTICAL GRADIENTS OF WIND SPEED AND DIRECTION FOR VARIOUS ATMOSPHERIC STABILITIES AND WINDMILL DIMENSIONS IS INVESTIGATED.

1978-0775 SHEU D L
WIND ENERGY CONVERSION. VOLUME 7. EFFECTS OF TOWER MOTION ON THE DYNAMIC RESPONSE OF WINDMILL ROTOR.
ASRL-TR-184-13.
NTIS, SEPTEMBER 1978. 61 P.
COO-4131-T1(VOL.7)

THE EFFECTS OF TOWER MOTION ON THE DYNAMIC RESPONSE OF A WINDMILL ROTOR ARE STUDIED. THE BLADE LAGGING AND SIDE TOWER MOTION ARE TAKEN INTO CONSIDERATION IN THE ANALYSIS. THE EQUATIONS OF MOTION FOR THE SYSTEM ARE A SET OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS HAVING PERIODIC COEFFICIENTS. THE PERIODIC COEFFICIENTS OF THE EQUATIONS OF MOTION FOR A THREE BLADED ROTOR ARE ELIMINATED BY USING THE MULTIBLADE COORDINATE TRANSFORMATION METHOD. FOR A TWO BLADED ROTOR, THE EQUATIONS OF MOTION ARE SOLVED BY USING THE HARMONIC BALANCE METHOD. IN ADDITION TO BOTH METHODS, THE FLOQUET TRANSITION MATRIX METHOD IS SHOWN TO BE AN EFFECTIVE WAY OF DEALING WITH

THE LINEAR ORDINARY DIFFERENTIAL EQUATIONS HAVING PERIODIC COEFFICIENTS. THE DIFFERENCES BETWEEN THE INSTABILITY REGIONS FOR A THREE BLADED SYSTEM AND FOR A TWO BLADED SYSTEM ARE DISCUSSED.

1978-0776 SHURTLEFF W W
SOLAR ENERGY SYSTEM TESTING: SOME EXPERIENCES WITH MINICOMPUTERS.
SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, GAITHERSBURG, MD., MAY 22-24, 1978. PROCEEDINGS. MT. PROSPECT, ILL., INST. ENVIRON. SCI., 1978. P. 265-269.

SANDIA LABORATORIES HAS FIVE MINICOMPUTER BASED CONTROLLERS WHICH AID IN DATA ACQUISITION AND CONTROL OF SUCH PROJECTS AS THE SOLAR TOTAL ENERGY PROJECT, PHOTOVOLTAIC TEST PROJECT, SOLAR COLLECTOR PROJECT, SOLAR THERMAL TEST FACILITY (POWER TOWER), AND THE VERTICAL AXIS WIND TURBINE. THE EXPERIENCES ASSOCIATED WITH THESE PROJECTS HAVE GIVEN SOME INSIGHT INTO DEVELOPING A "PHILOSOPHY APPLICATION" OF MINICOMPUTERS OR MICROPROCESSORS TO THIS TYPE OF TESTING. IN THIS PAPER, SUCH IDEAS AS VERSATILITY OF HARDWARE AND SOFTWARE AND "DISTRIBUTED" SYSTEMS ARE EXPLAINED WITH THE PURPOSE OF OUTLINING THIS PHILOSOPHY.

1978-0777 SIMPSON J
CITIZENS' ENERGY DIRECTORY.
WASHINGTON, D.C., CITIZENS' ENERGY PROJECT, INC., 1978. 157 P.

LISTED IN THIS DIRECTORY ARE PROJECTS, ADDRESSES, ORGANIZATIONAL DATA, PURPOSES, GOALS, AND SERVICES RENDERED IN 48 STATES, DISTRICT OF COLUMBIA, AND THE VIRGIN ISLANDS. A LISTING OF PROJECTS IS NOT GIVEN FOR NORTH DAKOTA AND LOUISIANA. LISTINGS BY INTEREST AREAS INCLUDE CONSERVATION, GENERAL ALTERNATIVES, WIND, GEOTHERMAL, HYDRO POWER, WOOD, METHANE/PROPANE, APPROPRIATE TECHNOLOGY, ANTI-NUCLEAR, AND SOLAR. RESOURCE LISTINGS INCLUDE APPROPRIATE TECHNOLOGY, SOLAR NEWSLETTERS AND MAGAZINES, WIND, GEOTHERMAL, AND CITIZEN ENERGY NEWSLETTERS.

1978-0778 SISTERSON D L, HICKS B B
ARGONNE WIND ENERGY STUDY.
NTIS, 1978. P. 107-112.
ANL-78-65(PT.4)

A STUDY OF THE NATURE, FREQUENCY, AND DISTRIBUTION OF NOCTURNAL, LOW-LEVEL WIND MAXIMA IN THE MIDWEST AND GREAT PLAINS IS MAKING USE OF WIND DATA FROM AN INSTRUMENTED TELEVISION TOWER IN CENTRAL OKLAHOMA AND THE ANL METEOROLOGY TOWER IN NORTHERN ILLINOIS. SINCE THE USE OF POWER-LAW WIND PROFILES IS COMMON IN ENGINEERING DESIGN STUDIES, POWER LAWS HAVE BEEN FITTED TO ACTUAL WIND PROFILES, AND THE FREQUENCY DISTRIBUTION OF THE POWER-LAW EXPONENT HAS BEEN EXAMINED ACCORDING TO HOURLY, SEASONAL, AND ANNUAL TIME INTERVALS. THE RESULTS OBTAINED FROM THE ANL TOWER DATA ARE SUMMARIZED; IT IS BASICALLY AN EXTENSION OF EARLIER ANALYSES PRESENTED BY MOSES AND BOGNER (1967).

1978-0779 SISTERSON D L, FRENZEN P
NOCTURNAL BOUNDARY-LAYER WIND MAXIMA AND THE PROBLEM OF WIND POWER ASSESSMENT.
ENVIRON. SCI. TECHNOL. 12(2): 218-221, FEBRUARY 1978.

HIGH-RESOLUTION MEASUREMENTS OF WIND PROFILES COLLECTED OVER CENTRAL ILLINOIS INDICATE THAT NOCTURNAL, LOW-LEVEL WIND MAXIMA OCCUR MORE FREQUENTLY THAN PREVIOUSLY SUPPOSED. AN ALTERNATIVE METHOD OF PROFILE REPRESENTATION APPROPRIATE TO STABILITY CONDITIONS CHARACTERISTIC OF NOCTURNAL WIND MAXIMA IS REVIEWED, AND IT IS SUGGESTED THAT THE STRONG WIND SHEARS ASSOCIATED WITH THESE PHENOMENA MAY PRESENT A SPECIAL HAZARD TO THE LONG ROTOR BLADES OF LARGE, HORIZONTAL AXIS WIND ENERGY CONVERSION SYSTEMS.

1978-0780 SLAGER W
WIND ENERGY IN WEST MICHIGAN.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 23-30.

A WIND ENERGY ASSESSMENT MODEL IS DESCRIBED, AND RESULTS RELATING TO WEST MICHIGAN ARE PRESENTED.

1978-0781 SMALL FARM ENERGY PROJECT.
COMPOST SCI./LAND UTIL. 19(3): V, MAY-JUNE 1978.

SPONSORED BY THE CENTER FOR RURAL AFFAIRS, WALTHILL, NEBRASKA, THE SMALL FARM ENERGY PROJECT RELAYS THE LATEST INFORMATION IN ALTERNATE ENERGY DEVELOPMENTS TO FARMERS THROUGHOUT THE COUNTRY. ECONOMIC ENERGY-SAVING IDEAS ARE RECOMMENDED, E.G., COMPOSTING, METHANE RECOVERY, WIND RECYCLING, AND WASTE AND SOLAR ENERGY, BASED ON INDIVIDUAL FARM FEASIBILITY.

1978-0782 SMALL WIND ENERGY: FOCUS GROUP RESULTS.
NTIS, 1978. 43 P.
DOE/TIC-10018

THIS REPORT OF THE FOCUS GROUP RESEARCH ON SMALL WIND ENERGY SYSTEMS WAS PREPARED FOR THE DEPARTMENT OF ENERGY AS PART OF THE COMMERCIALIZATON PROGRAM. THE PURPOSE OF THIS RESEARCH IS TO EVALUATE THE POTENTIAL FOR COMMERCIALIZATION OF SMALL WIND ENERGY SYSTEMS, TO DETERMINE THE BARRIERS TO DEVELOPMENT OF THIS RESOURCE, AND TO JUDGE WHAT ACTIONS ARE REQUIRED BY THE FEDERAL GOVERNMENT TO PROMOTE COMMERCIALIZATION.

1978-0783 SMALL WIND POWER UNIT. TECHNOLOGY--COAL COMPETITIVENESS--POTENTIAL MARKET.
STOCKHOLM, SWEDEN, NAEMNDEN FOER ENERGIPRODUKTIONSFORSKNING, 1978. 477 P. (IN SWEDISH)

THIS STUDY CONCERNS SMALL-SCALE LOCAL WIND POWER SYSTEMS DEFINED AS POWER UNITS IN THE 1 TO 40 KW RANGE DESIGNED FOR CONVERSION OF WIND ENERGY TO ELECTRICAL ENERGY.

1978-0784 WALTON J J
STRUCTURE AND FUNCTION OF THE PRINCIPAL COMPONENTS ANALYSIS (PCA) CODE.
NTIS, JUNE 1978. 41 P.
UCID-17827

1978-0785 SMEDMAN-HOEGSTROM A S, HOEGSTROM U
PRACTICAL METHOD FOR DETERMINING WIND FREQUENCY DISTRIBUTIONS FOR THE LOWEST 200 M FROM ROUTINE METEOROLOGICAL DATA.
J. APPL. METEOROL. 17(7): 942-954, JULY 1978.

A METHOD IS DESCRIBED FOR DETERMINING WIND SPEED FREQUENCY DISTRIBUTIONS AT ANY HEIGHT UP TO 200 M ABOVE GROUND FOR A METEOROLOGICAL STATION WHERE WIND SPEED AND DIRECTION IS MEASURED AT A LOW REFERENCE LEVEL (USUALLY 10 M)

AND WHICH REPORTS ROUTINE METEOROLOGICAL DATA AT LEAST ONCE EVERY 3 H. THE ROUGHNESS CHARACTERISTICS OF THE TERRAIN SURROUNDING THE STATION MUST BE KNOWN IN DETAIL, BECAUSE THE MODEL CALCULATES THE RATE OF GROWTH OF INTERNAL BOUNDARY LAYERS RESULTING FROM DISCONTINUITIES IN ROUGHNESS AS WELL AS THE SHAPE OF THE WIND PROFILE IN THE VARIOUS LAYERS. THE SHAPE CHARACTERISTICS OF THE PROFILE ARE DETERMINED AS A FUNCTION OF ROUGHNESS LENGTH AND OF STABILITY BY THE AID OF MEASUREMENTS FROM THREE SWEDISH 100 M MASTS.

1978-0786 SMITH O J M
SOW WIND TURBINES AND REAP THE WIND.
SYMPOSIUM ON COMMERCIALIZATION OF SOLAR AND CONSERVATION TECHNOLOGIES, MIAMI BEACH, FLORIDA, DECEMBER 11, 1978.
NTIS, 1978. P. 191-192.
CONF-781235-P1

1978-0787 SMITH M C
OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS.
POLICY ANAL. INF. SYST. 2(1): 149-171, JULY 15, 1978.

TECHNICAL OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS, INCLUDING SITE SELECTION, IS DESCRIBED AND AN EXAMPLE GIVEN. IT IS SHOWN THAT ONLY SYSTEM EFFICIENCY, WIND CHARACTERISTICS, ENERGY DESIRED, AND THE SYSTEM COST STRUCTURE ARE REQUIRED. ELECTRIC GRID ENERGY USAGE WITH NO STORAGE IS ASSUMED.

1978-0788 SNOW J W, GARSTANG M, PIELKE R, COOPER H
THE WIND POWER POTENTIAL OF THE COASTAL ZONE.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-19-1. (ABSTRACT ONLY)

1978-0789 SNYDER M H
AIRFOIL DATA FOR USE OF WIND TURBINE DESIGNERS.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 11-13, 1977. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 578-587.

THIS PAPER REVIEWS DESIGN PROCEDURES FOR WIND-AXIS TURBINE ROTORS. AN "ON DESIGN" ROUTINE FOR ROTOR BLADE DESIGN IS PRESENTED AS WELL AS AN "OFF-DESIGN" PERFORMANCE CALCULATION PROGRAM. RESULTING FROM THIS REVIEW ARE ANALYSES OF DESIRABLE CHARACTERISTICS OF AIRFOIL SECTIONS AND OF TYPES OF DATA WHICH ROTOR DESIGNERS NEED. INCLUDED IN THE PAPER ARE AIRFOIL CHARACTERISTICS FOR CANDIDATE BLADE SECTIONS INCLUDING 360 DEGREE DATA FOR GA(W)-1 AND GA(W)-2 AIRFOILS.

1978-0790 SORENSEN B
ON THE FLUCTUATING POWER GENERATION OF LARGE WIND ENERGY CONVERTERS, WITH AND WITHOUT STORAGE FACILITIES.
SOL. ENERGY 20(4): 321-331, 1978.

THE POWER FLUCTUATIONS AND TIME DURATION PATTERNS OF LARGE, HYPOTHETICAL WIND ENERGY GENERATORS ARE ANALYSED, USING METEOROLOGICAL DATA FOR DENMARK. IT IS FOUND THAT THE FLUCTUATIONS, RELATIVE TO A LOAD WHICH VARIES THROUGH THE YEAR IN A MANNER SIMILAR TO THE ACTUAL LOAD, ARE NO GREATER THAN THE FLUCTUATIONS RELATIVE TO A CONSTANT LOAD (BASE-LOAD APPLICATION). THE ADDITION OF A HYPOTHETICAL SHORT-TERM STORAGE, CAPABLE OF DELIVERING THE AVERAGE POWER FOR 10-20 HR, MAKES THE WIND ENERGY SYSTEM AS DEPENDABLE AS ONE LARGE NUCLEAR POWER PLANT, BEING CAPABLE OF DELIVERING THE AVERAGE POWER FOR ABOUT 70 PERCENT OF THE TIME. FOR FULL COVERAGE BY A WIND ENERGY SYSTEM, AN ADDITIONAL LONG-TERM STORAGE FACILITY MUST BE ADDED. THE PROSPECTS FOR DEVELOPING SUITABLE STORAGE FACILITIES, THE COST OF TOTAL WIND ENERGY SYSTEMS RELATIVE TO OTHER MEANS OF PRODUCING ELECTRICITY ARE DISCUSSED.

1978-0791 ALVES R
LIVING WITH ENERGY.
NEW YORK, PENGUIN BOOKS, 1978. 128 P.

MANY DESIGNS ARE DESCRIBED IN THIS BOOK BY PIONEERS UTILIZING BETTER BUILDING DESIGN, SOLAR HEATING, AND WIND POWER. THROUGH THEIR EXPERIENCES, THESE PEOPLE WILL ENABLE US TO TEMPER THE TRANSITION FROM A FOSSIL FUEL/NUCLEAR-BASED EXISTENCE TO A MORE STEADY-STATE, CONSERVATION-CONSCIOUS VITALITY. THEIR HOMES, GENERATORS, AND INTEGRATED SYSTEMS ARE SHOWN TO INTRODUCE THE AVAILABLE ALTERNATIVES. WHEN IT IS THOUGHT THAT ENERGY FROM THE SUN AND WIND IS NOT ECONOMICALLY FEASIBLE, TWO POINTS ARE OVERLOOKED, I.E., MANY ENERGY ALTERNATIVES ARE ALREADY COST COMPETITIVE AND NO AMOUNT OF MONEY CAN PURCHASE SOMETHING THAT DOES NOT EXIST, AND IT IS ONLY A MATTER OF TIME BEFORE FOSSIL FUELS WILL BE DEPLETED.

1978-0792 WELTE D
WIND TURBINE PLANT WITH MAIN ROTOR AND ONE OR MORE STARTING AUXILIARY ROTORS.
GERMAN (FRG) PATENT NO. 2,757,266/B/, NOVEMBER 2, 1978. 9 P. (IN GERMAN)

THE INVENTION CONCERNS WIND TURBINE PLANTS WITH ROTOR SHAFTS VERTICAL TO THE FLOW AIR. THE WIND TURBINE PLANT CONSISTS OF A MAIN ROTOR AND ONE OR MORE STARTING AUXILIARY ROTORS. THE MAIN ROTOR HAS SEVERAL PROFILE BLADES IN THE DIRECTION OF THE ROTOR SHAFT, WHILE THE STARTING AUXILIARY ROTORS HAVE BOWL-SHAPED BLADES. ACCORDING TO THE INVENTION THE BOWLS OF THE STARTING AUXILIARY ROTORS CAN ROTATE WITH THE ROTOR SHAFT, BUT ARE FREE TO MOVE RADIALLY IN DIFFERENT POSITIONS. CENTRIFUGAL FORCE CAUSES THE BOWLS OF THE STARTING AUXILIARY ROTORS TO MOVE FROM A POSITION OF MAXIMUM DISTANCE TO ONE OF MINIMUM DISTANCE FROM THE ROTOR SHAFT WITH INCREASING (SPEED OF) ROTATION, SO THAT THE OUTPUT OF THE STARTING AUXILIARY ROTORS BECOMES LESS AND LESS WITH INCREASING SPEED OF ROTATION.

1978-0793 SPERA D A
SUMMARY OF COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 502-516.
CONF-770921/2

THE OBJECTIVES OF THIS STUDY ARE TO PRESENT A BRIEF OVERVIEW OF EACH CODE (COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN HORIZONTAL-AXIS WIND TURBINES), AND IDENTIFY SOURCES FOR FURTHER DETAILED INFORMATION, AND TO COMPARE THE PERFORMANCE OF EACH CODE AGAINST TWO SETS OF TEST DATA MEASURED ON THE 100 KW MOD-0 WIND TURBINE.

1978-0794 SPIERINGS P A M
SIMPLIFYING WIND TURBINES WITH THE COMPOSITE BEARINGLESS ROTOR CONCEPT.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 119-125.

MATERIAL PROPERTIES, AERODYNAMIC CHARACTERISTICS, AND DESIGN PARAMETERS INVOLVED WITH COMPOSITE BEARINGLESS ROTORS FOR WIND TURBINES ARE REVIEWED.

1978-0795 SPIERINGS P A M, CHENEY M C
SUMMARY OF THE DESIGN OF A SELF-REGULATING WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 612-624.
CONF-770921/2

THE CONCEPT OF THE COMPOSITE BEARINGLESS ROTOR, SUCH AS USED IN SOME HELICOPTERS FOR REASONS OF WEIGHT, COST AND SIMPLICITY, IS SHOWN FEASIBLE FOR WIND TURBINES. SELF ALIGNMENT WITH THE WIND DIRECTION AND SELF REGULATION WITH THE WIND VELOCITY WERE DEMONSTRATED IN WIND TUNNEL TESTS OF A 4.5 FT DIAMETER DYNAMICALLY SCALED MODEL. THE MODEL CONSISTED OF A HUB SUPPORTED PENDULUM INTEGRATED WITH THE BLADE TO MAKE BLADE PITCH A FUNCTION OF ROTOR SPEED. THE EFFECTS OF SCALE ON THE CONCEPT WERE STUDIED IN THE DESIGN OF A 40-FT DIAMETER WIND TURBINE. FOR THIS 5 KW (AT 12 MPH) MACHINE, RESULTS OF PERFORMANCE TRADEOFF STUDIES, STRESS ANALYSIS OF THE BLADE AND TOWER STRUCTURE, AND A STABILITY INVESTIGATION ARE PRESENTED. ENGINEERING DRAWINGS OF THE COMPLETE SYSTEM HAVE BEEN PREPARED WHICH COULD LEAD TO FULL-SCALE FABRICATION AND DEMONSTRATION.

1978-0796 SPIERINGS P A M, CHENEY M C
DESIGN OF A SELF-REGULATING COMPOSITE BEARINGLESS BLADE WIND TURBINE. FINAL REPORT FOR OCTOBER 15, 1976-AUGUST 15, 1977.
NTIS, JANUARY 1978. 67 P.
COO-4150-77/8, R77-912668-8

A STUDY WAS UNDERTAKEN TO DESIGN A 40-FT DIAMETER WIND TURBINE EMPLOYING THE UTRC/ERDA SELF-REGULATING COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT. THE CBR CONCEPT WAS DEVELOPED AT UNITED TECHNOLOGIES FOR ROTARY WING APPLICATIONS AND IS NOW IN USE ON SIKORSKY HELICOPTERS. THE CONCEPT WAS FURTHER DEVELOPED FOR WIND TURBINE APPLICATIONS AT UTRC UNDER AN ERDA CONTRACT IN 1975-76. SUCCESSFUL WIND TUNNEL TESTS WERE CONDUCTED DURING THAT CONTRACT, WHICH DEMONSTRATED THE SELF-STARTING AND SELF-REGULATING FEATURES. THE LATEST CONTRACT WAS TO DESIGN A 40-FT SYSTEM IN THE 5 KW - 15 KW POWER RANGE. THIS EFFORT INCLUDED PERFORMANCE TRADEOFF STUDIES, STRESS ANALYSES OF THE BLADE AND TOWER STRUCTURE, A STABILITY INVESTIGATION, AND ENGINEERING DRAWINGS OF THE COMPLETE SYSTEM. HOWEVER AN OVERALL COST ANALYSIS WAS NOT PERFORMED IN THIS STUDY.

1978-0797 STEWART D A, ESSENWANGER O M
FREQUENCY DISTRIBUTION OF WIND SPEED NEAR THE SURFACE.
J. APPL. METEOROL. 17(11): 1633-1642, NOVEMBER 1978.

FREQUENCY DISTRIBUTIONS OF WIND SPEED FROM A LARGE COLLECTION OF DATA ARE EXAMINED. MOST DISTRIBUTIONS ARE SKEWED TO THE RIGHT AND THE MEAN IS USUALLY GREATER THAN THE MEDIAN. EXPERIENCE HAS SHOWN THAT THE WEIBULL DISTRIBUTION PROVIDES A GOOD ANALYTICAL APPROXIMATION TO THE CUMULATIVE DISTRIBUTION AND IS PARTICULARLY USEFUL FOR THE 9-99% THRESHOLDS. TWO METHODS OF FITTING A WEIBULL DISTRIBUTION WITH A NONZERO LOCATION PARAMETER ARE DISCUSSED. BOTH OF THESE METHODS REQUIRE LESS COMPUTATIONAL EFFORT THAN THE MAXIMUM LIKELIHOOD SOLUTION FOR A THREE-PARAMETER MODEL AND ARE SUITABLE FOR PRACTICAL USE BY THE ENGINEER. IT IS SHOWN THAT THE THREE-PARAMETER MODEL IS BETTER THAN THE TWO-PARAMETER MODEL FOR PREDICTING EXTREME VALUES. THESE RESULTS ARE RELEVANT TO WIND POWER.

1978-0798 STEWART H J
TECHNICAL IMPROVEMENTS IN LARGE SYSTEM DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 873-877
CONF-770921/2

THIS IS A SUMMARY OF THE SESSIONS OF THIS WORKING GROUP.

1978-0799 STIEFELD B, TOMLINSON R N
DATA ACQUISITION AND SIGNAL PROCESSING FOR A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM.
SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, GAITHERSBURG, MD., MAY 22-24, 1978. PROCEEDINGS. MT. PROSPECT, ILL., INST. ENVIRON. SCI., 1978. P. 241-244.

THE DATA ACQUISITION AND ANALYSIS SYSTEM DEVELOPED TO MEET THE NEEDS OF THE 17-METER VERTICAL AXIS WIND TURBINE AT KIRTLAND AIR FORCE BASE, NEW MEXICO, IS DESCRIBED. THE SYSTEM EMPLOYS A MINICOMPUTER-BASED DATA ACQUISITION SYSTEM WITH SPECIAL PERIPHERAL EQUIPMENT. STATISTICAL METHODS ARE DESCRIBED THAT ARE EMPLOYED TO EVALUATE THE PERFORMANCE OF THE SYSTEM. THE OBJECTIVE OF THIS PROGRAM IS THE DEVELOPMENT OF AN INSTRUMENTED OUTDOOR WIND LABORATORY. THIS LABORATORY HAS THE CAPABILITY OF EVALUATING VARIOUS ASPECTS OF WIND TURBINE PERFORMANCE AS WELL AS STUDIES INVOLVED IN DETAILED ANALYSIS OF WIND FLOW PROPERTIES.

1978-0800 STODDARD F S
STRUCTURAL DYNAMICS, STABILITY, AND CONTROL OF HIGH ASPECT RATIO WIND TURBINES.
NTIS, DECEMBER 1978. 311 P.
RFP-3027/67025/3533/79-9

THE BLADE DYNAMICS AND VIBRATION OF WIND TURBINE GENERATORS WITH HIGH ASPECT RATIO (SLENDER) BLADES ARE DEVELOPED. EQUATIONS OF MOTION ARE DERIVED, AND BLADE MOTIONS AND FORCES ARE FOUND, FOR DEGREES OF FREEDOM IN FLAPPING, LEAD-LAG AND FEATHERING SUBJECT TO GRAVITY, CROSSWIND, YAW RATE, AND AXISYMMETRIC AERODYNAMIC FORCES. TOWER DEGREES OF FREEDOM ARE ADDED TO ASSESS TOWER LOADS AND VIBRATION. SIGNIFICANT MECHANICAL AND AEROELASTIC INSTABILITIES WHICH MAY OCCUR ARE PREDICTED AND DISCUSSED. METHODS ARE DEVELOPED, AND QUANTITATIVE COMPUTER PROGRAMS ARE GIVEN, FOR THE STRUCTURAL AND VIBRATION ANALYSIS OF TWISTED, TAPERED, COMPOSITE SHELL BLADES. THE UNIVERSITY OF MASSACHUSETTS WIND FURNACE I, WHICH IS THE IMPETUS OF THIS STUDY, IS DESCRIBED.

1978-0801 STOTZ K C
WIND POWER IN COASTAL NEW ENGLAND.
POWER ENG. 82(12): 46-49, DECEMBER 1978.

PROJECTIONS OF POTENTIAL OPERATING EFFICIENCY OF WIND-POWERED GENERATORS, USING CALCULATIONS FOR WIND ON THE NEW ENGLAND COAST, SEEM TO INDICATE THAT MORE FAVORABLE RESULTS MAY COME FROM THE INDIVIDUAL USE OF SMALL MACHINES THAN FROM THE USE OF LARGE MACHINES IN CENTRAL STATIONS.

1978-0802 STUDENTS CULTIVATE FISH AND VEGETABLES IN SOLAR GREENHOUSE.
SOL. HEAT. COOL. 3(4): 15-17, AUGUST 1978.

THE SOLAR GREENHOUSE ADDITION TO THE NOBLE AND GREENOUGH SCHOOL AT DEDHAM, MASS., CALLED UMBILICUS HAS BOTH ACTIVE AND PASSIVE SOLAR HEAT SYSTEMS AND 75 PERCENT OF THE ELECTRICAL DEMAND IS SUPPLIED BY A 3 KILOWATT WIND TURBINE. THE GREENHOUSE AND ITS USE FOR THE SCHOOL IS DESCRIBED BRIEFLY.

1978-0803 SUAGEE D B
THE WIND ENERGY POTENTIAL: AN ECONOMIC AND POLITICAL OVERVIEW.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE 1978 NATIONAL CONFERENCE ON TECHNOLOGY FOR ENERGY CONSERVATION, ALBUQUERQUE, JANUARY 24-27, 1978. ROCKVILLE, MD., INFORMATION TRANSFER INC., 1978. P. 222-232.

1978-0804 SULLIVAN W N
EFFORTS ON THE ECONOMIC ANALYSIS OF DARRIEUS VERTICAL-AXIS WIND TURBINE SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 767-774.
CONF-770921/2

AS PART OF THE VERTICAL-AXIS WIND TURBINE PROGRAM AT SANDIA LABORATORIES, THERE HAVE BEEN EFFORTS TO UNDERSTAND THE ECONOMICS OF THE DARRIEUS TURBINE IN THE UTILITY GRID (CONSTANT RPM) APPLICATION. THERE ARE TWO MAJOR OBJECTIVES TO THESE EFFORTS. THE FIRST OBJECTIVE IS TO PROVIDE TOOLS TO PERMIT AN ECONOMIC BASIS FOR MAKING FUNDAMENTAL DESIGN DECISIONS. SUCH DECISIONS INCLUDE, FOR EXAMPLE, THE CHOICE OF THE "BEST" OPERATING RPM, NUMBER OF BLADES, ROTOR SOLIDITY, TURBINE HEIGHT TO DIAMETER RATIO, ETC. THE SECOND OBJECTIVE IS TO ESTIMATE WHAT THE ABSOLUTE COST OF SUCH SYSTEMS WILL BE, SO THAT THERE IS A BASIS FOR DECIDING WHETHER OR NOT FURTHER DEVELOPMENT OF THE CONCEPT IS DESIRABLE.

1978-0805 SULLIVAN W N
EFFORTS ON THE ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINES.
NTIS, 1978. 8 P.
SAND-78-1851C, CONF-780972-1

THERE IS AN ONGOING PROGRAM AT SANDIA LABORATORIES DESIGNED TO ESTABLISH REASONABLE ESTIMATES FOR THE COST OF UTILITY GRID ENERGY PRODUCED BY DARRIEUS VAWT SYSTEMS. THE ECONOMIC ANALYSIS IS BASED ON THE DETAILED EXAMINATION OF ACTUAL POINT DESIGNS WHICH COVER A RANGE OF SYSTEM SIZES. THE APPROACH IS UNIQUE IN THAT IN ADDITION TO DETERMINING THE DIRECT COST OF SYSTEM COMPONENTS, AN EFFORT IS MADE TO INCLUDE THE INDIRECT COSTS AND PROFITS OF THE MANUFACTURING, MARKETING, DISTRIBUTION, AND SALES TASKS OF THE ENTERPRISE PRODUCING THE SYSTEMS. THE POINT DESIGN SPECIFICATIONS AND DRAWINGS WERE DEVELOPED BY SANDIA LABORATORIES AND PROVIDE THE BASELINE FOR THIS STUDY. THE SPECIFICATIONS REPRESENT OPTIMUM DESIGNS, AS DETERMINED BY AN ECONOMIC OPTIMIZATION MODEL. THIS MODEL, WITH MATHEMATICAL FORMULAS FOR THE COSTS OF MAJOR SYSTEM ELEMENTS, WAS USED TO SELECT FROM MANY POSSIBILITIES AN OPTIMUM SET OF DESIGN SPECIFICATIONS.

1978-0806 SUOMI V E, MASSMAN W, HINTON B, AFANASJEVS J
SCIENTIFIC INVESTIGATIONS OF TROPICAL WIND, ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE). FINAL TECHNICAL REPORT, JULY 1976--SEPTEMBER 1977.
NTIS, JANUARY 1978. 42 P.
NP-23761

THE RESULTS FROM THE TROPICAL WINDS, ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENTS (TWERLE) FOR THE PERIOD JULY 1976 THROUGH 6 SEPTEMBER 1977 ARE SUMMARIZED. THESE RESULTS ARE: A LATITUDE PROFILE OF THE RATE OF CONVERSION FROM KINETIC TO POTENTIAL ENERGY FOR THE PERIOD FROM 12 JUNE 1975 TO 1 AUGUST 1976; EVIDENCE THAT GRAVITY WAVES GENERATED IN THE TROPOSPHERE SYSTEMATICALLY DEPOSIT ENERGY IN THE VICINITY OF THE TROPOPAUSE, AND ARE A MECHANISM FOR THE DISSIPATION OF KINETIC ENERGY ON THE GLOBAL SCALE; AND EVIDENCE THAT THE JET STREAM IS AN IMPORTANT MECHANISM FOR GENERATING THESE WAVES.

1978-0807 SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. EXECUTIVE SUMMARY.
NTIS, FEBRUARY 15, 1978. 11 P.
DSE-2332-T1

THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0808 SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. FINAL REPORT.
NTIS, FEBRUARY 1978. 347 P.
DSE-2332-T2

FLUCTUATION IN WIND SPEED CAUSES A VARIABILITY IN WIND POWER OUTPUT WHICH IS UNIQUE AMONG UTILITY LEVEL POWER SOURCES. IT IS IMPORTANT THAT THE FEASIBILITY AND THE CONSTRAINTS OF INSTALLING A SIGNIFICANT NUMBER OF WIND TURBINE GENERATORS INTO THE NATIONAL POWER SYSTEM BE INVESTIGATED. THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0809 WENDELL L
WIND CHARACTERISTICS AND SITING CONSIDERATIONS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 908-911.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0810 TAMMELIN B
WIND ENERGY ON THE SOUTH COAST OF FINLAND.
SAEHKOE 51(2): 48-50, FEBRUARY 1978. (IN FINNISH)

THE VERTICAL SHEAR OF WIND SPEED AND THUS THE AMOUNT OF KINETIC ENERGY NEAR THE GROUND DEPEND ESSENTIALLY ON THE ROUGHNESS OF THE SURFACE. FOR INSTANCE, ABOVE THE SEA THE SAME AMOUNT OF ENERGY CAN BE PRODUCED AT MUCH LOWER LEVELS THAN ABOVE THE GROUND. THE ARTICLE ALSO DEALS WITH THE ANNUAL AND DIURNAL FLUCTUATIONS IN POWER BASED ON WIND SPEED MEASUREMENTS MADE IN A 150 M METEOROLOGICAL TOWER.

1978-0811 TAYLOR R H
WIND POWER -- THE POTENTIAL LIES OFFSHORE.
ELECTR. REV. 203(20): 39-40, NOVEMBER 24, 1978.

THE FUTURE CONTRIBUTION OF WIND POWER TO ELECTRICITY SUPPLY IN THE UK CAN BEST BE REALIZED BY SITING

AEROGENERATORS OFFSHORE. BUT THE OPERATIONAL CONDITIONS, OPTIMUM SHAPE AND SPREAD OF GROUPS OF GENERATORS, AND THE AVAILABILITY AND INTEGRATION OF THE POWER INTO THE GRID ALL RAISE QUESTIONS NEEDING FURTHER INVESTIGATION.

1978-0812 TEMPLIN R J
WIND ENERGY RESEARCH IN CANADA.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 423-431.
CONF-770921/1

CANADA IS A COUNTRY WITH A HUGE AREA AND A SMALL POPULATION. THIS MAKES IT EASY TO SHOW THAT THE THEORETICAL POTENTIAL FOR WIND ENERGY DEVELOPMENT IS LARGE IN RELATION TO TOTAL ELECTRICITY DEMAND. THERE IS, THEREFORE, A GROWING REALIZATION THAT ALL POTENTIAL SOURCES OF ENERGY, INCLUDING RENEWABLE SOURCES, SUCH AS TIDAL, SOLAR AND WIND SHOULD BE EXPLOITED WHEREVER THIS IS ECONOMICALLY FEASIBLE.

1978-0813 TENNYSON G P
WIND ENERGY: AN ACCELERATING PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 153-161.
CONF-780357

WIND TURBINE RESEARCH AND DEVELOPMENT PROGRAMS IN THE U.S. ARE REVIEWED. PLANNED PROGRAMS AND PROJECTED MARKETING ASPECTS ARE DISCUSSED.

1978-0814 TEWARI S K
EVALUATION OF THE STRATEGY OF LOW COST HORIZONTAL AXIS WINDMILLS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1848-1853.

WITH THE LIMITED DATA PRESENTLY AVAILABLE, AN ATTEMPT IS MADE IN THIS PAPER TO ASSESS RELATIVE COST EFFECTIVENESS OF THREE TYPES OF WINDMILLS. THE LOW-TECHNOLOGY WINDMILLS OF MADURAI AND CRETAN TYPES ARE COMPARED ALONG WITH A CONVENTIONAL FACTORY BUILT ALL METAL WINDMILL. COSTS HAVE BEEN DISCOUNTED TO PRESENT A MORE REALISTIC PICTURE OF THE ECONOMICS OF THESE WINDMILLS. WITH THE DATA PROCESSED IN THIS PAPER, A NEED FOR HYBRIDIZATION OF LOW COST CONCEPT WITH THE HIGH MECHANICAL INTEGRITY OF CONVENTIONAL WINDMILLS IS HIGHLIGHTED AS A STRATEGY FOR BEST ACCEPTANCE FOR WIND ENERGY UTILIZATION.

1978-0815 TEWARI S K
WIND ENERGY CONVERSION IN INDIA.
RENEWABLE ENERGY RESOURCES AND RURAL APPLICATIONS IN THE DEVELOPING WORLD, BOULDER, COLORADO, WESTVIEW PRESS, FOR AAAS, 1978. P. 77-87.

THE CURRENT STATUS OF WIND ENERGY RESEARCH IN INDIA IS DISCUSSED.

1978-0816 THOMANN G C, JONG M, SNYDER M H
SMALL HORIZONTAL AXIS WIND TURBINE FEEDING POWER INTO THE UTILITY GRID.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 11-13, 1977. ROLLA, MISSOURI, UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 588-602.

A SMALL HORIZONTAL AXIS WIND TURBINE, WITH ABOUT A 2 KW POWER OUTPUT, WAS CONSTRUCTED TO CONVERT WIND ENERGY INTO AC POWER TO BE FED INTO THE UTILITY GRID. THE MACHINE IS INTENDED TO MODEL OPERATION OF THE LARGER WIND GENERATORS NOW BEING BUILT. THE VARIABLE PITCH ROTOR IS 18 FT IN DIAMETER AND HAS A GA(W)-1 BLADE AIRFOIL. THE ROTOR IS FABRICATED FROM SITKA SPRUCE MOUNTED ON A COMMERCIAL PROPELLER/HUB SYSTEM. ROTOR SPEEDS OF FROM 75 TO 150 RPM ARE USED IN OPERATION. A CHAIN DRIVE AND HELICAL GEAR DRIVE SYSTEM STEPS UP ROTOR SPEED TO 1800-3600 RPM TO DRIVE A GENERATOR CONNECTED TO THE UTILITY GRID. THE GENERATOR CAN BE OPERATED IN EITHER AN INDUCTION OR SYNCHRONOUS MODE; ONLY THE INDUCTION MODE HAS BEEN USED AT THE PRESENT TIME. ROTOR SPEED, ROTOR PITCH, TURBINE AZIMUTH, WIND SPEED AND DIRECTION, AND POWER OUTPUT ARE MONITORED DURING OPERATION. TOWER AZIMUTH AND ROTOR PITCH ARE CONTROLLED DURING EXPERIMENTS. AN AUTOMATIC DATA RECORDING SYSTEM IS PRESENTLY BEING INSTALLED. A MICROPROCESSOR AUTOMATIC CONTROL SYSTEM FOR ADJUSTING AZIMUTH DIRECTION AND ROTOR PITCH WILL BE INSTALLED SHORTLY. A COMPLETE SET OF EXPERIMENTS IS PLANNED FOR THE SPRING OF 1978.

1978-0817 THOMAS R L, RICHARDS T R
ERDA/NASA 100 KW MOD-0 WIND TURBINE OPERATIONS AND PERFORMANCE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 35-58.
CONF-770921/1

AS A PART OF THE FEDERAL WIND ENERGY PROGRAM, THE NASA LEWIS RESEARCH CENTER WAS DELEGATED BY ERDA TO DESIGN, BUILD AND TEST A 100 KW WIND TURBINE AT THE NASA PLUM BROOK STATION NEAR SANDUSKY, OHIO. THE PURPOSE OF THIS WIND TURBINE WAS TO PROVIDE EARLY OPERATION AND PERFORMANCE DATA OF A LARGE WIND TURBINE, IN VARIOUS CONFIGURATIONS. TO AID IN THE DESIGN OF FOLLOW-ON LARGE WIND TURBINES. THE 100 KW WIND TURBINE WAS DESIGNED, BUILT AND ASSEMBLED IN 18 MONTHS AND BECAME OPERATIONAL IN SEPTEMBER 1975. OPERATION OF THE 100KW WIND TURBINE HAS BEEN FULLY DEMONSTRATED AND INCLUDES STARTUP, SYNCHRONIZATION TO THE UTILITY NETWORK, BLADE PITCH CONTROL FOR CONTROL OF POWER AND SPEED, AND SHUTDOWN. ALSO FULLY AUTOMATIC OPERATION HAS BEEN DEMONSTRATED BY USE OF A REMOTE CONTROL PANEL, 50 MILES FROM THE SITE, SIMILAR TO WHAT A UTILITY DISPATCHER MIGHT USE. THIS REPORT BRIEFLY DESCRIBES THE OPERATION SYSTEMS AND EXPERIENCE WITH THE WIND TURBINE AND THE LOADS, ELECTRICAL POWER AND AERODYNAMIC PERFORMANCE OBTAINED FROM TESTING.

1978-0818 THOMAS R L, DONOVON R M
LARGE WIND TURBINE GENERATORS.
ENERGY TECHNOLOGY CONFERENCE, 5TH, WASHINGTON, D.C., FEBRUARY 27 - MARCH 1, 1978. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., APRIL 1978. P. 64-82.

A 5-YEAR WIND ENERGY PROGRAM PLAN WAS DEVELOPED IN 1974 AS PART OF THE SOLAR ENERGY PLAN OF THE PROJECT INDEPENDENCE BLUEPRINT. THIS WIND ENERGY PROGRAM INCLUDED A RECOMMENDATION TO PROCEED WITH THE DESIGN, BUILDING AND TESTING OF A NOMINAL 100 KW, 125-FOOT-DIAMETER ROTOR WIND TURBINE: THIS WIND TURBINE WAS DESIGNATED MOD-0. OTHER PROJECTS UNDERTAKEN SINCE THEN INCLUDE THREE 200 KW WIND TURBINES SIMILAR TO MOD-0 AND DESIGNATED MOD-0A, ONE 200-FOOT-DIAMETER 2000 KW WIND TURBINE DESIGNATED MOD-1, AND SEVERAL 300-FOOT-DIAMETER 2500 KW WIND TURBINES DESIGNATED MOD-2. A DESCRIPTION OF THESE WIND TURBINE SYSTEMS, THEIR PROGRAMMATIC STATUS, AND A SUMMARY OF THEIR POTENTIAL COSTS ARE PRESENTED.

1978-0819 THOMAS R B, LITTLER J G F

SOLAR HEATING FOR A NOVEL DWELLING INDEPENDENT OF SERVING NETWORKS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 16, 1978. ELMSFORD, NEW YORK, PERGAMON PRESS INC., 1978. P. 1667-1671.

THE AUTARKIC HOUSE WHICH IS INDEPENDENT OF ALL MAIN SERVICING NETWORKS USES SOLAR ENERGY ACTIVELY AND PASSIVELY FOR SPACE AND DOMESTIC HOT WATER HEATING. A COMPUTER SIMULATION HAS BEEN DEVELOPED WHICH MODELS BOTH THE ENERGY DEMAND AND SUPPLY OF THE HOUSE. ITS USE IN CONJUNCTION WITH WEATHER DATA HAS PERMITTED SIZING OF THE SOLAR COLLECTORS AND STORAGE TANKS AND ESTIMATING THE IMPORTANCE OF PASSIVE GAIN.

1978-0820 KATZENBERG R
IN THE WIND.
SOL. AGE 3(9): 36-37, SEPTEMBER 1978.

THE ROLE OF THE US DOE IN DEVELOPING WIND ENERGY CONVERSION SYSTEMS IS DISCUSSED.

1978-0821 TODD R W
LOW ENERGY HOUSING AT THE NATIONAL CENTRE FOR ALTERNATIVE TECHNOLOGY.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 75-89.

THREE BUILDINGS WHICH FORM PART OF THE PERMANENT EXHIBITION AT THE CENTRE ARE DESCRIBED. COMMENTS ARE MADE ON THE PHILOSOPHY UNDERLYING THE PROJECT. THE BUILDINGS ARE THE WATES CONSERVATION HOUSE, THE WIND-POWERED COTTAGE, AND THE SOLAR HEATED EXHIBITION AND OFFICE BUILDING.

1978-0822 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRIC POWER GENERATION FROM THE WIND: A SYSTEM LINKING WIND-POWER WITH HYDROELECTRIC STORAGE AND LONG-DISTANCE TRANSMISSION.
WIND ENG. 2(1): 10-24, 1978.

THE IDEA OF GENERATING WIND POWER AT THE WINDIEST AVAILABLE SITES (WIND-FARMS) IS EXAMINED FOR ITS EFFECT ON FEASIBILITY OF LARGE-SCALE WIND POWER INPUT TO THE NATIONWIDE ELECTRIC POWER NETWORK IN THE USA. WIND POWER IS CONSIDERED IN ASSOCIATION WITH PUMPED-STORAGE HYDROELECTRIC PLANTS FOR LOAD LEVELING AND EXISTING TYPES OF TRANSMISSION LINES FOR INTERCONNECTING THE WIND FARMS AND ENERGY-STORAGE SITES WITH LOAD CENTERS UP TO 2000 KM AWAY. POTENTIAL ENERGY HARVEST FROM WIND FARM SITES IN THE 17 WESTERN STATES IS ESTIMATED AT WELL OVER 100 GW, AND MANY TIMES THIS MUCH IN ARCTIC NORTH AMERICA. AT THE 100-GW LEVEL OF DEVELOPMENT, BUS BAR COST AT THE WIND FARM WOULD BE ABOUT 3 MILLS/MJ (10 MILLS/KWH). ENERGY STORAGE REQUIRED FOR LOAD LEVELING WOULD ADD ABOUT 1.8 MILLS/MJ AND TRANSMISSION COSTS ANOTHER 2.1 MILLS/MJ, FOR A TOTAL COST AT THE LOAD CENTER OF 6 MILLS/MJ (21 MILLS/KWH), ALL IN 1976 DOLLARS. THIS WOULD BE COMPETITIVE WITH ENERGY GENERATED NEAR LOAD CENTERS BY NEW NUCLEAR OR FOSSIL-FUEL POWER-PLANTS. WIND POWER APPEARS ENVIRONMENTALLY ACCEPTABLE AND AVOIDS MANY OF THE ENVIRONMENTAL LIABILITIES OF CONVENTIONAL SOURCES.

1978-0823 TORDA T P
OPTIMAL LOCATION OF WINDMILLS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1779-1785.

THE STATE OF THE ART IN SITING WIND MILLS AS WELL AS LAND USE PROBLEMS ARE DISCUSSED. SPECIFIC RECOMMENDATIONS ARE MADE FOR FURTHERING PRESENT KNOWLEDGE IN THESE AREAS.

1978-0824 TRACI R M, PHILLIPS G T, PATNAIK P C
DEVELOPING A SITE SELECTION METHODOLOGY FOR WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT, 15 JUNE 1977 - 15 SEPTEMBER 1978.
NTIS, SEPTEMBER 1978. 306 P.
DOE/ET/20280-3

PROGRESS ON THE DEVELOPMENT OF A NEW WIND ENERGY SITE SELECTION METHODOLOGY ACHIEVED DURING THE FINAL DEVELOPMENT PHASE OF THE PROGRAM IS DESCRIBED. THE SITING APPROACH PROVIDES A USEFUL PRELIMINARY TO, AND PARTIAL SUBSTITUTE FOR, CONVENTIONAL SITING STUDIES INVOLVING LARGE FIELD TEST PROGRAMS BY EMPLOYING MATHEMATICAL MODELS OF MESO- AND MICROMETEOROLOGY IN REGIONS OF COMPLEX TERRAIN. THE MODELS MAKE USE OF DATA FROM METEOROLOGICAL STATIONS WHERE WEATHER RECORDS ARE AVAILABLE AND PREDICT THE WINDFIELD CLIMATOLOGY OF SITES, WITHIN THE REGION OF INTEREST, WHERE DATA ARE UNAVAILABLE. THESE FORECASTS ARE SUBSEQUENTLY ANALYZED TO PREDICT SITE WIND CHARACTERISTICS AND TO AID IN THE DESIGN OF DETAILED FIELD PROGRAM TO QUANTIFY THE WIND CHARACTERISTICS AT PROMISING WIND ENERGY SITES.

1978-0825 TRACI R M, PHILLIPS G T, PATNAIK P C, FREEMAN B E
THE UTILITY OF MATHEMATICAL WINDFIELD MODELS IN A WECS SITING METHODOLOGY: A CASE STUDY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF. MAY 1978. VOL. 2, P. 677-688.
CONF-770921/2

AN IMPORTANT LINK IN THE CHAIN OF ACTIVITIES FOR DEVELOPING PRACTICAL WIND ENERGY CONVERSION SYSTEMS (WECS) IS THE PROSPECTING OR SITE SELECTION ACTIVITY FOR IDENTIFYING OPTIMUM LOCATIONS FOR WECS SITING. PRESENT TECHNIQUES RELY ON METEOROLOGICAL RECORDS, WHICH ARE OFTEN UNAVAILABLE FOR THE MOST PROMISING SITES, AND METEOROLOGISTS' "RULES OF THUMB." SUCH TECHNIQUES HAVE BEEN INADEQUATE IN THE PAST. THUS, THE MAIN GOAL OF THE PRESENT PROGRAM IS TO PROVIDE AN IMPROVED SITING METHODOLOGY WHICH MAKES USE OF MATHEMATICAL WINDFIELD MODELING TO ACCURATELY EXTRAPOLATE CLIMATOLOGICAL DATA FROM A GIVEN SITE (OR SITES) IN A REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION.

1978-0826 TRAN V-V
TECHNICAL AND ECONOMICAL ASPECTS OF A SOLAR STILL COUPLED WITH A GREENHOUSE IN ARID LANDS OF DEVELOPING COUNTRIES.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 2031-2035.

THERE IS A MOUNTING SHORTAGE OF FOOD CAUSED BY THE EVER INCREASING EARTH POPULATION, BY THE UNCONTROLLED WEATHER, AND THE RISING COST OF FUEL AROUND THE GLOBE, ESPECIALLY IN ARID ZONES OF DEVELOPING COUNTRIES. SINCE THE NEEDS OF SUCH SMALL COMMUNITIES ARE FOOD AND DRINKING WATER, THE INSTALLATION OF A SOLAR STILL COMBINED WITH A GREENHOUSE MAY BE JUSTIFIED. A MATHEMATICAL MODEL OF THE PROPOSED SOLAR STILL GREENHOUSE, CALCULATED AND BASED ON THE METEOROLOGICAL DATA OF 1971 AT ANKARA, WAS TESTED USING EXPERIMENTAL DATA AND AGREEMENT IS

EXCELLENT. THE COST OF A SOLAR STILL COUPLED WITH A GREENHOUSE USING ONLY SOLAR AND WIND ENERGY IS MORE EXPENSIVE THAN ONE WITH CONVENTIONAL FUELS, BUT PROVIDES FOR INDEPENDENCE FROM ENERGY SOURCES OUTSIDE THE COMMUNITY. ALTERNATIVE DESIGNS AND FUTURE RESEARCH OF THE SOLAR STILL GREENHOUSE IN ARID ZONES ARE RECOMMENDED.

1978-0827 TRENKA A R
ROCKY FLATS TEST ACTIVITIES TO FEBRUARY 1978.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 126-147.

AN OVERVIEW IS PRESENTED OF THE TESTING ACTIVITIES BEING CONDUCTED AT ROCKY FLATS ON WIND TURBINE GENERATORS. THREE MAJOR AREAS ARE COVERED: THE PURPOSE AND PHILOSOPHY OF TESTING AT ROCKY FLATS TEST CENTER; A DESCRIPTION OF THE TEST FACILITIES; AND SOME CURRENT TEST RESULTS, BOTH QUANTITATIVE AND QUALITATIVE OBTAINED AT THE ROCKY FLATS TEST CENTER.

1978-0828 TRENKA A
INTRODUCTION TO THE 1 KW HIGH RELIABILITY WTG.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 38-39.

THE DOE SMALL WIND TURBINE RESEARCH AND DEVELOPMENT PROGRAM IS REVIEWED.

1978-0829 URBANEK A
TVINDKRAFT, THE LARGEST WINDMILL IN THE WORLD.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 23-24, NOVEMBER-DECEMBER 1978. (IN GERMAN)

A WIND POWER PLANT WITH AN OUTPUT OF 100 KW IS DESCRIBED. THE PLANT CONSISTS MAINLY OF A WIND ROTOR WITH A DIAMETER OF 19 METERS. THE ROTOR HAS 350 SHEET STEEL BLADES OF 1 SQ. METER SURFACE AREA EACH. THE PLANT WAS PRODUCED BY PRIVATE INDUSTRY.

1978-0830 BHUMRALKAR C M
ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
MENLO PARK, CALIFORNIA, SRI INTERNATIONAL, APRIL 1978. 149 P.

A PRACTICAL METHOD HAS BEEN DEVELOPED AND APPLIED TO THE PROBLEM OF DETERMINING WIND CHARACTERISTICS AT CANDIDATE WIND ENERGY CONVERSION SITES WHERE THERE ARE NO AVAILABLE HISTORICAL DATA. THE METHOD USES A MASS CONSISTENT FLOW MODEL (CALLED "COMPLEX") TO INTERPOLATE BETWEEN STATIONS WHERE WIND DATA ARE AVAILABLE. THE COMPLEX MODEL INCORPORATES THE EFFECTS OF TERRAIN FEATURES AND AIRFLOW. THE KEY TO THE PRACTICAL APPLICATION OF COMPLEX TO THE DERIVATION OF WIND STATISTICS IS THE MODEL'S LINEARITY. THIS ALLOWS THE INPUT DATA SETS TO BE RESOLVED INTO ORTHOGONAL COMPONENTS ALONG THE SET OF EIGENVECTORS OF THE COVARIANCE MATRIX. THE SOLUTION FOR EACH EIGENVECTOR IS DETERMINED WITH COMPLEX; THE HOURLY INTERPOLATED WINDS ARE THEN FORMED FROM LINEAR COMBINATIONS OF THESE SOLUTIONS.

1978-0831 USMANI I H
RURAL ELECTRIFICATION: AN ALTERNATIVE FOR THE THIRD WORLD.
NAT. RESOUR. FORUM 2(3): 271-277, APRIL 1978.

RURAL ELECTRIFICATION IS AN ESSENTIAL ELEMENT IN DEVELOPMENT PLANNING IN DEVELOPING COUNTRIES. IN THE PAST, THE CONVENTIONAL APPROACH TO RURAL ELECTRIFICATION HAS BEEN EITHER TO EXTEND NATIONAL GRIDS FROM CENTRAL POWER STATIONS, OR TO INSTALL SMALL DIESEL GENERATORS. THIS ARTICLE EXPLORES A THIRD ALTERNATIVE, NAMELY THE HARNESSING OF SUCH RENEWABLE SOURCES OF ENERGY AS SOLAR, WIND AND BIOMASS FOR THE PRODUCTION OF LOCAL ELECTRIC POWER. THE AUTHOR OUTLINES THE CONCEPT OF THE RURAL ENERGY CENTRE IN COMPARISON WITH THE STRUCTURE OF ENERGY NEEDS, AND RESPONDS TO CRITICS OF THIS INTEGRATED APPROACH TO THE PROBLEM OF RURAL ELECTRIFICATION.

1978-0832 UTILITIES PUT THE SUN TO WORK.
EPRI J. 3(2): 26-32, MARCH 1978.

SAMPLES OF SOLAR APPLICATIONS ILLUSTRATE HOW UTILITIES ARE COMMITTING FUNDS FOR RESEARCH AND DEVELOPMENT OF SOLAR ENERGY IN ANTICIPATION OF ITS BECOMING A SIGNIFICANT CONTRIBUTOR TO THEIR ENERGY MIX. THE EXAMPLES, CHOSEN FROM 458 PROGRAMS, INCLUDE A HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) PROJECT, BIOMASS, CLIMATIC DATA COLLECTION, WIND ENERGY, SOLAR COLLECTOR TESTING, PHOTOVOLTAICS, AND VARIOUS SOLAR HEATING AND COOLING (SHAC) EFFORTS. FUNDING LEVELS AND EXTENT OF ACTIVE PARTICIPATION ON THE PART OF UTILITIES ARE INDICATED. THE INFORMATION WAS GATHERED THROUGH A TELEPHONE SURVEY BY THE ELECTRIC POWER RESEARCH INSTITUTE, BUT DOES NOT INCLUDE EPRI-FUNDED PROJECTS. SHAC AND RELATED RESEARCH ACCOUNTS FOR 74% OF THE TOTAL $15 TO $20 MILLION COMMITMENT MADE BY 150 INVESTOR-OWNED, PUBLIC, AND COOPERATIVE UTILITIES.

1978-0833 VAN DUSEN E S, KIRCHHOFF R H
A TWO DIMENSIONAL VORTEX SHEET MODEL OF A SAVONIUS ROTOR.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 15-31.

A TWO-DIMENSIONAL INVISCID FLOW MODEL IS DEVELOPED FOR A VERTICAL AXIS WINDMILL OF THE SAVONIUS ROTOR TYPE WITH TWO FOILS OF ARBITRARY SHAPE. THE SOLUTION IS CONSTRUCTED BY THE SUPERPOSITION OF STREAMFUNCTIONS FOR THE UNIFORM FLOWS AND THE VORTEX SHEETS REPRESENTED THE FOILS AND THE WAKE VORTICITY. CALCULATIONS ARE PERFORMED IN THE REFERENCE FRAME OF THE ROTATING FOILS AND INCLUDE A TIME DEVELOPING WAKE AS VORTICITY IS SHED FROM THE TRAILING EDGE OF EACH FOIL. THE RESULTS FROM DIFFERENT TIME STEPS, HENCE ROTOR ORIENTATIONS, ARE PRESENTED AS PLOTS OF TORQUE, STREAMLINES, AND POWER COEFFICIENT OVER A WIDE RANGE OF TIP SPEED RATIOS. RESULTS INVESTIGATING THE TIME STEP BETWEEN SOLUTIONS AND DIFFERENT GEOMETRIES ARE ALSO PRESENTED AND COMPARED TO EMPIRICAL VALUES. A HEURISTIC STALL MODEL TO ACCOUNT FOR FLOW SEPARATION IS INCLUDED IN A MANNER THAT ANTICIPATES FUTURE VISCOUS ANALYSIS.

1978-0834 BOLT J B D H
NETHERLANDS EXPERIMENTAL VERTICAL AXIS WIND TURBINE.
NEDERLANDSE VERENIGING VOOR LUCHTVAARTTECHNIEK, YEARBOOK 1977. AMSTERDAM, NEDERLANDSE VERENIGING VOOR LUCHTVAARTTECHNIEK, 1978. P. 5.1--5.8.

THE PAPER GIVES A GENERAL DESCRIPTION OF AN EXPERIMENTAL 5.3-M-DIAM VERTICAL AXIS WIND TURBINE AND ITS ASSOCIATED POWER CONVERSION SYSTEM AND OTHER SUBSYSTEMS. THE TWO GLASS-FIBER REINFORCED PLASTIC BLADES ARE STRENGTHENED BY BONDED LIGHT-METAL PLATES. AS DESIGN-CRITERIA FOR THE STATIC STRENGTH OF THE BLADES, A MAXIMUM BLADE ROTATION SPEED OF 450 RPM IN CALM WEATHER CONDITIONS AND A REDUCING SPEED OF 2.5 RAD/SQ SEC AT 325 RPM

ARE USED. THE ROTOR OPERATES IN TWO MODES: CONSTANT SPEED, AND CONSTANT BLADE-SPEED/WIND-SPEED RATIO. BLOCK DIAGRAMS OF THE MECHANICAL-HYDRAULIC ENERGY CONVERSION SYSTEM AND THE CONTROL AND PROTECTION SYSTEMS ARE PRESENTED. THE TEST PROGRAM WILL COMPRISE MEASUREMENT OF VIBRATION CHARACTERISTICS OF THE TURBINE WHEN STATIONARY AND RUNNING, WITH OR WITHOUT TETHERING, MEASUREMENT OF TURBINE EFFICIENCY AT CONSTANT ROTOR RPM AND BLADE-SPEED/WIND-SPEED RATIO, MEASUREMENT OF TENSION IN THE BLADE ROOTS, AND MEASUREMENT OF THE INFLUENCE OF TENSION IN THE GUY WIRES ON DYNAMIC BEHAVIOR OF THE TURBINE.

1978-0835 DEBONTRIDDER J, VANDENPUT A, MARCELIS R, GEYSEN W, DE KEUSTER C, FIERENS E
COMBINATION ASYNCHRONOUS GENERATOR-VERTICAL AXIS WIND TURBINE FOR SMALL POWER APPLICATIONS.
PROCEEDINGS: INTERNATIONAL CONFERENCE ON ELECTRIC MACHINERY, VOL. 2. LOUVAIN, BELGIUM, KATHOLIC UNIVERSITAIRE, 1978. P. G5.5.1--G5.5.11.

THE PAPER DISCUSSES THEORETICAL WORKING PRINCIPLES OF COUPLING AN ASYNCHRONOUS GENERATOR AND A WIND-DRIVEN VERTICAL AXIS TURBINE, CONSIDERING CHOICE OF THE GENERATOR, LIMITING THE TURBINE SPEED, EFFICIENCY OF THE SYSTEM AND THE MINIMUM WIND VELOCITY FOR STARTING.

1978-0836 VAN HOLTEN T
WIND POWER ENHANCEMENT BY THE TIPVANE SYSTEM.
NED. TIDSCHR. NATUURKD. A. A44(1): 42-46, MARCH 1978. (IN DUTCH)

AIR FLOW PATTERNS ARE ILLUSTRATED FOR CONVENTIONAL WIND TURBINES AND FOR THOSE WITH TIP-WAVES. WIND TUNNEL TESTS HAVE SHOWN A MASS FLOW ENHANCEMENT OF 4 TIMES WITH TIPVANES RELATIVE TO NORMAL TURBINES. AN INTERESTING ANALOGY IS DRAWN BETWEEN THE AERODYNAMIC FLOW CONDITIONS AND THE MAGNETIC FIELD IN MAGNETIC LENSES OF THE SHORT SOLENOID TYPE.

1978-0837 VAN HOLTEN T
PROPELLER OR A SET OF WINGS FOR A WIND MILL.
U.S. PATENT NO. 4,093,402, JUNE 6, 1978. 4 P.

A PROPELLER FOR A WIND MILL COMPRISING A ROTATABLE SUPPORTED HUB WITH AT LEAST ONE MAINLY RADIALLY EXTENDING BLADE HAVING A CROSS SECTION IN THE SHAPE OF A "WING PROFILE", EACH BLADE BEING PROVIDED WITH AT LEAST ONE AUXILIARY BLADE WITH A CROSS SECTION IN THE SHAPE OF WING PROFILE AND BEING POSITIONED SUCH THAT THE AUXILIARY BLADE WILL GENERATE A "VENTURY EFFECT" BY WHICH A PART OF THE FLUID, WHICH NORMALLY SHOULD PASS OUTSIDE THE PROPELLER DISC AREA, IS DRAWN INTO THE PROPELLER.

1978-0838 HEWSON E W, BAKER R W, BARBER D A, PETERSON B
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST.
NTIS, SEPTEMBER 1978. 171 P.
DOE/BP/10552-T1

SINCE 1975 THE BONNEVILLE POWER ADMINISTRATION (BPA) HAS BEEN SPONSORING WIND POWER RESEARCH AT OREGON STATE UNIVERSITY. A FEASIBILITY STUDY THAT INITIALLY CONCENTRATED ON THE WIND POWER POTENTIAL IN THE COLUMBIA RIVER GORGE HAS EXPANDED TO THE BPA SERVICE AREA WHICH COVERS WASHINGTON, OREGON, IDAHO, WESTERN MONTANA AND NORTHERN NEVADA. PREVIOUS BPA REPORTS HAVE DOCUMENTED THE PROGRESS OF THIS RESEARCH. THE OBJECTIVES AND CONCLUSIONS OF THE INVESTIGATIONS DURING THE NINE MONTH PERIOD, DECEMBER 1977 TO AUGUST 1978, ARE SUMMARIZED. THE DETAILS OF THE RESEARCH ARE PRESENTED.

1978-0839 VAS I E
WIND ENERGY INNOVATIVE SYSTEMS. TECHNICAL STATUS REPORT, JULY 1978.
NTIS, AUGUST 1978. 58 P.
SERI/PR-13-054

THE SOLAR ENERGY RESEARCH INSTITUTE HAS BEEN AUTHORIZED BY THE DEPARTMENT OF ENERGY TO PROVIDE TECHNICAL MANAGEMENT OF THE WIND ENERGY INNOVATIVE SYSTEMS (WEIS) PROGRAM CURRENTLY COMPRISED OF EIGHT RESEARCH AND DEVELOPMENT CONTRACTS. THESE RESEARCH EFFORTS ARE AIMED AT DETERMINING TECHNICAL AND ECONOMIC FEASIBILITY OF INNOVATIVE CONCEPTS AND SYSTEMS UTILIZING WIND ENERGY. THE CURRENT REPORT IS THE SECOND OF THE MONTHLY TECHNICAL STATUS REPORTS AND REVIEWS THE PROGRESS OF THE CONTINUING TASKS.

1978-0840 VAUGHAN D H, MOSES H L, O'BRIEN W F
APPLICATION OF WIND POWER TO REFRIGERATE APPLE STORAGES.
ASAE PAPER 78-3526, FOR WINTER MEETING, CHICAGO, DECEMBER 18-20, 1978. ST. JOSEPH, MICHIGAN, ASAE, 1978. 25 P.

A WIND-POWERED COLD STORAGE FACILITY, WHICH INCLUDES A 10-KILOWATT WIND GENERATOR MOUNTED ON A 90-FT. TOWER, A DC VAPOR COMPRESSION REFRIGERATION SYSTEM, A 100-BUSHEL APPLE STORAGE BUILDING, AN ICE/TANK THERMAL STORAGE UNIT, AND AN ELECTRICAL (BATTERY BANK) ENERGY STORAGE, IS DESCRIBED. OPERATION OF THE SYSTEM, WITH APPLES STORED IN THE BUILDING, BEGAN ON MARCH 7, 1978. TYPICAL PERFORMNCE DATA FOR THE COOLING SYSTEM ARE GIVEN.

1978-0841 VAUGHAN D H, MOSES H L, BLANTON J C, BALDWIN J D
DESIGN OF A WIND-POWERED COLD STORAGE FACILITY.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 71-83.

THE DESIGN AND CONSTRUCTION OF A COLD STORAGE FACILITY FOR USE WITH WIND POWER IS DESCRIBED. THE FACILITY INCLUDES A 10-KILOWATT WIND GENERATOR, A COLD STORAGE BUILDING, A VAPOR-COMPRESSION REFRIGERATION SYSTEM, AND A THERMAL STORAGE UNIT. WHEN POWER FROM THE WIND IS SUFFICIENT, HEAT IS REMOVED FROM THE SOLUTION WHICH THEN ACTS AS A THERMAL STORAGE FOR PERIODS WHEN WIND ENERGY IS UNAVAILABLE. THE FREEZING POINT OF THE ETHYLENE GLYCOL/WATER MIXTURE IS ADJUSTED TO PROVIDE THE LATENT HEAT OF FUSION AT THE TEMPERATURE DESIRED IN THE STORAGE ROOM. THE DESIGN ANALYSIS OF THE COMPLETE SYSTEM INCLUDED A STUDY OF THE STORAGE REQUIREMENTS FOR APPLES, THE COOLING LOAD CALCULATIONS FOR THE BUILDING, SPECIFICATIONS OF THE SYSTEM COMPONENTS, AND THERMAL STORAGE REQUIREMENTS.

1978-0842 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
NTIS, APRIL 1978. 15 P.
CONF-781014-2, PNL-SA-6918

WITHIN THE FEDERAL WIND ENERGY PROGRAM OF THE UNITED STATES OF AMERICA, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) HAS BEEN ESTABLISHED WITH THE RESPONSIBILITY FOR ASSEMBLING AND DEVELOPING WIND CHARACTERISTICS INFORMATION APPROPRIATE TO THE NEEDS OF THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND PERFORMANCE OF

WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND THE OPERATION OF WECS. THE U.S. DEPARTMENT OF ENERGY (DOE) IS ADDRESSING THIS RESPONSIBILITY THROUGH A MANAGEMENT/RESEARCH PROGRAM WHICH INCLUDES: RELIABLE WIND AND TURBULENCE DESCRIPTIONS PERTINENT TO WECS DESIGN AND PERFORMANCE EVALUATION; EFFECTIVE ANALYSES AND METHODS FOR THE DETERMINATION OF WIND ENERGY POTENTIAL OVER LARGE AREAS; DEPENDABLE AND COST-EFFECTIVE METHODOLOGIES FOR THE SITING OF WECS; AND DESCRIPTIONS OF DAY-TO-DAY WIND VARIABILITY AND PREDICTABILITY FOR WECS OPERATIONS.

1978-0843 VON KOENING F
WIE MAN WINDRAEDER BAUT. BERECHNUNG, KONSTRUKTION UND AUSFUEHRUNG.
MUENCHEN, GERMANY, F.R., PFRIEMER, 1978. 190 P. (IN GERMAN)

AFTER SOME INTRODUCING REFLECTIONS ABOUT THE ENERGY AMOUNT OF AIR STREAMS, THE FOLLOWING PROBLEMS ARE DISCUSSED IN DIFFERENT CHAPTERS: 1) WINDPOWER ON THE BLADE 2) SIZE AND SHAPING OF THE BLADES 3) PROJECT OF AN AMERICAN WIND TURBINE 4) MODERN HIGH SPEED ROTORS 5) WIND TURBINE OF MEDIUM ROTATIONAL SPEED 6) PERFORMANCE OF A LA TOUR-BLADE 7) WIND WHEEL WITH TRIANGULAR SAILS 8) VERTICAL AXLE TURBINE. AT THE END WORK SHOP ASSEMBLY INFORMATION FOR WIND TURBINES ARE SPECIFIED.

1978-0844 VON KOENING F
WINDENERGIE IN PRAKTISCHER NUTZUNG: RAEDER, ROTOREN, MUEHLEN, WINDDRAFTWERKE. (WIND ENERGY IN PRACTICAL UTILIZATION: WHEELS, ROTORS, MILLS, WIND POWER PLANTS.)
MUNICH, GERMANY, FR, UDO PFRIEMER VERLAG, 1978. 211 P.

THE PRACTICAL USE OF WIND ENERGY FROM THE EARLIEST CULTURES UP TO THE PRESENT TIME IS REVIEWED. THE WIND AS AN ENERGY SOURCE, PRACTICAL APPLICATIONS, LARGE-SCALE WIND POWER PROJECTS, NEW WIND ENERGY RESEARCH, AND WIND POWER UTILIZATION AND ECONOMICS ARE THE TOPICS DISCUSSED.

1978-0845 VUKOVICH F M, CLAYTON C A
A TECHNIQUE TO PREDICT WIND STATISTICS FOR WIND ENERGY CONVERSION SYSTEMS IN REMOTE LOCATIONS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 321-334.
CONF-770921/1

A TECHNIQUE WAS DEVELOPED TO PREDICT WIND STATISTICS IN REMOTE LOCATIONS UTILIZING HISTORICAL WIND DATA FROM A SYNOPTIC WEATHER STATION, WIND FIELD SIMULATIONS FROM A PRIMITIVE EQUATION MODEL, AND A STATISTICAL MODEL. THE RESULTS SUGGEST THAT REASONABLE PREDICTIONS OF WIND STATISTICS CAN BE ACHIEVED PROVIDED GOOD PARAMETERIZATION OF THE HYDRODYNAMIC MODEL IS ACCOMPLISHED.

1978-0846 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF WIND POWER POTENTIAL.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, 1978. PROCEEDINGS. NTIS, 1978. P. 156-165.
CONF-780754

TREE DEFORMATION APPEARS TO BE A SENSITIVE INDICATOR OF ANNUAL MEAN WIND SPEED AND DIRECTION AND TREES MAY BE USED TO ESTIMATE BOTH THE ANNUAL MEAN WIND SPEED (MEAN ERROR +- 17%) AND PERCENT OF USABLE WINDS (MEAN ERROR +- 22%). THIS TECHNIQUE COULD APPROPRIATELY BE USED AS A FIRST STAGE IN A WIND SURVEY PRIOR TO INSTRUMENTATION WITH ANEMOMETERS.

1978-0847 WAKE N S
DIRECTORY OF ENERGY-RELATED EDUCATIONAL PROGRAMS.
NTIS, DECEMBER 1978. 79 P.
BNL-50988

THIS REPORT PRESENTS AN INVENTORY OF ENERGY-RELATED TRAINING PROGRAMS BEING OFFERED WITHIN UNITED STATES EDUCATIONAL INSTITUTIONS THAT MIGHT MEET THE TRAINING NEEDS OF LESS DEVELOPED COUNTRIES. TRAINING PROGRAMS IN THE ENERGY AREA INCLUDE THE AREAS OF ENERGY RESOURCES, ENERGY PLANNING AND ANALYSIS, THE DEVELOPMENT AND UTILIZATION OF DIFFERENT ENERGY TECHNOLOGIES INCLUDING RENEWABLE SOURCES, AND ENGINEERING.

1978-0848 WALLENSTEIN A R
BARRIERS AND INCENTIVES TO SOLAR ENERGY DEVELOPMENT. AN ANALYSIS OF LEGAL AND INSTITUTIONAL ISSUES IN THE NORTHEAST.
NTIS, DECEMBER 1978. 115 P.
NESEC-1

THE LEGAL AND INSTITUTIONAL BARRIERS AND INCENTIVES TO COMMERCIALIZING ALTERNATE ENERGY SOURCES ARE ANALYZED WITH PARTICULAR EMPHASIS ON SOLAR ENERGY. THE LAWS THAT CONSTITUTE EITHER LEGAL BARRIERS OR POSSIBLE INCENTIVES IN THE COMMERCIALIZATION OF SOLAR ENERGY IN THE NINE STATES IN THE NORTHEAST SOLAR ENERGY CENTER ARE DETAILED. THE NINE STATES ARE: CONNECTICUT, MAINE, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, AND VERMONT.

1978-0849 WALTERS R E, MIGLIORE P G
THE CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 784-793.
CONF-770921/2

THIS NSF/ERDA STUDY STARTED IN 1975. THE MAJOR EMPHASIS HAS BEEN TO THEORETICALLY AND EXPERIMENTALLY INVESTIGATE THE AERODYNAMIC PERFORMANCE AND STRUCTURAL REQUIREMENTS OF A STRAIGHT-BLADED VERTICAL AXIS WIND TURBINE (VAWT). SYSTEM AND COST STUDIES ARE INCLUDED. OF PARTICULAR INTEREST IS THE EVALUATION OF HIGH-LIFT, VARIABLE BLADE PITCH, CIRCULATION-CONTROLLED (C.C.) AIRFOILS.

1978-0850 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G, SQUIRE W
INNOVATIVE WIND TURBINES. CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE. PROGRESS REPORT, MARCH 1-DECEMBER 31, 1976.
NTIS, OCTOBER 1978. 140 P.
ORO-5135-77/1

THEORETICAL AND EXPERIMENTAL RESEARCH EFFORTS IN EVALUATING AN INNOVATIVE CONCEPT FOR VERTICAL AXIS WIND TURBINES (VAWT) ARE DESCRIBED. THE CONCEPT IS THAT OF USING STRAIGHT BLADES COMPOSED OF CIRCULATION CONTROLLED AIRFOIL SECTIONS. THE THEORETICAL ANALYSIS HAS BEEN DEVELOPED TO DETERMINE THE UNSTEADY LIFT AND MOMENT CHARACTERISTICS OF MULTIPLE-BLADE CROSS-FLOW WIND TURBINES.

1978-0851 WANG P N, HUANG I
WIND POWER FROM A VORTEX CHAMBER.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.1. 9 P.

TO STUDY THE WIND POWER THROUGH A TORNADO TYPE VORTEX FLOW, A SPIRAL SHAPE VORTEX CHAMBER WAS TESTED IN AN OPEN CIRCUIT, SUCTION TYPE WIND TUNNEL. THE VORTEX CHAMBER WAS PLACED ON THE FLOOR OF THE TUNNEL WITH THE CENTRAL REGION OF THE CHAMBER BOTTOM CONNECTED OUT OF THE WIND TUNNEL TO A BLOWER. WITH THE PREVAILING WIND SPEED, BLOWING FLOW RATE, CENTRAL OPENING AREA AND HEIGHT OF THE CHAMBER AS CONTROL PARAMETERS, THE WIND POWER CHARACTERISTICS CAN BE STUDIED.

1978-0852 WARMBRODT W
AEROELASTIC RESPONSE AND STABILITY OF A COUPLED ROTOR/SUPPORT SYSTEM WITH APPLICATION TO LARGE HORIZONTAL AXIS WIND TURBINES. PH.D. THESIS.
LOS ANGELES, U.C.L.A., 1978. AVAIL.: ANN ARBOR, UNIVERSITY MICROFILMS, 1978. 326 P. ORDER NO. 79-01415.

THE DERIVATION OF A GOVERNING SET OF NONLINEAR EQUATIONS OF MOTION FOR A COUPLED ROTOR/SUPPORT SYSTEM IS PRESENTED. THE MODEL INCLUDES AN N-BLADED ROTOR WITH ELASTIC BLADE FLAP AND LEAD-LAG DEGREES OF FREEDOM. THE BLADES CAN HAVE PRECONE, PITCH BEARING OFFSET, BUILT-IN TWIST, AND CROSS SECTIONAL OFFSETS BETWEEN THE AERODYNAMIC CENTER, THE CENTER OF MASS, AND THE ELASTIC AXIS. THE ROTOR SUPPORT HAS TWO TRANSLATIONAL DEGREES OF FREEDOM AND THREE ROTATIONAL DEGREES OF FREEDOM. THE GENERAL SET OF EQUATIONS WERE SPECIALIZED TO ANALYTICALLY REPRESENT A COUPLED N-BLADED ROTOR/FUSELAGE MODEL OF A HELICOPTER IN HOVER OF FORWARD FLIGHT. THE FUSELAGE WAS MODELED AS A RIGID BODY. INERTIA, AERODYNAMIC, STRUCTURAL, AND GRAVITATIONAL LOADS ARE CONSIDERED. WIND GUSTS IN ALL THREE DIRECTIONS WAS INCLUDED. ROTOR/FUSELAGE MATCHING WAS PERFORMED BY REQUIRING FORCE AND MOMENT EQUILIBRIUM BETWEEN THE ROTOR AND THE FUSELAGE.

1978-0853 WARMBRODT W, FRIEDMANN P P
AEROELASTIC RESPONSE AND STABILITY OF A COUPLED ROTOR/SUPPORT SYSTEM WITH APPLICATION TO LARGE HORIZONTAL AXIS WIND TURBINES.
LOS ANGELES, UNIV. CAL. SCHOOL OF ENG. AND APPL. SCI., MECH. AND STRUCT. DEPT., 1978. 299 P.
UCLA-ENG-7881

THE DERIVATION OF A GOVERNING SET OF NONLINEAR EQUATIONS OF MOTION FOR A COUPLED ROTOR/SUPPORT SYSTEM IS PRESENTED. THE MODEL INCLUDES AN N-BLADED ROTOR WITH ELASTIC BLADE FLAP AND LEAD-LAG DEGREES OF FREEDOM.

1978-0854 WENDELL L L, CONNELL J R, PENNELL W T, RENNE D S, WEGLEY H L
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD JULY 1977 THROUGH JULY 1978.
NTIS, DECEMBER 1978. 138 P.
PNL-2545

AS A SERVICE ELEMENT WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN THE DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), IN ENERGY PROGRAM PLANNING, IN SELECTING SITES FOR WECS INSTALLATION, AND IN THE OPERATION OF WECS.

1978-0855 WARNE D F
MEDIUM SCALE WIND TURBINES FOR SMALL POWER SYSTEMS.
INT. POWER GENERATION 1(8): 31-33, DECEMBER 1978-JANUARY 1979.

MEDIUM SCALE WIND TURBINES ARE DEFINED AS BETWEEN 100 KW TO 1 MW, WITH A ROTOR DIAMETER OF BETWEEN 10 AND 30 M. THE TECHNICAL AND ECONOMIC FACTORS OF EMPLOYING SUCH TURBINES IN SMALL NETWORKS ARE DISCUSSED, AND THEIR SUITABILITY FOR ISLAND COMMUNITIES STRESSED. A 925 KW DESIGN IS DESCRIBED, WHICH HAS A 30 M ROTOR WITH TWO WELDED MILD STEEL BLADES ROTATING AT 70 RPM TO DRIVE AN INDUCTION GENERATOR VIA A SPEED INCREASING GEARBOX.

1978-0856 WARNE D F
USABLE ENERGY FROM WIND.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 39-49.

THE FOLLOWING TOPICS ARE DISCUSSED: THE BASIS FOR ASSESSING WIND GENERATORS AGAINST INDIVIDUAL APPLICATIONS, A PRACTICAL WIND GENERATOR REVIEW, ENERGY STORAGE, AND ECONOMICS.

1978-0857 WEBER R C, GIES P, SEIFERT J
ENERGY CONSERVATION ON FORKLIFT TRUCK OPERATIONS.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 554-558.

A TWO-FOLD STUDY OF WIND ENERGY IN AN INDUSTRIAL APPLICATION IS PRESENTED IN THIS PAPER. THE FIRST PHASE OF THE STUDY CONCERNED THE POSSIBILITY OF USING WIND ENERGY TO SUPPLY POWER FOR ELECTRIC FORKLIFT TRUCKS. THE SECOND PHASE RELATED THE FEASIBILITY OF PROPANE POWER VERSUS ELECTRIC POWER IN FORKLIFT TRUCK OPERATIONS.

1977-0496 ARNOLD J E

ON THE CORRELATION BETWEEN DAILY AMOUNTS OF SOLAR AND WIND ENERGY AND MONTHLY TRENDS OF THE TWO ENERGY SOURCES. AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESS. B.2. 5 P.

THE CORRELATION BETWEEN DAILY AMOUNTS OF SOLAR AND WIND ENERGY AS WELL AS THE MONTHLY CORRELATION BETWEEN THE TWO ENERGY SOURCES WAS EXAMINED FOR 30 OF THE 36 MONTHS FOR THE PERIOD OF 1973 TO 1975 AT COLLEGE STATION, TEXAS. ALTHOUGH THE MONTHLY PAIRS OF DATA HAD A NEGATIVE CORRELATION COEFFICIENT, DAILY PAIRS OF DATA EXHIBITED BOTH POSITIVE AND NEGATIVE CORRELATION COEFFICIENTS WHEN THE DATA WAS GROUPED BY MONTHS. DURING MOST OF THE MONTHS, THE CORRELATION BETWEEN DAILY VALUES OF SOLAR AND WIND ENERGY WAS NOT SIGNIFICANT. MONTHLY TOTALS OF WIND AND SOLAR ENERGY TENDED TO COMPLIMENT EACH OTHER TO YIELD A FAIRLY UNIFORM TOTAL ENERGY SUPPLY. IF WIND ENERGY IS TAKEN AT AN ELEVATED HEIGHT, A PRONOUNCED PEAK IN THE ENERTOTALS IS OBSERVED DURING THE HIGH WIND MONTHS OF THE YEAR.

1977-0497 AWALT T Y

AIR CONDITIONED SHELTER.
U.S. PATENT NO. 4,059,969, NOVEMBER 29, 1977. 8 P.

A MECHANICALLY AIR CONDITIONED SHELTER INCLUDES WIND DEFLECTORS, AS PART OF THE OUTER WALLS OF THE SHELTER, AND A SERIES OF BLADES MOVING ABOUT A GENERALLY VERTICAL AXIS, THE WIND BEING FUNNELED INTO WORKING ENGAGEMENT WITH THE BLADES. IN A PREFERRED EMBODIMENT, POWER FROM THE BLADES IS USED TO COMPRESS A FLUID WHICH IS REVERSIBLY DISTRIBUTED TO COILS LOCATED OUTSIDE OF THE SHELTER, AND TO ANOTHER WITHIN A LIQUID STORAGE TANK, THEREBY TO EITHER HEAT OR COOL THE LIQUID IN THE STORAGE TANK. THIS LIQUID IS USED FOR HEATING OR COOLING OF THE SHELTER. A SUFFICIENT VOLUME OF LIQUID IS MAINTAINED IN THE STORAGE TANK TO KEEP THE SHELTER COOLED OR HEATED DURING THOSE PERIODS IN WHICH THERE IS LITTLE OR NO WIND.

1977-0498 BANKWITZ H, FRITZSCHE A, WELTE D, DOERNER H, MOLLY J P

POSSIBILITIES FOR THE USE OF WIND POWER STATIONS IN DEVELOPING COUNTRIES. PART 1.
NTIS, 1977. 51 P. (IN GERMAN)
NP-23666

INFORMATION IS PRESENTED CONCERNING REQUIREMENTS OF WIND POWER PLANTS FOR DEVELOPING COUNTRIES; STATE-OF-THE-ART FOR WIND TURBINES; BASIC DESIGN PRINCIPLES; WIND ENERGY STATISTICS; ENERGY CONVERSION, MATCHING SUPPLY AND DEMAND; SAFETY AND MAINTENANCE; CONSIDERATIONS OF APPROPRIATE TECHNOLOGY; AND ECONOMICS.

1977-0499 BARIEAU R E

IMPROVED COMPUTER PROGRAM FOR CALCULATING THE THEORETICAL PERFORMANCE PARAMETERS OF A PROPELLER TYPE WIND TURBINE. AN APPENDIX TO THE FINAL REPORT ON FEASIBILITY OF USING WIND POWER TO PUMP IRRIGATION WATER (TEXAS).
NTIS, MARCH 1977. 71 P.
TR-77/101-A, PB-294017

THE PROP PROGRAM OF WILSON AND LISSAMAN HAS BEEN MODIFIED BY ADDING THE NEWTON-RAPHSON METHOD AND A STEP WISE SEARCH METHOD, AS OPTIONS FOR THE METHOD OF SOLUTION. IN ADDITION, AN OPTIMIZATION METHOD IS INCLUDED. TWIST ANGLES, TIP SPEED RATIO AND THE PITCH ANGLE MAY BE VARIED TO PRODUCE MAXIMUM POWER COEFFICIENT. THE COMPUTER PROGRAM LISTING IS PRESENTED ALONG WITH SAMPLE INPUT AND OUTPUT DATA. FURTHER IMPROVEMENTS TO THE PROGRAM ARE DISCUSSED.

1977-0500 BERENY J A

SURVEY OF THE EMERGING SOLAR ENERGY INDUSTRY--1977 EDITION.
NTIS, 1977. 417 P.
SEIS-77/01, PB-281200

SEE 1977-0031 FOR ABSTRACT.

1977-0501 BEUSSE H

ARRANGEMENT FOR ADAPTING A WIND WHEEL TO AN ELECTRIC POWER GENERATOR.
GERMAN (FRG) PATENT NO. 2,623,233/B/, AUGUST 11, 1977. 6 P. (IN GERMAN)

THE INVENTION IS CONCERNED WITH A DEVICE FOR ADAPTING A WIND WHEEL TO AN ELECTRIC POWER GENERATOR IN SUCH A WAY THAT THE WIND WHEEL WILL ALWAYS BE OPERATED WITH A MAXIMUM PERFORMANCE COEFFICIENT, THAT ANOTHER SOURCE OF ENERGY, E.G. A PRIME MOVER, CAN SUPPLY THE POWER DEFICIT IF THE WIND POWER IS NOT SUFFICIENT, AND THAT THE GENERATOR AT THE OUTPUT OF THE FACILITY IS KEPT MAINS-SYNCHRONOUS OF CONSTANT SPEED AND CONSTANT VOLTAGE. ACCORDING TO THE INVENTION, THE SHAFT POWER OF THE WIND POWER ENGINE IS TRANSMITTED TO A FIRST GENERATOR DRIVING AN ELECTROMOTOR. THE MOTOR IS COUPLED TO A SECOND GENERATOR FEEDING INTO A CONSUMER GRID. BY MEANS OF AN ANEMOMETER THE EXCITATION OUTPUT OF THE MOTOR IS CONTROLLED IN SUCH MANNER THAT THE SPEED OF THE GENERATOR IS PRACTICALLY CONSTANT--PROVIDED A SUFFICIENT SUPPLY OF WIND IS AVAILABLE. ON THE SHAFT OF THE OUTPUT GENERATOR A PRIME MOVER, E.G. A DIESEL ENGINE, IS MOUNTED BEING CONTROLLABLE FOR CONSTANT SPEED BY MEANS OF A CONTROL DEVICE IN SUCH A WAY THAT THE PRIME MOVER TAKES OVER THE MISSING AMOUNT OF POWER IF THE WIND SUPPLY FALLS SHORT OF THE POWER TAKEN OFF AT THE GENERATOR OUTPUT.

1977-0502 WOOD R R

ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977. P. 23.1-23.39.
EPRI-ER-515-SR

THIS PROGRAM IS AN ANALYSIS OF SOLAR ENERGY POWER PLANTS IN RELATION TO THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA). NEPA REQUIRES THE PREPARATION OF A DETAILED STATEMENT OF THE IMPACTS ASSOCIATED WITH ANY MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT. THE FOLLOWING FIVE SOLAR ENERGY CONCEPTS ARE BEING CONSIDERED: SOLAR THERMAL; PHOTOVOLTAIC; WIND; OCEAN THERMAL; AND PHOTOPRODUCTION. THE WORK ASSOCIATED WITH THIS PROGRAM HAS INCLUDED REFERENCE PLANT DESCRIPTIONS, REFERENCE SITE SELECTIONS, AND ENVIRONMENTAL ASSESSMENT.

1977-0503 BOGERS A J, QUAKERNAAT J

LE ROLE EVENTUEL DE L'HYDROGENE DANS LE DOMAINE D'ENERGIE DES PLAYS BAS. (POSSIBLE ROLE OF HYDROGEN IN THE ENERGY SUPPLY SECTOR OF THE NETHERLANDS.)
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 3, 18 P. (IN FRENCH)

NUCLEAR ENERGY HAS TO BE CONSIDERED AS A MAJOR SOURCE OF ENERGY FOR THE NETHERLANDS WHEN IN THE FUTURE GAS AND OIL BECOME SCARCE. THE FACT THAT BOTH NUCLEAR ENERGY AND WIND ENERGY ARE, NEARLY EXCLUSIVELY, TO BE TRANSFORMED INTO ELECTRICITY AND THIS ELECTRICITY CANNOT BE STORED IN LARGE QUANTITIES, MAKES IT NECESSARY TO LOOK FOR AN ALTERNATIVE TO THE EXCLUSIVE USE OF ELECTRICITY. THIS ALTERNATIVE CAN BE FOUND IN HYDROGEN. A SYSTEM BASED ON BOTH ELECTRICITY AND HYDROGEN AS THE MAIN ENERGY CARRIERS IS TO BE PREFERRED TO A SYSTEM BASED ON EITHER ELECTRICITY OR HYDROGEN ALONE. THE MAIN REASON FOR THIS IS THE FACT THAT HYDROGEN CAN BE STORED AND USED FOR PEAK SHAVING. SINCE HOLLAND HAS A NUMBER OF SMALL AND MEDIUM SIZED NATURAL GAS WELLS, EXCELLENT POSSIBILITIES OF STORAGE ARE AVAILABLE IN THESE WELLS, ONCE THE NATURAL GAS HAS BEEN TAKEN OUT. MOREOVER THE PRESENT NATURAL GAS LINES CAN BE USED AND WILL HAVE SUFFICIENT CAPACITY FOR TRANSFER AND DISTRIBUTION OF HYDROGEN.

1977-0504 BOOTHROYD P
COMPARATIVE SOLAR IMPACT ASSESSMENT OF LARGE-SCALE COMMUNITY-SCALE, AND HOUSEHOLD-SCALE SOLAR TECHNOLOGIES.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 45, 15 P.

AN ANALYSIS AND EVALUATION OF THE SOCIAL IMPACTS OF VARIOUS SCALES OF SOLAR ENERGY SYSTEMS (HEATING, PHOTOVOLTAICS, WIND, BIOMASS, WAVES) SUGGEST THAT COMMUNITY-SCALE SYSTEMS PROVIDE THE MOST FAVORABLE BALANCE IN PROMOTING POSITIVE SOCIAL-ENVIRONMENTAL CONDITIONS FOR THE BROADEST RANGE OF TYPES OF PERSONS, THOUGH THERE ARE SOME BENEFITS OF, AND CONDITIONS APPROPRIATE TO, THE DEVELOPMENT OF LARGE SCALE AND HOUSEHOLD SCALE SYSTEMS. THE CONCLUSIONS ARE BASED ON THEORETICAL/DEDUCTIVE CONSIDERATIONS, NOT ON THE DATA FROM A SPECIFIC EMPIRICAL RESEARCH PROJECT.

1977-0505 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL FOR GENERATION OF ELECTRICAL POWER. VOLUME I. EXECUTIVE SUMMARY. FINAL REPORT, APRIL 1975-APRIL 1976.
NTIS, JANUARY 1977. 29 P.
COO-2617-76/1/1

THE FEASIBILITY OF THE GIROMILL FOR THE COST EFFECTIVE PRODUCTION OF ELECTRICAL ENERGY IS STUDIED. TWENTY-ONE DIFFERENT GIROMILL CONFIGURATIONS COVERING THREE SIZES OF GIROMILL SYSTEMS (120, 500 AND 1500 KW) WERE ANALYZED, VARYING SUCH PARAMETERS AS ROTOR SOLIDITY, ROTOR ASPECT RATIO, RATED WIND VELOCITY, AND NUMBER OF ROTOR BLADES. THE GIROMILL SYSTEM ANALYSIS EMPLOYED THE SAME GROUND RULES BEING USED FOR CONVENTIONAL WINDMILL ANALYSES TO FACILITATE COMPARISONS BETWEEN THESE SYSTEMS. THE RESULTS INDICATE THAT A GIROMILL IS A VERY EFFICIENT DEVICE, AND COUPLED WITH ITS RELATIVELY SIMPLE CONSTRUCTION APPEARS QUITE COST EFFECTIVE WHEN COMPARED TO CONVENTIONAL WINDMILLS.

1977-0506 BUNDGAARD R
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 56-57.
CONF-7705119, PB-282565

THE FABRICATION OF A 17 METER DARRIEUS ROTOR AND A 300 FOOT DIAMETER HORIZONTAL AXIS ROTOR SYSTEM IS DESCRIBED.

1977-0507 CALLAHAN H L
ALTERNATE ENERGY CHOICES FOR PLANT STUDIES.
ERDA ENERGY MANAGEMENT SYMPOSIUM, 3RD, KNOXVILLE, TENNESSEE, SEPTEMBER 19, 1977.

CHARACTERISTICS, AVAILABILITY, AND TECHNOLOGY ASSESSMENTS ARE PRESENTED FOR 13 ALTERNATE ENERGY CHOICES. COAL AND LIGNITE, OIL AND GAS, AND THE ALL ELECTRIC SYSTEM ARE CONSIDERED FOR CONVENTIONAL ENERGY SYSTEMS. UNDER SPECIAL SITUATIONS, REFUSE DERIVED FUELS AND ENERGY RECOVERY, PURCHASED STEAM HEAT, COAL GASIFICATION, NUCLEAR, AND HEAT PUMPS ARE CONSIDERED. ENERGY ALTERNATIVES FOR OCEAN POWER, GEOTHERMAL DEVELOPMENT, DISSOLVED METHANE ENERGY SOURCES, WIND POWER, AND SOLAR POWER ARE SITE SPECIFIC.

1977-0508 CANFIELD M
WIND ENERGY PROGRAM CRITIQUE.
WASHINGTON, D.C., GENERAL ACCOUNTING OFFICES, 1977. 7 P.
EMD-77-33

RECOMMENDATIONS BY THE U.S. GENERAL ACCOUNTING OFFICE ON HOW THE DOE SPONSORED WIND ENERGY PROGRAM SHOULD BE STRUCTURED ARE PRESENTED. THE RECOMMENDATIONS URGE RE-EVALUATION OF PROGRAMS DIRECTED TO ONLY LARGE-SCALE WIND ENERGY SYSTEMS.

1977-0509 CARLIN P
SMALL WIND SYSTEMS PROGRAM DEVELOPMENT.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 413-425.

THE DOE-SPONSORED SMALL WIND TURBINE TESTING PROGRAM AT THE ROCKY FLATS PLANT IS DESCRIBED.

1977-0510 CATANIA P J, FULLER G A, STEWART W D
RENEWABLE ENERGY EDUCATION AT THE UNIVERSITY OF REGINA.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 54, 10 P.

FOUR YEARS OF RENEWABLE ENERGY EDUCATION CONDUCTED BY FACULTY OF ENGINEERING MEMBERS ARE REVIEWED. FROM THE REVIEW, A NUMBER OF RECOMMENDATIONS ON ENERGY EDUCATIONAL GOALS, PRIORITIES AND INFORMATION NEEDS, PARTICULARLY IN THE FIELDS OF ENERGY CONSERVATION AND RENEWABLE ENERGY SOURCES, ARE EVOLVED. SOLAR AND WIND ENERGY ARE CONSIDERED IN THE OVERALL ENERGY CONTEXT OF THE ABOVE AND OUTLINES THE OBJECTIVES AND NEEDS OF AN EXTENSIVE TEACHING AND EXTENSION PROGRAM FOR THE NEXT FEW YEARS.

1977-0511 WIND POWER FOR QUEBEC'S MAGDALEN ISLANDS.
CIM BULL. 70(779): 213-214, MARCH 1977.

1977-0512 CHARACTERIZATION AND APPLICATIONS ANALYSIS OF ENERGY STORAGE SYSTEMS.
NTIS, DECEMBER 1977. 523 P.
PB-299261, ATR-77(7538)-1

A SYSTEMATIC CHARACTERIZATION OF KNOWN ENERGY STORAGE DEVICES/CONCEPTS AND AN ANALYSIS OF ENERGY SYSTEMS EMPLOYING THESE DEVICES/CONCEPTS IN TRANSPORTATION, ELECTRIC UTILITY, INDUSTRIAL, AND RESIDENTIAL/COMMERCE

APPLICATIONS ARE PRESENTED. EACH ENERGY SYSTEM IS CHARACTERIZED IN TERMS OF ITS DESIGN AND OPERATING PARAMETERS, INCLUDING CONFIGURATION, PHYSICAL AND/OR CHEMICAL PROPERTIES, ENERGY SOURCES, METHOD OF OPERATION, EFFICIENCY, COSTS, AND LIFETIME, AS WELL AS ITS STATE OF DEVELOPMENT AND CRITICAL PROBLEMS. AN ANALYSIS OF ENERGY STORAGE APPLICATIONS IS BASED ON THE DESCRIBED CHARACTERIZATION EFFORT. MAJOR APPLICATION VARIABLES AFFECTING THE CHARACTERISTICS OF THE STORAGE SYSTEM ARE IDENTIFIED AND IT IS SHOWN HOW THEY VARY AS THE VALUES OF THE PARAMETERS FOR ENERGY GENERATION, CONVERSION, AND STORAGE ARE ALTERED. IN ADDITION, A BRIEF REVIEW AND PRELIMINARY ASSESSMENT IS MADE OF POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS WHICH COULD OCCUR AS RESULT OF THE IMPLEMENTATION OF ENERGY STORAGE SYSTEMS IN VARIOUS APPLICATION AREAS. THE REPORT INCLUDES A CONCISE DISPLAY AND COMPARISON OF STORAGE SYSTEM CHARACTERISTICS, A GENERAL OVERVIEW OF THE STUDY SCOPE, AND SUMMARY OF FINDINGS RELATED TO STORAGE SYSTEM IMPLEMATATION IMPACTS.

1977-0513 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X28-X33.

COST REDUCTIONS RELATED TO INITIAL BLADE COSTS AND MAINTENANCE HAVE BEEN DEMONSTRATED WITH THE COMPOSITE BEARINGLESS ROTOR (CBR) FOR HELICOPTER APPLICATIONS. THESE HAVE EVOLVED AS A RESULT OF THE CONSTRUCTION OF THE CBR ROTOR. ADDITIONAL SAVINGS RELATED TO WIND TURBINES ARE ASSOCIATED WITH THE CONTROLS REQUIRED TO OPTIMIZE PERFORMANCE. WORK WAS PERFORMED UNDER AN ERDA CONTRACT TO INVESTIGATE THE FEASIBILITY OF THE CBR FOR USE IN WIND TURBINES AND TO EXPLORE CONTROL CONCEPTS WHICH WOULD RESULT IN A FULLY SELF-REGULATING SYSTEM.

1977-0514 CLOUTIER G G
IMPACT OF NEW SOURCES OF ENERGY ON THE EQUILIBRIUM OF NATURAL RESOURCES.
R. SOC. CAN. TRANS. 15: 83-94, 1977. (IN FRENCH)

THE STATE OF THE ART OF WIND, SOLAR, AND FUSION POWER IS DESCRIBED. CONSTRAINTS ON THEIR USE ARE ANALYZED AS WELL AS THE IMPLICATIONS OF THEIR WIDESPREAD ADOPTION.

1977-0515 COLIN R
NEW ENERGIES IN TELECOMMUNICATIONS.
INTERNATIONAL CONFERENCE ON PHOTOVOLTAIC SOLAR ENERGY, LUXEMBOURG, SEPTEMBER 27-30, 1977. PROCEEDINGS. DORDRECHT, NETHERLANDS, REIDEL, 1977. P. 801-808. (IN FRENCH)

TESTS ON TWO TYPES OF APPLICATIONS ARE DESCRIBED WITH PERMANENT POWER BETWEEN ONE WATT AND SEVERAL HUNDRED WATTS. THE AEROSOLEC STATION IS DESIGNED TO SUPPLY RADIO-RELAYS IN REMOTE LOCATIONS. THIS PLANT IS MADE UP OF A SOLAR GENERATOR AND A WIND-DRIVEN GENERATOR CONNECTED IN PARALLEL, WHICH SHARE POWER PRODUCTION ACCORDING TO THE PREVAILING CONDITIONS AT THE SITE. A STORAGE BATTERY ENSURES CONTINUITY AND REGULARITY OF THE OUTPUT POWER. EMERGENCY CALL PILLARS INSTALLED ALONG MOTORWAYS ARE SUPPLIED FOR TWO YEARS BY CHEMICAL BATTERIES. WHERE THE PROCUREMENT OF THESE IS DIFFICULT AND EXPENSIVE, MORE PARTICULARLY IN DEVELOPING COUNTRIES, THE USE OF A SOLAR GENERATOR MAY BE A SATISFACTORY SOLUTION.

1977-0516 CONSIDINE D M
ENERGY TECHNOLOGY HANDBOOK.
NEW YORK, MCGRAW-HILL, INC., 1977. 1857 P.

THE HANDBOOK SETS FORTH THE FUNDAMENTAL AND BASIC DATA ON TODAY'S MAJOR ENERGY SOURCES, THE LATEST ENERGY CONVERSION PROCESSES, ENERGY TRANSPORTATION AND TRANSMISSION, AND THE MOST PROMISING TRENDS IN POWER TECHNOLOGY.

1977-0517 COROTIS R B
PROBABILITY MODELS OF WIND VELOCITY AND WIND POWER.
ADVANCES IN CIVIL ENGINEERING THOUGH ENGINEERING MECHANICS, ASCE ENGINEERING MECHANICS DIVISION, SPECIALTY CONFERENCE, RALEIGH, N.C., MAY 25, 1977. NEW YORK, ASCE, 1977. P. 55-58.

WIND STUDIES HAVE GENERALLY BEEN CONCERNED DIRECTLY WITH THE FORCE OF THE WIND. IN THIS RESEARCH THE RATE OF POTENTIAL WIND ENERGY TRANSFER, WHICH IS PROPORTIONAL TO THE CUBE OF THE VELOCITY, IS INVESTIGATED. WHILE FINE SCALE MEASUREMENTS IN BOTH TIME AND SPACE ARE NECESSARY FOR A DETAILED STUDY OF ENERGY TRANSFER, IT IS POSSIBLE TO CHARACTERIZE THE PROBABILITY DISTRIBUTION OF THE INSTANTANEOUS POWER THOUGH AN ANALYSIS OF THE CUBED VELOCITY READINGS OBTAINED DIRECTLY FROM HOURLY WEATHER BUREAU RECORDS. THE EMPHASIS IN THE STUDY HAS BEEN ON THE FULL RANGE OF OBSERVED VALUES, SINCE THE RATE OF POTENTIAL WIND ENERGY TRANSFER IS OF INTEREST FOR WIND ENERGY GENERATION AS WELL AS ACTIVE CONTROL OF STRUCTURES, EVALUATION OF OCCUPANCY COMFORT, AND HEAT TRANSFER FOR HEATING AND AIR CONDITIONING LOADS.

1977-0518 COTY U, VAUGHN L
IMPLEMENTATION ISSUES OF WIND ENERGY.
NEW OPTIONS IN ENERGY TECHNOLOGY, SAN FRANCISCO, CALIFORNIA, AUGUST 2-4, 1977. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 97-105.

THE EFFECT OF INITIAL PRODUCTION QUANTITY ON THE SELLING PRICE OF A TWO MEGAWATT WIND TURBINE GENERATOR IS DETERMINED. TO THIS IS ADDED THE EFFECT OF LOAN INTEREST RATES, TAXES, AND OTHER ANNUAL OPERATING EXPENSES. THE COST OF ELECTRICAL ENERGY GENERATED IS DETERMINED AND COMPARED TO THE COST OF FUEL FOR PRIVATE UTILITIES AND TO THE COST OF BUYING ENERGY WHOLESALE FOR PUBLIC UTILITIES. FROM THIS COMPARISON, THE INITIAL PRODUCTION QUANTITIES OF WIND TURBINE GENERATORS IS DETERMINED WHICH WOULD BRING COST OF WIND ENERGY DOWN TO A COMPETITIVE LEVEL. IT IS CONCLUDED THAT WITHOUT INCENTIVES, AND WITH WIND SITES HAVING 7 M/S ANNUAL AVERAGE WINDSPEED, THE INITIAL PRODUCTION QUANTITY IS 260 UNITS TO BRING THE COST OF WIND ENERGY DOWN TO THE PRESENT PRICE OF OIL (2.6/KW) FOR PRIVATE UTILITIES AND DOWN TO 1.5/KW FOR PUBLIC UTILITIES. FEDERAL POWER AGENCIES COULD MEET THE PRESENT COST OF OIL WITH ENERGY FROM WIND TURBINE GENERATORS WITH INITIAL PRODUCTION ORDER OF 40 UNITS.

1977-0519 COX K E
HYDROGEN FROM SOLAR ENERGY.
HYDROGEN: ITS TECHNOLOGY AND IMPLICATIONS. VOLUME I. HYDROGEN PRODUCTION TECHNOLOGY. CLEVELAND, OHIO, CRC PRESS, INC., 1977. P. 145-175.

TOPICS DISCUSSED INCLUDE OCEAN THERMAL ENERGY CONVERSION, POWER FROM WIND, BIOMASS, ARTIFICIAL SOLAR COLLECTION SCHEMES, METHODS OF SOLAR ENERGY CONVERSION TO HYDROGEN (WATER ELECTROLYSIS, PHOTOELECTROLYSIS, BIOPHOTOLYSIS, AND THERMOCHEMICAL DECOMPOSITION OF WATER), AND ECONOMICS OF HYDROGEN PRODUCTION FROM SOLAR ENERGY.

1977-0520 CROMACK D E
WIND FURNACE PROJECT.

NESEA '77: BETTER THEMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 427-432.

ONE OF THE MOST COST EFFECTIVE APPLICATIONS FOR WIND POWER IS THOUGHT TO BE FOR SPACE HEATING. A BRIEF DESCRIPTION IS PRESENTED FOR THE UMASS WIND FURNACE. THE DESIGN AND CONSTRUCTION ASPECTS ALONG WITH A DISCUSSION OF THE PRELIMINARY COMPONENT TESTS AND INITIAL OPERATIONAL EXPERIENCE ARE INCLUDED. THE WIND FURNACE WILL BE DEMONSTRATED UNDER FULLY AUTOMATIC OPERATION DURING THE 1977-1978 HEATING SEASON.

1977-0521 CURTO P, MILLER G
ENGINEERING COST ESTIMATES FOR SOLAR TECHNOLOGIES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 29, SESS. L-3. 5 P.

THE PAPER REPORTS ON A STUDY TO ESTIMATE ENGINEERING COSTS FOR EACH OF SEVERAL DESIGNS FOR SOLAR TECHNOLOGIES. THESE TECHNOLOGIES INCLUDE: WIND ENERGY CONVERSION SYSTEMS, SOLAR THERMAL ELECTRIC AND TOTAL ENERGY SYSTEMS, PHOTOVOLTAIC SYSTEMS, OCEAN THERMAL ENERGY CONVERSION SYSTEMS, BIOMASS-DERIVED FUELS AND ENERGY CONVERSION SYSTEMS, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT SYSTEMS, AND SOLAR HEATING AND COOLING OF BUILDING SYSTEMS. THESE DATA PROVIDE, IN A SINGLE SOURCE, THE MOST COMPLETE AND THE LATEST INFORMATION ON SOLAR TECHNOLOGY STATE-OF-THE-ART AND RESEARCH AND DEVELOPMENT RESULTS. THE APPLICATIONS FOR USE OF THIS DATA ARE WIDESPREAD, AND MAY INCLUDE MARKET PENETRATION STUDIES, REGIONAL AND NATIONAL IMPACTS, ENVIRONMENTAL ASSESSMENT, RESOURCE MANAGEMENT (MANPOWER, MATERIALS AND FINANCIAL), AND SCENARIO STUDIES.

1977-0522 DAMBOLENA I G, RIKKERS R F, KAMINSKY F C
COMPUTER MODEL FOR LARGE-SCALE OFFSHORE WIND-POWER SYSTEMS.
WIND ENG. 1(3): 163-168, 1977.

A COMPUTER-BASED PLANNING MODEL HAS BEEN DEVELOPED TO EVALUATE THE COST AND SIMULATE THE PERFORMANCE OF OFFSHORE WIND-POWER SYSTEMS. IN THESE SYSTEMS, THE ELECTRICITY PRODUCED BY WIND GENERATORS EITHER SATISFIES DIRECTLY DEMAND OR PRODUCES HYDROGEN BY WATER ELECTROLYSIS. THE HYDROGEN IS STORED AND LATER USED TO PRODUCE ELECTRICITY IN FUEL CELLS. USING AS INPUTS BASIC CHARACTERISTICS OF THE SYSTEM AND HISTORICAL OR COMPUTER-GENERATED TIME SERIES FOR WIND SPEED AND ELECTRICITY DEMAND, THE MODEL SIMULATES SYSTEM PERFORMANCE OVER TIME. A HISTORY OF THE ENERGY PRODUCED AND THE DISCOUNTED ANNUAL COST OF THE SYSTEM ARE USED TO EVALUATE ALTERNATIVES. THE OUTPUT ALSO CONTAINS THE INFORMATION WHICH IS USEFUL IN POINTING TOWARDS MORE FAVORABLE DESIGN ALTERNATIVES. USE OF THE MODEL TO ANALYZE A SPECIFIC WIND-POWER SYSTEM FOR NEW ENGLAND INDICATES THAT ELECTRIC ENERGY COULD PERHAPS BE GENERATED AT A COMPETITIVE COST.

1977-0523 DAVIDSON M, GRETHER D
EFFECTS OF SOLAR ENERGY CONVERSION ON CLIMATE.
CLIMATE AND SOLAR ENERGY CONVERSION. ACOUSTIC EMISSION MEETING, LONDON, UK, DECEMBER 20, 1976. LAXENBURG, AUSTRIA, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS, 1977. P. 91-108.

THE POSSIBLE CLIMATIC EFFECTS OF IMPLEMENTING SOLAR ENERGY TECHNOLOGY ARE CONSIDERED. MOST OF THE ANALYSIS IS QUALITATIVE IN NATURE OWING TO THE IMMENSE COMPLEXITY OF THE ATMOSPHERIC ECOSYSTEM. THE CLIMATOLOGICAL EFFECTS OF SOLAR THERMAL CONVERSION SYSTEM AND CENTRAL RECEIVER POWER PLANTS ARE CONSIDERED IN DETAIL.

1977-0524 DEMEO E A
OVERVIEW AND SUMMARY OF EPRI WIND ENERGY CONVERSION PROGRAM.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977. P. 19.1.
EPRI-ER-515-SR

1977-0525 DOERNER H
EXPERT OPINION ON WIND ENERGY CONVERSION SYSTEMS DESIGNED BY HERMANN HONNEF.
NTIS, DECEMBER 1977. 80 P.
BMFT-FB-T-77-35, N79-18456

THE PLANS BY HERMANN HONNEF FOR USING WIND POWER BY MEANS OF LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS WITH REGARD TO THE PROPOSED TECHNICAL DESIGN AND THEIR PRESENTLY EXPECTED COST-EFFECTIVENESS WERE ASSESSED. THE CONCLUSION THAT THE FINDINGS AND EXPERIENCE OF THE PAST FEW DECADES HAVE SHOWN THAT THIS TYPE OF WIND ENERGY CONVERSION SYSTEMS USING CONTRA-ROTATING, MULTI-BLADE TURBINES ARE NOT ECONOMICAL. THE COST-EFFECTIVENESS OF THIS TYPE WAS COMPARED UNFAVOURABLY WITH THE ADVANCED TYPE OF FREE-RUNNING, TWO-BLADED TURBINES. THE ASSERTION THAT WIND CONDITIONS AT ALTITUDES BETWEEN 200 AND 500 M WERE SUFFICIENTLY EXPLORED FOR THE PURPOSE OF WIND ENERGY FACILITIES, IS NOT VALID.

1977-0526 DORY B
LARGEST SOURCE OF MECHANICAL ENERGY.
ENERG. ATOMTECH. 30(12): 559-564, DECEMBER 1977. (IN HUNGARIAN)

THIS ARTICLE DISCUSSES WIND ENERGY AS A POWER SOURCE, AND SUGGESTS SOME QUESTIONS THAT NEED ANSWERS.

1977-0527 DOUGLAS J H
WIND ENERGY FROM THE YEN TORNADO.
SCI. NEWS 111(2): 31, JANUARY 8, 1977.

BY WHIPPING WIND INTO A CONTROLLED VORTEX INSIDE A LARGE TOWER, AT THE BOTTOM A VACUUM IS CREATED THAT INCREASES BY SEVERAL TIMES THE VELOCITY OF AIR DRIVING A TURBINE. SUCH A TURBINE COULD PRODUCE MORE ELECTRICITY THAN A SINGLE WINDMILL TYPE ENERGY CONVERTER COULD, AND WOULD APPEAR TO HAVE ADVANTAGES OVER CONVENTIONAL SYSTEMS. JAMES T. YEN OF THE GRUMMAN AEROSPACE CO. IS WORKING ON SUCH A PROJECT UNDER COMMISSION FROM ERDA.

1977-0528 DRAKE R L
METHODS FOR SITING SMALL WIND MACHINES.
NTIS, MAY 1977. 52 P.
CONF-770539-4, BNWL-SA-6297

THE QUESTION OF SITING WIND ENERGY CONVERSION SYSTEMS (WECS) REPRESENTS A BALANCE BETWEEN THE ECONOMIC, TECHNICAL AND SOCIAL VALUES OF THE USER AND THE LOCAL CITIZENS. THE TECHNICAL ISSUES ARE DISCUSSED. BEFORE ADDRESSING THE TECHNICAL SITING ISSUES, AS WELL AS THE SOCIAL AND ECONOMIC ONES, A DETERMINATION OF THE POTENTIAL USER, THE APPLICATION OF THE WECS, AND THE GEOGRAPHICAL LOCATION OF THE INSTALLATION MUST BE MADE.

ONCE THESE THREE DETERMINATIONS HAVE BEEN MADE, THE METEOROLOGICAL AND TOPOGRAPHICAL CHARACTERISTICS OF SPECIFIC CANDIDATE SITES MUST BE ASSESSED. SOME OF THE TOPOGRAPHICAL ISSUES DISCUSSED ARE THE EFFECTS OF SITING WECS NEAR BODIES OF WATER, NEAR OR IN TREES AND FORESTS, AROUND STRUCTURES AND BUILDINGS, AND IN HILLY TERRAIN; AND SOME OF THE METEOROLOGICAL FEATURES CONSIDERED ARE THE EFFECTS OF LOCAL WIND CIRCULATIONS, VELOCITY PROFILES, LOCAL TURBULENCE, AND HAZARDOUS WEATHER ELEMENTS.

1977-0529 DRAKE R L
SITE SELECTION TECHNIQUES AND METHODOLOGIES FOR WECS.
NTIS, AUGUST 1977. 13 P.
BNWL-SA-6457

THE QUESTION OF SITING A WIND ENERGY CONVERSION SYSTEM, OR SYSTEMS (WECS), REPRESENTS A BALANCE BETWEEN ECONOMIC AND TECHNICAL CRITERIA AND THE ENVIRONMENTAL AND SOCIAL VALUES OF THE USER AND THE LOCAL CITIZENS, WHETHER THE WECS IS FOR A SMALL FARM OR A UTILITY SERVING A MULTI-STATE REGION. THE TECHNICAL SITING ISSUES INCLUDE THE METEOROLOGICAL CHARACTERISTICS OF THE CANDIDATE SITE THAT CONTRIBUTE TO THE EFFICIENT AND SAFE PRODUCTION OF POWER BY WIND, THE POTENTIAL WEATHER HAZARDS OF THE SITE IN QUESTION, AND THE TERRAIN AND SEISMIC FEATURES OF THE SITE. THESE TECHNICAL ISSUES ARE HIGHLY RELATED TO THE SIZE AND TYPE OF THE PROPOSED WECS AND THE TYPE OF STORAGE SYSTEM (IF THERE IS ONE) REQUIRED FOR THE INSTALLATION. A GOOD SITING POLICY IS ONE THAT OPTIMIZES THE POWER OUTPUT BASED ON THE CONSTRAINTS IMPOSED BY THESE VARIOUS ISSUES.

1977-0530 DREES H M
CYCLOTURBINE AND ITS POTENTIAL.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 433-436.

PINSON ENERGY CORPORATION, A PRIVATELY FUNDED COMPANY, WAS FORMED TO DEVELOP AND PRODUCE THE CYCLOTURBINE, A WIND ENERGY CONVERTER. PINSON ENERGY HAS ITS OFFICES IN MARSTONS MILLS, MASSACHUSETTS, AND A TEST FACILITY AT NEW SEABURY, MASSACHUSETTS, BOTH ON WINDY CAPE COD. TESTING OF A PROTOTYPE CYCLOTURBINE WAS INITIATED EARLY IN 1976. THE TEST PROGRAM YIELDED VALUABLE DATA UTILIZED IN THE DESIGN OF AN IMPROVED SECOND PROTOTYPE. TESTING OF THIS SECOND MACHINE IS NEARING COMPLETION AND PRESENTLY FOUR PREPRODUCTION UNITS ARE BEING INSTALLED AS PART OF PINSON ENERGY CORPORATION'S FIELD TEST AND DEMONSTRATION PROGRAM. IT IS ANTICIPATED THAT PRODUCTION-RUN CYCLOTURBINES WILL BE AVAILABLE ON A LIMITED AND SELECTIVE BASIS IN MID 1978.

1977-0531 DUBEY M
HOW TO MAKE FERTILIZER FROM WIND, AIR, AND WATER.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1977. P. 62-67.

NITROGENOUS FERTILIZERS, SUCH AS AMMONIA AND AMMONIUM NITRATE, CAN BE MADE FROM WIND, AIR AND WATER. THESE THREE INGREDIENTS ARE ABUNDANT, REPLENISHABLE SOURCES OF ENERGY AND THE BASIC CHEMICAL FEEDSTOCKS FOR THE PROCESS. THE SYNTHESIS OF AMMONIA, AS WE MAKE IT TODAY, USES NATURAL GAS AS THE PRIMARY FEEDSTOCK. THE GROWING SHORTAGE OF NATURAL GAS HAS CAUSED MUCH CONCERN, FOR ITS FUTURE SUPPLY IS UNCERTAIN, AND THE RESULTING PRICE INCREASES FOR AMMONIA BASED FERTILIZERS ARE FORCING THE PRICES OF FOOD HIGHER AND HIGHER. THE WIND POWERED PROCESS SUGGESTED HERE IS AN ATTRACTIVE ALTERNATIVE.

1977-0532 DUNCAN C N
SOLAR AND WIND POWER-SOME METEOROLOGICAL ASPECTS.
WEATHER 32(12): 451-456, DECEMBER 1977.

THE EXCEPTIONAL WEATHER IN BRITAIN DURING SOME SUMMERS, COUPLED WITH THE RISING COST OF FUEL, HAS GENERATED AN INCREASING INTEREST IN THE USE OF SOLAR ENERGY FOR DOMESTIC HEATING. THE INTENTION OF THIS ARTICLE IS TO ILLUSTRATE SOME RELATED METEOROLOGICAL ASPECTS BY PRESENTING A SIMPLE FEASIBILITY STUDY. IT IS POSSIBLE TO ESTIMATE THE ENERGY WHICH CAN BE OBTAINED FROM THE SUN AND WIND BY USING READILY AVAILABLE METEOROLOGICAL OBSERVATIONS. ALL THAT IS REQUIRED IS A LARGE NUMBER OF WIND-SPEED AND SUNSHINE-DURATION OBSERVATIONS, ALTHOUGH CONTINUOUS ANEMOGRAPH AND SOLARIGRAPH RECORDS ARE PREFERABLE.

1977-0533 DUNHAM D C
ALTERNATIVE ENERGY SYSTEMS IN RURAL MAURITANIA.
NTIS, SEPTEMBER 1977. 67 P.
PB-296364

THIS REPORT CONTAINS BACKGROUND DATA AND RECOMMENDATIONS ON THE POTENTIAL OF SIMPLE DEMONSTRATION PROJECTS IN THE USE OF ALTERNATE ENERGY SOURCES IN MAURITANIA, WEST AFRICA. THE STUDY IS LIMITED TO THOSE ENERGY APPLICATIONS WHICH WOULD USE THE MATERIALS AND TECHNICAL SKILLS AVAILABLE IN THE AREA AT THIS TIME, I.E., SOLAR ENERGY, WIND ENERGY, AND WATER POWER.

1977-0534 ELDERKIN C E, RAMSDELL J V, TENNYSON G P
MEETING REVIEW. WIND CHARACTERISTICS WORKSHOP, 2-4 JUNE 1976, BOSTON, MASS.
AM. METEOROL. SOC. BULL. 58(1): 45-51, JANUARY 1977.

THIS WORKSHOP CONSISTED OF ERDA CONTRACTORS AND ATMOSPHERIC SCIENTISTS INVOLVED IN WIND CHARACTERISTICS RESEARCH TO EXCHANGE INFORMATION WITH THOSE RESPONSIBLE FOR DEVELOPMENT AND APPLICATION OF WECS. THREE GENERAL SUBJECT AREAS WERE CONSIDERED IN THE DISCUSSIONS. THESE WERE: THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND THE DESIGN OF LARGE-SCALE WECS; THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND LARGE SYSTEM APPLICATIONS; AND THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND SMALL CONVERSION SYSTEMS AND THEIR APPLICATIONS. THE DIVISION BETWEEN LARGE AND SMALL SYSTEMS WAS ARBITRARILY PLACED AT 100KW.

1977-0535 ELLIOTT D L
SYNTHESIS OF NATIONAL WIND ENERGY ASSESSMENTS.
NTIS, JULY 1977. 59 P.
BNWL/WIND-5

THE OBJECTIVE OF THIS STUDY IS TO PERFORM A SYNTHESIS OF EXISTING NATIONAL WIND ENERGY ASSESSMENTS TO DEVELOP AN IMPROVED CONSISTENT ASSESSMENT OF THE GEOGRAPHICAL DISTRIBUTION OF THE AVAILABLE WIND POWER OVER THE UNITED STATES. PREVIOUS NATIONAL WIND ENERGY ASSESSMENTS HAVE BEEN REVIEWED WITH RESPECT TO TECHNIQUES, ASSUMPTIONS, DATA SETS/SUMMARIES, AND INTERPOLATION SCHEMES USED. THE OVERALL REPRESENTATIVENESS OF THE RESOURCE MAPS PRODUCED HAS BEEN EVALUATED. DISCREPANCIES EXIST AMONG PREVIOUS ASSESSMENTS WITH REGARD TO GEOGRAPHICAL VARIATIONS AND THE ESTIMATED VALUES OF WIND POWER.

1977-0536 ENERGIE VOM WIND. (ENERGY FROM WIND).

MUENCHEN, DEUTCHE GESELLSCHAFT FUR SONNENENERGIE E.V., 1977. 379 P. (IN GERMAN AND ENGLISH)
ENERGIE VOM WIND, CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. (4TH MEETING OF THE GERMAN SOCIETY FOR SOLAR ENERGY).

INFORMATION IS PRESENTED FROM VARIOUS EUROPEAN COUNTRIES CONCERNING WIND POWER AVAILABILITY; WIND TURBINE DESIGN AND PERFORMANCE TESTING; AND FEASIBILITY OF LARGE WIND POWER PLANTS.

1977-0537 L'ENERGIE ET LE DEVELOPPEMENT RURAL: RESSOURCES RENOUVELABLES ET OPTIONS TECHNIQUES POUR LES PAYS EN DEVELOPPEMENT (ENERGY FOR RURAL DEVELOPMENT: RENEWABLE RESOURCES AND ALTERNATIVE TECHNOLOGIES FOR DEVELOPING COUNTRIES).
NTIS, 1977. 331 P. (IN FRENCH)
PB-286457

THIS REPORT PROVIDES A SUMMARY OF THE STATE OF THE ART OF ALTERNATIVE (APPROPRIATE OR SOFT) TECHNOLOGIES FREQUENTLY SUGGESTED AS SOLUTIONS TO RURAL OR INDIVIDUAL-FAMILY ENERGY NEEDS. MOREOVER, IT INFORMS BOTH THE TECHNOLOGIST AND THE PLANNER WHERE TO GO FOR MORE DETAILED INFORMATION AND WHAT KINDS OF RESEARCH AND DEVELOPMENT ARE NEEDED BEFORE A PARTICULAR DEVICE OR PROCESS IS READY FOR USE. THUS, IT SHOULD BE OF CONSIDERABLE ASSISTANCE IN EVALUATING THE POTENTIAL OF EACH ENERGY SOURCE IN EACH CANDIDATE SITUATION. THIS IS THE FRENCH EDITION OF THE ORIGINAL REPORT WHICH WAS PRINTED IN 1976.

1977-0538 ENERGY CONSERVATION RESOURCES FOR EDUCATION.
COLLEGE STATION, TEXAS, TEXAS A AND M UNIVERSITY, 1977. 431 P.

THIS INFORMATION WAS DESIGNED FOR USE AT THE JUNIOR HIGH AND MIDDLE SCHOOL EDUCATION LEVELS. THE MATERIAL AND ACTIVITIES HAVE BEEN FIELD TESTED IN AND ARE APPROPRIATE FOR INDUSTRIAL ARTS OR FOR SCIENCE CLASSES. SUBJECTS COVERED ARE ENERGY SOURCES, PRODUCTION, CONSERVATION, AND ALTERNATIVE ENERGY SOURCES.

1977-0539 ENERGY DEVELOPMENT CENTER: A CONCEPT FOR ORDERLY ENERGY DEVELOPMENT AND COMMUNITY GROWTH.
WASHINGTON, D.C., SYSTEMS CONSULTANTS, INC., 1977. 10 P.

CONCEIVED AND PREPARED BY SYSTEMS CONSULTANTS, INC., THIS REPORT SPECIFIES THE NEED FOR A SERIES OF ENERGY DEVELOPMENT CENTERS OR COMMUNITIES TO BE LOCATED IN AREAS OF THE UNITED STATES THAT ARE NOW OR WILL SOON UNDERGO RAPID GROWTH AS DOMESTIC ENERGY RESOURCES, IN PARTICULAR COAL, AS WELL AS SOLAR, GEOTHERMAL, AND WIND POWER ARE DEVELOPED. THE CONCEPT PRESENTS A RATIONAL ALTERNATIVE TO THE RAPID AND UNPLANNED GROWTH THAT IS TAKING PLACE AROUND SUCH SMALL ENERGY-ORIENTED TOWNS AS GILLETTE, WYOMING; PAGE, ARIZONA; AND PORT VALDEZ, ALASKA. THIS CONCEPT FOR AN ENERGY DEVELOPMENT CENTER IS DIRECTED AT THE CRITICAL ISSUES OF CONSERVATION, SUPPLY DEVELOPMENT, ENVIRONMENT AND INTERGOVERNMENTAL RELATIONS, AS SPECIFIED IN THE PUBLIC NOTICE FROM THE PRESIDENT'S ENERGY POLICY PLANNING OFFICE.

1977-0540 ENERGY FACTS. A REPORT TO THE IDAHO STATE LEGISLATURE.
NTIS, JANUARY 18, 1977. 94 P.
PB-291839

THIS REPORT IS THE FIRST ATTEMPT TO COLLECT AND SUMMARIZE IDAHO ENERGY DATA ON A STATEWIDE BASIS. THE ACCUMULATION OF THIS DATA IS AN IMPORTANT INITIAL REQUIREMENT FOR THE DEVELOPMENT OF A SOUND STATE ENERGY POLICY THAT CAN ASSURE STABLE ENERGY SUPPLIES FOR THE NEAR AND DISTANT FUTURE.

1977-0541 ENERGY IN MINNESOTA. ENERGY TECHNOLOGY INFORMATION FOR DECISION MAKERS.
NTIS, AUGUST 1977. 430 P.
ENERGY IN MINNESOTA. ENERGY TECHNOLOGY INFORMATION FOR DECISION MAKERS, NORTHFIELD, MINNESOTA, AUGUST 14-16, 1977.
PB-299277

THE ENERGY WORKSHOP WAS PLANNED TO PROVIDE INFORMATION ON THE TECHNICAL RAMIFICATIONS OF THE ENERGY DECISIONS WHICH MUST BE MADE NOW AND IN THE FUTURE. THE WORKSHOP WAS DIVIDED INTO THE FOLLOWING THREE DISCUSSION SECTIONS: (1) MAKING AND MOVING ENERGY, HOW ENERGY IS USED AND WASTED, AND ALTERNATIVE ENERGY SOURCES; (2) APPLICATIONS IN MAKING AND MOVING ENERGY, INCLUDING NUCLEAR, COAL, WASTE HEAT, TRANSMISSION LINES, EFFICIENCY OF CARS AND TRUCKS, HEATING HOMES, AND ENERGY PRICING OPTIONS; AND (3) ALTERNATE ENERGY SOURCES INCLUDING SOLAR AND WIND, BIOMASS, FERMENTATION AND AGRICULTURAL SOURCES, PEAT AND WOOD, COAL GASIFICATION, APPROPRIATE TECHNOLOGY, HEAT PUMPS, AND FUSION. FOLLOWING THESE BASIC DISCUSSION SECTIONS, A PANEL DISCUSSED SEVERAL ASPECTS OF THE MINNESOTA ENERGY PICTURE.

1977-0542 ENERGY: RESEARCH, DEVELOPMENT, AND DEMONSTRATION. PROGRAMME OF THE IEA.
PARIS, FRANCE, ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, 1977. 24 P.

THE OBJECTIVES OF THE IEA'S ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACTIVITIES ARE TO DEVELOP A STRATEGY FOR ENERGY R AND D, FOSTER EFFECTIVE NATIONAL PROGRAMS OF ENERGY R AND D, AND UNDERTAKE COOPERATIVE ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS IN HIGH-PRIORITY AREAS. THE WORKING PARTY (DESIGNATED TO DEVELOP R AND D COOPERATION) IS COMPOSED OF 14 WORKING BODIES. THEY DEAL WITH ENERGY CONSERVATION TECHNOLOGY; COAL TECHNOLOGY; SAFETY, RADIOACTIVE WASTES, AND HIGH-TEMPERATURE REACTORS FOR PROCESS HEAT (NUCLEAR POWER); GEOTHERMAL ENERGY; HEATING AND COOLING OF BUILDINGS AND ELECTRIC POWER GENERATION (SOLAR ENERGY); BIOMASS CONVERSION; OCEAN ENERGY SYSTEMS; WIND POWER; FUSION POWER; AND HYDROGEN PRODUCTION FROM WATER.

1977-0543 ENERGY STATISTICS: NORTH AMERICAN AND WORLD SOURCES.
ARLINGTON, VIRGINIA, AMERICAN GAS ASSOCIATION, 1977.

THIS REFERENCE TOOL HAS BEEN COMPILED TO SERVE AS A STARTING POINT FOR LOCATING STATISTICAL DATA IN THE ENERGY FIELD. THE SOURCES INDEXED REPRESENT A DEFINED BODY OF THE ENERGY STATISTICAL INFORMATION SOURCES AVAILABLE. SECTION I CONSISTS OF A LIST OF THE STATISTICAL SOURCES INDEXED. SECTION II CONTAINS THE INDEXED STATISTICAL DATA FOR EACH ENERGY SOURCE. WIND ENERGY IS ONE OF THE MANY SOURCES INCLUDED.

1977-0544 ENGSTROM S
STORA VINDKRAFTVERK KAN PRODUCERA BILLIG ELENERGI. (LARGE WIND POWER PLANTS CAN GENERATE CHEAP POWER).
TEK. TIDSKR. 107(15): 17-19, 1977. (IN SWEDISH)

THE ARTICLE PRESENTS RESULTS OF AN EXTENSIVE STUDY OF THE POSSIBILITIES OF INDUSTRIAL UTILIZATION OF WIND POWER IN SWEDEN. TOPICS COVER OPTIMUM SELECTION OF WIND POWER PLANT SITES, HEIGHT OF POWER PLANT TOWERS AND THEIR LOCATION, AND THE DESIGN AND OPERATION OF A LARGE HORIZONTAL-SHAFT WIND TURBINE.

1977-0545 ESBENSEN T V, STRABO F
DESIGN OF A LOW-ENERGY HOUSE IN DENMARK HEATED BY A COMBINATION OF SOLAR AND WIND ENERGY.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 437-447.

THE PAPER DESCRIBES THE PROJECT FOR A LOW-ENERGY HOUSE CONSTRUCTED IN SKIVE, JUTLAND IN DENMARK. WITH ENERGY CONSERVATION ARRANGEMENTS SUCH AS HIGH-INSULATED CONSTRUCTIONS, MOBILE INSULATION OF THE WINDOWS AND HEAT RECOVERY IN THE VENTILATING SYSTEM, THE HEAT REQUIREMENT FOR SPACE HEATING IS CALCULATED TO 6,000 KWH PER YEAR. THE ENERGY SYSTEM CONSISTS OF A 13 M2 FLAT-PLATE SOLAR COLLECTOR INTEGRATED INTO THE ROOF CONSTRUCTION, A WIND ROTOR WITH A COATED AREA OF 25 M2 AND A WATER STORAGE TANK WITH A CAPACITY OF 4 M3. THE STORAGE TANK IS PROVIDED WITH A WATER BRAKE DRIVEN BY THE WIND ROTOR. THIS ENERGY SYSTEM SUPPLIES THE HOUSE WITH 7,200 KWH, WHICH IS 67% OF THE TOTAL HEAT REQUIREMENT FOR SPACE HEATING AND HOT WATER SUPPLY.

1977-0546 FEDERAL WIND ENERGY PROGRAM.
NTIS, JANUARY 1, 1977. 56 P.
ERDA-77-32

TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION, AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS IS THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM, MANAGED BY THE WIND SYSTEMS BRANCH (WSB) OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DIVISION OF SOLAR ENERGY. THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 76 ARE OUTLINED. THE PROGRAM'S GENERAL ORGANIZATION AND THE PROGRAM ELEMENTS WHICH MAKE IT WORK ARE ALSO OUTLINED.

1977-0547 FIESTER K
ENERGY WAR IS GENERATING JOBS.
WORKLIFE 2(10): 14-20, OCTOBER 1977.

THE FACT THAT A PERMANENT RETURN FROM AN ENERGY-INTENSIVE TO A LABOR-INTENSIVE SOCIETY WILL CREATE MANY NEW JOBS HAS BEEN OVERSHADOWED BY FEARS OF SACRIFICE AND DISCOMFORT. ALTHOUGH THE FIRST VISIBLE JOBS TO BE CREATED BY CONSERVATION PROGRAMS WERE FOR LOW-SKILL SHORT-TERM WEATHERIZATION, MUCH OF THIS WORK WAS ALSO DONE BY HOMEOWNERS. LONG-TERM EMPLOYMENT OPPORTUNITIES WILL DEVELOP FROM SOLAR ENERGY AND WIND SYSTEM PROJECTS, INCREASED COAL PRODUCTION, AND NEW RAIL SERVICE. EACH OF THESE WILL INVOLVE PUBLIC AND PRIVATE INVESTMENT THAT WILL EFFECTIVELY REDUCE UNEMPLOYMENT TO A MINIMAL LEVEL WHILE IMPROVING THE ENVIRONMENT. PROJECTIONS AND ILLUSTRATIONS OF THE IMPACT OF EXISTING AND PLANNED PROGRAMS ARE GIVEN TO SHOW HOW CONSERVATION GOALS CAN BE MET AND PERMANENT SKILLED JOBS CAN BE CREATED.

1977-0548 FLATT R
SPEED POLAR OF A WIND TURBINE POWERED CARGO BOAT.
WIND ENG. 1(3): 218-230, 1977.

THE FEASIBILITY OF WIND TURBINE PROPULSION, DISCOVERED MORE THAN HALF A CENTURY AGO, HAS REGAINED SOME INTEREST DUE TO THE PRESENT ENERGY CRISIS. A SOUND PREREQUISITE CONCERNING THE CONSTRUCTIVE AND ECONOMIC ASPECTS OF SUCH AN ENDEAVOR LIES IN THE ASSESSMENT OF ITS DYNAMICAL POTENTIALITY. THIS PAPER DESCRIBES A SIMPLE ANALYSIS FOR THE SPEED POLAR OF SUCH A BOAT. APPLIED TO A 45,000 TON CARGO BOAT, THE CALCULATION RESULTS IN A NEARLY CIRCULAR POLAR, THE AVERAGE SPEED OF WHICH IS ABOUT 4 M/S (APPROX. 8 KNOTS) FOR AN ASSUMED TRUE WIND SPEED OF 10 M/S (APPROX. 20 KNOTS).

1977-0549 FRANK A
SMALL WIND-ENERGY-CONVERSION SYSTEMS.
SOL. AGE 2(12): 28-29, DECEMBER 1977.

THOUGH THE FEDERAL GOVERNMENT IS UNWILLING TO INVEST IN SMALL-SCALE WIND-ENERGY-CONVERSION SYSTEMS, STUDIES BY THE MITRE CORP. INDICATE THAT THE SYSTEMS ARE HIGHLY ECONOMICAL FOR ELECTRICITY GENERATION AND FOR SPACE HEATING. APPLICATION OF SUCH SYSTEMS COULD SAVE AS MUCH AS 1.4 MILLION BPD OF OIL. IN CERTAIN INSTANCES, WIND-ENERGY-CONVERSION SYSTEMS CAN BE MORE ECONOMICAL THAN SOLAR ENERGY. IF SUCH SYSTEMS ARE TO BECOME A REALITY, HOWEVER, THE FEDERAL GOVERNMENT MUST PLAY THE KEY ROLE.

1977-0550 FULLER G A
WIND ENERGY CONVERSION SYSTEMS.
SOLAR ENERGY UPDATE '77: CANADA. CONFERENCE OF THE SOLAR ENERGY SOCIETY OF CANADA, 3D, EDMONTON, ALBERTA, AUGUST 22, 1977. EDMONTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. 2 P., PAP. 44.

THIS PAPER PRESENTS AN OVERVIEW OF WIND ENERGY CONVERSION. BASIC PRINCIPLES OF WIND ENERGY CONVERSION FOR VARIOUS TYPES OF SYSTEMS ARE DISCUSSED WITH SPECIAL EMPHASIS GIVEN TO DARRIEUS VERTICAL AXIS TURBINES SIMILAR TO THOSE WHICH WERE TESTED BY THE NATIONAL RESEARCH COUNCIL OF CANADA. METHODS OF ENERGY STORAGE ARE DISCUSSED ALONG WITH THE ECONOMICS AND POSSIBLE FUTURE TYPES OF WIND ENERGY CONVERSION SYSTEMS.

1977-0551 GADSBY G N
SYSTEMS DESCRIPTIONS AND ENGINEERING COSTS FOR SOLAR-RELATED TECHNOLOGIES. APPENDIX TO VOLUME I. EXPERIENCE CURVES AND COST TRENDS: A PRELIMINARY CONSIDERATION OF SOME FACTORS LIKELY TO INFLUENCE CAPITAL COSTS IN SELECTED SOLAR ENERGY SYSTEMS.
NTIS, JUNE 1977. 130 P.
MTR-7485(APP.)(VOL.1)

THIS APPENDIX TO MITRE/METREK REPORT MTR-7485 PRESENTS THE FINDINGS OF A LIMITED STUDY OF EXPERIENCE CURVE AND COST TREND HISTORIES WITHIN A WIDE RANGE OF COMMODITIES RELEVANT TO PROJECTED SOLAR ENERGY SYSTEM CONCEPTS. TWO FORMS OF DATA PRESENTATION ARE USED: (1) EXPERIENCE CURVES DERIVED FROM PRODUCTION VOLUME AND UNIT COST INPUTS AND (2) COST TREND CURVES WHERE DATA ON ACCUMULATED PRODUCTION VOLUMES ARE READILY AVAILABLE.

1977-0552 GALANIS N
PRODUCTION OF ELECTRICITY FROM THE WIND: A PRELIMINARY FEASIBILITY STUDY FOR GREECE.
WIND ENG. 1(4): 241-249, 1977.

WIND STATISTICS FOR GREECE SHOW THAT THE CONDITIONS PREVAILING ON THE AEGEAN ISLANDS--I.E. CONSIDERABLE AMOUNTS OF WIND ENERGY, SMALL ELECTRICAL LOADS AND HIGH GENERATION COSTS--ARE ESPECIALLY FAVORABLE FOR THE INSTALLATION OF WIND TURBINE GENERATORS (WTGS). THIS STUDY GIVES PRELIMINARY DESIGN PARAMETERS FOR WTGS AT SIX LOCATIONS AND EVALUATES THEIR PERFORMANCE. THE DURATION OF OPERATION VARIES FROM 5000 TO 7400 HOURS ANNUALLY AND THE SPECIFIC PRODUCTION IS BETWEEN 2300 AND 3600 KWH/KW. THE INSTALLATION OF THE WTGS WOULD RESULT IN DIESEL FUEL SAVINGS CORRESPONDING TO A MONTH'S CONSUMPTION. FINALLY, THE COST OF WIND GENERATED ELECTRICITY WILL BE LOWER THAN THAT FROM DIESEL ENGINES ONE TO THREE YEARS AFTER THE INSTALLATION OF THE WTGS.

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1977-0550 FULLER G A
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SOLAR ENERGY UPDATE '77: CANADA. CONFERENCE OF THE SOLAR ENERGY SOCIETY OF CANADA, 3D, EDMONTON, ALBERTA, AUGUST 22, 1977. EDMONTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. 2 P., PAP. 44.

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1977-0553 GARSTANG M, ASPLIDEN C, PIELKE R
COASTAL ZONE WIND ENERGY. SEMI-ANNUAL PROGRESS REPORT, 15 DECEMBER 1976--15 MARCH 1977.
NTIS, APRIL 11, 1977. 8 P.
RLO-2344-4

WORK ON THE CONTRACT DURING THE FIRST HALF YEAR HAS FOLLOWED THE SUBDIVISION OF: CLIMATOLOGICAL STUDY; AND MODELLING. IN BOTH AREAS THE WORK HAS CONCENTRATED UPON ESTABLISHMENT OF A RATIONAL FRAMEWORK AND THE ACQUISITION OF THE NECESSARY DATA TO TEST HYPOTHESES USED IN ESTABLISHING THE FRAMEWORK. THUS TANGIBLE RESULTS ARE ONLY IN THE FORM OF RECENTLY ACQUIRED DATA AND METHODOLOGY WHICH WILL EMPLOY THESE DATA. RESULTS FROM THESE EFFORTS WILL BEGIN TO ACCRUE DURING THE THIRD QUARTER.

1977-0554 GOODRICH R W
SOME EFFECTS OF WIND ENERGY CONVERSION SYSTEMS ON ELECTRIC DISTRIBUTION SYSTEM.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 367-370.

AN OVERVIEW IS PRESENTED OF HOW EACH TYPE OF WIND ENERGY CONVERSION SYSTEM ELECTRIC GENERATOR AFFECTS THE SAFETY AND QUALITY OF SERVICE OF ELECTRIC UTILITIES.

1977-0555 GOSLICH H D
LOW-COST CONCEPT FOR THE ENERGY SUPPLY FROM THE WIND.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 425-436.

AFTER A NUMBER OF YEARS OF PRACTICAL EXPERIENCE WITH WINDMILLS (TWO-ROTOR KW AT SYLT; 11KW, 10 METER DIAMETER AND ALSO SMALLER PLANTS AT HAMBURG) TWO-BLADE, HIGH R.P.M. PLANTS WERE DESIGNED WITH THE ROTOR ON THE LEE SIDE OF THE TOWER, BOTH IN ORDER TO SINK SIGNIFICANTLY THE CONSTRUCTION AND MAINTENANCE COST AND TO INCREASE THE LIFE OF THE WINDMILL. THE ROTOR BLADES ARE JOINTED AT THE HUB AND ROTATE ON A "SPHERICAL RADIUS" DURING PERIODS OF HIGH WIND VELOCITY. FULL POWER IS PRODUCED DURING STORMY PERIODS. A CONCEPT OF LARGE SCALE POWER GENERATION, ALONG WITH COST COMPARISONS, WILL BE DESCRIBED.

1977-0556 GOTTLIEB R, TENENBOM B
SOLAR GREENHOUSE EXPERIENCE AT THE INSTITUTE FOR SOCIAL ECOLOGY.
CONFERENCE ON ENERGY-CONSERVING SOLAR HEATED GREENHOUSES, MARLBORO, VERMONT, NOVEMBER 19, 1977. MARLBORO, VERMONT, MARLBORO COLLEGE, 1977. P. 229-236.

EXPERIENCE WITH THE HYBRID SOLAR HEATED WINDPOWERED AQUACULTURE GREENHOUSE COMPLEX IS DESCRIBED. THE DESIGN AND PREDICTED PERFORMANCE OF A PASSIVE SOLAR GREENHOUSE NEARING COMPLETION ARE PRESENTED.

1977-0557 GREENWALD M L
ALTERNATE ENERGY AS A CURRICULUM BASE FOR TEACHING INDUSTRIAL ARTS ON THE SECONDARY-POST SECONDARY LEVEL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 609-610.

1977-0558 GROSSMAN W C
ENERGY CONVERSION SYSTEM USING WINDMILL.
U.S. PATENT NO. 4,055,950, NOVEMBER 1, 1977. 6 P.

A SYSTEM IS DESCRIBED FOR RECOVERING THE ENERGY FROM ATMOSPHERIC WIND WHEREIN A WINDMILL OPERATES A COMPRESSOR FOR COMPRESSING AIR WHICH IS STORED IN ONE OR MORE TANKS. THE COMPRESSED AIR IS USED TO DRIVE A PRIME MOVER COUPLED BY GEAR MEANS TO AN ELECTRICAL GENERATOR OR OTHER WORK-PRODUCING APPARATUS. THE PRIME MOVER IS OPERATED BY HYDRAULIC FLUID RESPONSIVE TO THE APPLICATION OF THE COMPRESSED AIR TO FLUID TANKS BY VALVE MEANS RESPONSIVE TO THE OPERATION OF THE PRIME MOVER. THE COMPRESSOR HAS A UNIQUE MEANS FOR LUBRICATING THE SAME. ALTERNATELY, THE PRIME MOVER CAN BE OPERATED BY CONVENTIONAL WATER PRESSURE DURING PERIODS OF LITTLE OR NO WIND.

1977-0559 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1977. 189 P.
NTIS/PS-77/0882/9ST

1977-0560 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1977. 187 P.
NTIS/PS-77/0883/7ST

1977-0561 HAGEN H
VACATION HOMES NEAR THE SEA WITH SOLAR AND WIND ENERGY UTILIZATION.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 449-458.

THE GOAL OF THIS STUDY WAS TO CONSIDER THE UTILIZATION OF A COMBINATION OF SOLAR AND WIND ENERGY FOR VACATION HOMES, IN ORDER TO ACHIEVE ENERGY AUTONOMY AND YET TO PROVIDE A MINIMUM ROOM TEMPERATURE LEVEL, WITH 100% OF THE HEATING LOADS FOR SHORT TIME PERIODS BEING SUPPLIED EVEN IN THE WINTER. THIS WOULD INCREASE THE VALUE OF THESE HOMES. A MAIN CONSIDERATION HERE WAS TO DEVELOP AN ADEQUATE ARCHITECTURE ASSOCIATED WITH SOLAR AND WIND ENERGY UTILIZATION.

1977-0562 HALEY D
OPERATION BOOTSTRAP: RENEWABLE AND EFFICIENT ENERGY FOR NEW YORK STATE.
NTIS, 1977. 110 P.
NP-23796

OPERATION BOOTSTRAP IS A SELF-HELP PROGRAM DESIGNED TO MAKE SURE THAT THE VAST SUMS SPENT ON ENERGY IN NEW YORK STATE ARE SPENT TO THE EXTENT SENSIBLE AND POSSIBLE WITHIN NEW YORK, CREATING JOBS AND STIMULATING BUSINESS. THE THEME OF THE REPORT IS HOW MUCH CAN BE ACCOMPLISHED AND HOW QUICKLY BY CONSERVATION AND RENEWABLE ENERGY SYSTEMS APPLICABLE TO NEW YORK. WIND POWER IS INCLUDED IN THE DISCUSSION.

1977-0563 HAWAII NATURAL ENERGY INSTITUTE ANNUAL REPORT, 1977.
HONOLULU, HAWAII, UNIVERSITY OF HAWAII, 1977. 40 P.

THIS REPORT DESCRIBES THE ACTIVITIES OF HNEI FOR 1977. THE SEED PROJECTS SUPPORTED BY HNEI AND THE ONGOING PROJECTS IN WHICH HNEI HAS PARTICIPATED ARE DISCUSSED IN THE FIVE SECTIONS: GEOTHERMAL ENERGY, BIOCONVERSION AND SOLID WASTE, OCEAN THERMAL ENERGY CONVERSION, DIRECT SOLAR RADIATION, AND WIND ENERGY. EACH SECTION FIRST PRESENTS AN OVERVIEW OF AN ENERGY PROGRAM AREA OF INTEREST AND IMPORTANCE TO HAWAII, FOLLOWED BY SHORT NARRATIVES OF INDIVIDUAL RESEARCH PROJECTS, IDENTIFYING FOR EACH THE NATURE OF THE PROBLEM, THE METHODS EMPLOYED, AND THE RESULTS OBTAINED.

1977-0564 HERWIG L O
REVIEW OF OVERSEAS SOLAR TECHNOLOGIES RELATIVE TO INTERNATIONAL COOPERATION.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 26-38, P. 30.6-30.11.

A BRIEF REVIEW IS PRESENTED OF THE OVERSEAS INTERESTS AND ACTIVITIES IN SOLAR TECHNOLOGY AND COOPERATIVE PROGRAMS AND OF THE INCREASING COOPERATIVE RELATIONSHIPS BETWEEN THE U.S. AND VARIOUS OTHER COUNTRIES. A MORE DETAILED REVIEW OF OVERSEAS INTERESTS AND COOPERATION IN SMALL SOLAR THERMAL POWER SYSTEMS IS PRESENTED TO ILLUSTRATE THE BROADENING INTEREST IN SOME TECHNOLOGIES. IN PARTICULAR, TECHNOLOGIES AS DEVELOPING IN JAPAN, THE U.S.S.R., FRANCE, GERMANY AND OTHER COUNTRIES ARE SUMMARIZED. THOSE TECHNOLOGIES WITH GREATEST INTERNATIONAL INTEREST INCLUDE WATER AND AIR HEATING FOR VARIED USES: HEATING AND COOLING OF SPACE FOR RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL USE; PUMPING OF WATER FOR GENERAL USES AND FOR IRRIGATION; AND PRODUCTION OF ELECTRICITY BY SMALLER POWER SYSTEMS INCLUDING SOLAR THERMAL, PHOTOVOLTAIC, AND WIND SYSTEMS.

1977-0565 HOULT C P
ANEMONITOR: A NEW INSTRUMENT FOR WIND POWER SITE SELECTION.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1977. P. 51-61.

FOR WIND POWER TO BE ECONOMICALLY FEASIBLE, IT WILL BE NECESSARY TO PUT WIND ENERGY CONVERSION SYSTEMS (WECS'S) IN VERY WINDY PLACES. THIS PAPER DISCUSSES THE SITE SELECTION PROCESS FOR WECS'S, IN GENERAL, AND DESCRIBES A UNIQUE INSTRUMENT, THE ANEMONITOR, WHICH MEASURES THE WIND POWER AVAILABLE AT A SPECIFIC SITE. STUDIES OF THE DURATION OF ANEMONITOR MEASUREMENT, AND OF THE USE OF THE ANEMONITOR TO FIND OPTIMUM SITES FOR WEC'S ARE ALSO REPORTED.

1977-0566 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, JUNE 1977. 128 P.
NTIS/PS-77/0520

1977-0567 HWANG H H, GILBERT L J
SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
NTIS, 1977. 16 P.
DOE/NASA/1004-77/12, NASA-TM-X-73613, CONF-770384-1

THE SYNCHRONIZING OF A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORGUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS.

1977-0568 HWANG H H, GILBERT L J
DIGITAL SIMULATION OF SYNCHRONIZING THE ERDA-NASA 100 KW WIND TURBINE GENERATOR AGAINST AN INFINITE BUS.
PICA '77. IEEE POWER IND. COMPUT. APPL. CONF., 10TH, TORONTO, MAY 24-27, 1977. PROCEEDINGS. NEW YORK, IEEE, 77CH1131-2-PWR, 1977. P. 326-333.

THE PROBLEM OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS.

1977-0569 HWANG H H, GILBERT L J
SYNCHRONIZATION OF WIND TURBINE GENERATORS AGAINST AN INFINITE BUS UNDER GUSTING WIND CONDITIONS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, MEXICO CITY, JULY 17-22, 1977. PREPRINT. NEW YORK, IEEE, PAPER F 77 675-2, 1977. 9 P.

SYNCHRONIZATION IS THE PROCESS OF MATCHING THE WIND TURBINE'S SYNCHRONOUS ALTERNATOR OUTPUT WITH THE ELECTRIC UTILITY IN FREQUENCY, PHASE, AND VOLTAGE WITHOUT SEVERE TRANSIENTS. STUDIES OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS ARE PERFORMED ON A DIGITAL COMPUTER. IN DIGITAL SIMULATION, WIND GUSTS OF DIFFERENT MAGNITUDES AND DURATIONS ARE HYPOTHESIZED.

1977-0570 HWANG H H, GILBERT L J
RANDOM SYNCHRONIZATION OF THE ERDA--NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
1977 CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION. CONTROL OF POWER SYSTEMS CONFERENCE AND EXHIBITION, COLLEGE STATION, TEXAS, MARCH 14, 1977. N.Y., INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, 1977. P. 26-30.

THE PROBLEM OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS. EXPERIMENTS HAVE BEEN RECENTLY PERFORMED ON THE ERDA-NASA 100 KW WIND TURBINE. EXPERIMENTAL RESULTS MATCHED COMPUTER STUDY RESULTS VERY CLOSELY AND CONFIRMED THAT THE RANDOM SYNCHRONIZATION CAN BE ACCOMPLISHED BY MEANS OF THE EXISTING SPEED CONTROL SYSTEM AND THE AUTOMATIC SYNCHRONIZER.

1977-0571 HWANG H H, GUO T, MOZEICO H V
TECHNIQUES FOR STABILIZING WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 29 - FEBRUARY 3, 1978. PREPRINT. NEW YORK, IEEE, PAPER A 78 280-0, 1977. 7 P.

THIS STUDY PRESENTS AN ANALYTICAL REPRESENTATION OF A WIND TURBINE GENERATOR WHICH EMPLOYS BLADE PITCH ANGLE FEEDBACK CONTROL. A MATHEMATICAL MODEL IS FORMULATED. WITH THE FUNCTIONING MOD-0 WIND TURBINE (ERDA-NASA 100 KW UNIT) SERVING AS A PRACTICAL CASE STUDY, RESULTS OF A COMPUTER SIMULATION OF THE MODEL AS APPLIED TO THE

PROBLEM OF DYNAMIC STABILITY AT RATED LOAD IS PRESENTED. THE EFFECT OF THE TOWER SHADOW IS INCLUDED IN THE INPUT TO THE SYSTEM. DIFFERENT CONFIGURATIONS OF THE DRIVE TRAIN, AND OPTIMAL VALUES OF THE TIE LINE ARE USED IN THE SIMULATIONS. COMPUTER RESULTS REVEAL THAT A STATIC EXCITATION CONTROL SYSTEM COUPLED WITH OPTIMAL VALUES OF THE TIME LINE WILL EFFECTIVELY REDUCE OSCILLATIONS OF THE POWER OUTPUT, WITHOUT THE USE OF A SLIP CLUTCH.

1977-0572 ILLIES K
ENERGY FOR MARINE PROPULSION. A LOOK INTO THE FUTURE.
SCHIFF HAFEN 29(12): 1119-1123, 1977. (IN GERMAN)

THE ARTICLE DISCUSSES POSSIBLE ENERGY SOURCES, INCLUDING WIND, FOR MARINE PROPULSION WHEN PETROLEUM IS NO LONGER AVAILABLE.

1977-0573 AN INFORMAL DIRECTORY OF U.S. WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND RESOURCE GROUPS.
MOTHER EARTH NEWS NO. 46: 34-35, JULY/AUGUST 1977.

THIS IS A LIST OF OVER 30 OF THE MOST ACTIVE AND INFLUENTIAL WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND ORGANIZATIONS IN THE U.S. THIS DIRECTORY REPRESENTS A CROSS SECTION OF THE INDUSTRY.

1977-0574 INGLIS D R
THE ANSWER IS BLOWING IN THE WIND.
PROGRESSIVE 41(1): 43-46, JANUARY 1977.

A COMMON FEATURE OF WIND POWER PROJECTS IS THAT THEY WERE ABANDONED FOR ECONOMIC REASONS ALONE IN AN AGE OF CHEAP FOSSIL FUEL. WIND POWER IS TECHNICALLY READY TO GO. STARTING WITH AN ANNUAL BUDGET OF $200,000 ABOUT THREE YEARS AGO, THE WIND ENERGY DEVELOPMENT PROGRAM IN ERDA GREW TO $15 MILLION/YR. YET THE ONLY SUBSTANTIAL HARDWARE TO SHOW FOR THE EXPENDITURES IS A 100 KW TURBINE NEAR SANDUSKY, OHIO. THE REST OF ERDA'S WIND POWER FUNDS ARE MOSTLY SCATTERED, GIVING THE IMPRESSION THAT THE AGENCY WANTS TO GO SLOWLY ENOUGH TO MAKE SURE THAT SOME MORE FAVORABLE POSSIBILITY HAS TIME TO SHOW UP BEFORE A COMMITMENT IS MADE TO THE CONVENTIONAL, RAPIDLY ROTATING, HORIZONTAL-AXIS CONCEPT. A DRASTICALLY ACCELERATED WIND POWER DEMONSTRATION PROGRAM IS OUTLINED.

1977-0575 IVANOVIC V, KOPRIVICA O
ANALIZA VENTILACIONIH KARAKTERISTIKA PRIRODNOG PROVETRAVANJA U POVSINSKOM OTKOPU RUDNIKA BAKRA MAJDANPEK. (ANALYSIS OF THE CHARACTERISTICS OF NATURAL VENTILATION IN THE OPEN PIT OF THE MAJDANPEK COPPER MINE).
RUD. GLAS. NO. 3: 56-66, 1977. (IN SERBO-CROATIAN)

THE OPEN PIT OF YUGOSLAVIA'S MAJDANPEK COPPER MINE IS CURRENTLY AT A DEPTH AT WHICH WIND POWER CAN GENERATE SUFFICIENT AIR FLOW TO PROVIDE AN EFFECTIVE NATURAL VENTILATION AND DUST CONTROL WITHIN THE PIT. THESE FINDINGS WERE MADE BY CARRYING OUT AN ANALYSIS OF THE PIT'S NATURAL-VENTILATION CHARACTERISTICS. THE ANALYSIS WAS BASED ON THE GEOMETRICAL AND MATHEMATICAL CALCULATIONS OF SUCH WIND PARAMETERS AS VELOCITY, DIRECTION AND POWER. DEEPENING OF THE PIT WILL, OF COURSE, CREATE MAJOR CHANGES IN THE VENTILATION SITUATION.

1977-0576 JACOBS M L, JACOBS P R
WIND ELECTRIC PLANT WITH IMPROVED ALTERNATOR FIELD EXCITATION.
U.S. PATENT NO. 4,059,771, NOVEMBER 22, 1977. 6 P.

IN A WIND ELECTRIC PLANT OF THE TYPE INCLUDING A WIND-DRIVEN PROPELLER OR THE LIKE AND AN ALTERNATING CURRENT ALTERNATOR CONNECTED TO BE DRIVEN THEREBY TO GENERATE ELECTRICAL ENERGY FOR CHARGING STORAGE BATTERIES OR OTHER DESIRED USE, ELECTRICAL CIRCUITRY CONNECTED WITH THE ALTERNATOR AND A STORAGE BATTERY IS DESCRIBED WHICH INCLUDES CONTROLS RESPONSIVE TO ALTERNATOR SPEED AND BATTERY VOLTAGE TO PROVIDE A RELATIVELY CONSTANT EXCITATION CURRENT FOR THE FIELD WINDING OF THE ALTERNATOR FROM A STORAGE BATTERY. THE ALTERNATOR FIELD IS FULLY EXCITED AT SUBSTANTIALLY ALL SPEEDS OF OPERATION AND THE NEED FOR A CONVENTIONAL ALTERNATOR EXCITER IS ELIMINATED.

1977-0577 JOHANSON E E
ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS FOR ELECTRICAL POWER GENERATION.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 437-444.

THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) HAS FUNDED EIGHT STUDIES ON THE ECONONICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). THESE EIGHT STUDIES HAVE BEEN REVIEWED, THE RESULTS PUT ON A COMMON ECONOMIC BASIS, AND ARE PRESENTED HERE IN 1975 DOLLARS. A COPY OF THE FULL REPORT, PREPARED UNDER CONTRACT TO ERDA, WILL BE AVAILABLE FROM NTIS IN THE FALL OF 1977.

1977-0578 JOHNSON A W
ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS.
SEMIANNUAL REVIEW MEETING ON SILICON TECHNOLOGY, WILLIAMSBURG, VIRGINIA, AUGUST 23,1977. PROCEEDINGS. NTIS, DECEMBER 1977. P. 667-689.
CONF-770865

1977-0579 JOHNSON G L
IMPACT OF WIND ELECTRIC GENERATORS ON ELECTRIC UTILITIES.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, STILLWATER, OKLAHOMA, OCTOBER 26, 1977. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1977. P. 10.1-10.14.

IT HAS BEEN SHOWN THAT WIND ELECTRIC GENERATION CAN BE CONSIDERED AS BASE GENERATION IF A STRONG EFFORT TO REDUCE THE PEAK SYSTEM DEMAND IS SUCCESSFUL. UNDER SUCH CIRCUMSTANCES, INDIVIDUALLY OWNED WIND GENERATORS SHOULD BE TREATED GENEROUSLY BY THE ELECTRIC UTILITIES. THEY SHOULD PAY A REASONABLE CAPITAL CHARGE FOR THE ELECTRICAL SERVICE AND DISTRIBUTION LINES, BUT NOT PAY FOR TRANSMISSION LINES OR UTILITY GENERATION (NO DEMAND CHARGE). THEIR KWH METER SHOULD BE ALLOWED TO RUN BACKWARDS SO THAT THEIR NET YEARLY ENERGY BILL CAN BE REDUCED TO ZERO. THE UTILITY SHOULD NOT PAY THE WIND GENERATOR OWNER FOR NET GENERATION BECAUSE THE UTILITY SHOULD BE THE BULK ENERGY SUPPLIER FOR ITS SERVICE REGION, WITH ALL NET GENERATION, PERHAPS INCLUDING SOME WIND GENERATORS, UNDER ITS CONTROL.

1977-0580 JOHNSON G L
ECONOMIC DESIGN OF WIND ELECTRIC SYSTEMS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, MEXICO CITY, JULY 17-22, 1977. PREPRINT. NEW YORK, IEEE, PAPER F 77 679-4, 1977. 9 P.

LONG TERM WIND RECORDS ARE USED TO SELECT THE RATED WIND SPEED FOR WIND ELECTRIC GENERATORS. THE WIND IS

CHARACTERIZED BY A WEIBULL DENSITY FUNCTION. DETAILED RESULTS ARE PRESENTED FOR WESTERN KANSAS. GRAPHS ARE PRESENTED WHICH CAN BE USED TO DESIGN A WIND SYSTEM FOR MAXIMUM SPECIFIC OUTPUT FOR A SPECIFIED LOAD FACTOR AT A GIVEN SITE. IT IS SHOWN THAT A WIND TURBINE RATED AT A WIND SPEED OF 9 M/S HAS A SPECIFIC OUTPUT WITHIN 80% OF THE MAXIMUM FOR A WIDE RANGE OF WIND CONDITIONS.

1977-0581 JOHNSON G L, WALKER H S
THREE-PHASE INDUCTION MOTOR LOADS ON A VARIABLE FREQUENCY WIND ELECTRIC GENERATOR.
WIND ENG. 1(4): 268-276, 1977.

A DC MOTOR DRIVING AN AC ALTERNATOR WAS USED TO SIMULATE AN ASYNCHRONOUS WIND ELECTRIC GENERATOR. THE OUTPUT WAS USED TO DRIVE A COMMERCIAL AIR CONDITIONING UNIT CONTAINING A HERMETICALLY SEALED THREE-PHASE INDUCTION MOTOR. THE AIR CONDITIONER STARTED EASILY AS FREQUENCY WAS INCREASED FROM ZERO AND RAN WITHIN RATINGS AT ALL FREQUENCIES BETWEEN ZERO AND 60 HZ. THE ONLY CHANGE FROM COMMERCIAL EQUIPMENT WHICH MIGHT BE DESIRABLE IS A VARIABLE EXPANSION VALVE AT THE EVAPORATOR WHICH WOULD MAINTAIN A CONSTANT PRESSURE UPSTREAM OF THE EVAPORATOR WITH VARIABLE FLOW RATES. THIS WOULD MAINTAIN THE EVAPORATOR TEMPERATURE BETTER THAN THE FIXED EXPANSION VALVE USUALLY USED.

1977-0582 JOHNSON R
SWEDISH WIND-POWER--SQUALLY WINDS ARE A PROBLEM IN ELECTRICAL-POWER GENERATION.
ELTEK. MED AKTUELL ELEKTRON. 29(15): 38-40, OCTOBER 1977. (IN SWEDISH)

WIND POWER IS ONE OF THE ALTERNATIVE SOURCES OF ENERGY WHICH IS BEING CONSIDERED FOR RESEARCH. GENERATION OF ELECTRICITY BY WIND POWER HAS ITS OWN SPECIAL PROBLEMS SINCE THE WIND CANNOT BE CONTROLLED. THIS PRESENTS SPECIAL REQUIREMENTS IN THE DESIGN OF THE GENERATOR AND CONTROL EQUIPMENT.

1977-0583 JONES B W, MORETTI P M
EVALUATION OF WIND GENERATOR ECONOMICS IN A LOAD DURATION CONTEXT.
ENERGY DEVELOPMENT, NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 25-29.

WIND GENERATORS USED WITHOUT ENERGY STORAGE ARE USUALLY CONSIDERED TO COMPETE WITH OTHER GENERATION FACILITIES ON THE BASIS OF THE AVERAGE INCREMENTAL COST OF GENERATION. THIS APPROACH CAN SIGNIFICANTLY UNDERESTIMATE THE ACTUAL COMPETITIVENESS OF THE WIND GENERATORS. BY ANALYZING THE EFFECT OF THE WIND GENERATORS ON THE REMAINING LOAD CHARACTERISTICS FOR AN ELECTRIC UTILITY'S GENERATION SYSTEM, THEY ARE SHOWN TO AFFECT THE REQUIRED INVESTMENT IN OTHER GENERATION FACILITIES CONSIDERABLY MORE THAN THEY AFFECT OPERATING COSTS.

1977-0584 JONES W J, RUANE M
ALTERNATIVE ELECTRICAL ENERGY SOURCES FOR MAINE. SUMMARY REPORT.
NTIS, DECEMBER 1977. 554 P.
PB-287909

AN EVALUATION OF ELEVEN TECHNOLOGIES AS POSSIBLE ALTERNATIVES TO THE CONSTRUCTION OF A BASE-LOAD TYPE 600 MW COAL-FIRED GENERATING PLANT, CENTRAL MAINE SEARS ISLAND NO. 1, IN 1986 IS PRESENTED. CONSIDERED ALTERNATIVES ARE GEOTHERMAL, OCEAN THERMAL, OCEAN AND RIVERINE CURRENT, WAVE, WIND, AND SOLAR ENERGY CONVERSION; CONSERVATION; FUEL CELLS; CONVERSION OF BIOMASS AND SOLID WASTES; AND THE ENVIRONMENTAL IMPACTS OF THESE TECHNOLOGIES.

1977-0585 KALS W S
THE RIDDLE OF THE WINDS.
GARDEN CITY, N.Y., DOUBLEDAY, 1977. 201 P.

CHAPTER 17, "POWER FROM THE WIND", IS A BRIEF REVIEW OF THE USE OF WIND FOR ENERGY PRODUCTION.

1977-0586 KANE W
A PERSPECTIVE AS TO THE TOTAL COST OF "SOFT" ENERGY.
ELECTR. PERSPECT. 77(3): 12-15, 1977.

THE ECONOMICS OF SOLAR HEATING SYSTEMS ARE DISCUSSED IN RELATION TO AMORY LOVIN'S PROPOSALS FOR "SOFT" ENERGY PATHS. CURRENTLY, SOLAR ENERGY HEATING SYSTEMS SELL FOR $7,000 TO $10,000 OR MORE INSTALLED, AND THE PRICE IS NOT LIKELY TO BE REDUCED RADICALLY IN THE NEAR FUTURE SINCE A SIGNIFICANT PORTION OF THE TOTAL COST IS DUE TO INSTALLATION CHARGES. ASSUMING THAT THE SOLAR HEATING CUSTOMER BORROWS MONEY FROM THE BANK FOR SUCH A SYSTEM AT INTEREST RATES BETWEEN 8.75% AND 12%, HIS YEARLY GAS BILL WOULD HAVE TO EXCEED ANYWHERE FROM $1300 TO $2400 IN ORDER FOR HIM TO BREAK EVEN. ASSUMING THAT A $7,000 SOLAR PANEL HEATING SYSTEM WERE REQUIRED PER HOME OR PER TWO APARTMENTS AND THAT THE SYSTEM WAS INSTALLED IN VIRTUALLY ALL AMERICAN HOMES AND APARTMENTS, THE RESULTANT COST TO THE AMERICAN PUBLIC WOULD BE $364 BILLION. SIMILAR ECONOMICS PRESENTED FOR "HOME" WINDMILLS AND "ALCOHOL POWER" SHOW THEIR COSTS AND NECESSARY SCALE OF PRODUCTION TO BE EVEN MORE INFEASIBLE, AS FAR AS SUPPLANTING TRADITIONAL SOURCES.

1977-0587 KAUFMAN V
SURVEY OF RESEARCH ACTIVITIES OF THE DIVISION OF SOLAR ENERGY, ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 26-38, P. 30.1-30.5.

THE PRIMARY GOAL OF THE SOLAR ENERGY PROGRAM OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION IS TO DEVELOP AND INTRODUCE, AT AN EARLY DATE, ECONOMICALLY COMPETITIVE AND ENVIRONMENTALLY ACCEPTABLE SOLAR ENERGY SYSTEMS TO MEET A SIGNIFICANT FRACTION OF THE NATIONAL ENERGY REQUIREMENTS COMMENSURATE WITH ITS POTENTIAL. THE PROGRAM IS ACCOMPLISHED THROUGH THE FUNDING OF SPECIFIC PROJECTS IN EACH OF THE SOLAR TECHNOLOGIES. INFORMATION ON THE ALLOCATION OF FUNDS AMONG THE VARIOUS TYPES OF R AND D INSTITUTIONS AND THE DIVISION OF FUNDS BETWEEN BASIC AND APPLIED RESEARCH AND DEVELOPMENTS IS GIVEN. THE TOTAL OPERATING FUNDS OF THE DIVISION OF SOLAR ENERGY FOR FY 1977 HAVE MORE THAN DOUBLED OVER THOSE OF FY 1976 WHICH, IN TURN, WERE MORE THAN TWICE THOSE OF PREVIOUS YEARS.

1977-0588 KEABLE J
HEAT PUMP IN RELATION TO SOLAR ENERGY.
ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION. CONFERENCE ON ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION, LONDON, JULY 1977. LONDON, INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. P. 43-48.

THE COMPONENTS OF A HEAT-PUMPING SYSTEM ARE BRIEFLY REVIEWED. ELECTRICITY AND ALTERNATE POWER SOURCES

INCLUDING GAS, OIL, WIND-POWER, METHANE AND ALCOHOL ARE DISCUSSED AS FEASIBLE POWER SOURCES FOR HEAT PUMPS. IT IS NOTED THAT HEAT PUMPING IS SUITABLE IN THE MAJORITY OF ENERGY USE CATEGORIES, INCLUDING SPACE-HEATING, FOOD PRESERVATION BY COOLING, HOT WATER HEATING AS WELL AS MANY INDUSTRIAL APPLICATIONS. COST IN USE (CAPITAL COST OF A SYSTEM DIVIDED BY AN ASSUMED INSTALLATION LIFE SPAN) IS USED AS A FIGURE OF MERIT TO COMPARE A CONVENTIONAL HOT AIR HEATING SYSTEM WITH A SOLAR SYSTEM AND AN ELECTRICALLY DRIVEN HEAT PUMP. NO ADVERSE ENVIRONMENTAL SIDE EFFECTS ARE FORESEEN IF HEAT PUMPS ARE PRODUCED IN LARGE QUANTITIES.

1977-0589 KIDDER T
TINKERING WITH SUNSHINE.
ATL. MON.: 70-83, OCTOBER 1977.

SOME OF THE OUTSTANDING PEOPLE IN THE FIELD OF SOLAR ENERGY AND GENERAL ENERGY CONSERVATION ARE DISCUSSED. EXAMPLES OF PEOPLE UPGRADING THE CURRENT SOLAR TECHNOLOGY ARE GIVEN. A SURVEY OF PEOPLE MANUFACTURING AND INVENTING NEW EQUIPMENT FOR SOLAR SYSTEMS. PHOTOVOLTAIC, TECHNOLOGY AND COSTS ARE ALSO MENTIONED. WIND ENERGY AND WIND EQUIPMENT AS WELL AS THE PEOPLE INTERESTED IN THIS FIELD ARE ALSO DISCUSSED.

1977-0590 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
ENERGY DEVELOPMENT, NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 108-114.

AN ANALYSIS OF THE POTENTIAL FOR WIND GENERATION AT AN OFFSHORE SITE IDENTIFIED BY PUBLIC SERVICE ELECTRIC AND GAS COMPANY OF NEWARK, N.J. INDICATES A POTENTIAL IN EXCESS OF 5700 KWH/KW FOR A 1 MW WINDMILL RATED AT 20 MI/H AND A HUB HEIGHT OF 235 FEET. THE PRELIMINARY ECONOMICS OF THE APPLICATION OF WIND POWER, AS A LIMITED SUPPLEMENT TO BASE LOADED NUCLEAR AND OTHER FORMS OF GENERATION, APPEARS TO OFFER ENOUGH PROMISE SUCH THAT A MORE SERIOUS STUDY IS WARRANTED TO DETERMINE THE OVERALL ECONOMIC, TECHNICAL, AND ENVIRONMENTAL FEASIBILITY OF SUCH AN APPLICATION. IN ADDITION SOME OF THE STATISTICAL PROPERTIES OF THE WIND AT THE OFFSHORE SITE HAVE BEEN ANALYZED.

1977-0591 KISS A L
ORDER OF MAGNITUDE OF HUNGARY'S WIND POWER RESERVE.
ENERG. ATOMTECH. 30(10): 461-464, OCTOBER 1977. (IN HUNGARIAN)

WIND POWER RESEARCH AND DEVELOPMENT PROGRESS IN HUNGARY IS SURVEYED.

1977-0592 KLEMS J H
CALIFORNIA WIND ENERGY RESOURCE.
NTIS, SEPTEMBER 1977. 41 P.
LBL-6835

THE SIZE OF THE WIND ENERGY RESOURCE FOR CALIFORNIA IS ESTIMATED BY SEVERAL METHODS AND FOUND TO BE LARGE RELATIVE TO THE CURRENT STATE ELECTRICAL CONSUMPTION. CENTRALIZED AND DISPERSED SYSTEMS FOR UTILIZING LARGE AMOUNTS OF WIND ENERGY ARE COMPARED.

1977-0593 KOIDE G T, TAKAHASHI P K
WIND AND SOLAR ENERGY APPLICATIONS STUDY.
NTIS, AUGUST 1977. 113 P.
PB-287593

THE STUDY ON SOLAR RADIATION AND WIND POWER APPLICATIONS IS A FACET OF THE TOTAL SOLAR ASSESSMENT PROGRAM. ENGINEERING CONSULTANTS, GOVERNMENT AUTHORITIES, TECHNOLOGY ASSESSMENT SPECIALISTS AND BUSINESSMEN WERE CONTACTED FOR INPUT INTO THE REPORT. THE RESULT IS A BROAD IMPLEMENTATION PLAN HIGHLIGHTING SEVEN TYPICAL APPLICATIONS--THREE SOLAR, THREE WIND AND ONE COMBINATION.

1977-0594 KOLM K E
PREDICTING THE SURFACE WIND CHARACTERISTICS OF SOUTHERN WYOMING FROM REMOTE SENSING AND EOLIAN GEOMORPHOLOGY. FINAL REPORT.
NTIS, SEPTEMBER 30, 1977. 166 P.
RLO/2343-78/1

EOLIAN GEOMORPHOLOGICAL FEATURES CAN BE USED TO SUCCESSFULLY LOCATE AREAS OF HIGH-WIND ENERGY BECAUSE EOLIAN FEATURES CAN BE EASILY AND ECONOMICALLY IDENTIFIED AND MAPPED FROM COLOR COMPOSITE LANDSAT IMAGERY. IN THIS STUDY LANDSAT IMAGE INTERPRETATIONS WERE CORRELATED WITH METEOROLOGICAL DATA TO SHOW THAT ACTIVE EOLIAN FEATURES INDICATE A WINDY CLIMATE.

1977-0595 LANDA H C
THE SOLAR ENERGY HANDBOOK.
MILWAUKEE, WISCONSIN, FICOA/SEECOA, 1977. 92 P.

1977-0596 LANDA H C, LANDA M C, LANDA J M, LANDA D C
SOLAR ENERGY HANDBOOK.
MILWAUKEE, WISCONSIN, FILM INSTRUCTION CO. OF AMERICA, 1977. 5TH. EDITION. 183 P.

1977-0597 LAPIN E E
MULTIMEGAWATT VERTICAL AXIS WINDMILLS.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS, CO., 1977. P. 43-50.

ON THE BASIS OF AN ELEMENTARY THEORY FOR VERTICAL AXIS WINDMILLS, WHICH COMBINE BLADE ELEMENT AND ACTUATOR DISC CONSIDERATIONS, THE NET POWER EXTRACTIVE PERFORMANCE FOR SEVERAL MILLS IS ESTIMATED. A COMPARISON IS MADE BETWEEN ROTORS AND WINGS AS THE PROPULSIVE ELEMENTS. THE CONDITIONS UNDER WHICH WINDMILLS AS FUEL-SUBSTITUTES BECOME COMPETITIVE WITH FOSSIL FUELED PLANTS ARE SHOWN.

1977-0598 LEBOST B A
FLUID TURBINE.
U.S. PATENT NO. 4,057,270, NOVEMBER 8, 1977. 10 P.

A TURBINE FOR GENERATING ELECTRIC POWER WHEN EXPOSED TO A FLUID SOURCE, SUCH AS A LIQUID OR GASEOUS CURRENT IS DESCRIBED. THE TURBINE HAS TWO SUBSTANTIALLY ANNULAR ROTOR HOUSINGS SPACED IN PARALLEL, HORIZONTAL PLANES. EACH HOUSING IS PROVIDED WITH A PLURALITY OF RADIALLY EXTENDING BLADES WHICH ARE CONNECTED TO COAXIAL SHAFTS.

ONE OF THE SHAFTS IS CONNECTED TO THE FIELD WINDINGS OF AN ELECTRIC GENERATOR WHILE THE OTHER SHAFT IS CONNECTED TO THE ARMATURE WINDINGS. THE RADIAL BLADES IN EACH ROTOR HOUSING WHEN EXPOSED TO THE LIQUID OR GASEOUS CURRENT ROTATE IN OPPOSITE DIRECTIONS CAUSING THE FIELD AND ARMATURE WINDINGS OF THE GENERATOR TO ROTATE IN OPPOSITE DIRECTIONS TO INCREASE THE POWER OUTPUT OF THE GENERATOR.

1977-0599 LEIGHTON L H, WRIGHT J K, SYRETT J J
POTENTIAL FOR UNCONVENTIONAL ENERGY SOURCES FOR THE UNITED KINGDOM.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 18 P.

THE UNCONVENTIONAL SOURCES CONSIDERED IN THE PAPER ARE SOLAR ENERGY, WIND POWER, WAVE AND TIDAL POWER, AND GEOTHERMAL HEAT. THEIR POTENTIAL CONTRIBUTION TO ENERGY SUPPLY IN THE UK IS BEING ASSESSED AS PART OF A WIDER EXERCISE AIMED AT FORMULATING A NATIONAL ENERGY RESEARCH DEVELOPMENT (R&D) STRATEGY SUFFICIENTLY ROBUST TO BE VALID FOR A WIDE RANGE OF POSSIBLE FUTURE CONDITIONS.

1977-0600 LINACRE J K
CHALLENGE OF ENERGY ALTERNATIVES.
ENERGY DIG. 6(4): 7-9, OCTOBER 1977.

THIS ARTICLE CONSIDERS THE FOLLOWING ALTERNATIVES TO FOSSIL FUELS, DEVELOPMENT OF SOME OF WHICH HAVE RECEIVED SUPPORT FROM THE BRITISH GOVERNMENT; GEOTHERMAL ENERGY, SOLAR ENERGY, WIND ENERGY, AND TIDAL ENERGY. PREDICTED CONTRIBUTIONS TO UNITED KINGDOM ENERGY BY THE YEAR 2000 ARE GIVEN AS FOLLOWS, IN MILLIONS OF TONS OF COAL EQUIVALENT (MTCE): WAVES = 15 MTCE; SOLAR FOR WATER AND SPACE HEATING = 4 TO 5 MTCE; SOLAR FROM BIOMASS CONVERSION = 5 MTCE; WIND = 6 MTCE; TIDES = 3 TO 10 MTCE. IT IS STATED THAT THE TOTAL CONTRIBUTION IS 40 MILLION TONS COAL EQUIVALENT OR APPROXIMATELY 25 MILLION TONS OIL EQUIVALENT. THIS IS CONSIDERABLY IN EXCESS OF THE CURRENT REQUIREMENTS FOR PETROCHEMICAL FEED STOCK, AND PROBABLY EXCEEDS THE PREDICTED REQUIREMENT FOR 2000.

1977-0601 LINKE S, TESHOME A, YEHSAKUL P D
TRANSMISSION AND PROTECTION FOR WIND-ENERGY GENERATION SYSTEMS.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXHIBITION, TORONTO, SEPTEMBER 26-28, 1977. NEW YORK, IEEE, 1977. P. 218-219.

THIS PAPER REPORTS RESULTS OF A TECHNICAL AND ECONOMIC STUDY OF TRANSMISSION, DISTRIBUTION, AND PROTECTION SYSTEMS FOR 1500 KW WIND-ENERGY GENERATORS CONNECTED TO AN ELECTRIC-UTILITY GRID IN SEVERAL CONFIGURATIONS. COST OF CONVENTIONAL PROTECTIVE EQUIPMENT IS FOUND TO BE EQUAL TO OR GREATER THAN TRANSMISSION-LINE COSTS FOR MOST INSTANCES.

1977-0602 LINSCOTT B S, GLASGOW J, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH. PROCEEDINGS. LA GRANGE PARK, ILL., ANS, IEEE, 77CH12633 ENERGY, 1977. VOL. 2, P. 1633-1650, PAPER 779273.

THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER IS DISCUSSED. THIS 100 KW TURBINE, DESIGNATED THE MOD-0, IS LOCATED AT THE NASA PLUM BROOK SITE NEAR SANDUSKY, OHIO. EXPERIMENTAL TEST DATA HAVE BEEN CORRELATED WITH ANALYSES OF TURBINE LOADS AND COMPLETE SYSTEM BEHAVIOR OF THE ERDA-NASA 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS.

1977-0603 LITTLER J G F, THOMAS R B
ECONOMIC CONSIDERATIONS IN THE ENERGY SUPPLY OF AUTARKIC DWELLINGS.
ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION. CONFERENCE ON ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION, LONDON, JULY 1977. LONDON, INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. P. 64-77.

DATA FROM COMPUTER SIMULATIONS RUN IN CONJUNCTION WITH LIVE WEATHER DATA ARE PRESENTED SHOWING ENERGY REQUIREMENTS FOR THE AUTARKIC HOUSE. MEETING THE ENERGY REQUIREMENTS BY EITHER A SOLAR HEATING SYSTEM OR A WIND GENERATOR SYSTEM USING RESISTANCE HEATING IS CONSIDERED. A COMPUTER SIMULATION IS USED TO VARY THE ELEMENTS OF THESE TWO SYSTEMS. A COMPARISON OF VARYING VOLUMES OF STORAGE MEDIUM AND INSULATION IS PRESENTED FOR THE SOLAR HEATING SYSTEM. A TABLE OF LOSSES ASSOCIATED WITH SUPPLYING ELECTRICITY FROM WINDMILLS IS GIVEN. THE TRADE-OFF BETWEEN MILL SIZE AND STORAGE VOLUME AND THE COSTS OF A WINDMILL SYSTEM ARE DISCUSSED.

1977-0604 LOTH J L
WIND ENERGY CONCENTRATORS.
U.S. PATENT NO. 4,045,144, AUGUST 30, 1977. 8 P.

THE HORIZONTAL AND VERTICAL WIND ENERGY CONCENTRATORS ARE STRUCTURALLY SIMPLE AND LIGHT AND ARE CAPABLE OF CONCENTRATING THE WIND ENERGY AT LEAST SIX TIMES WITH VERY HIGH EFFICIENCY. THIS PERMITS A CORRESPONDING REDUCTION IN THE FRONTAL AREA OF THE WIND TURBINE AND INCREASES ITS SPEED WITHOUT SACRIFICE IN WIND ENERGY HARNESSED. THE WIND ENERGY CONCENTRATOR IS A HIGH LIFT, SHORT ASPECT RATIO WING, WHICH IS DESIGNED TO MAXIMIZE THE INDUCED DRAG. THIS INDUCED DRAG TAKES THE VELOCITY OUT OF THE WIND BUT TRANSFORMS THE WIND ENERGY INTO ROTATIONAL ENERGY PRESENT IN THE SHED VORTEX SYSTEM. THE DESIGN IS SUCH THAT MOST OF THIS ROTATIONAL ENERGY CAN BE HARNESSED BY A SMALL HIGH SPEED WIND TURBINE PLACED IN THE ROLLED UP WING TIP VORTEX.

1977-0605 LOTH J L
BETZ TYPE LIMITATION OF VORTEX WIND MACHINES.
WIND ENG. 1(3): 169-185, 1977.

THE THEORETICAL POWER LIMITATIONS ARE DESCRIBED FOR FOUR VORTEX TYPE WIND MACHINES. THE MAXIMUM POSSIBLE POWER OUTPUT IS PRESENTED IN THE FORM OF A BETZ-TYPE DIMENSIONLESS POWER COEFFICIENT. ALL THESE VORTEX WIND MACHINES USE A VORTEX GENERATOR IN THE FORM OF EITHER A LOW ASPECT RATIO WING OR VANES IN A TOWER. THESE PARTS DO NOT ROTATE BUT HAVE TO MOVE WITH THE WIND DIRECTION AND THEREFORE, ARE NON-STATIONARY; CONSEQUENTLY THEIR PROJECTED AREA HAS BEEN SELECTED FOR THE REFERENCE AREA. ALL FOUR MACHINES ARE PROVEN HERE TO HAVE A POWER COEFFICIENT BELOW THAT OF AN ACTUATOR DISK IN A FREE STREAM. THREE MACHINES USE A TURBINE ROTOR PLACED COAXIALLY WITH THE CORE OF A VORTEX. THE FIRST TWO MACHINES HAVE A VORTEX GENERATED UPSTREAM OF THE ROTOR AND INGEST THE VISCOUS PART OF THE VORTEX. THE TOTAL PRESSURE DEFICIT IN THE VISCOUS CORE OF THE VORTEX REDUCES THEIR POWER OUTPUT IN PROPORTION TO THE SQUARE OF THE VORTEX STRENGTH. THE SECOND TWO MACHINES HAVE A VORTEX GENERATED DOWNSTREAM OF THE ROTOR AND USE THE VISCOUS CORE AS A VACUUM PUMP TO DRIVE THE WIND TURBINE. THE VORTEX GENERATING DEVICE IS MUCH LARGER THAN THE TURBINE, EXPECIALLY FOR THE SECOND PAIR OF MACHINES, WHICH FURTHER LOWERS THE OBTAINABLE POWER COEFFICIENT.

1977-0606 LUCAS T
HOW TO USE SOLAR ENERGY IN YOUR HOME AND BUSINESS.
PASADENA, CALIFORNIA, WARD RITCHIE PRESS, 1977. 318 P.

THE BOOK ACCUMULATES EXPLANATIONS ABOUT SOLAR ENERGY AND SOLAR HARDWARE IN 12 CHAPTERS, NAMELY: HOW TO CUT YOUR UTILITY BILLS; SOLAR WATER HEATING--NEW TECHNIQUES FOR SAVING MONEY; INSTALLING A COMMERCIAL SOLAR WATER HEATER; SOLAR SPACE SYSTEMS, LIQUID-TYPE; ADVANTAGES OF AIR-TYPE SOLAR COLLECTOR SYSTEMS; SOLAR HEAT FOR SUMMER COOLING; PASSIVE SOLAR TECHNIQUES--VERSATILE AND LOW-COST; SOLAR HEATING FOR SWIMMING POOLS AND SPAS; SOLAR-HEATING SYSTEMS NEED AUTOMATIC CONTROLS; SOLAR ENERGY FOR YOUR BUSINESS--A NECESSITY SOON; SOLAR CELLS, SPACE STATIONS, AND ELECTRIC CARS; AND WINDMILLS AS POWER PLANTS.

1977-0607 MCLAUGHLIN T
MAKE YOUR OWN ELECTRICITY.
NORTH POMFRET, VERMONT, DAVID AND CHARLES INC., 1977. 128 P.

IN ORDER TO BUFFER ONESELF AGAINST THE INCREASING COST OF ELECTRICITY AND BREAKDOWNS IN SUPPLY CAUSED BY ACCIDENTS, OVERLOADING, OR STRIKES, THIS BOOK PRESENTS MANY PROJECTS AND SUGGESTIONS FOR THE HOMEOWNER. THE HOMEOWNER MUST DECIDE WHAT KIND OF SUPPLY TO INSTALL (ENERGY, PARTIAL OR COMPLETE REPLACEMENT) TO TAKE CARE OF HIS REQUIREMENTS. THE EQUIPMENT THAT CAN BE BOUGHT, RANGING FROM SOPHISTICATED ENGINE-RUN GENERATORS TO HOME-MADE WINDMILLS OR SOLAR PANELS, IS CONSIDERED IN DETAIL. CONSTRUCTIONAL DETAILS AND DIAGRAMS ARE INCLUDED ON ENGINE-DRIVEN GENERATORS, WIND GENERATORS, POWER FROM WATER AND THE SUN, THERMOELECTRIC POWER, STORAGE BATTERIES, INVERTERS AND CONVERTERS, AND CHANGEOVER SWITCHES.

1977-0608 MCVEIGH J C, PONTIN G W W
WIND-WALL: AN INTEGRATED WIND/SOLAR SYSTEM.
WIND ENG. 1(2): 150-158, 1977.

AN APPROACH IS DESCRIBED TO THE PROBLEM OF PROVIDING SPACE AND WATER HEATING TO A GROUP OF LOCAL AUTHORITY HOUSES IN THE SOUTH OF ENGLAND. WINDMILL SYSTEM IS GROUPED IN A "WIND-WALL", A NEW CONCEPT WITH FIXED DUCTED HORIZONTAL-AXIS, BI-DIRECTIONAL WINDMILLS BASED ON A 2 MC CUBE.

1977-0609 MCVEIGH J C
SUN POWER. AN INTRODUCTION TO THE APPLICATIONS OF SOLAR ENERGY.
NEW YORK, PERGAMON PRESS INC., 1977. 216 P.

THE FOLLOWING CHAPTERS ARE INCLUDED: HISTORICAL BACKGROUND; SOLAR RADIATION; WATER AND AIR HEATING APPLICATIONS; SPACE HEATING APPLICATIONS; THERMAL POWER AND OTHER THERMAL APPLICATIONS; METHODS OF ECONOMIC ANALYSIS; PHOTOVOLTAIC CELLS, BIOLOGICAL CONVERSION SYSTEMS, AND PHOTOCHEMISTRY; WIND POWER; AND SOME PRACTICAL HEATING APPLICATIONS. A GLOSSARY IS ALSO INCLUDED.

1977-0610 MACCREADY P B
ASSESSING THE LOCAL WIND FIELD FOR SITING OF WIND POWER SYSTEMS. FINAL REPORT, JULY 1976-JUNE 1977.
NTIS, SEPTEMBER 1977. 87 P.
RLO-2441-76/16

THE DETERMINING OF FLOW FIELD CHARACTERISTICS FOR A GIVEN WIND TURBINE SITE IS DIFFICULT. THE BEST MONITORING DEVICE WOULD BE SOME SORT OF REMOTE MONITOR WHICH CONTINUOUSLY DEFINES THE ENTIRE THREE-DIMENSIONAL FLOW FIELD FROM GROUND TO 100 M THROUGHOUT A HILLY REGION OF, SAY, 5 KM BY 5 KM. NONE EXISTS. THERE ARE MANY ALTERNATIVE SCHEMES WHICH ARE AVAILABLE, EACH WITH ITS STRENGTHS AND WEAKNESSES. THE SCHEMES ARE EXAMINED IN THIS REPORT, FROM THE PERSPECTIVE OF THEIR SUITABILITY FOR ECONOMICALLY PROVIDING FIELD OBSERVATIONS WITH WHICH EXACT SITES IN COMPLEX TERRAIN CAN BE SELECTED.

1977-0611 MAGOVENY G S, FORGO E J
HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL.
U.S. PATENT NO. 4,047,834, SEPTEMBER 13, 1977. 6 P.

A HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL IS DESCRIBED WHICH COMPRISES A HOUSING HAVING APERTURES ON ALL SIDES FOR INGRESS AND EGRESS OF AIR AND A ROTOR ON A DRIVE SHAFT WITHIN THE HOUSING, EACH APERTURE BEING THE LARGER END OF A FUNNEL-SHAPED PASSAGE, THE SMALLER ENDS OF THE PASSAGES BEING POSITIONED TO DELIVER AIR AT RELATIVELY HIGH VELOCITIES AGAINST THE ROTOR BUCKETS, THE AIR ENTERING THE HOUSING THROUGH ONE OR MORE APERTURES ON THE WINDWARD SIDE THEREOF AND BEING EXHAUSTED THROUGH APERTURES ON THE LEEWARD SIDE. THE HOUSING IS PREFERABLY SO SHAPED THAT AMBIENT AIR IMPINGING ON THE HOUSING SURFACE WITHOUT ENTERING AN APERTURE WILL FLOW AROUND THE HOUSING AND CREATE A LOW PRESSURE ZONE ADJACENT THE EXHAUST FUNNEL APERTURES, AND THE HOUSING IS ALSO PREFERABLY SO SHAPED THAT A PLURALITY OF UNITS CAN BE STACKED VERTICALLY WITH THEIR DRIVE SHAFTS COUPLED TOGETHER.

1977-0612 MAKOFSKE W
RAMAPO AQUACULTURE-GREENHOUSE SYSTEM.
CONFERENCE ON ENERGY-CONSERVING SOLAR HEATED GREENHOUSES, MARLBORO, VERMONT, NOVEMBER 19, 1977. MARLBORO, VERMONT, MARLBORO COLLEGE, 1977. P. 44-47.

IN RESPONSE TO A DETERIORATING WORLD ENVIRONMENT, A GROUP OF FACULTY AND STUDENTS AT RAMAPO COLLEGE FORMED THE RAMAPO ALTERNATIVE ENERGY CENTER. ITS PROGRAM CONSISTS OF A MULTI-FACETED APPROACH TO MEET THE ENERGY-ENVIRONMENT PROBLEM, AND INCLUDES EDUCATIONAL, RESEARCH, AND COMMUNITY ACTION COMPONENTS.

1977-0613 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND ENERGY SYSTEMS.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977.
P. 20.1--20.13.
EPRI-ER-515-SR

THE APPLICATION OF WIND ENERGY SYSTEMS(WES) IN A REAL ELECTRIC UTILITY SYSTEM IS INVESTIGATED WITH THE OBJECTIVES OF DEVELOPING AND APPLYING A METHODOLOGY FOR DETERMINING THE TECHNICAL AND ECONOMIC CHARACTERISTICS OF SUCH APPLICATIONS. THE PROGRAM BEGINS WITH THE SELECTION OF A GEOGRAPHIC AREA AND AN ASSOCIATED UTILITY WITHIN WHICH WES ARE TO BE STUDIED. INCLUDED IS A PRELIMINARY SITING ANALYSIS FOR WES. SEVERAL REPRESENTATIVE KINDS OF VERTICAL AND HORIZONTAL AXIS WIND MACHINES OF VARYING CONFIGURATIONS AND SIZES WERE CONSIDERED AND SELECTIVELY SCREENED TO PRODUCE FIVE REFERENCE SYSTEMS FOR FURTHER STUDY. ESTABLISHED ELECTRIC UTILITY INDUSTRY PROCEDURES FOR ECONOMIC AND PERFORMANCE ANALYSIS OF GENERATING SYSTEMS WERE MODIFIED FOR USE IN THIS STUDY AS REQUIRED BY THE INTERMITTENT NATURE OF THE WIND ENERGY SOURCE. USING THIS METHODOLOGY THE REFERENCE

SYSTEMS WILL BE STUDIED IN THE FRAMEWORK OF THE SELECTED ELECTRIC UTILITY TO APPRAISE THE ECONOMIC AND TECHNICAL ASPECTS OF WIND ENERGY SYSTEMS.

1977-0614 MELISS M, PAUL J, STEIMLE F
UTILIZABLE ENERGY FLOWS.
CONGRESS ON THE DEVELOPMENT OF ENERGY DEMAND AND POSSIBILITIES OF SUPPLY, BERLIN, DECEMBER 5-7, 1977.
DUSSELDORF, F.R.G., VDI-VERL., 1977. P. 33-46. (IN GERMAN)

APART FROM FOSSIL AND NUCLEAR PRIMARY ENERGY SOURCES PREVAILINGLY USED UNTIL NOW, REGENERATIVE ENERGY FLOWS ARE AVAILABLE FOR MANKIND FOR COVERING ITS ENERGY REQUIREMENTS WHICH WILL EVEN INCREASE WITH A DEGREE OF CERTAINTY UNTIL THE END OF THIS CENTURY. YET ONLY A FEW OF THOSE PLENTIFUL, POSSIBLE UTILIZATION TECHNIQUES CAN BE USED IN THE FEDERAL REPUBLIC OF GERMANY: GEOTHERMAL HEATING AND POWER STATIONS, HYDROELECTRIC POWER PLANTS, SOLAR CELLS, WIND ENERGY CONVERTERS, HEAT PUMPS AND LOW-TEMPERATURE TYPE COLLECTOR INSTALLATIONS. THE ACTUAL AND EXPECTED SUBSTITUTIONAL POTENTIALS OF THESE TECHNOLOGIES ARE POINTED OUT. IT IS OBVIOUS THAT ONLY THE THREE ENERGY SOURCES MENTIONED LAST WILL BECOME INCREASINGLY IMPORTANT FOR THE ENERGY SUPPLY OF THE FRG.

1977-0615 MELISS M
CONTRIBUTION OF WIND ENERGY STILL UNCERTAIN. PUBLIC EXPECTATIONS OFTEN TOO HIGH--REPORT FROM A DGS MEETING IN BREMEN.
VDI NACHR. 31(39): 2, JULY 1977. (IN GERMAN)

ON JUNE 7 AND 8, 1977, THE 'DEUTSHE GESELLSCHAFT FUER SONNENENERGIE' HELD ITS MEETING IN BREMEN. THE ARTICLE IS A REVIEW OF THE MEETING. IT IS SHOWN THAT UTILIZATION OF WIND ENERGY WILL BE POSSIBLE IN THE FRG IN THE NEAR FUTURE. IT IS ESTIMATED THAT BY THE YEAR 2000, ABOUT 1% OF THE ANNUAL ENERGY DEMAND OF THE FRG WILL BE MET BY WIND ENERGY. POSSIBLE SYSTEMS FOR THE UTILIZATION OF WIND ENERGY ARE BRIEFLY DISCUSSED.

1977-0616 MICHAUD L M
ON THE ENERGY AND CONTROL OF ATMOSPHERIC VORTICES.
J. RECH. ATMOS. 11(2): 99-120, APRIL-JUNE 1977.

THIS ARTICLE EXPLAINS WHY IT MIGHT BE POSSIBLE TO CONTROL VORTICES OF THE TORNATO/DUST DEVIL TYPE IN ORDER TO PRODUCE ENERGY. EMPHASIS IS PLACED ON THE THERMODYNAMICS OF THE ENERGY PRODUCTION PROCESS. EQUATIONS ARE DERIVED FOR THE QUANTITY OF ENERGY PRODUCED DURING CONVECTION. THE EQUATIONS AND THE METHOD OF ANALYSIS ARE APPLICABLE NOT ONLY TO ATMOSPHERIC VORTICES BUT ALSO TO THE GENERAL ATMOSPHERIC ENERGETICS PROBLEM. CONTROL PARAMETERS IN NATURAL AND MAN-MADE VORTICES ARE DISCUSSED. A METHOD IS PROPOSED FOR PRODUCING A CONTROLLED VORTEX AND FOR OBTAINING ENERGY FROM THE PROCESS.

1977-0617 MIFFLIN R
ALGORITHM FOR CONSTRAINED OPTIMIZATION WITH SEMISMOOTH FUNCTIONS.
NTIS, FEBRUARY 1977. 36 P.
N78-11511

LARGE-SCALE OPTIMIZATION MODELS APPEAR IN MANY AREAS OF APPLICATION AT IIASA. FOR EXAMPLE, SUCH MODELS ARE USEFUL FOR ESTIMATING THE ECONOMIC VALUE OF INTRODUCING SOLAR AND WIND GENERATED ELECTRICAL ENERGY INTO AN EXISTING POWER GRID AND FOR DETERMINING EQUILIBRIUM PRICES FOR AGRICULTURAL COMMODITIES IN INTERNATIONAL TRADE AS A FUNCTION OF NATIONAL POLICIES. CERTAIN METHODS OF DECOMPOSITION FOR SOLVING SUCH OPTIMIZATION PROBLEMS REQUIRE THE SOLUTION OF A RELATIVELY SMALL PROBLEM, THE OBJECTIVE FUNCTION OF WHICH IS NOT EVERYWHERE DIFFERENTIABLE. AN IMPLEMENTABLE ALGORITHM THAT CAN BE USED TO SOLVE SUCH NONSMOOTH OPTIMIZATION PROBLEMS IS PRESENTED.

1977-0618 MIGLIORE P G, FANUCCI J B, KUHLKE K D, WOLFE W P
EXPERIMENTAL ANALYSIS OF A STRAIGHT BLADED DARRIEUS WIND TURBINE.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1265-1269.

AN EXPERIMENTAL PROGRAM FOR DETERMINING THE AERODYNAMIC CHARACTERISTICS OF A STRAIGHT BLADED DARRIEUS WIND TURBINE ARE DESCRIBED. DATA PRESENTED SHOW TORQUE, POWER COEFFICIENTS AND ZERO LIFT DRAG COEFFICIENTS.

1977-0619 MILLER K J
ALTERNATIVE ENERGY SOURCES.
FORUM ON NUCLEAR POWER AND THE ENERGY FUTURE, LONDON, OCTOBER 11, 1977. NUCLEAR POWER AND THE ENERGY FUTURE. A ROYAL INSTITUTION FORUM. LONDON, SYMPOSIUM PRESS, 1977. P. 143-150.

ALTERNATIVE OR RENEWABLE SOURCES OF ENERGY--PARTICULARLY WAVE AND WIND POWER--ARE EXAMINED, AND IT IS CONCLUDED THAT TOGETHER WITH CONSERVATION MEASURES THEY COULD MAKE A USEFUL CONTRIBUTION TO THE UK ENERGY NEEDS BY THE END OF THE CENTURY. THEIR ENGINEERING FEASIBILITY AND ECONOMICS ARE UNCERTAIN AND ONLY THE RESULTS OF FULL SCALE DEMONSTRATION UNITS WILL SHOW WHETHER THEY CAN BE COMPETITIVE WITH CONVENTIONAL AND NUCLEAR POWER SOURCES.

1977-0620 MILLER D R
WIND TURBINE STRUCTURAL DYNAMICS, 1977.
WASHINGTON, D.C., NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, 1977. 287 P.
WIND TURBINE STRUCTRUAL DYNAMICS CONFERENCE, CLEVELAND, OHIO, NOVEMBER 15, 1977.

TWENTY-NINE SHORT PAPERS BY VARIOUS AUTHORS ARE PRESENTED AT THIS WORKSHOP. THE FOLLOWING TOPICS WERE DISCUSSED IN RELATION TO WIND TURBINE STRUCTURAL DYNAMICS: METHODS FOR CALCULATING DYNAMIC LOADS; AEROELASTIC STABILITY; WIND LOADS, BOTH STEADY AND TRANSIENT; CRITICAL DESIGN CONDITIONS; DRIVE TRAIN DYNAMICS; SYSTEMS DYNAMICS; AND BEHAVIOR OF OPERATING WIND TURBINES.

1977-0621 MILLER G
SYSTEMS DESCRIPTIONS AND ENGINEERING COSTS FOR SOLAR-RELATED TECHNOLOGIES. VOLUME VI. WIND ENERGY CONVERSION SYSTEMS (WECS).
NTIS, JUNE 1977. 127 P.
MTR-7485(VOL.6)

A STUDY OF THE TECHNOLOGIC AND ECONOMIC CHARACTERISTICS OF WIND ENERGY CONVERSION SYSTEMS (WECS) WAS CARRIED OUT FOR THE SOLAR ENERGY DIVISION OF THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA). BASIC TECHNOLOGIC DATA INCLUDING COMPONENT DESCRIPTIONS, COSTS AND RESOURCE REQUIREMENTS ARE PRESENTED FOR SEVERAL DESIGNED AND PROPOSED WECS UNITS INCLUDING GENERAL ELECTRIC 500 AND 1500 KW UNITS, KAMAN AEROSPACE 500 AND 1500 KW UNITS, A METREK PROPOSED 1500 KW UNIT AND A METREK PROPOSED 1500 KW UNIT FOR LOW WIND REGIONS. THE DATA ARE

BASED PRIMARILY ON PREVIOUS DESIGN STUDIES CARRIED OUT UNDER THE AUSPICES OF THE WIND ENERGY OFFICE OF ERDA BY GENERAL ELECTRIC SPACE SYSTEMS DIVISION AND KAMAN AEROSPACE.

1977-0622 MINARDI J E
ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR RESEARCH.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1237-1247.

THE EFD WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT, POSSIBLY, FOR DIRECTING IT INTO THE WIND. THERE ARE SIGNIFICANT ADVANTAGES TO EFD WIND DRIVEN GENERATORS WHEN COMPARED WITH CONVENTIONAL WIND TURBINES. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING ABOUT 200 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE CAN BE REALIZED.

1977-0623 MOHAN N, PETERSON H A, LONG W F, DREIFUERST G R, VITHAYATHIL J J
ACTIVE FILTERS FOR AC HARMONIC SUPPRESSION.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 30 - FEBRUARY 4, 1977. NEW YORK, IEEE, PAPER A 77 026-8, 1977. 7 P.

AC/DC CONVERTERS USED IN HVDC TRANSMISSION SYSTEMS INJECT HARMONICS INTO THEIR ASSOCIATED AC AND DC SYSTEMS. SUCH CONVERTERS ARE ALSO PROPOSED IN CONJUNCTION WITH WIND POWER GENERATION, FUEL CELLS AND SOME OTHER ENERGY STORAGE DEVICES. SERIES-TUNED PASSIVE FILTERS ARE USED TO PREVENT THE HARMONIC CURRENTS FROM ENTERING INTO THE AC NETWORK. HOWEVER, THE PASSIVE FILTERS GET DETUNED IF THE SYSTEM FREQUENCY CHANGES OR IF THE FILTER PARAMETERS CHANGE DUE TO TEMPERATURE VARIATION OR AGE. IN THIS PAPER, A NEW CONCEPT OF ACTIVE FILTERS IS PRESENTED, WHICH DO NOT HAVE THE LIMITATIONS MENTIONED ABOVE. BASIC CONCEPTS AND DESIGN OF ACTIVE FILTERS FOR ELIMINATING AC HARMONICS ARE CONSIDERED AND PRELIMINARY COMPUTER SIMULATION RESULTS ARE PRESENTED.

1977-0624 MOHAN N, RIAZ M
WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATORS FOR RESIDENTIAL ELECTRIC HEATING.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 29 - FEBRUARY 3, 1978. PREPRINT. NEW YORK, IEEE, PAPER A 78 050-7, 1977. 6 P.

A SCHEME USING A WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATOR IS DESCRIBED TO SUPPLY FREQENCY-INSENSITIVE HEATING LOADS. DESPITE THE WIDE VARIATION IN ROTOR SPEED, THE SLIP REMAINS SMALL, THEREBY, PROVIDING A HIGH-EFFICIENCY OPERATION. THE ELECTRIC POWER OUTPUT CAN BE CONTROLLED OVER A SUBSTANTIAL RANGE TO MATCH THE WIND-TURBINE SPEED-POWER CHARACTERISTIC, BY ADJUSTING THE EXCITATION-CAPACITANCE.

1977-0625 MOLLY J P
UTILIZATION AND STORAGE PROBLEMS IN WIND POWER PLANTS.
NTIS, 1977. 34 P. (IN GERMAN)
AED-CONF-77-139-013

THE ENERGY YIELD OF A POWER PLANT CONSISTING OF WIND ENERGY CONVERTER AND STORER IS CONSIDERALBY INFLUENCED BY THE CHOICE OF SPECIFIC CHARACTERISTIC VALUES OF BOTH COMPONENTS. BOUNDARY CONDITIONS OF THE OPTIMIZATION PROCESS ARE SITE, CONSUMER BEHAVIOR AND A MINIMUM DEMAND OF SUPPLY SAFETY. IF THE COSTS OF THE POWER PLANT COMPONENTS ARE KNOWN, THEN ONE MAY DETERMINE THE CHEAPEST WIND POWER PLANT TAKING ACCOUNT OF THE BOUNDARY CONDITIONS. THE PRECONDITIONS AND WAY OF CALCULATION FOR OPTIMUM ROTARY NUMBER, THE BEST SPECIFIC ROTOR DISK POWER AND THE NECESSARY STORAGE CAPACITY FOR A CERTAIN SUPPLY SAFETY ARE GIVEN.

1977-0626 MORAN E
STEPHAN SIERADSKI: WINDMILL ON A BOOM.
POP. SCI. 210(2): 22-23, FEBRUARY 1977.

THE DESIGN OF A SMALL WIND TURBINE WHICH DEVELOPS APPROXIMATELY 200 WATTS AT 12 VOLTS IN A 15 MPH WIND IS PRESENTED. IN HIGH WINDS THE ENTIRE WIND TURBINE AND COUNTERWEIGHTED TOW ASSEMBLY GRADUALLY PIVOT UNTIL A HORIZONTAL POSITION IS REACHED.

1977-0627 MOSES R
PROMISE AND PROBLEMS IN APPLYING NEW TECHNOLOGY IN LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 361-364.

THE FEASIBILITY OF LARGE WIND POWER PLANTS CONNECTED TO ELECTRIC UTILITY POWER SYSTEMS IS ANALYZED. TECHNICAL AND ECONOMICAL ASPECTS ARE CONSIDERED.

1977-0628 MOTHER PUTS UP A 2-KW WINDPLANT IN TWO HOURS!
MOTHER EARTH NEWS NO. 43: 86-87, JANUARY/FEBRUARY, 1977.

THIS ARTICLE DESCRIBES THE PROCESS OF PUTTING UP A PREFAB WINDMILL WITH THE HELP OF A BOOM TRUCK IN A SHORT PERIOD OF TIME.

1977-0629 MUSGROVE P
WIND ENERGY SYSTEMS AND THEIR POTENTIAL IN THE UK.
WIND ENG. 1(4): 235-240, 1977.

WIND ENERGY SYSTEMS HAVE THE POTENTIAL TO PROVIDE AT LEAST ONE QUARTER OF OUR PRESENT ELECTRICITY REQUIREMENTS. THE UK HAS MUCH RELEVANT TECHNOLOGICAL EXPERIENCE, IN ITS AEROSPACE AND ENGINEERING INDUSTRY, AND IF A WIND ENERGY RESEARCH AND DEVELOPMENT PROGRAMME WERE ADEQUATELY FUNDED, WE COULD START TO PRODUCE SIGNIFICANT QUANTITIES OF WIND GENERATED ELECTRICITY IN LITTLE MORE THAN A DECADE.

1977-0630 NEBERAY Y I
DETERMINING MANPOWER TRAINING NEEDS IN EMERGING ENERGY AREAS IN NEW MEXICO AND ARIZONA. PH.D. THESIS.
NEW MEXICO STATE UNIVERSITY, LAS CRUCES, NEW MEXICO. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 77-25074, 1977. 126 P.

THIS STUDY MADE AN ATTEMPT TO DETERMINE HOW EMERGING ENERGY POLICIES IN THE SOUTHWEST RELATE TO MANPOWER NEEDS, TO IDENTIFY EMERGING ENERGY SOURCES, AND TO DISCOVER POSSIBLE MANPOWER TRAINING NEEDS IN EACH EMERGING AREA. THE POPULATION OF THE STUDY CONSISTED OF ORGANIZATIONS AND AGENCIES THAT HAVE SOME CONNECTION WITH SOLAR ENERGY, COAL GASIFICATION, WASTE PRODUCTS, WIND POWER, AND GEOTHERMAL ENERGY IN NEW MEXICO AND ARIZONA. THE FINDINGS OF THE STUDY INDICATE THAT SOLAR ENERGY TAX-INCENTIVE BILLS ENACTED BY THE STATES OF ARIZONA AND NEW

MEXICO HAVE SOME RELATION TO MANPOWER NEEDS IN THE REGION. BECAUSE OF THIS LINK IT WAS SUGGESTED THAT MORE TAX-INCENTIVE ENERGY POLICIES MUST EVOLVE TO ACCELERATE ECONOMIC ACTIVITIES IN EMERGING ENERGY SOURCES.

1977-0631 NEW MEXICO UTILITY WILL TEST 200-KW WIND TURBINE UNIT: EXPERIMENTAL POWER WINDMILL WILL BE BUILT ON CLAYTON MUNICIPAL SYSTEM.
PUBLIC POWER 35(1): 23, 1977.

A 200-KILOWATT WIND TURBINE UNIT WILL BE TESTED AT CLAYTON, NEW MEXICO, AS AN ERDA DEMONSTRATION PROGRAM OF A DUAL-FUEL UNIT FOR POWER GENERATION. BETWEEN 5 AND 15 PERCENT OF LOCAL POWER IS EXPECTED TO BE SUPPLIED ON A WINDY DAY. MODIFICATIONS WERE MADE IN THE SANDUSKY, OHIO, PROTOTYPE TO MAKE IT STRONGER AND THE BLADE DESIGN MORE EFFICIENT. A MAXIMUM OF 200 KW WILL BE PRODUCED, ENOUGH TO SERVE 60 FAMILIES. NEW FEATURES IN THE DESIGN WILL ALLOW THE UNIT TO RESPOND TO CHANGING WIND SPEEDS AND DIRECTION. TWIN ALUMINUM BLADES WILL MAINTAIN A CONSTANT ROTOR SPEED OF 40 REVOLUTIONS PER MINUTE. AFTER TESTS AT THE CLAYTON SITE, FOUR MORE SITES WILL BE SELECTED FOR SIMILAR AND LARGER INSTALLATIONS. POSSIBLE LOCATIONS ARE LISTED ALONG WITH THE NAME OF THE ADMINISTERING UTILITY.

1977-0632 1977 SOLAR ENERGY AND RESEARCH DIRECTORY.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, INC., 1977. 396 P.

THE DIRECTORY WAS COMPILED FROM ANN ARBOR SCIENCE QUESTIONNAIRES DISTRIBUTED TO INDIVIDUALS, COMPANIES AND RESEARCH FACILITIES INVOLVED IN SOLAR ACTIVITIES. THE DIRECTORY IS COMPOSED OF SEVEN CHAPTERS WHOSE TITLES REFLECT THE ENTRANT'S MAJOR AREA OF ACTIVITY. COMPLETE INFORMATION FOR EACH ENTRANT IS LISTED IN THE CHAPTER DESIGNATED ON THE QUESTIONNAIRE AS THE NUMBER 1 RANKED MAJOR CLASSIFICATION. ADDITIONAL MAJOR CLASSIFICATIONS ARE ALSO LISTED IN ORDER OF ENTRANT RANKING. MAJOR CLASSIFICATIONS ARE AS FOLLOWS: 1. ENERGY CONSERVATION; 2. MANUFACTURERS OF SOLAR COMPONENTS; 3. MANUFACURERS OF SOLAR TOTAL SYSTEMS; 4. DISTRIBUTORS OF SOLAR PRODUCTS; 5. DESIGN/CONSTRUCTION, RESIDENCES OR BUILDINGS; 6. SOLAR RESEARCH; AND 7. SOLAR ENERGY-OTHER RELATED AREAS.

1977-0633 ODDO S
WHY THE LOWER EAST SIDE DID.
SOL. AGE 2(4): 18-21, 35, APRIL 1977.

THE RENEWAL OF AN APARTMENT BUILDING USING INSULATION R-20 TO R-35, SOLAR HOT WATER HEATING, AND A 2KW WIND GENERATOR IS DESCRIBED. THIS PROJECT INCLUDED FINANCING, ON-THE-JOB TRAINING, BASIC EDUCATION, AND WORKING WITH VARIOUS FEDERAL AGENCIES FOR GRANTS FOR DIFFERENT PHASES OF THE PROJECT. THE SOCIO-ECONOMIC FACTORS ARE EMPHASIZED. GREENHOUSES ON ROOFS AND WINDOWS ARE PLANNED AS PART OF THE URBAN SURVIVAL PROGRAM.

1977-0634 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
COST-EFFECTIVE ENERGY FROM HUMID AIR.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1249-1252.

A VAST AMOUNT OF ENERGY IS CONTAINED IN THE LATENT HEAT OF VAPORIZATION OF THE WATER VAPOR IN HUMID AIR. THIS PAPER IS A REPORT ON RESEARCH IN PROGRESS, THE GOAL OF WHICH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK. THIS WOULD BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1977-0635 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
CLEAN ENERGY FROM HUMID AIR.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 577-597.

1977-0636 OLSSON L E
METEOROLOGY AND UTILIZATION OF WIND AND SOLAR ENERGY.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 19 P.

IT IS DIFFICULT AT THIS EARLY STAGE OF THE WORLD-WIDE SOLAR ENERGY CONVERSION EFFORT TO SPECIFY ALL OF THE USER NEEDS IN THE FIELD OF SOLAR RADIATION AND OTHER METEOROLOGICAL DATA. HOWEVER, VARIANCE OF CLOUDINESS AND OTHER METEOROLOGICAL PARAMETERS CAN PROVIDE GUIDANCE TO THE ACCURACY REQUIREMENTS OF INSOLATION DATA. PRELIMINARY ANALYSIS BASED ON A SIMPLIFIED ERROR STRUCTURE OF EACH OBSERVATION SUGGESTS THAT THERE IS LITTLE REASON TO DEMAND THAT THE RANDOM ERROR OF OBSERVATION BE BETTER THAN 5 OR 10%. BUT PAST DATA FROM ONLY VERY LIMITED NETWORKS OVER THE WORLD MAY NOT ACHIEVE EVEN THIS ACCURACY. A METHOD HAS BEEN SUGGESTED BY WHICH THE PAST DATA MAY BE CORRECTED. THE METHOD REQUIRES COMPARING ACTUAL OBSERVATIONS FOR CLEAR TRUE SOLAR NOON WITH THOSE ESTIMATED FROM OTHER OBSERVATIONS FROM THEORY.

1977-0637 OMAN R A, YEN J T
AERODYNAMIC AUGMENTATION OF WIND TURBINES.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1271-1280.

THE HIGH INITIAL COST OF PRESENT WIND ENERGY CONVERSION SYSTEMS (WECS) IS PRIMARILY DUE TO THE VERY LOW ENERGY DENSITY OF THE WIND. TO CAPTURE SIGNIFICANT QUANTITIES OF POWER, LARGE STRUCTURES ARE NECESSARY. CONVENTIONAL WECS USE ROTATING BLADES TO EXTRACT ENERGY DIRECTLY, BUT THESE LARGE ROTATING ELEMENTS ARE THE SOURCE OF VERY CHALLENGING DYNAMIC PROBLEMS WHICH HAVE PROVEN VERY COSTLY TO SOLVE. THE AUTHORS BELIEVE THAT THE WAY TO DEVELOP A SIGNIFICANT ROLE FOR WIND POWER IN THE WORLD ENERGY ECONOMY IS TO MAKE USE OF STATIC SURFACES AS AERODYNAMIC AUGMENTORS. THESE AUGMENTING SURFACES CAN REDUCE SUBSTANTIALLY THE SIZE AND THE DYNAMIC LOADINGS OF THE LARGE ROTOR BLADES NECESSARY TO PRODUCE LARGE UNIT LEVELS OF POWER. ALTHOUGH THE AUGMENTING SURFACES ARE LARGE, AND WILL THEREFORE BE COSTLY, AT LARGE POWER RATING THE ADDITIONAL COST OF A LARGER ROTOR BECOMES EVEN GREATER. IT IS THE AUTHOR'S CONTENTION THAT THE ADVANTAGES OF AUGMENTATION WILL BECOME MORE EVIDENT AS EXPERIENCE WITH LARGE WECS IS ACCUMULATED, AND AS THE MARKET FOR LARGE WECS MATURES. THIS PAPER DISCUSSES THE PRESENT PROSPECTS FOR TWO SUCH AUGMENTATION CONCEPTS: THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) AND THE TORNADO WIND TURBINE (TWT).

1977-0638 OWEN J A
ANALYSIS OF A SOLAR-THERMAL, WIND ASSISTED, TURBOELECTRIC POWER SYSTEM WITH HEAT RECOVERY ASPECTS.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 27, 11 P.

A CASE FOR DECENTRALIZED CASCADED POWER WITH SOLAR-THERMAL AND WIND ENERGY SOURCES IS PRESENTED. THIS CONCEPT CAN BE ADAPTED TO VIRTUALLY ANY EXISTING OR PROPOSED COMMUNITY, FARMSTEAD, OR COMMERCIAL-INDUSTRIAL SITE; AND

IT IS FLEXIBLE IN APPLICATION FOR ELECTRICITY, DOMESTIC HOT WATER AND PROCESS HEAT. THE SOLAR-THERMAL PORTION OF THE SYSTEM UTILIZES CYLINDRICAL PARABOLIC CONCENTRATORS, WHILE THE WIND TURBINE IS A VERTICAL AXIS, VERTICAL AEROFOIL TYPE. BY COMBINING BOTH ENERGY SOURCES, THEN THE MAXIMUM AMOUNT OF SOLAR AND AEOLIAN POTENTIALS CAN BE REALIZED, PROVIDING BOTH SOURCES ARE PRESENT IN EXTRACTABLE LEVELS OF DIRECT BEAM SOLAR ENERGY AND MEAN WIND VELOCITIES.

1977-0639 PARKER C E, PAL D, VODRASKA K F, CIANI J B
IDENTIFICATION OF ALTERNATIVE POWER SOURCES FOR DREDGED MATERIAL PROCESSING OPERATIONS. FINAL REPORT.
NTIS, NOVEMBER 1977. 136 P.
AD-A048312, WES-TR-D-77-32

THIS REPORT PROVIDES A BASIS FOR SELECTING ALTERNATIVE, RENEWABLE POWER SOURCES SPECIFICALLY FOR OPERATING DREDGED MATERIAL PROCESSING SYSTEMS. OF ALL THE ALTERNATIVE POWER SOURCES STUDIED, WIND ELECTRIC GENERATION SEEMS TO BE THE MOST PRACTICAL AND VERSATILE TO APPLY AT THIS TIME.

1977-0640 PASSIVE SOLAR HOME FOR NORTHERN CLIMATE.
ALTERN. SOURCES ENERGY NO. 25: 5-11, APRIL 1977.

1977-0641 PATTERSON G N
THEORY OF WIND TURBINES WITH CONTRAROTATION.
TORONTO UNIV. INST. AEROSP. STUD. UTIAS REP. NO. 218, JULY 1977. 30 P. ALSO: NTIS, JULY 1977. 31 P.
N78-18556, UTIAS-218

THE BASIC AERODYNAMIC THEORY IS PRESENTED FOLLOWED BY A SUGGESTED DESIGN PROCEDURE FOR CONTRAROTATING WIND TURBINES (DUCTED WINDMILLS WITH CONTRAROTATION). THE POSSIBILITY OF HIGHLY EFFICIENT DESIGNS BASED ON THE PRINCIPLE OF CONTRAROTATION IS EMPHASIZED.

1977-0642 PELSER J
POSSIBLE USE OF WIND POWER FOR THE PRODUCTION OF ELECTRIC ENERGY.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 12 P.

ENERGY EXTRACTED FROM WIND HAS BEEN USED IN THE NETHERLANDS TO GENERATE MECHANICAL POWER FOR SEVERAL CENTURIES. IN THE PAST, POWER FROM THIS SOURCE HAS BEEN UNABLE TO COMPETE WITH THAT GENERATED BY BURNING FOSSIL FUELS. HOWEVER, IN 1973, WHEN FUEL PRICES BEGAN TO RISE, THERE WAS A RENEWED INTEREST IN THE USE OF WIND POWER WHICH HAS RESULTED IN THE SETTING UP OF A NATIONAL RESEARCH PROGRAMME ON WIND ENERGY. THE GOAL OF THE PROGRAMME IS TO INVESTIGATE THE FEASIBILITY, TECHNICALLY AS WELL AS ECONOMICALLY, OF WIND CONVERSION SYSTEMS OF MODERN DESIGN.

1977-0643 PHASES IN THE DEPLOYMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) CONFIGURATIONS TO LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS. APPENDIX A.
NTIS, MARCH 1977. 49 P.
PB-297687

THE BASIC SEQUENCE OF FUNCTIONS AND ACTIONS WHICH WILL BE OR MAY BE INVOLVED IN THE DEPLOYMENT OF AN OFFSHORE WIND ENERGY CONVERSION SYSTEM (WECS) INSTALLATION IS PRESENTED. CERTAIN PROJECT CONFIGURATIONS ARE POSITED IN ORDER TO EXAMINE ON A PROVISIONAL BASIS THE TYPES OF LEGAL-INSTITUTIONAL ISSUES WHICH MIGHT ARISE IN THE PROCESS OF INSTALLATION.

1977-0644 PHILLIPS F
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 58-60.
CONF-7705119, PB-282565

THE FEASIBILITY OF USING SMALL WIND TURBINES IN THE HAWAIIAN ISLANDS IS DISCUSSED.

1977-0645 PREUSS R D, MORINO L
COMPUTATIONAL ANALYSIS OF WINDMILL AERODYNAMICS.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1253-1258.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL EMBEDDED IN INCOMPRESSIBLE, INVISCID FLOW IS CONSIDERED. THE INCOMING VORTICITY FIELD IS ASSUMED TO BE UNPERTURBED BY THE PRESENCE OF THE WINDMILL, ENABLING THE USE OF A POTENTIAL FORMULATION. TWO INTEGRAL EQUATION METHODS (FOR LIFTING SURFACES AND COMPLEX CONFIGURATIONS) ARE PRESENTED. BOTH METHODS ARE FORMULATED IN A FRAME OF REFERENCE RIGIDLY ROTATING AT CONSTANT ANGULAR VELOCITY RELATIVE TO THE GROUND. SIMPLE OSCILLATORY UNSTEADY ANALYSIS MAY BE PERFORMED UNDER A SMALL PERTURBATION HYPOTHESIS WHILE A FULLY UNSTEADY TRANSIENT ANALYSIS REQUIRES NO SUCH HYPOTHESIS.

1977-0646 RAJAGOPALAN V, LESCARBEAU A, VEILLETTE D, SANKARA RAO K
CONTRIBUTION TO THE DEVELOPMENT OF WIND ENERGY CONVERSION SCHEMES.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXHIBITION, TORONTO, SEPTEMBER 26-28, 1977. NEW YORK, IEEE, 1977. P. 216-217.

THIS PAPER PRESENTS EXPERIMENTAL RESULTS OBTAINED FROM FOUR DIFFERENT METHODS OF GENERATING ELECTRIC POWER FROM A VARIABLE SPEED PRIME MOVER TO FEED INTO A CONSTANT FREQUENCY AND CONSTANT VOLTAGE ELECTRIC UTILITY SYSTEM. THE COMMON FEATURE OF ALL THESE SCHEMES SIMILAR TO A D.C. TRANSMISSION CONFIGURATION CONSISTING OF A THREE PHASE DIODE BRIDGE, A D.C. LINK AND A THREE PHASE LINE-COMMUTATED THYRISTOR INVERTER; THEIR DIVERSITY LIES IN THE USE OF EITHER AN ALTERNATOR OR A SLIP-RING INDUCTION MACHINE OR TWO SLIP-RING MACHINES CUMULATIVELY CASCADED OR DIFFERENTIALLY CASCADED FOR POWER GENERATION. THE PRIME MOVER IS SUPPOSEDLY A WIND MILL WHEREIN ENERGY INPUT IS ESSENTIALLY VARIABLE.

1977-0647 RAMAGE C
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 54-55.
CONF-7705119, PB-282565

METEOROLOGICAL SURVEYS FOR THE HAWAIIAN ISLANDS ARE SUMMARIZED. THE SURVEYS ARE BEING CONDUCTED TO ESTABLISH THE FEASIBILITY OF WIND POWERED SYSTEMS.

1977-0648 RAMAGE C S, DANIELS P A, SCHROEDER T A, THOMPSON N J

OAHU WIND POWER SURVEY, FIRST REPORT.
NTIS, MAY 1977. 44 P.
UHMET-77-01, PB-287361

A WIND POWER SURVEY HAS BEEN CONDUCTED ON OAHU SINCE SUMMER 1975. AT SEVENTEEN POTENTIALLY WINDY SITES, CALIBRATED ANEMOMETERS AND WIND VANES WERE INSTALLED AND RECORDINGS MADE ON COMPUTER-PROCESSABLE MAGNETIC TAPE CASSETTES.

1977-0649 RAMAGE C S, OSHIRO N E
KAUAI WIND POWER SURVEY. PART 1. MOBILE SAMPLING PROGRAM, 19 AUGUST TO 5 SEPTEMBER 1977.
NTIS, NOVEMBER 1977. 35 P.
UHMET-77-05, PB-287350

A WIND POWER SURVEY OF HAWAII WAS CONDUCTED. A VAN-MOUNTED ANEMOMETER WAS SET UP AT EACH OF 47 SITES FOR AT LEAST 24 HOURS. THE PROBABLE LONG-TERM AVERAGE WIND SPEED AT EACH SITE WAS ESTIMATED BY COMPARING THE MEASURED WIND SPEEDS TO SIMULTANEOUS OBSERVATIONS MADE AT LIHUE AIRPORT. THIS MOBILE FIELD SURVEY WAS DESIGNED TO FIND WHERE THE WINDS WERE STRONGEST, TO DESCRIBE THEIR DIURNAL VARIATION AND TO IDENTIFY SITES FOR FIXED STATIONS WHERE LONG PERIOD MONITORING SHOULD BE UNDERTAKEN.

1977-0650 RENAISSANCE OF WIND ENERGY. WIND POWER STATIONS CAN COVER PART OF THE DEMAND.
UMSCH. WISS. TECH. 77(21): 704-708, NOVEMBER 1977. (IN GERMAN)

1977-0651 RICHARDS H M
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 61-62.
CONF-7705119, PB-282565

THE AVAILABILITY OF WIND POWER ON THE KOHALA ISLAND OF HAWAIIAN ISLANDS IS DISCUSSED.

1977-0652 RINEER A E
WIND-DRIVEN ROTOR ASSEMBLY.
U.S. PATENT NO. 4,049,362, SEPTEMBER 20, 1977. 4 P.

A WIND-DRIVEN ROTOR FOR GENERATING POWER HAS A CENTRAL NORMALLY VERTICAL COLUMN MOUNTED IN A BASE STRUCTURE FOR ROTATION ABOUT THE COLUMN AXIS. IN THE PREFERRED FORM OF THE INVENTION, A PLATE IS SECURED TO THE TOP OF THE COLUMN PERPENDICULAR TO THE AXIS OF ROTATION, AND FUNCTIONS BOTH AS AN AERODYNAMIC END PLATE AND AS A BRACKET SUPPORTING A GROUP OF ARTICULATING AIRFOILS. THESE ARE ROTATABLE ABOUT A PIVOT CONNECTION TO THE END PLATE WITH FREEDOM OF MOVEMENT WITHIN A LIMITED SECTOR OF ARTICULATION PROVIDING DRIVING AND FEATHERING AIRFOIL POSITIONS.

1977-0653 ROGERS S E, CORNABY B W, RODMAN C W, STICKSEL P R, TOLLE D A
ENVIRONMENTAL STUDIES RELATED TO THE OPERATION OF WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, DECEMBER 1977. 158 P.
COO-0092-77/2

THIS BIOPHYSICAL IMPACT ASSESSMENT EXPLORES THE ENVIRONMENTAL CONSEQUENCES OF THE EMERGING WIND ENERGY CONVERSION TECHNOLOGY THROUGH FIELD STUDIES DONE AT THE DOE/NASA 100-KW EXPERIMENTAL WIND TURBINE LOCATED AT NASA LEWIS RESEARCH CENTER'S PLUM BROOK STATION NEAR SANDUSKY, OHIO.

1977-0654 ROGERS P
EFFICIENCY AND UTILIZATION OF COOLING TOWERS.
U.S. PATENT NO. 4,031,173, JUNE 21, 1977. 6 P.

THE INVENTION RELATES TO COOLING TOWERS OF THE TYPE CURRENTLY IN USE FOR COOLING WATER AND/OR CONDENSING EXHAUST STEAM AS FOR EXAMPLE IN ASSOCIATION WITH NUCLEAR OR FOSSIL FUEL TYPE POWER PLANTS. TYPICALLY TOWERS ARE VERY LARGE AND VERY HIGH. THE INVENTION EMBODIES AN ORIGINAL CONCEPT FOR UTILIZATION OF SUCH TOWERS, FOR EXAMPLE HYPERBOLIC TOWERS, FOR THE GENERATION OF ENERGY FROM WIND AND ALSO FOR IMPROVING THE EFFICIENCY OF THE COOLING TOWER. IN THE EXEMPLARY FORM OF THE INVENTION A LARGE WIND DRIVEN ROTOR IS PROVIDED TO BE CARRIED BY THE TOWER AND TO ROTATE AROUND ITS AXIS AT THE POSITION OF THE NARROWED THROAT OF THE TOWER. PRESSURE IS GENERATED BY THE ROTOR AND DISCHARGED THROUGH NOZZLES ARRAYED ON THE INSIDE OF THE WALLS OF THE TOWER TO AUGMENT AND ENHANCE THE DRAFT WITHIN THE TOWER.

1977-0655 ROGGE E
WIND POWER PLANT.
GERMAN (FRG) PATENT NO. 2,627,198/A/, DECEMBER 22, 1977. 6 P. (IN GERMAN)

THE APPLICATION RELATES TO A WIND POWER PLANT CONSISTING OF A ROTARY TOWER, TO THE BOTTOM END OF WHICH TWO OPPOSED BOOMS ARE HINGED WHICH CAN BE MOVED UPWARD AND DOWNWARD BY MEANS OF WINCHES ACTING THROUGH CABLES. THE BOOMS CARRY AT THEIR OUTER ENDS ONE PROPELLER EACH WHICH DRIVE GENERATORS BY MEANS OF CHAIN DRIVES OR CABLE DRIVES, WHICH GENERATORS ARE INSTALLED IN THE ROTARY TOWER. ROTATION OF THE TOWER MOVES THE PROPELLERS INTO OR OUT OF THE WIND.

1977-0656 ROHRBACH C, WAINAUSKI H, WOROBEL R
EXPERIMENTAL AND ANALYTICAL RESEARCH ON THE AERODYNAMICS OF WIND DRIVEN TURBINES. FINAL REPORT.
NTIS, DECEMBER 1977. 258 P.
COO-2615-T2, HSER 7505

THIS AERODYNAMIC RESEARCH PROGRAM WAS AIMED AT PROVIDING A RELIABLE, COMPREHENSIVE DATA BASE ON A SERIES OF WIND TURBINE MODELS COVERING A BROAD RANGE OF THE PRIME AERODYNAMIC AND GEOMETRIC VARIABLES. SUCH DATA OBTAINED UNDER CONTROLLED LABORATORY CONDITIONS ON TURBINES DESIGNED BY THE SAME METHOD, OF THE SAME SIZE, AND TESTED IN THE SAME WIND TUNNEL HAD NOT BEEN AVAILABLE IN THE LITERATURE.

1977-0657 ROSCHEL A
WIND DRIVEN GENERATOR.
GERMAN (FRG) PATENT NO. 2,620,236/A/, NOVEMBER 24, 1977. 9 P. (IN GERMAN)

IT IS THE PURPOSE OF THE INVENTION TO PRODUCE HEAT BY WIND-DRIVEN OR WATER-DRIVEN MACHINES, PARTICULARLY OVER THE WHOLE RANGE OF WIND STRENGTHS AND WATER QUANTITIES. FOR THIS PURPOSE, WATER- OR WIND-DRIVEN MACHINES OF ANY TYPE OF CONSTRUCTION HAVE THEIR DRIVING SHAFT CONNECTED TO A MACHINE, WHICH PRODUCES MECHANICAL FRICTION AND WHICH GIVES UP THE RESULTING HEAT USING A LIQUID OR GASEOUS MEDIUM, WITH INTERPOSITION OF A HEAT EXCHANGER.

THE HEAT CAN BE PRODUCED IN A TURBULENCE BRAKE FOR GASES, LIQUIDS OR PLASTIC MATERIAL OR IN A MAGNETIC EDDY CURRENT BRAKE. THE HEAT GENERATORS USING FRICTION, TURBULENCE OR MAGNETIC EDDY CURRENTS CAN BE EQUIPPED WITH PRESSURE AND TEMPERATURE CONTROLLERS AND CAN WORK WITH A THERMALLY INSULATED HEAT STORE. THE HEAT GENERATORS CAN BE USED IN COMBINATION WITH ELECTRIC GENERATORS OR PUMPS FOR SPEED CONTROL OF THE WIND OR WATER DRIVEN MACHINERY BY CONTROL OF THE HEAT PRODUCING FORCE.

1977-0658 RUMSEY R D
VERTICAL AXIS WIND TURBINE MOTOR.
U.S. PATENT NO. 4,052,134, OCTOBER 4, 1977. 14 P.

A WIND POWER CONVERSION TURBINE MOTOR HAS A BODY SUPPORTED TO ROTATE ABOUT A VERTICAL AXIS AND CARRYING A PLURALITY OF SUBSTANTIALLY UPRIGHT VANES SUBSTANTIALLY SPACED FROM THE VERTICAL AXIS AND CIRCUMFERENTIALLY SPACED FROM ONE ANOTHER SO THAT WIND THRUSTING PROPULSIVELY AGAINST OUTER SIDES OF THE VANES CAN MOVE ACROSS THE SPACE CIRCUMSCRIBED BY THE VANES AND THRUST PROPULSIVELY AGAINST INNER SIDES OF THE VANES ON LEAVING THE SPACE, THEREBY ATTAINING DUAL POWER ADVANTAGE FROM SUBSTANTIALLY ALL WIND THAT STRIKES THE TURBINE. EACH OF THE PLURALITY OF VANES IS PIVOTALLY CARRIED ON THE BODY, WITH A CONTROL MEANS TO MAINTAIN A SUBSTANTIALLY CONSTANT VANE ANGLE OF ATTACK TO A RELATIVE WIND VECTOR.

1977-0659 SABZEVARI A
POTENTIAL OF WIND AS AN ENERGY SOURCE IN IRAN.
IRAN. J. SCI. TECHNOL. 6(2): 51-62, 1977.

WIND ENERGY IS A CLEAN, ABUNDANT RESOURCE IN IRAN. IT CAN BE CAPTURED BY LARGE-GROUP WIND TURBINE GENERATORS TO SUPPLEMENT THE ELECTRICITY PROVIDED BY THERMAL POWER PLANTS. IT CAN ALSO BE CAPTURED BY MEDIUM-SCALE LOCAL WIND TURBOGENERATORS TO SUPPLY THE ENERGY NEEDS OF SO MANY THOUSANDS OF SCATTERED RURAL CENTERS IN THE WINDY REGIONS, IN PARTICULAR IN THE EASTERN PROVINCES OF THE COUNTRY.

1977-0660 SALIEVA R B
CLASSIFICATION OF WIND AND SOLAR POWER PLANT OUTPUT REGULATION MODES.
GELIOTEKHNIKA 13(5): 49-60, 1977. TRANSL.: APPL. SOL. ENERGY 13(5): 38-47, 1977.

THIS ARTICLE EXAMINES THE CLASSIFICATION OF WIND AND SOLAR PLANT OUTPUT REGULATION MODES BASED ON FUNCTION AND DURATION AND CONCLUDES THAT THE PRIMARY METHOD FOR CALCULATING THE PARAMETERS OF WIND AND SOLAR POWER PLANT STORAGE SYSTEMS IS THE CALENDAR METHOD, WHEN THE CALCULATION IS MADE USING CHRONOLOGICAL MULTI-YEAR SERIES OF ACTUAL PERIODIC OBSERVATIONS OF THE WIND AND SOLAR RADIATION REGIMES.

1977-0661 WIND-DRIVEN POWER; QUESTIONS AND ANSWERS.
ELECTR. CONSTR. MAINT. 76: 93, AUGUST 1977.

SUGGESTIONS TO SOLVE THE PROBLEM OF VARIATION IN WIND SPEED THAT EFFECTS THE ROTATING SPEED OF THE GENERATOR AND ITS OUTPUT ARE GIVEN.

1977-0662 SAVINO J M, WAGNER L H, SINCLAIR D
WAKE CHARACTERISTICS OF AN EIGHT-LEG TOWER FOR A MOD-0 TYPE WIND TURBINE.
NTIS, DECEMBER 1977. 70 P.
NASA-TM-73868, E-9463, N78-24615

LOW SPEED WIND TUNNEL TESTS WERE CONDUCTED TO DETERMINE THE FLOW CHARACTERISTICS OF THE WAKE DOWNWIND OF A 1/25TH SCALE, ALL TUBULAR EIGHT LEG TOWER CONCEPT SUITABLE FOR APPLICATION TO THE DOE-NASA MOD-0 WIND POWER TURBINE. MEASUREMENTS WERE MADE OF WIND SPEED PROFILES, AND FROM THESE WERE DETERMINED THE WAKE LOCAL MINIMUM VELOCITY, AVERAGE VELOCITY, AND WIDTH FOR SEVERAL WIND APPROACH ANGLES.

1977-0663 SCHMIDT E R
ALTERNATE SOURCES OF ENERGY AND THE LAW.
CONFERENCE ON TECHNOLOGY FOR ENERGY CONSERVATION, WASHINGTON, D.C., JUNE 8, 1977. TECHNOLOGY FOR ENERGY CONSERVATION. ROCKVILLE, MD., INFORMATION TRANSFER INC., 1977. P. 7-8.

ALTERNATIVE SOURCES OF ENERGY (ASE) INCLUDE SOLAR, WIND, SMALL HYDRO-POWER, HOME-MADE GAS, AND NON-INTERNAL COMBUSTION TRANSPORT. TO SOME, ASE MEANS BACK TO REAL HORSEPOWER AND CANDLE LIGHTING. UNDER LAW CLASSIFICATION ARE LAWS, BUILDING CODES, TRANSPORT RULES, OFFICIALDOM DIRECTIVE, ODD TAX TREATMENT, AND UNOFFICAL COMMUNITY STANDARDS. SINCE ASE HAS NEVER BEEN RECOGNIZED, THERE ARE NO ANTI-ASE LAWS BUT THE OLD LAWS, CODES, AND REGULATIONS ARE BEING INTERPRETED TO SUIT ANTI-ASE BIAS OF THE ENFORCERS. IN THIS PAPER, THE AUTHOR USES NON-INTERNAL COMBUSTION VEHICLES, HOME WIND/ELECTRICITY, AND NEW BUILDING REGULATIONS TO DISCUSS ASE AND THE LAW.

1977-0664 SEITZ H
TOTAL ENERGY SYSTEMS
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 459-470.

THE POSSIBILITY OF LOCAL, COMPLETE AND SELF SUFFICIENT ENERGY SUPPLY SYSTEMS FOR RESIDENCES IS INVESTIGATED USING THE EXAMPLE OF A FAMILY RESIDENCE IN THE OLDENBURG AREA, WHICH IS SUPPLIED WITH WIND AND SOLAR POWER. USING WIND DATA COLLECTED DURING A LONG PERIOD OF TIME WE DISCUSS THE SIZE OF WIND TURBINES AND STORAGE SYSTEMS. FROM THE SMALL FLUCTUATION OF THE ENERGY AVAILABLE YEARLY. WE CONCLUDE THAT THIS RENEWABLE SOURCE HAS HIGH RELIABILITY. VARIOUS SYSTEMS BUILT OUT OF SOLAR COLLECTORS, WIND TURBINES, ELECTRIC AND HEAT STORAGE SYSTEMS ARE CALCULATED. THE FREQUENCY OF CHARGE AND DISCHARGE OPERATIONS OF A STORAGE SYSTEM IS EXAMINED.

1977-0665 SFORZA P M
VORTEX AUGMENTED WIND ENERGY CONVERSION.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1233-1236.

A DISCUSSION OF RESEARCH, DESIGN AND DEVELOPMENT ON A NOVEL AERODYNAMIC DEVICE WHICH CAN CONCENTRATE AND AUGMENT NATURAL WIND IS PRESENTED.

1977-0666 SFORZA P M
VORTEX AUGMENTATION OF WIND ENERGY.
WIND ENG. 1(3): 186-197, 1977.

AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS ARE DISCUSSED. THE KEYNOTE ELEMENT IS THE

GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH POWER DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF RELATIVELY LOW POWER DENSITY. PROPERLY DESIGNED TURBINES ARE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED VORTEX FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). THE BASIS FOR THE CONCEPT IS DESCRIBED AND EXPERIMENTAL STUDIES OF THE VORTEX FLOW FIELD ARE DISCUSSED. TURBINE ROTOR REQUIREMENTS AND ADVANTAGES ARE OUTLINED AND A TEST FACILITY FOR SUCH ROTORS IS ILLUSTRATED. A PROTOTYPE WIND ENERGY CONVERSION SYSTEM INCORPORATING THE VAC IS DESCRIBED. THE FIELD TEST PROGRAM FOR THE PROTOTYPE IS DISCUSSED.

1977-0667 SFORZA P M
FLUID FLOW ENERGY CONVERSION SYSTEMS.
U.S. PATENT NO. 4,047,832, SEPTEMBER 13, 1977. 22 P.

FLUID FLOW ENERGY CONVERSION SYSTEMS EMPLOYING AERODYNAMIC FLOW-SEPARATION VORTEX GENERATION FOR FOCUSING THE KINETIC ENERGY OF FLOW IN THE WORKING AREA OF THE TURBINE ARE DISCLOSED IN THE CONTEXT OF WIND POWER PLANTS. AS A CONSEQUENCE OF THIS AUGMENTATION, FLUID VELOCITY ACTING ON THE ROTOR IS INCREASED BY A SUBSTANTIAL AMOUNT OVER THE FREE STREAM VELOCITY, RESULTING IN SUBSTANTIAL INCREASES IN POWER OUTPUT FOR A GIVEN TURBINE CONFIGURATION. THE ILLUSTRATIVE EMBODIMENTS INCLUDE SIMPLE FLOW SEPARATION, VORTEX AUGMENTING SURFACES, SUCH AS THOSE FOUND IN DELTA PLANFORMS WHICH IN THIS CONTEXT GENERATE VORTICES AND THEREFORE FUNCTION AS AERODYNAMIC LENSES; THESE SURFACES ARE ORIENTED TO THE WIND TURBINE SO THAT GENERATED VORTICES ARE DIRECTED AT THE TURBINE BLADES.

1977-0668 SCHROEDER T A, TARLTON T G, DANIELS P A
MAUI COUNTY WIND POWER SURVEY. PART 2: MOLOKAI MOBILE SAMPLING PROGRAM 21 JUNE TO 31 JULY 1977. PART 3: MAUI FIXED STATION DATA SEPTEMBER 1976 TO JULY 1977.
HONOLULU, UNIVERSITY OF HAWAII, DEPARTMENT OF METEOROLOGY, OCTOBER 1977. 69 P.

A PRELIMINARY ATTEMPT WAS MADE TO IDENTIFY AREAS ON THE ISLAND OF MOLOKAI WHERE WINDS FAVOR ELECTRIC POWER GENERATION. BETWEEN 21 JUNE AND 31 JULY, 1977, FOUR MOBILE PLATFORMS WERE POSITIONED AT 58 LOCATIONS ON MOLOKAI. THE WINDS AT THESE SITES WERE COMPARED TO THOSE OBSERVED AT MOLOKAI AIRPORT. DIURNAL CYCLES ARE EVIDENT. THE VERTICAL STRUCTURE OF THE WIND WAS DETERMINED BY DAILY PILOT BALLOON ASCENTS FROM MOLOKAI AIRPORT. THE FIELD SURVEY HAS ALLOWED PLANNING THE ESTABLISHMENT OF PERMANENT MONITORING STATIONS ON MOLOKAI.

1977-0669 SIMKOVITS H R, KASSAKIAN J G
CONTROL AND DYNAMIC ANALYSIS OF A WIND ENERGY CONVERSION AND STORAGE SYSTEM OPERATING AT CONSTANT VELOCITY RATIO.
ENERGY DEVELOPMENT, NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 48-55.

LEAD-ACID BATTERIES ARE USED FOR ENERGY STORAGE AND CONSIDERATION IS GIVEN TO THE NUMBER OF BATTERY SECTIONS REQUIRED TO PRODUCE EFFICIENT OPERATION OF THE WINDMILL. A CHARGE CONTROL ALGORITHM IS DEVELOPED AND THE SYSTEM ENERGY EXTRACTION EFFICIENCY CALCULATED. SYSTEM DYNAMICS CAUSED BY BOTH WINDSPEED TRANSIENTS AND BATTERY SWITCHING ARE INVESTIGATED. OPTIMUM VALUES OF FIELD TIME CONSTANTS ARE DETERMINED.

1977-0670 SO R M C
ON VORTEX WIND POWER.
ASME PAPER 77-WA/FE-20, 1977. 5 P.

AN INFINITE VISCOUS LAMINAR VORTEX WITH NO REVERSE FLOW REGION IN THE EXIT PLANE, BUT WITH AXIAL INFLOW AT THE BASE, IS ANALYZED. THE AXIAL INFLOW IS ASSUMED TO BE FINITE EVERYWHERE. FROM THE ANALYSIS, THE MAXIMUM WIND POWER THAT CAN BE OBTAINED FROM SUCH A VORTEX IS CALCULATED. THE RESULTS SHOWS THAT THE POWER DEVELOPED DEPENDS ON THE CIRCULATION AT INFINITY AND ON THE VISCOUS RADIUS OF THE CORE OF THE VORTEX. THE SIGNIFICANCE OF THIS RESULT, AS IT RELATES TO THE RECENTLY PROPOSED VORTEX WIND ENERGY SYSTEM, IS DISCUSSED.

1977-0671 SO R M C
LIFT ON A ROTATING POROUS CYLINDER.
ASME TRANS. J. FLUIDS ENG. 99(4): 753-757, DECEMBER 1977.

TWO-DIMENSIONAL FLOW PAST A ROTATING CIRCULAR CYLINDER WITH UNIFORM SUCTION AT THE SURFACE IS CONSIDERED. THE METHOD OF SOLUTION FOLLOWS CLOSELY THAT USED BY GLAUERT AND THE PROBLEM IS SOLVED FOR THE CASE IN WHICH THERE IS NO VISCOUS FLOW SEPARATION FROM THE CYLINDER SURFACE. EXPRESSIONS IN TERMS OF THE RATIO OF THE CYLINDER PERIPHERAL VELOCITY AND A SUCTION PARAMETER ARE OBTAINED FOR THE LIFT AND TORQUE. THE RESULTS SHOW THAT UNIFORM SUCTION HAS A LIMITED EFFECT ON THE LIFT; HOWEVER, THE TORQUE INCREASES WITH SUCTION. POSSIBLE APPLICATION OF THESE RESULTS TO WIND POWER GENERATION IS BRIEFLY DISCUSSED.

1977-0672 SOLAR ENERGY.
MELVILLE, NEW YORK, OTTAVIANO TECHNICAL SERVICES, INC., 1977. 397 P.

THIS BOOK IS DIVIDED INTO THE FOLLOWING SEVEN SECTIONS: (1) NATIONAL ENERGY POLICY, (2) THE JUSTIFICATION OF USING SOLAR ENERGY, (3) DATA CONCERNING SOLAR ENERGY, (4) PRODUCTS AVAILABLE, (5) APPLICATIONS OF THESE PRODUCTS, (6) ECONOMICS, AND (7) FUTURE APPLICATIONS.

1977-0673 SOLAR--HYDROGEN ALTERNATIVE.
N.Z. ENERGY J. 50(3): 25, MARCH 25, 1977.

SOLAR ENERGY PROMISES MORE FOR ECOLOGY AND A PERMANENT ABUNDANT, CLEAN ENERGY SOURCE THAN DOES THE DEVELOPMENT OF ATOMIC ENERGY, WITH THE EXCEPTION OF FUSION. AND SOLAR METHODS OFFER A PATH FOR ABUNDANT, CLEAN ENERGY WHICH SEEMS FAR MORE EASILY ATTAINABLE THAN THAT OF FUSION. WIND ENERGY, PREVIOUSLY REGARDED AS A TRIVIAL SOURCE, COULD BE USED AS A MASSIVE SOURCE OF ENERGY IF AEROGENERATORS COULD BE LOCATED IN THE HIGH-INTENSITY WIND BELTS OF THE WORLD WHERE THE MEAN ANNUAL WIND IS MORE THAN 25 KM/H. HYDROGEN COULD BE MADE FROM THE ELECTRICITY GENERATED THERE AND BE TRANSPORTED TO DISTANT POINTS. THE AVAILABILITY OF MASSIVE QUANTITIES OF HYDROGEN WOULD GIVE A PERMANENTLY CLEAN METALLURGICAL AND CHEMICAL INDUSTRY.

1977-0674 SOUTH P, RANGI R S, TEMPLIN R J
APPLICATIONS OF WIND TURBINES IN CANADA.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 22 P.

IN THIS PAPER AN EFFORT HAS BEEN MADE TO DETERMINE THE WIND POWER POTENTIAL AND THE AMOUNT THAT IS ECONOMICALLY USABLE IN CANADA. FROM EXISTING WIND DATA A MAP SHOWING THE DISTRIBUTION OF WIND POWER DENSITY HAS BEEN PREPARED. THIS MAP SHOWS THAT THE MARITIME PROVINCES AND THE WEST COAST OF HUDSON BAY HAVE HIGH WIND POWER

POTENTIAL. USING THE POWER DENSITY MAP THE POWER POTENTIAL FOR THE THREE CASES HAS BEEN CALCULATED. THE FIGURES SHOW THAT THE WIND POWER POTENTIAL IS OF THE SAME ORDER AS THE INSTALLED ELECTRICAL GENERATING CAPACITY IN CANADA (58 X 10**6KW IN 1974). HOWEVER, IN ORDER TO DETERMINE HOW MUCH OF THIS POWER IS USABLE THE ECONOMICS OF ADDING WIND ENERGY TO AN EXISTING SYSTEM MUST BE CONSIDERED. A COMPUTER PROGRAM HAS BEEN DEVELOPED TO ANALYZE THE COUPLING OF WIND TURBINES WITH MIXED POWER SYSTEMS.

1977-0675 SPERA D A
BRUSH WIND TURBINE GENERATOR AS DESCRIBED IN SCIENTIFIC AMERICAN OF DECEMBER 20, 1890.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, OHIO, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1977. P. 275-283.
CONF-771148

AN HISTORIC WIND TURBINE GENERATOR IS DESCRIBED WHICH OPERATED IN CLEVELAND, OHIO, FROM 1888 TO 1908. THE MACHINE HAD A 144-BLADE ROTOR 56 FEET IN DIAMETER, A PIVOTED TOWER 60 FEET HIGH, AND A MAXIMUM OUTPUT OF 12 KW DC. THE DESCRIPTION IS BASED ON AN 1890 ARTICLE IN SCIENTIFIC AMERICAN JOURNAL.

1977-0676 STUDY OF FEASIBILITY OF UTILIZING SOLAR, WIND AND GEOTHERMAL ENERGY IN HOBBS, NEW MEXICO.
NTIS, AUGUST 2, 1977. 183 P.
TID-28581

IT IS INDICATED THAT OF THE THREE TYPES OF RENEWABLE ENERGY SOURCES CONSIDERED: (1) GEOTHERMAL ENERGY IS NOT AVAILABLE CONVENIENTLY TO THE HOBBS AREA AND IS NOT CONSIDERED IN DEPTH; (2) WIND ENERGY, BASED ON TWENTY-FOUR HOUR AVERAGES OF WIND SPEED AND DENSITY, IS NOT A VIABLE SUPPLEMENTARY SOURCE BUT, WHEN CONSIDERING WINDS DURING THE HOURS BETWEEN 9:00 A.M. AND 5:00 P.M., IS ECONOMICALLY FEASIBLE; AND (3) SOLAR ENERGY CONTAINS MORE THAN SIX TIMES THE ENERGY PER SQUARE METER THAN WIND DOES AND THEREFORE IS MORE ATTRACTIVE ECONOMICALLY AND SHOULD BE PURSUED. GEOGRAPHIC CHARACTERISTICS PERTINENT TO THE SOUTHEASTERN PORTION OF NEW MEXICO ARE STUDIED WITH EMPHASIS ON LEA COUNTY. THE AREA DEMAND FOR ENERGY IS DISCUSSED. THE EVALUATION OF GEOTHERMAL ENERGY SOURCES, THE WIND, AND SOLAR ENERGY AS USABLE ENERGY SOURCES IS DISCUSSED. THE THREE MOST COMMON TYPES OF SOLAR ENERGY SYSTEMS ARE DISCUSSED. A NUMBER OF SPECIFIC SOLAR ENERGY SYSTEMS ARE DESCRIBED. THE SYSTEMS ARE EVALUATED ON THE BASIS OF AVAILABLE COST PROJECTIONS. THE RESULTS ARE SUMMARIZED AND RECOMMENDATIONS ARE PRESENTED.

1977-0677 SULLIVAN T F P
ENERGY REFERENCE HANDBOOK.
WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1977. 352 P.

IT HAD BEEN RECOGNIZED THAT A NEED EXISTED FOR A REFERENCE SOURCE INCORPORATING THE KEY WORDS AND TERMS FREQUENTLY USED IN THE VARIOUS SEGMENTS OF THE ENERGY FIELD. THE FIRST EDITION OF THE HANDBOOK WAS CREATED TO FILL THAT NEED. IN THIS SECOND EDITION, OUT-OF-DATE TERMS HAVE BEEN CULLED AND REPLACED WITH THE MOST CURRENT TERMS. SPECIAL ATTENTION HAS BEEN PAID TO THOSE TERMS PECULIAR TO EACH AREA WITHIN THE ENERGY TECHNOLOGY FIELD, NAMELY: COAL, NUCLEAR, OIL, GAS, SOLAR, WIND, OCEAN POWER, GEOTHERMAL, SHALE, AND THE ENVIRONMENT. IN ADDITION TO THE GLOSSARY, ALSO INCLUDED ARE FREQUENTLY USED CONVERSION TABLES, WITH PARTICULAR ATTENTION FOCUSED ON THOSE SPECIFIC TO ENERGY. CONVERSION TABLES ARE ESPECIALLY IMPORTANT AS THE U.S. ENTERS THE METRIC AGE. ALSO ADDED ARE CHARTS AND TABLES FORECASTING THE RESERVES OF VARIOUS FUEL RESOURCES. AN EFFORT WAS MADE TO COMPILE AND DEFINE THE MOST COMMON, MOST SPECIFIC TERMS TO RESULT IN A BETTER UNDERSTANDING OF THE TERMINOLOGY USED IN EACH ENERGY APPLICATION. IN MANY CASES IT IS SOMETIMES DIFFICULT TO SETTLE UPON A SINGLE DEFINITION ACCEPTABLE TO ALL CONCERNED.

1977-0678 SUMNER J
HEAT PUMPS SAVE FUEL COSTS.
ELECTR. REV. 201(21): 16-17, NOVEMBER 25, 1977.

THIS ARTICLE EXPLAINS THAT A HEAT PUMP COMBINED WITH A WATER OR WINDMILL MAY PROVE TO BE THE BEST SAVER OF DOMESTIC ENERGY COSTS. A HEAT PUMP DRIVEN BY THE PUBLIC SUPPLY IS ALSO A WORTHWHILE PROPOSITION.

1977-0679 SVENSSON T
CONSTRUCTION OF 1KVA INVERTER FOR WIND POWER PLANTS.
NTIS, MARCH 1977. 67 P. (IN SWEDISH)
STU-75-3324

A SINGLE PHASE INVERTER FOR 1 KVA HAS BEEN CONSTRUCTED. THE INVERTER CONSISTS OF A SINGLE PHASE THYRISTOR BRIDGE COUPLING WITH A DC VOLTAGE SOURCE AND A RIPPLE FILTER CHOKE ON THE DC SIDE AND A VARIABLE PARALLEL TURNED CIRCUIT ON THE AC SIDE. THE RELIABILITY OF THE INVERTER HAS BEEN TESTED. THE INFLUENCE OF LEAD AND SUPPLY VOLTAGE ON THE OUTPUT VOLTAGE AND FREQUENCY HAVE BEEN DETERMINED. THE INVERTER HAS ALSO BEEN TESTED UNDER TRANSIENT CONDITIONS SUCH AS STARTUP OF DIFFERENT LOADS. THE TESTS SHOW THAT THE INVERTER WORKS SATISFACTORILY. IN DECEMBER 1976 THE INVERTER WAS CONNECTED TO THE WIND POWER PLANT AT BOHUS MALMSEN, SWEDEN, AND HAS WORKED QUITE NORMALLY.

1977-0680 SYSTEMS DESCRIPTIONS AND ENGINEERING COST FOR SOLAR-RELATED TECHNOLOGIES. VOLUME I. SUMMARY.
NTIS, JUNE 1977. 157 P.
MTR-7485(VOL.1)

THE RESULTS OF THE METREK SOLAR ENERGY ENGINEERING COST STUDY, IN SUPPORT OF THE SYSTEM TO PROJECT UTILIZATION OF RENEWABLE RESOURCES (SPURR) MODEL, ARE PRESENTED. GENERIC SYSTEMS DESIGNS ARE FORMULATED AND THE ASSOCIATED ENGINEERING COSTS ARE EVALUATED AND ESTIMATED. AN AIM OF THIS STUDY IS TO PREDICT THE LIKELY COSTS AND PERFORMANCE OF SOLAR EQUIPMENT, ONCE MASS PRODUCED.

1977-0681 TENNYSON G P
FEDERAL WIND ENERGY PROGRAM.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 483-484.

1977-0682 TETZLAFF G
WIND POWER.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 415-424.

THE ENERGY OUTPUT FROM WIND TURBINES DEPENDS ON THE LOCAL METEOROLOGICAL CONDITIONS. FIRST ESTIMATIONS SHOW DIFFICULTIES IN GETTING RELIABLE DATA OUT OF LONG TERM AVERAGES (ANNUAL) OF WIND SPEED VALUES. THE CORRELATION BETWEEN THE VALUES 10 M ABOVE THE GROUND AND AT 100 M HEIGHT IS NOT NECESSARILY GOOD. GUSTINESS INFORMATION IS

SPARSE AND MORE EXPERIMENTAL DATA IS NEEDED. THE SPATIAL EXTENSION OF THE WAKE IS ONLY KNOWN FOR SOME FEW CASES. THE GAPS IN THE WIND POWER AVAILABILITY MAY PROBABLY BE REDUCED BY SPREADING THE WIND TOWERS IN A LARGE AREA.

1977-0683 TEXAS ENERGY DEVELOPMENT FUND. VOLUME I. PERSPECTIVES FOR R AND D.
AUSTIN, TEXAS, TEXAS ENERGY ADVISORY COJNCIL, 1977. 57 P.
T-77-008

THE TEXAS ENERGY DEVELOPMENT ACT OF 1977 CREATED THE ENERGY DEVELOPMENT FUND TO SUPPORT RESEARCH IN AND DEVELOPMENT OF SOLAR, GEOTHERMAL, LIGNITE, BIOMASS, WIND, CONSERVATION, AND OTHER ALTERNATE ABUNDANT ENERGY RESOURCE TECHNOLOGIES. THE ACT REQUIRES THAT A PLAN BE PROMULGATED FOR PURPOSES OF ADMINISTERING THE FUND. THE PLAN DEVELOPED FOR PURPOSES OF THE ACT CONSISTS OF TWO VOLUMES. THE FIRST VOLUME PROVIDES AN OVERVIEW OF THE OUTLOOK TO THE YEAR 2000 FROM CONVENTIONAL SOURCES OF ENERGY IN TEXAS, PRIMARILY OIL AND GAS, AND FURTHER, DESCRIBES THE PROSPECTS FROM DEVELOPING ENERGY TECHNOLOGIES. LEGAL, TECHNOLOGICAL, ECONOMIC, AND INSTITUTIONAL PROBLEMS IMPEDING THE DEVELOPMENT OF EACH OF THE DEVELOPING TECHNOLOGIES ARE IDENTIFIED, AND THE RATIONALE FOR PROJECT SOLICITATION IMPLIED FROM THIS OVERVIEW IS DESCRIBED. VOLUME II DESCRIBES THE PROCEDURES FOR ADMINISTERING THE FUND: SUBMISSION AND SOLICITATION OF PROPOSALS, EVALUATION AND SELECTION OF PROPOSALS BY AN IMPARTIAL GROUP OF TECHNICAL EXPERTS, THE DISBURSEMENT OF CONTRACTED FUNDS, PROJECT COSTS ACCOUNTING, PROJECT REPORTING REQUIREMENTS, AND DISSEMINATION OF RESULTS.

1977-0684 THALHEIM K
ELECTRIC POWER GENERATOR USING SUN AND WIND.
GERMAN (FRG) PATENT NO. 2,604,175/A/, AUGUST 11, 1977. 2 P. (IN GERMAN)

THE PATENT CLAIMS AN ELECTRIC WIND POWER GENERATOR WHOSE WIND BLADES ARE EQUIPPED WITH SOLAR CELLS. ALSO OTHER PARTS OF THE WIND POWER GENERATOR MAY BE EQUIPPED WITH SOLAR CELLS. THE POWER GENERATED MAY BE SUPPLIED DIRECTLY TO THE USER.

1977-0685 THOMANN G C, JONG M, SNYDER M H
SMALL HORIZONTAL-AXIS WIND TURBINE FEEDING POWER INTO THE UTILITY GRID.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, ROLLA, MISSOURI, OCTOBER 11, 1977. PROCEEDINGS. NTIS, 1977. P. 588-602.
CONF-771C136

A SMALL HORIZONTAL AXIS WIND TURBINE, WITH ABOUT A 2 KW POWER OUTPUT, WAS CONTRUCTED TO CONVERT WIND ENERGY INTO AC POWER TO BE FED INTO THE UTILITY GRID. THE MACHINE IS INTENDED TO MODEL OPERATION OF THE LARGER WIND GENERATORS NOW BEING BUILT. THE VARIABLE PITCH ROTOR IS 18 FT IN DIAMETER AND HAS A GA(W)-1 BLADE AIRFOIL. THE ROTOR IS FABRICATED FROM SITKA SPRUCE MOUNTED ON A COMMERCIAL PROPELLER/HUB SYSTEM. ROTOR SPEEDS OF FROM 75 TO 150 RPM ARE USED IN OPERATION. A CHAIN DRIVE AND HELICAL GEAR DRIVE SYSTEM STEPS UP ROTOR SPEED TO 1800-3600 RPM TO DRIVE A GENERATOR CONNECTED TO THE UTILITY GRID. THE GENERATOR CAN BE OPERATED IN EITHER AN INDUCTION OR SYNCHRONCUS MODE; ONLY THE INDUCTION MODE HAS BEEN USED AT THE PRESENT TIME. ROTOR SPEED, ROTOR PITCH, TURBINE AZIMUTH, WIND SPEED AND DIRECTION, AND POWER OUTPUT ARE MONITORED DURING OPERATION. TOWER AZIMUTH AND ROTOR PITCH ARE CONTROLLED DURING EXPERIMENTS. AN AUTOMATIC DATA RECORDING SYSTEM IS PRESENTLY BEING INSTALLED. A MICROPROCESSOR AUTOMATIC CONTROL SYSTEM FOR ADJUSTING AZIMUTH DIRECTION AND ROTOR PITCH WILL BE INSTALLED SHORTLY. A COMPLETE SET OF EXPERIMENTS IS PLANNED FOR THE SPRING OF 1978.

1977-0686 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRICAL POWER GENERATION FROM THE WIND.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESS. B.2. 5 P.

WIND ENERGY CONVERSION SYSTEMS (WECS) NOW BEING DEVELOPED ARE EXPECTED TO BE ABLE TO PROVIDE LARGE AMOUNTS OF ELECTRICAL ENERGY AT SELECTED WINDY SITES AT COSTS COMPETITIVE WITH ENERGY FROM NEW COAL AND NUCLEAR POWER PLANTS. WECS AND HYDROELECTRIC FACILITIES FOR STORAGE CONNECTED TO THE SAME LARGE-SCALE TRANSMISSION GRIDS ARE EXPECTED TO PUT LARGE ENERGY RESOURCES WITHIN REACH OF LOAD CENTERS UP TO 2000 KM FROM THE WIND SITES. DIVERSITY OF WIND SITES REDUCES THE COST OF STORAGE REQUIRED TO SMOOTH FLUCTUATIONS IN WIND ENERGY. TRANSMISSION FROM THE BEST SITES TO LOAD CENTERS IS EXPECTED TO BE PREFERABLE TO LOCAL GENERATION FROM THE WIND AND SUN AT INFERIOR SITES. ALL ELEMENTS OF THE INTEGRASYSTEM ARE WITHIN THE PRESENT STATE OF THE ART.

1977-0687 TODD J
TOMORROW IS OUR PERMANENT ADDRESS.
J. NEW ALCHEM.: 85-106, 1977.

THE ARK ON PRINCE EDWARD ISLAND IN CANADA IS DESCRIBED. IT IS CONSIDERED AS A BIOSHELTER SINCE IT PROVIDES ITS OWN ENERGY AND CLIMATE FOR ITS RESIDENTS. IT INCLUDES ITS OWN WIND POWERED GENERATION FACILITIES AND WASTE TREATMENT PLANT. SOLAR PONDS PROVIDE THE FOOD FOR THE INHABITANTS. THE ARK HAS DOMESTIC HOT WATER SYSTEMS INCLUDING A 700 SQ. FT. COLLECTOR FOR SPACE HEATING AND A PASSIVE WARM WATER AQUACULTURE FACILITY FOR HEATING. ENERGY CONSERVATION TECHNIQUES HELP TO MINIMIZE THE ENERGY NEEDS. SUGGESTIONS ARE MADE FOR THE ADOPTION OF THE BIOLOGICAL DESIGN MODELS. OVER THIRTY SENSORS MONITOR THE ARK FOR PERFORMANCE OF ENERGY, CLIMATOLOGICAL AND BIOLOGICAL PROCESSES. A MINI-COMPUTER WILL BE INSTALLED IN THE PROJECT FOR SIMULATION AND OBSERVATION.

1977-0688 TRAVIS S
NATURAL HOUSE FOR NORTHERN MAINE.
ALTERN. SOURCES ENERGY NO. 26: 15-19, JUNE 1977.

DETAILED DESIGN FEATURES OF A MAINE HOUSE WHICH COMBINES PASSIVE SOLAR HEATING, SOLAR COOKING, WIND POWER, SNOW REFRIGERATION, AND SOLAR SEWAGE COMPOSTING FOR COMPLETE SELF-SUFFICIENCY ARE DESCRIBED. ARCHITECTURAL DRAWINGS SHOW ALL VIEWS OF THE STRUCTURE. THE HOUSE IS BUILT OVER A WATER POND, WHERE SOLAR ENERGY IS STORED. A WOOD BURNING FURNACE PROVIDES BACK-UP HEATING. INFORMATION IS INCLUDED ON PROCUREMENT SOURCES FOR KEY COMPONENTS. CONTACT INFORMATION IS GIVEN FOR OBTAINING A FULL SET OF DETAILED BUILDING PLANS AT NOMINAL COST.

1977-0689 TRENDS.
UMSCH. WISS. TECH. 77(21): 704-708, NOVEMBER 1, 1977. (IN GERMAN)

A 3 MW WIND POWER PLANT CALLED GROWIAN IS DESCRIBED. A TOTAL OF 20 MILLION DM IS ESTIMATED FOR THE FOUR YEAR WIND ENERGY PROSPECTING PROGRAM ENDING 1980.

1977-0690 URBANEK A
WIND POWER.

ENERGIE 29(9): 296-299, SEPTEMBER 1977. (IN GERMAN)

THE TECHNICAL FEATURES OF WIND-POWER UTILISATION AND PRIME MOVER/GENERATING PLANT ARE DISCUSSED, EXPERIMENTAL PLANT AND WIND POWER PROGRAMMES IN VARIOUS COUNTRIES ARE DISCUSSED AND REFERENCE IS MADE TO ENERGY STORAGE, SOLAR/WIND POWER INTERCONNECTION AND PROSPECTS IN THE THIRD WORLD. IN THE GERMAN FEDERAL REPUBLIC IT IS HOPED TO HAVE A 3 MW PROTOTYPE UNIT READY FOR TECHNICAL EVALUATION BY THE END OF 1980 UNDER THE GROWIAN RESEARCH PROGRAMME. DESPITE RENEWED INTEREST IN WIND POWER GENERATION AND ITS ATTRACTIVE FEATURES AND TECHNICAL FEASIBILITY, IT IS CONCLUDED THAT DOUBTS STILL EXIST ON ECONOMICAL GROUNDS FOR LARGE SCALE UTILIZATION.

1977-0691 USE OF BRACKISH GROUND WATER RESOURCES FOR REGIONAL ENERGY CENTER DEVELOPMENT. TULAROSA BASIN, NEW MEXICO: PRELIMINARY EVALUATION.
NTIS, MARCH 1977. 517 P.
FEA/G-77/101, PB-269898

THE PURPOSE OF THIS STUDY IS TO CONTRIBUTE TO THE GROWING KNOWLEDGE ABOUT THE FEASIBILITY OF ENERGY CENTERS, PARTICULARLY IN RELATION TO UTILIZATION OF HITHERTO UNALLOCATED AND MAINLY UNUSABLE GROUNDWATER IN THE WESTERN STATES. SPECIFICALLY THE SUITABILITY OF THE TULAROSA BASIN IN SOUTH-CENTRAL NEW MEXICO AS THE SITE FOR A REGIONAL ENERGY CENTER IS STUDIED. THE CENTER IS ASSUMED TO BE PRIMARILY NUCLEAR WITH VARYING POTENTIALS FOR FOSSIL, SOLAR, GEOTHERMAL, AND WIND ENERGY-GENERATING FACILITIES. THE ANALYSIS ALSO CONSIDERS ANTICIPATED SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT ON THE REGION.

1977-0692 WARNE D F, CALNAN P G
GENERATION OF ELECTRICITY FROM THE WIND.
INST. ELECTR. ENG. PROC. 124(11R): 963-985, NOVEMBER 1977.

A REVIEW IS PRESENTED WHICH TRACES THE HISTORY OF WIND-DRIVEN PLANT FROM A POINT WHEN IT WAS FIRST CONSIDERED FOR ELECTRICITY GENERATION IN ABOUT 1890. THE BUILD UP OF A SIGNIFICANT LEVEL OF AVAILABLE TECHNOLOGY FOR LARGE-SCALE EXPLOITATION IS DEMONSTRATED, BASED ON RESEARCH AND DEVELOPMENT THAT HAS SINCE TAKEN PLACE, TOGETHER WITH SOME OF THE CONCURRENT COMMERCIAL ACHIEVEMENTS. PLANT SUBSYSTEM DESIGN OPTIONS INTERACT WITH EACH OTHER AND AFFECT PERFORMANCE AND COSTS. THESE OPTIONS ARE DISCUSSED, AND THE COSTS, COSTING METHODS AND COMPETITIVENESS OF LARGE WIND GENERATORS NOW AT, OR SOON TO REACH, THE STAGE OF CONCEPTION OR DESIGN, ARE EXAMINED. AN ACCOUNT IS INCLUDED OF THE SCOPE OF CURRENT ACTIVITIES OF ANY SIZE OR SPECIAL INTEREST IN SEVERAL COUNTRIES. A FUTURE WORLDWIDE ROLE FOR WIND GENERATION LINKED TO NEEDS, WINDS AND TECHNICAL INNOVATIONS IS PROJECTED.

1977-0693 WEINLICH K
ENERGY CHARACTERISTIC QUANTITIES.
BRENNST.-WAERME-KRAFT 29(12): 481-488, DECEMBER 1977.

FOR COMPARING VARIOUS ENERGY FORMS, SPECIFIC ENERGY, ENERGY DENSITY AND ENERGY SLOW DENSITY CAN BE USED AS ENERGY CHARACTERISTIC QUANTITIES WHICH ENABLE DEDUCTIONS IN RESPECT OF THE DEMAND ON MATERIALS, VOLUME AND AREA FOR A CERTAIN ENERGY CONVERSION TO BE MADE. ASSUMING A LOSS-FREE CONVERSION, THESE THREE ENERGY CHARACTERISTIC QUANTITIES ARE DETERMINED FOR POTENTIAL ENERGY, PRESSURE ENERGY, KINETIC ENERGY, THERMAL ENERGY, COMBUSTION ENERGY, COMPLETE TRANSFORMATION OF MASS INTO ENERGY (ANNIHILATION), NUCLEAR FISSION ENERGY, NUCLEAR FUSION ENERGY, AS WELL AS SOLAR AND WIND ENERGY. A COMPARISON IS MADE BETWEEN THEM.

1977-0694 WEISBRICH A L
FEATURE REVIEW OF SOME ADVANCED AND INNOVATIVE DESIGN CONCEPTS IN WIND ENERGY CONVERSION SYSTEMS.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 445-458.

IN RESPONSE TO THE IMPENDING ENERGY SITUATION, NUMEROUS ALTERNATIVE ENERGY GENERATION SCHEMES ARE BEING PROPOSED AND PURSUED. SPECIFICALLY, IN THE AREA OF WIND ENERGY MUCH EFFORT IS BEING EXPENDED TO DEVELOP A SUPERIOR ENERGY CONVERSION SYSTEM. SOME ADVANCED WIND ENERGY CONVERSION SYSTEM (WECS) CONCEPTS ARE PRESENTED AND THEIR FEATURES HIGHLIGHTED. ALTHOUGH OTHERS MAY BE PURSUING SIMILAR OR OTHER CONCEPTS, ONLY CERTAIN INDIVIDUALS AND ORGANIZATIONS ASSOCIATED WITH THESE CONCEPTS ARE SPECIFIED.

1977-0695 WENDNER W
PENDULUMIMPELLER--WIND- AND HYDROELECTRIC POWER PLANT WITH VERTICAL ROTATION AXIS AND FLY WHEEL CENTRIFUGAL ENERGY STORAGE.
GERMAN (FRG) PATENT NO. 2,612,200/A/, OCTOBER 16, 1977. 16 P. (IN GERMAN)

THE INVENTION DEALS WITH A WIND- OR WATER WHEEL WITH VERTICAL AXIS. ON THE CIRCUMFERENCE OF THE WHEEL, ARRANGED ARE THE PENDULUM IMPELLERS WHICH--EQUIPPED WITH COUNTERWEIGHTS--CAN SWIVEL AROUND A VERTICAL AXIS AND THROUGH SPRING POWER ARE PUSHED BACK INTO MID-POSITION, IN A WAY THAT THE WHEEL IS DRIVEN FROM THE SIDES TURNED TOWARDS AND AWAY FROM THE STREAM AND MADE TO ROTATE.

1977-0696 WHITFORD D H, MINARDI J E, STARNER F L, WEST B S
MADARAS ROTOR POWER PLANT.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1281-1290.

ANALYTICAL STUDIES, WIND TUNNEL EXPERIMENTS, AND FULL-SCALE TESTS OF THE NOVEL, WIND-POWERED, MADARAS ROTOR POWER PLANT WERE CONDUCTED IN THE 1930 TO 1934 TIME PERIOD. THIS SYSTEM, INVENTED BY JULIUS D. MADARAS, USED 90-FT HIGH BY 22.2-FT DIAMETER ROTATING, VERTICALLY-MOUNTED CYLINDERS TO CONVERT WIND POWER TO MAGNUS EFFECT FORCES WHICH PROPELLED AN ENDLESS TRAIN OF CARS AROUND A CLOSED TRACK. GENERATORS GEARED TO THE CAR AXLES PRODUCED ELECTRIC POWER. FORCE MEASUREMENTS ON A FULL-SIZE CYLINDER PROVED THAT THE CONCEPT WAS TECHNICALLY FEASIBILE, BUT THE PROJECT WAS DISCONTINUED PRIOR TO PILOT PLANT DEMONSTRATION BECAUSE OF THE DEPRESSION. THE UNIVERSITY OF DAYTON RESEARCH INSTITUTE HAS CONDUCTED STUDIES OF THE MADARAS SYSTEM TO VERIFY THE INITIAL COMPUTATIONS MADE BY MADARAS AND HIS CO-WORKERS. THESE STUDIES HAVE INCLUDED A THOROUGH REVIEW OF THE LITERATURE OF THE MADARAS PROGRAM CONTAINED IN A SET OF 14 UNPUBLISHED TECHNICAL REPORTS AND DISCUSSIONS WITH TWO KEY MEN WHO WORKED WITH THE ORIGINAL MADARAS PROJECT. THE STUDIES ALSO HAVE INCLUDED A REVIEW OF THE MAJOR WIND TUNNEL TESTS ON ROTATING CYLINDERS CONDUCTED SINCE THE MID 1920'S AND COMPUTER SIMULATION STUDIES OF THE SYSTEM PERFORMANCE.

1977-0697 WIEDEMANN H
DEVICE FOR MAKING NATURAL ENERGY AVAILABLE.
GERMAN (FRG) PATENT NO. 2,617,023/A/, OCTOBER 20, 1977. 28 P. (IN GERMAN)

THE CLAIMS CHIEFLY CONCERN A WATER VEHICLE OF THE CATAMARAN TYPE AND A PLATFORM COVERING THE HULL OF THE SHIP

WITH DEVICES FOR CONVERTING SOLAR ENERGY AND/OR WAVE ENERGY AND/OR WIND ENERGY AND/OR THE HEAT OF THE SEAWATER INTO ELECTRICAL ENERGY. THE ELECTRICAL ENERGY IS STORED IN THE FORM OF KINETIC ENERGY OF TWO FLYWHEELS ROTATING IN OPPOSITE DIRECTIONS.

1977-0698 WILSON D E
AEROELASTIC PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 571-573.

1977-0699 WIND ENERGY SOON NECESSARY FOR ELECTRIC POWER GENERATION.
ALTES HAUS-MOD. NO. 14: 4, 1977. (IN GERMAN)

1976-0562 1976 ENERGY RESEARCH AND DEVELOPMENT INVENTORY FOR THE STATE OF MISSOURI.
JEFFERSON CITY, MISSOURI, MISSOURI ENERGY AGENCY, 1976. 25 P.

THE MISSOURI ENERGY AGENCY HAS COMPILED AN INVENTORY OF 150 STATEWIDE R AND D PROJECTS INVOLVED WITH ENERGY AS A FIRST STEP IN OPENING COMMUNICATIONS CHANNELS BETWEEN GROUPS INVOLVED. THE PROJECTS WILL BE KEPT INFORMED OF RESEARCH ACTIVITIES AND FUNDING OPPORTUNITIES. MOST FUNDS ORIGINATE WITH ERDA AND THE NATIONAL SCIENCE FOUNDATION, WITH CONTRIBUTIONS FROM THE ELECTRIC POWER RESEARCH INSTITUTE, GAS RESEARCH INSTITUTE, ET AL. PROJECTS ARE LISTED IN BROAD CATEGORIES OF AGRICULTURE, ELECTRIC ENERGY ANALYSIS AND UTILIZATION STUDIES, FOSSIL FUEL, NUCLEAR ENERGY, SOLAR, WIND, MISCELLANEOUS, AND PENDING. LISTINGS INCLUDE THE ORGANIZATION, NAMES OF PRINCIPAL INVESTIGATORS, TITLE OF PROJECT, FUNDING SOURCE, DOLLAR AMOUNTS, AND DURATION OF PROJECT.

1976-0563 BAKER R H
ENERGY SUPPLY, DEMAND/NEED, AND THE GAPS BETWEEN. VOL. III. MONOGRAPHS AND WORKING PAPERS: WIND ENERGY.
EPA ENVIRONMENTAL PROTECTION TECHNOLOGY SERIES, MARCH 1976. P. 2-1--2-8.
EPA-600/2-76-044B

1976-0564 BALACHANDRAN S
ENERGY STATISTICS: A GUIDE TO SOURCES.
CHAMPAIGN, ILLINOIS, COUNCIL OF PLANNING LIBRARIANS, 1976. 51 P.

THIS PUBLICATION COMPILES A SELECTED AND ANNOTATED GUIDE TO 162 NATIONAL AND INTERNATIONAL SOURCES OF STATISTICS COVERING ALL FORMS OF ENERGY SUCH AS COAL, ELECTRICITY, NATURAL GAS, NUCLEAR POWER, PETROLEUM, SOLAR, AND OTHER MISCELLANEOUS TYPES. EACH FORM IS DEALT WITH SEPARATELY, THE FIRST LISTING COVERING COMPOSITE SOURCES--SOURCES WHOSE COVERAGE EXTENDS TO ALL FORMS OF ENERGY. A SUBJECT INDEX AND A DIRECTORY OF PUBLISHERS ARE ALSO INCLUDED.

1976-0565 BEATSON C
RESEARCH TODAY FOR TOMORROW'S POWER.
ENGINEER 242(6275): 54-55, 57, JUNE 24, 1976.

MUCH R AND D WILL BE REQUIRED FOR SOLAR, TIDAL, WAVE, WIND, AND GEOTHERMAL ENERGY TO BE EXPLOITED ON A LARGE SCALE IN THE UK. WIND ENERGY IS WIDELY AVAILABLE BUT IRREGULAR AND VARIABLE, THE BASIC PROBLEM BEING STORAGE. TIDAL AND WAVE POWER ARE OF PRACTICAL INTEREST ONLY TO LARGE ELECTRICITY SUPPLY ORGANIZATIONS; WAVE POWER IS MORE OF A CONVENTIONAL BASE-LOAD ENERGY SOURCE FOR WHICH STORAGE IS NEEDED IF THE FULL POTENTIAL IS TO BE REALIZED; AN EXPANDED TIDAL SCHEME COULD PROVIDE THIS STORAGE BECAUSE IT IS COMPLEMENTARY TO ANY PRIMARY SOURCE.

1976-0566 BEHRMAN D
SOLAR ENERGY: THE AWAKENING SCIENCE.
BOSTON, MASSACHUSETTS, LITTLE, BROWN AND COMPANY, 1976. 408 P.

THE BOOK CONCERNS ANSWERS TO THE QUESTIONS: (1) IS SOLAR ENERGY THE KEY TO THE FUTURE OF OUR ENERGY NEEDS; AND (2) WHAT ARE THE FACTS AND TRUE POTENTIAL OF THIS ENORMOUS, STILL LARGELY UNEXPLORED SOURCE OF RENEWABLE POWER. IT REVIEWS THE KNOWLEDGE OF SOLAR ENERGY FROM THE MIRRORS THAT ARCHIMEDES USED TO SET A ROMAN FLEET AFLAME IN 215 B.C., TO TODAY'S PLANS FOR DESIGNING ATTRACTIVE, AFFORDABLE DOMESTIC SOLAR HOUSING, TO TOMORROW'S DREAMS OF BUILDING SOLAR SKYSCRAPERS. MANY OF THE SITES AND THE TECHNOLOGY APPLIED TO HARNESS THE SUN'S POWER ARE DESCRIBED.

1976-0567 BLIAMPTIS E E
MUSES: A MULTIPURPOSE UTILIZATION OF SOLAR ENERGY SYSTEM.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY. 1ST CONFERENCE AND EXHIBITON OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 512-524.

THE MULTIPURPOSE UTILIZATION OF SOLAR ENERGY SYSTEM (MUSES) IS A SYSTEM FOR LARGE SCALE UTILIZATION OF SOLAR ENERGY. IT CONSISTS OF THE FOLLOWING BASIC COMPONENTS: (A) A DISTILLATION POND; (B) A DUCT FOR THE FLOW OF THE HEATED AIR/VAPOR MIXTURE; (C) A HIGH ELEVATION WIND TURBINE/ELECTRIC GENERATOR; (D) A COOLING TOWER FACILITY; (E) A HIGH ELEVATION RESERVOIR FOR STORAGE OF WATER CONDENSED FROM THE AIR/VAPOR MIXTURE; (F) A SERIES OF HYDRAULIC TURBINES PRODUCING ADDITIONAL ELECTRIC POWER; AND FINALLY (G) A LOW ELEVATION RESERVOIR FOR STORING THE SPENT WATER BEFORE IT IS USED FOR IRRIGATION OR DRINKING PURPOSES. THE OPERATION, ADVANTAGES, AND DISADVANTAGES OF SUCH A SYSTEM ARE DISCUSSED.

1976-0568 BLOK C
LEVEN VAN DE WIND. (LIVING ON WIND).
ORGANORAMA 13(1): 1976. (IN DUTCH)

1976-0569 CHAMIS C C, SULLIVAN T L
FREE VIBRATIONS OF THE ERDA-NASA 100 KW WIND TURBINE.
NTIS, 1976. 16 P.
DOE/NASA/1028-77/7, NASA-TM-X-71879, CONF-760307-4

THE ERDA-NASA WIND TURBINE (WINDMILL), WHICH CONSISTS OF A 93-FOOT TRUSS TOWER, A BED PLATE THAT SUPPORTS MECHANICAL AND ELECTRICAL EQUIPMENT, AND TWO 62.5-FOOT LONG BLADES, WAS ANALYZED TO DETERMINE ITS FREE VIBRATIONS USING NASTRAN. THE FINITE ELEMENT REPRESENTATION OF THE SYSTEM CONSISTED OF BEAM AND PLATE ELEMENTS. THE FREE VIBRATIONS OF THE TOWER ALONE, THE BLADES ALONE, AND THE COMPLETE SYSTEM WERE DETERMINED EXPERIMENTALLY IN THE FIELD.

1976-0570 CHARACTERISTICS OF WINDMILLS.
NTIS, 1976. 6 P. TRANSLATION OF P-2062/G.
RFP-TRANS-192

THE SPECIFICATIONS AND PRICES OF ENAG WIND POWERED ELECTRIC GENERATORS WITH CAPACITIES OF 400 WATTS, 1200 WATTS, AND 2500 WATTS ARE LISTED.

1976-0571 CHILCOTT R E
A REVIEW OF RENEWABLE ENERGY IN NEW ZEALAND WITH EMPHASIS ON WIND POWER UTILIZATION.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 117-121.

1976-0572 CLARKE R
BUILDING FOR SELF-SUFFICIENCY.
NEW YORK, UNIVERSE BOOKS, 1976. 296 P.

THE BIOTECHNIC RESEARCH AND DEVELOPMENT (BRAD) EXPERIMENT, SET UP IN 1973, HAS FAILED, BUT THE AUTHOR REVIEWS THE EXPERIENCES OF CONVERTING THE 43-ACRE HILL-FARM AND NEAR-DERELICT COTTAGE INTO A COMMUNE. IT WAS TO DEVISE A LIFESTYLE OF SELF-SUFFICIENCY IN FOOD, ENERGY, WATER, AND MATERIALS. CLARKE DESCRIBES HOW AND TO WHAT EXTENT THE COMMUNE SUCCEEDED. HE DESCRIBES HOW HE AND THE OTHER INEXPERIENCED PEOPLE BUILT A LARGE, WATERTIGHT, HABITABLE HOUSE WITH SOLAR-HEATED WATER. FURTHER, HE SHOWS HOW THE ARTS OF HOUSEBUILDING, PLASTERING, AND CARPENTRY MAY BE MASTERED. HE WRITES ABOUT HEAT, INSULATION, SOLAR ENERGY, WIND POWER, WATER AND PLUMBING, WASTE AND COMPOST, TRANSPORT, AND FOOD. CLARKE DOES NOT NECESSARILY THINK ALL SHOULD STRIVE FOR SELF-SUFFICIENCY, BUT BE AWARE THAT IT IS POSSIBLE.

1976-0573 CLARK P, LANDFIELD J
NATURAL ENERGY. WORKBOOK NO. 2.
BERKELEY, CALIFORNIA, BOOKPEOPLE, SEPTEMBER 1976. 128 P.

NATURAL ENERGY WORKBOOK NUMBER 2 IS A COMPREHENSIVE TEXT ON THE APPLICATION OF LOCALLY REGENERATIVE RESOURCES (SUN, WIND, WATER, AND PHOTOSYNTHETIC FUELS) TO LOCAL ENERGY NEEDS. ENERGY CONSERVATION AND USE ARE PLACED INTO PERSPECTIVE. SIMPLE EXPERIMENTS ARE GIVEN WHICH DEMONSTRATE THE CONCEPTS OF REGENERATIVE CONVERSION IN LAY TERMS. BASIC PRINCIPLES OF SCIENCE AND ENGINEERING ARE OUTLINED AS THEY APPLY TO SPECIFIC CONVERSION TECHNIQUES AND CONSTRUCTION APPROACHES. ECONOMICAL APPLICATION IS SHOWN TO BE DEPENDENT ON SIMPLIFICATION OF SYSTEMS AND LOCALLY BASED DEVELOPMENT. CAPITAL AND LABOR INVESTMENT ARE REDUCED THROUGH THE USE OF ALREADY MASS-PRODUCED AND LOCALLY AVAILABLE ITEMS.

1976-0574 COONLEY D R
REGIONAL WIND, INDIVIDUAL WIND: TWO STUDIES ASSESS WAYS IN WHICH WE CAN USE THE WIND. II. GATHER UP THE WIND FOR A HOUSE OR A FAVORITE SKYSCRAPER.
SOL. AGE 1(3): 28-29, MARCH 1976.

THE USE OF TALL BUILDINGS AS WIND ENERGY COLLECTORS IS DISCUSSED.

1976-0575 COSTELLO D
CHOOSING ALTERNATIVE ENERGY SYSTEMS UNDER CONDITIONS OF UNCERTAINTY.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1976. P. 268-275.

A METHODOLOGY FOR SIMULATING THE DECISION PROCESS OF AN INVESTOR DECIDING BETWEEN ALTERNATIVE ENERGY SYSTEMS IS PRESENTED. THE APPROACH ASSUMES THE INVESTOR BASES HIS DECISION ON COST (OR RATE OF RETURN) AND RISK. RISK IS TREATED DIRECTLY IN THE MODEL AND NOT REDUCED TO A CERTAINTY EQUIVALENT. THE RATE OF RETURN--RISK CHARACTERISTICS OF MANY SYSTEM COMBINATIONS ALLOWS THEM TO BE ELIMINATED AS VIABLE CHOICES TO THE INVESTOR WITHOUT REFERENCE TO HIS PERSONAL ATTITUDE TOWARD RISK.

1976-0576 DATTA R L, SHERMAN M M
AN INTRODUCTION TO INTEGRATED SOLAR-WIND SYSTEMS.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 139-143.

1976-0577 DAVARAJAN S, MOHAPATRA P K
ENERGY ENVIRONMENT--1.
CHEM. ENG. WORLD 11(8): 49-53, AUGUST 1976.

A CHEMICAL ENGINEERING WORLD RESEARCH BUREAU SURVEY COVERS THE WORLD'S RESERVES OF OIL, COAL, NATURAL GAS, SHALE OIL AND TAR SANDS; INDIA'S SUPPLY, DEMAND AND CONSUMPTION OF COAL, OIL, NATURAL GAS, HYDROELECTRIC POWER, NUCLEAR ENERGY, FIREWOOD, COWDUNG, AND AGRICULTURAL WASTES; AND THE PROSPECTS OF USING SOLAR ENERGY, GEOTHERMAL ENERGY, WIND POWER AND TIDAL POWER TO HELP MEET INDIA'S ENERGY REQUIREMENTS.

1976-0578 DEAN T
SOLAR ASSISTED HEAT PUMP AIR CONDITIONING SYSTEM.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 3. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 373-377.

THE DESIGN OF A SOLAR ASSIST TO HEAT PUMPS IN A YEAR ROUND AIR CONDITIONING SYSTEM IS PRESENTED. THE RESIDENCE IN WHICH THE SYSTEM IS INSTALLED CONTAINS 1850 SQUARE FEET OVER A 720 SQUARE FOOT BASEMENT, ATTACHED 126 X 206 PIT GREENHOUSE, TWO CAR GARAGE, AND ASSOCIATED PORCHES AND STORAGE AREAS. SOLAR HEATED WATER IS USED FOR DOMESTIC HOT WATER PREHEAT AND FOR SPACE HEATING WHEN TANK TEMPERATURE EXCEEDS 95".

1976-0579 DESFRESNES J P
SOLUTIONS ACTUELLES ET PERSPECTIVES D'AVENIR POUR L'ALIMENTATION DES STATIONS AUTONOMES DE TELECOMMUNICATIONS. (PRESENT SOLUTIONS AND FUTURE PROSPECTS FOR THE POWER SUPPLY OF SELF-CONTAINED TELECOMMUNICATION STATIONS).
REV. GEN. ELECTR. 85(6): 510-520, JUNE 1976.

THE DATA CONCERNING THE DELICATE PROBLEM RAISED BY ISOLATED OR REMOTE PLANTS ON POWER DISTRIBUTION NETWORKS ARE RECALLED AND THE PRESENT CONVENTIONAL SOLUTIONS, I.E.: CELLS, TURBO-GENERATORS AND GENERATING SETS ARE FIRST CONSIDERED. NEW SOLUTIONS ARE THEN DISCUSSED.

1976-0580 DJOJODIHARDJO H
RESEARCH AND PROSPECTS OF UTILIZATION OF WIND ENERGY IN INDONESIA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 125-129.

1976-0581 DUMON R
PROFITABILITY AND PROSPECTS FOR DEVELOPMENT OF NEW ENERGY SOURCES.
IND. PET. MONDE, GAZ-CHIM. NO. 481: 15-20, APRIL 1977. (IN FRENCH)

A SURVEY WHICH EMPHASIZES FRENCH AND AMERICAN ACTIVITIES COVERS SOLAR ENERGY AND ITS APPLICATIONS, INCLUDING SOLAR PANELS, THE SOLAR ENGINE, SOLAR PHOTOELECTRIC CELLS, AND THE ODEILLO SOLAR FURNACE; WIND ENERGY RECOVERY

EQUIPMENT; GEOTHERMAL ENERGY EQUIPMENT AND CURRENT INSTALLATIONS; CURRENT STUDIES, ON MARINE THERMAL ENERGY; TIDAL ENERGY RECOVERY; ENERGY FROM INDUSTRIAL WASTES, INCLUDING LOW-PRESSURE STEAM, HOT WATER, WOOD WASTES, AND DOMESTIC REFUSE; AND THE PROBABLE ROLE OF THESE SUPPLEMENTARY ENERGY SOURCES IN THE FUTURE ENERGY ECONOMIES OF THE U.S. AND FRANCE.

1976-0582 EATON W W
SOLAR ENERGY.
WASHINGTON, D.C., ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, 1976. 51 P.

THE FOLLOWING TOPICS ARE INCLUDED: SOLAR ENERGY USED AS HEAT; CONVERTING SOLAR ENERGY TO ELECTRICITY: WIND, SOLAR THERMAL, PHOTOVOLTAIC CONVERSION, AND OCEAN THERMAL; CONVERTING SOLAR ENERGY TO PLANTS AND FOSSIL FUELS; AND ENERGY PLANNING FOR THE FUTURE. THE FOLLOWING ARE CONTAINED IN APPENDICES: BASIC UNITS RELATED TO ENERGY; MANAGEMENT OF SOLAR ENERGY ACTIVITIES; AND PUBLIC PARTICIPATION IN THE RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

1976-0583 ENERGIEQUELLEN FUER MORGEN. NICHTNUKLEARE--NICHTFOSSILE PRIMAERENERGIEQUELLEN. (TOMORROW'S ENERGY SOURCES. NON NUCLEAR--NON FOSSIL PRIMARY ENERGY SOURCES).
FRANKFURT AM MAIN, GERMANY, F.R., UMSCHAU, 1976. 165 P. (IN GERMAN)

THIS SHORTENED VERSION OF THE PROGRAM (STUDY IN SIX PARTS WITH THE SAME TITL) DEALS IN AN EASILY COMPREHENSIBLE WAY WITH UTILIZATION POSSIBILITIES OF SOLAR, WIND, TIDAL, GEOTHERMAL, AND HYDRO ENERGY. IN A COMPARISON OF THE RENEWABLE ENERGY SOURCES, POSSIBILITIES OF UTILIZATION WITHIN AND BEYOND THE FRG ARE ALSO INVESTIGATED.

1976-0584 ENERGY: THE U.S. AT THE CROSSROADS.
ENVIRON. SCI. TECHNOL. 10: 854-859, SEPTEMBER 1976.

ENERGY POLICY IS DISCUSSED IN RELATION TO THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES. EMPHASIS IS ON SOLAR ENERGY TECHNOLOGY, WITH DISCUSSIONS ALSO OF OCEAN THERMAL, TIDE AND WIND POWER. ECONOMIC FACTORS ASSOCIATED WITH THE DEVELOPMENT OF RENEWABLE SOURCES ARE EXAMINED.

1976-0585 ERIKSSON B, HELGESEN H
USE OF SYNCHRONOUS MACHINES AS GENERATORS AT WIND POWER PLANTS. (PART I)
NTIS, MAY 1976. 65 P. (IN SWEDISH)
LUTMDN/TMVK-76-05-03(PT.1)

THE THEORY FOR THE SYNCHRONOUS MACHINE UNDER DYNAMICAL CONDITIONS IS APPLIED IN ORDER TO FORECAST ITS BEHAVIOUR WHEN USED AS A GENERATOR AT A WIND POWER PLANT. THE AIM OF THIS REPORT IS TO DESCRIBE HOW THE DIFFERENT CONSTRUCTIVE PARAMETERS OF THE MACHINE WILL AFFECT ITS PROPERTIES AS A WIND GENERATOR. THE ANALYTICAL BASIS NECESSARY FOR THE DETERMINATION OF THESE PROPERTIES AS WELL AS OF ITS SUITABILITY FOR BEING A WIND GENERATOR IS ALSO PRESENTED.

1976-0586 ERIKSSON B, HELGESEN H
USE OF SYNCHRONOUS MACHINES AS GENERATORS AT WIND POWER PLANTS. (PART II)
NTIS, MAY 1976. 38 P. (IN SWEDISH)
LUTMDN/TMVK-76-05-03(PT.2)

IN AN EARLIER REPORT (PART I) THE ANALYTICAL BASIS NECESSARY FOR THE DETERMINATION OF THE SUITABILITY OF THE SYNCHRONOUS MACHINE FOR BEING A WIND GENERATOR HAS BEEN PRESENTED. THIS REPORT CONTAINS THE RESULTS FROM COMPUTER CALCULATIONS APPLYING THE METHODS DESCRIBED IN THE EARLIER REPORT. THE RESULTS ARE PRESENTED IN GRAPHS.

1976-0587 FARMSTEAD HEATED WITH SOLAR ENERGY.
SONNENENERGIE-TECH. 2(7): 8-9, DECEMBER 1976. (IN GERMAN)

1976-0588 FERENCZ D
VERTICAL AXIS WIND MOTOR.
U.S. PATENT NO. 3,986,785, OCTOBER 19, 1976. 4 P.

A VERTICAL-AXIS WIND MOTOR COMPRISES AN ANNULAR WIND DEFLECTOR ASSEMBLY SURROUNDING THE ROTOR ASSEMBLY AND INCLUDING A PLURALITY OF DEFLECTORS ORIENTED TO DEFLECT THE WIND SO THAT, FROM ALL WIND DIRECTIONS, A GREATER WIND FORCE IS APPLIED TO THE ROTOR VANES ON ONE SIDE OF THE VERTICAL AXIS THAN ON THE OTHER SIDE. SUCH A WIND MOTOR MAY BE CONSTRUCTED OF VERY LARGE DIMENSIONS BOTH IN HEIGHT AND DIAMETER SO AS TO MORE EFFICIENTLY EXPLOIT THE WIND ENERGY.

1976-0589 FREEDMAN A
ENERGY FACILITY SITING SELECTED ABSTRACTS.
NTIS, AUGUST 1976. 310 P.
MTR-7159, PB-284152

THIS REPORT CONTAINS A BIBLIOGRAPHIC SURVEY OF RESEARCH ON ALL ISSUES THAT AFFECT TIME, COSTS, OR ACCEPTABILITY OF BRINGING NEW ENERGY FACILITIES ON LINE. EACH LISTING INCLUDES TITLE, PERFORMING AND SPONSORING ORGANIZATIONS, PRINCIPAL INVESTIGATOR, AND AN ABSTRACT.

1976-0590 FREEMAN B E
NEW WIND ENERGY SITE SELECTION METHODOLOGY. QUARTERLY REPORT NO. 3, SEPTEMBER 17 - DECEMBER 16, 1975.
NTIS, JANUARY 1976. 74 P.
SAI-76-510-LJ, PB-287750

MAJOR EMPHASIS WAS PLACED ON THE TESTING AND APPLICATION OF A 3-D MESOSCALE COMPUTER CODE SIGMET ON WIND ENERGY SITE SELECTION. IDEALIZED PROBLEM CALCULATIONS WERE CARRIED OUT. THESE INCLUDED SEVERAL 3-D CALCULATIONS REPRESENTING FLOW OVER REAL TERRAIN TO HELP DETERMINE VALUES OF INPUT PARAMETERS FOR SATISFACTORY SOLUTIONS AND CODE IMPROVEMENTS. INVESTIGATIONS WERE CONTINUED INTO THE DEVELOPMENT OF MORE ACCURATE AND ECONOMICAL METHODS FOR MESOSCALE SIMULATION. THEY INVOLVED THE PARTIAL IMPLICATION OF GRAVITY WAVES, TURBULENCE FORMATION, AND MORE ACCURATE ADVECTION CALCULATIONS. AN ANALYTICAL STUDY OF STABILITY CONDITIONS WAS PERFORMED TO PROVIDE GUIDANCE IN CODE DESIGN AND USE. FIELD DATA FOR VALIDATION COMPARISONS WERE ALSO OBTAINED. THE REPORT INCLUDES A SUMMARY OF FIELD DATA GATHERING, WORK AND CALCULATIONS ON THE 3-D SIGMET CODE, AND A REVIEW OF NEW TECHNIQUES AND ANALYSES.

1976-0591 FRICKE J
WINDMILLS.

PHYS. UNSERER ZEIT 7(5): 129-130, SEPTEMBER 1976. (IN GERMAN)

A NEW PLAN OF A WIND ENERGY CONVERTER IS INTRODUCED. THE PRINCIPLE IS THE PRODUCTION OF TORNADO-LIKE WHIRLWINDS USING WIND POWER. THE PRESSURE DIFFERENCE BETWEEN THE INNER SIDE OF THE "TORNADO" AND ITS ENVIRONS IS TO BE USED TO DRIVE A TURBINE. ACCORDING TO THE CALCULATIONS THE NEW CONSTRUCTION PROVIDES FOR A BETTER ENERGY YIELD THAN WAS POSSIBLE WITH CONVENTIONAL WIND MILLS OF THE SAME SIZE. FURTHERMORE, THIS SYSTEM IS LESS SENSITIVE TO STORMS. THE TURBINE RUNS WITH HIGHER R.P.M., THUS MAKING A POWER TRANSMISSION UNNECESSARY; IT IS NEAR TO THE GROUND AND THIS MAKES SERVICING EASY. THE PRODUCTION OF 1 MW SHOULD BE POSSIBLE USING A TURBINE WITH A DIAMETER OF 2 M IN A 60 M HIGH TOWER WITH A DIAMETER OF 20 M.

1976-0592 FRIEDMANN P P
AEROELASTIC MODELING OF LARGE WIND TURBINES.
AM. HELICOPTER SOC. J. 21(4): 17-27, OCTOBER 1976.

A SET OF COUPLED FLAG-LAG-TORSIONAL EQUATIONS OF MOTION FOR A SINGLE WIND TURBINE BLADE ARE DERIVED IN A GENERAL, NONLINEAR, PARTIAL DIFFERENTIAL FORM. THESE EQUATIONS ARE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY OR RESPONSE OF LARGE WIND TURBINE BLADES. METHODS FOR SOLVING THE EQUATIONS, TOGETHER WITH SOME POSSIBLE SIMPLIFICATION OF THE EQUATIONS, ARE DISCUSSED. FINALLY, THE FORMULATION OF THE COMPLETE ROTOR-TOWER AEROELASTIC PROBLEM IS CONSIDERED IN GENERAL TERMS.

1976-0593 FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 9TH ANNUAL, PROCEEDINGS, 1976.
STILLWATER, OKLAHOMA STATE UNIVERSITY, UNIVERSITY EXTENSION PROGRAM, 1976.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 9TH, STILLWATER, OKLAHOMA, OCTOBER 27-28, 1976.

THE PROCEEDINGS INCLUDES TEXTS OF 16 PAPERS GIVEN AT THE CONFERENCE, MANY OF WHICH ARE ON WIND ENERGY.

1976-0594 GARLAND J, PAVELIC V
WINDGENERATOR MECHANISM.
OKLAHOMA STATE UNIVERSITY APPLIED MECHANISMS CONFERENCE, 4TH, CHICAGO, ILLINOIS, NOVEMBER 3, 1975.
PROCEEDINGS. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 21.1 - 21.9.

THE MECHANISM DESCRIBED IS A WINDMILL CONSISTING OF THREE SMOOTHLY FINISHED BLADES WHICH ARE DRIVEN BY THE WIND AT FLUCTUATING SPEEDS. A CENTRIFUGAL FEATHERING MECHANISM IS INCLUDED TO STABILIZE THE ROTATION FOR HIGH VELOCITY WINDS AND POSSIBLE ERRATIC WIND GUSTS. THE ROTATING BLADES PROVIDE DRIVING TORQUE TO A HORIZONTAL SHAFT WHICH LEADS TO A SPEED INCREASING ASSEMBLY. THIS ASSEMBLY IN TURN DRIVES A GENERATOR WHICH PROVIDES THE ELECTRICAL POWER. A SPEED INCREASER IS DESIGNED SO THAT IT ROTATES THE GENERATOR AT ITS MAXIMUM EFFICIENCY POINT. THE ENTIRE WINDGENERATOR MECHANISM IS MOUNTED ON A TOWER AND PIVOTS FREELY ON A VERTICAL SHAFT.

1976-0595 GOOL W VAN
FLOURING TYPES OF ENERGY: POTENTIAL AND RESEARCH.
ATOOMENERG. HAAR TOEPASS. 18(2): 33-36, FEBRUARY 1976.

1976-0596 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1976. 130 P.

1976-0597 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1976. 119 P.

1976-0598 HAMER J
SOLAR ENERGY.
ED. RES. REP. 11(18): 825-842, NOVEMBER 12, 1976.

1976-0599 HAUSER L G
NEW POWER GENERATION SYSTEMS.
COAL AGE 81(7): 41, JULY 1976.

ONLY 12 NEW POWER GENERATION SYSTEMS ARE FEASIBLE USING EXISTING TECHNOLOGY AND CAPABLE OF COMPETING IN COST WITH SYSTEMS NOW IN USE. SINCE INTENSIVE DEVELOPMENT IS NEEDED TO MAKE ANY OF THE 12 SUCCESSFUL, EFFORTS SHOULD CONCENTRATE ON THE FIVE THAT WILL "MOST BENEFIT SOCIETY OVER THE NEXT 25 YEARS." THESE ARE (1) COAL GASIFICATION WITH GAS- AND STEAM-TURBINE GENERATORS IN COMBINED CYCLES, (2) THE BREEDER REACTOR, (3) MUNICIPAL WASTES WITH STEAM-TURBINE GENERATORS, (4) WIND POWER WITH WIND-TURBINE GENERATORS, AND (5) ELECTROLYTES WITH STORAGE BATTERIES.

1976-0600 HAWAII'S NATURAL ENERGY RESOURCES, 1976.
NTIS, JUNE 1, 1976. 65 P.
PB-298278

THE ALTERNATIVE ENERGY SOURCES AVAILABLE IN HAWAII ARE DISCUSSED: SOLAR ENERGY, OCEANIC WATERS SUITABLE FOR OCEAN THERMAL ENERGY CONVERSION, WIND POWER, BIOMASS, AND GEOTHERMAL ENERGY.

1976-0601 HERBERG G M
ENERGY STORAGE SYSTEM.
U.S. PATENT NO. 3,996,741, DECEMBER 14, 1976. 4 P.

A SYSTEM AND APPARATUS FOR THE STORAGE OF ENERGY GENERATED BY NATURAL ELEMENTS ARE DESCRIBED. ENERGY FROM NATURAL ELEMENTS SUCH AS FROM THE SUN, WIND, TIDE, WAVES, AND THE LIKE, IS CONVERTED INTO POTENTIAL ENERGY IN THE FORM OF AIR UNDER PRESSURE WHICH IS STORED IN A LARGE, SUBTERRANEAN CELL. MACHINES OF KNOWN TYPES SUCH AS WINDMILLS ARE DRIVEN BY NATURAL ELEMENTS TO OPERATE AIR COMPRESSORS. AIR COMPRESSORS PUMP THE AIR UNDER PRESSURE TO THE STORAGE CELL. AIR ENTERING THE STORAGE CELL DISPLACES WATER FROM THE CELL WHICH RETURNS TO A WATER RESERVOIR AS AN OCEAN OR A LAKE. WATER LOCKS THE AIR IN THE STORAGE CELL. THE STORED COMPRESSED AIR IS AVAILABLE UPON DEMAND TO PERFORM A WORK FUNCTION AS DRIVING AN AIR TURBINE TO OPERATE AN ELECTRIC GENERATOR.

1976-0602 HIGGIN R M R
SUN, WIND, AND WASTE HAVE A ROLE TO PLAY. RENEWABLE ENERGY SOURCES MERIT CONTINUING STUDY.
NORTH. MINER : C6-C8, SEPTEMBER 23, 1976.

THE POTENTIAL OF RENEWABLE ENERGY SOURCES IN CANADA IS DISCUSSED.

1976-0603 HIX J
DESCRIPTION OF PROVIDENT HOUSE, KING CITY, ONTARIO.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 229-235.

A DWELLING UNIT POWERED BY SOLAR AND WIND ENERGY FOR SPACE AND WATER HEATING IS DESCRIBED. ARCHITECTURAL, INSULATION, AND SOUND PROTECTION ASPECTS OF THE BUILDING ARE ANALYZED.

1976-0604 HOPPE H
WAVE AND WIND STORAGE STATION.
GERMAN (FRG) PATENT NO. 2,514,447/A/, OCTOBER 14, 1976. 9 P. (IN GERMAN)

THE SPECIFICATION CONCERNS AN ARRANGEMENT WHICH IS TO USE THE ENERGY OF SEA WAVES. IT IS TO BE SITUATED OUTSIDE THE BREAKERS IN WATERS OF GREAT DEPTH. PISTONS ARE MOVED TO AND FRO BY THE SEA WAVES IN CYLINDERS WHICH ARE OPEN BELOW AND WHICH REACH INTO THE WATER. IN THE UPPER AIR FILLED PART OF SUCH A CYLINDER, THERE IS ALTERNATE HIGH AND LOW PRESSURE DUE TO THE PISTON MOVEMENT, AND A SO-CALLED EXCESS PRESSURE STORE IS FILLED VIA NON-RETURN VALVES, WHILE A LOW-PRESSURE STORE IS EMPTIED. USING THESE TWO STORES, WATER IS PUMPED PNEUMATICALLY FROM A LOWER FRESH WATER CONTAINER INTO AN UPPER CONTAINER FLOATING ON IT. THE WATER DRIVES A TURBINE, WHEN FLOWING BACK FROM THE UPPER TO THE LOWER CONTAINER, WHICH IS COUPLED TO A GENERATOR FOR POWER GENERATION.

1976-0605 HOWELL Y
AFRICAN RURAL ENERGY CENTER.
SUNWORLD NO. 2: 2-5, NOVEMBER 1976.

A PLAN FOR A REMOTE AREA RURAL ENERGY CENTER IN SENEGAL, INCORPORATING SOLAR, WIND, BIOGAS AND BIOMASS SYSTEMS IS DESCRIBED. PROCESSING OF AGRICULTURAL WASTES, FRESH WATER AND ELECTRICITY PRODUCTION, IRRIGATION, AND HOT WATER HEATING, ALONG WITH HEAT FOR COOKING AND HOME SPACE HEATING ARE INCLUDED. SMOKELESS WOOD STOVES, SOLAR STEAM COOKERS, AND SOLAR FOOD WARMERS ARE PROPOSED.

1976-0606 HUQ R, LOTH J L
VORTEX KINETIC ENERGY CONCENTRATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH. PROCEEDINGS. NEW YORK, AICHE, 1976. VOL. 2, P. 1773-1778, PAPER 769305.

THE AERODYNAMIC PERFORMANCE OF A NON-ROTATING VERTICAL HIGH LIFT FINITE WING WHICH IS ORIENTED INTO THE WIND IS DESCRIBED. AS THE WING DEVELOPS LIFT, THE TRAILING VORTEX SHEET ROLLS UP TO FORM A SINGLE VORTEX OF SIGNIFICANT STRENGTH. THE CORE OF THE VORTEX IS SUBJECT TO LOW STATIC PRESSURE DUE TO THE CENTRIFUGAL EFFECTS. THE ASIMUTHAL MOTION IN THIS VORTEX PROVIDES THE CORE WITH CONCENTRATED ROTATIONAL KINETIC ENERGY WHICH CAN BE HARNESSED BY AN APPROPRIATE ROTOR PLACED COAXIALLY WITH THE VORTEX CORE. AS A RESULT OF THIS AUGMENTATION THE POWER HARNESSED PER UNIT ROTOR AREA CAN BE INCREASED UP TO FIVE FOLD, THEREBY PERMITTING A CORRESPONDING REDUCTION IN ROTOR SIZE. THE THEORETICAL ASPECTS OF CONCENTRATING KINETIC ENERGY IN THE TRAILING WING TIP VORTEX BEHIND A HIGH LIFT WING IS REPORTED. SPECIFIC DESIGN CRITERIA FOR THE REQUIRED WIND TURBINES ARE DEVELOPED. THE ENERGY CONCENTRATION RATIO OF VARIOUS ROTOR SIZES AND WING LOADING CHARACTERISTICS IS COMPUTED. SIGNIFICANT CONCENTRATION RATIOS ARE OBTAINABLE WITH THIS TECHNIQUE.

1976-0607 JAYADEV T S
INDUCTION GENERATORS FOR WIND ENERGY CONVERSION SYSTEMS. PROGRESS REPORT FOR THE PERIOD JULY-DECEMBER 1975.
NTIS, FEBRUARY 1976. 54 P.
AER-75-00653

THIS IS A REPORT ON THE APPLICATION OF INDUCTION GENERATORS IN WIND ENERGY CONVERSION SYSTEMS (WECS). THE CONVENTIONAL INDUCTION GENERATOR, WHICH IS AN INDUCTION MACHINE WITH A SQUIRREL CAGE ROTOR, HAD BEEN USED IN LARGE WIND POWER PLANTS IN EUROPE, BUT HAS NOT CAUGHT MUCH ATTENTION UNTIL NOW BY DESIGNERS OF LARGE SYSTEMS IN THIS COUNTRY. EVEN FOR SMALL SYSTEMS OPERATING ON UTILITY POWER LINES, THE SIMPLEST AND CHEAPEST GENERATING SCHEME IS THE CONVENTIONAL INDUCTION GENERATOR. SOMEHOW, THIS POINT HAS NOT CAUGHT THE ATTENTION OF SMALL SYSTEM DEVELOPERS AS WELL. PART I OF THIS REPORT BRIEFLY REVIEWS THE INDUCTION GENERATOR WITH A SQUIRREL CAGE ROTOR AND DEVELOPS USEFUL DESIGN TECHNIQUES TO BUILD INDUCTION GENERATORS FOR WIND ENERGY APPLICATION. PART II DESCRIBES THE DOUBLE OUTPUT INDUCTION GENERATOR (DOIG)--SO-CALLED BECAUSE POWER IS FED INTO THE GRID FROM THE STATOR, AS WELL AS THE ROTOR. IT IS A WOUND ROTOR INDUCTION MACHINE WITH POWER ELECTRONICS TO CONVERT ROTOR SLIP FREQUENCY POWER TO THAT OF LINE FREQUENCY. IT IS SHOWN THAT BY VARYING THE FIRING ANGLE OF SCR'S THE OUTPUT CHARACTERISTICS OF THE GENERATOR COULD BE PERFECTLY MATCHED WITH THE CHARACTERISTICS OF WIND TURBINE. FURTHER, THE SPEED COULD VARY FROM SYNCHRONOUS SPEED TO ANY VALUE, SAY, DOUBLE THE SYNCHRONOUS, MAKING THE SYSTEM A VARIABLE SPEED ONE AND RESULTING IN INCREASED ENERGY OUTPUT. THUS, AN IDEAL GENERATION SCHEME IS REALIZED WITH DOIG, WHICH IS SIMPLE, ECONOMICAL, AND EFFICIENT OPERATING AS A VARIABLE SPEED SYSTEM.

1976-0608 JAYADEV T S
NOVEL ELECTRIC GENERATION SCHEMES FOR WIND POWER PLANTS. ACCG AND DOIG, PART I: EXECUTIVE SUMMARY.
NTIS, JULY 30, 1976. 26 P.
PB80-190838

TWO NOVEL ELECTRIC GENERATION SCHEMES FOR WIND POWER PLANTS ARE EVALUATED: AN A.C. COMMUTATOR GENERATOR (ACCG) AND THE ROTOR FED INDUCTION GENERATOR. THE REPORT PRESENTS EXPERIMENTAL AND ANALYTICAL RESULTS AND CONCLUSIONS WHICH INCLUDE TECHNICAL INFORMATION AND COST DATA. ACCG IS A MACHINE SIMILAR TO THE D.C. MACHINE AND HAS SIMILAR PERFORMANCE CHARACTERISTICS. ALTHOUGH THERE ARE NO LIMITATIONS ON THE USE OF THIS MACHINE FOR WIND POWER GENERATION, THE COST COUPLED WITH LACK OF A U.S. MANUFACTURER SEVERELY LIMITS ITS POTENTIAL FOR USE IN VARIABLE SPEED CONTACT FREQUENCY GENERATION. RESEARCH ON THE ROTOR FED INDUCTION GENERATOR LED TO A POWER ELECTRONIC CIRCUIT CONNECTED TO THE ROTOR CIRCUIT WHICH OPERATES AS A GENERATOR WITH BROAD POWER VS. SPEED CHARACTERISTICS. THIS IS APPLICABLE TO WIND ENERGY SYSTEMS IN WHICH SPEED VARIATION IS ABOUT 30-40 PERCENT. THIS SYSTEM CAN ALSO REGENERATE POWER THAT WOULD BE DISSIPATED. BY THIS MEANS, POWER OUTPUT IS OBTAINED FROM BOTH REACTOR AND ROTOR. THE MACHINE THUS DEVISED IS CALLED A DOUBLE OUTPUT INDUCTION GENERATOR (DOIG). DOIG IS THE BEST CHOICE FOR WIND ENERGY SYSTEMS. A CHART COMPARES VARIABLE SPEED CONSTANT FREQUENCY GENERATORS.

1976-0609 JOHNSON C A
RECYCLING ENERGY BY BUILDING HEAT EXCHANGE SYSTEMS.
ASAE, ANNUAL MEETING, LINCOLN, NEBRASKA, JUNE 27-30, 1976. PAPER 76-4035, 24 P.

ECONOMIC FEASIBILITY OF THE USE OF SOLAR OR WIND ENERGY FOR RESIDENTIAL HEATING SYSTEMS IS DEPENDENT UPON MINIMIZING EQUIPMENT SIZE (AND COST) OF COLLECTORS--WHICH CAN BE ACCOMPLISHED BY AVAILABLE TECHNIQUES OF

INSULATION, AUGMENTED BY SUGGESTED DESIGNS FOR WINDOW, WALL AND ROOF HEAT EXCHANGERS--SYSTEMS DESIGNED FOR ENERGY CONSERVATION.

1976-0610 JOHNSTON P
PLANNING FOR SMALL-SCALE USE OF RENEWABLE ENERGY SOURCES IN FIJI.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 144-146.

1976-0611 JORGENSEN G L, LOTKER M, MEIER R C, BRIERLEY D
DESIGN, ECONOMIC AND SYSTEM CONSIDERATIONS OF LARGE WIND-DRIVEN GENERATORS.
IEEE TRANS. POWER APPAR. SYST. PAS-95(3): 870-878, MAY-JUNE 1976.

RESULTS AND CONSIDERATIONS OF AN INVESTIGATION OF LARGE WIND-DRIVEN GENERATORS ARE PRESENTED. THIS PAPER EMPHASIZES THE CONCEPT SELECTION OF WIND-DRIVEN GENERATORS, SYSTEM OPTIMIZATION, CONTROL SYSTEM DESIGN, SAFETY ASPECTS, ECONOMIC VIABILITY ON ELECTRIC UTILITY SYSTEMS AND POTENTIAL ELECTRIC SYSTEM INTERFACING PROBLEMS.

1976-0612 KOEHLER H W
ELECTRIC POWER FROM WIND POWER.
BILD WISS. 13(7): 56-61, JULY 1976. (IN GERMAN)

IN SEARCH OF NEW ENERGY SOURCES, THE INTEREST IN WIND TURBINES WAS ALSO REVIVED. FOR THE PAST FEW YEARS THERE HAVE BEEN EXPERIMENTS WITH VARIOUS TYPES. THE DIAMETERS OF THE ROTORS COME UP TO 53 M. CURRENT PROTOTYPES HAVE CAPACITIES OF UP TO 100 KW. WITHIN THE FRAMEWORK OF AN AMERICAN RESEARCH PROGRAMME, TURBINES WITH A CAPACITY OF 1,000 KW AND A ROTOR DIAMETER OF UP TO 90 M ARE TO BE BUILT BY 1980.

1976-0613 LEE C-O
WINDPOWER STUDIES IN KOREA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 121-125.

1976-0614 LEE S M
INSOLATION AND WIND: A NATURAL COMBINATION FOR SELF-SUFFICIENT POWER SYSTEMS.
IEEE PHOTOVOLTAIC SPECIALISTS CONFERENCE, 12TH, BATON ROUGE, LOUISIANA, NOVEMBER 15, 1976. NEW YORK, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., 1976. P. 721-724.

AT REMOTE AND ISOLATED LOCATIONS WHERE THE INSOLATION LEVEL IS HIGH, FREQUENTLY THERE ALSO EXISTS A GOOD WIND POTENTIAL. IN MANY CASES, THERE IS A NEGATIVE SEASONAL CORRELATION BETWEEN WIND AND SOLAR ENERGY. THIS PROVIDES THE POSSIBILITY FOR AN ATTRACTIVE COMBINATION OF THESE SOURCES, WHICH CAN LEAD TO AN EFFECTIVE, SELF-SUFFICIENT ENERGY SYSTEM AT THESE REMOTE INSTALLATIONS.

1976-0615 LITTLER J G F
IS SOLAR HEATING COST EFFECTIVE IN ENGLAND?
NESEA 75: DECISION MAKING IN SOLAR TECHNOLOGY. 1ST CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 111-113.

TOTAL INSTALLED COSTS ON NEW OR OLD BUILDINGS OF AEROGENERATORS, OF SOLAR COLLECTORS FOR WATER HEATING, OR WATER AND SPACE HEATING WITH LIMITED STORAGE, OR WITH INTERSEASONAL STORAGE AND OF MANY CONSERVATION MEASURES SUCH AS HEAT RECOVERY FROM HOT WATER OR VENTED AIR ARE CALCULATED.

1976-0616 MCVEIGH J C
BRIGHTON POLYTECHNIC INTEGRATED SOLAR DWELLING (ISD).
SOLAR COOLING AND HEATING: A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, DECEMBER 13, 1976. NTIS, 1976. P. 129-133.
CONF-761220

THE BRIGHTON ISD PROJECT IS A SELF-SUFFICIENT DWELLING BASED ON A COMBINATION OF PRACTICAL EXPERIENCE OF THE VARIOUS SYSTEMS--SOLAR, WIND, WATER, FOOD, AND SANITATION--AND THEORETICAL MODELING STUDIES. THERE ARE 12 SQ. M. OF SOLAR COLLECTORS. THE EXPERIMENTAL PROGRAM FOR 1976-1978 AND A FLOOR PLAN ARE GIVEN.

1976-0617 MAGOVENY G S, FORGO E J
HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL.
U.S. PATENT NO. 3,938,907, FEBRUARY 17, 1976.

A HORIZONTAL MULTIDIRECTIONAL WINDMILL IS DESCRIBED WHICH COMPRISES A FIXED HOUSING AND A ROTOR, THE HOUSING BEING CONSTITUTED BY UPPER AND LOWER HORIZONTALLY DISPOSED MEMBERS AND A PLURALITY OF VERTICALLY DISPOSED VANES EXTENDING BETWEEN THE MEMBERS. A VERTICAL AXLE IS SECURED TO THE ROTOR MEMBERS. BUCKETS ARE MOUNTED BETWEEN THE ROTOR MEMBERS AND EXTEND INWARDLY FROM THE PERIPHERY THEREOF. EACH BUCKET HAS A FLEXIBLE VERTICALLY DISPOSED SURFACE PORTION AND SUPPORTS FOR THE INNER AND OUTER EDGES OF THE PORTIONS. THE DISTANCE BETWEEN THE SUPPORTS IS VARIED AUTOMATICALLY AS A FUNCTION OF ROTATIONAL SPEED OF THE ROTOR.

1976-0618 MAYER-SCHWINNING W
USEFUL ENERGY FROM WIND ENERGY.
ENVIRONMENTAL POLICIES MEETING ON UNMASTERED GROWTH., BAD BOLL, GERMANY, F.R., APRIL 29, 1976. (IN GERMAN)

THE WORK GROUP REGARDS THE USE OF WIND ENERGY AS THE THIRD LEG OF ENERGY TECHNOLOGY. IT CALCULATES THE WIND UTILIZATION IN VOGELSBERG OVER AN AREA OF 1500 SQ. KILOMETERS WITH 5 PLANTS EACH 100 M BIG ON 1 SQ. KILOMETER AS EXAMPLE. PRODUCTION OF 14,000 MW ELECTRICITY THROUGH 7500 WIND WHEELS CAN BE GENERATED WITH AN INVESTMENT SUM OF UP TO 28 THOUSAND MILLION D-MARK WITHOUT MAINTENANCE COSTS.

1976-0619 MERONEY R N
WIND POWER APPLICATIONS IN RURAL AND REMOTE AREAS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, DEPARTMENT OF CIVIL ENGINEERING, CEP76-77-RNM-1, 1976.

IT IS REASONABLE TO EXPECT THAT AGRICULTURE, RURAL AND REMOTE AREAS APPLICATIONS CAN AGAIN PLAY AN IMPORTANT ROLE IN THE DEVELOPMENT OF A FUTURE VIABLE WIND ENERGY INDUSTRY IN THE UNITED STATES AS FOSSIL FUELS BECOME MORE SCARCE AND EXPENSIVE. AN EXAMINATION OF THE RURAL AREA ENERGY BUDGET IDENTIFIES NUMEROUS AREAS WHERE WIND MACHINES MAY CONTRIBUTE. EXAMPLES OF SUCH APPLICATIONS ARE (1) PRODUCTION OF HOT WATER FOR RURAL SANITATION

USES; (2) HEATING OF RURAL STRUCTURES AND PRODUCTS; (3) REFRIGERATION OF RURAL STRUCTURES AND PRODUCTS; (4) DRYING OF AGRICULTURAL PRODUCTS; AND (5) IRRIGATION OR AQUACULTURE. A GREAT DEAL OF DEVELOPMENT NEEDS TO BE DONE ON THE DESIGN OF SMALL TO MEDIUM SCALE MACHINES FOR RURAL USE; THE DESIGN OF SIMPLE YET RELIABLE TOWERS; AND THE MATCHING OF WIND MACHINE PERFORMANCE TO THE REQUIREMENTS OF SPECIFIC APPLICATIONS.

1976-0620 MEYER H
GEMINI SYNCHRONOUS INVERTER.
SOL. AGE 1(3): 11-14, MARCH 1976.

THE GEMINI SYNCHRONOUS INVERTER IS A SOLID STATE DEVICE THAT, WHEN INTERPOSED BETWEEN A VARIABLE-VOLTAGE DC POWER SOURCE AND AN AC POWER GRID, CONVERTS THE DC TO AC AT STANDARD LINE VOLTAGES AND FREQUENCIES. IF MORE POWER IS AVAILABLE FROM THE DC SOURCE THAN IS REQUIRED BY THE LOAD, THE EXCESS FLOWS INTO THE POWER GRID. IF LESS POWER IS AVAILABLE THAN IS REQUIRED BY THE LOAD THE DIFFERENCE IS PROVIDED BY THE POWER GRID IN THE NORMAL FASHION.

1976-0621 MILLER R H, MARTINEZ-SANCHEZ M, DUGUNDJI J, LARRABEE E, HUMES T
WIND ENERGY CONVERSION.
NTIS, FEBRUARY 15, 1976. 183 P.
ASRL-TR-184-2, PB-256198

TESTING OF THE WIND TUNNEL MODEL AND AEROELASTIC ANALYSES INDICATE THE SCOPE OF THE PROBLEM INVOLVED IN SELECTING A SUITABLE SPEED FOR A WIND TURBINE. THIS REPORT DISCUSSES THE PROBABILITY THAT AT LEAST FOR CONVENTIONAL ROTOR TYPE WIND TURBINES, A CONSTANT TIP SPEED RATHER THAN A CONSTANT RATIO OF TIP SPEED TO WIND SPEED IS A MORE SATISFACTORY DESIGN SOLUTION. THE PENALTY INVOLVED IN MAINTAINING CONSTANT TIP SPEED IS INVESTIGATED AS PART OF THE CONTROL STRATEGY RESEARCH (TASK I) IN ORDER TO DETERMINE WHETHER CONTROL SHOULD BE CONSIDERED FOR A CONSTANT SPEED OR FOR VARIABLE SPEED (CONSTANT TIP SPEED RATIO) WIND TURBINE. AS A RESULT OF EXPERIENCE WITH THE AEROELASTIC ANALYSES (TASK 3), IT WAS DECIDED TO CONCENTRATE ON THE CONSTANT SPEED CONFIGURATION. TASK 2 IS CONCERNED WITH THE EXPERIMENTAL AND THEORETICAL INVESTIGATION OF AIRLOADS IN THE PRESENCE OF WIND SHEAR AND GUST.

1976-0622 MUKHERJEE T
NATIONAL SCIENCE FOUNDATION (U.S.A.) SOLAR ENERGY PROGRAM.
HELIOTECHNIQUE AND DEVELOPMENT. INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2-6, 1975. CAMBRIDGE, MASSACHUSETTS, DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. VOL. 2, P. 696-701.

THE MAIN OBJECTIVES AND MAJOR ACCOMPLISHMENTS OF THE UNITED STATES' SOLAR ENERGY PROGRAM INITIATED UNDER THE FEDERAL LEADERSHIP OF THE NATIONAL SCIENCE FOUNDATION ARE REVIEWED. WIND ENERGY CONVERSION IS ONE OF THE SIX APPLICATIONS CONSIDERED.

1976-0623 OOSTHUIZEN P H, RUSH C K
PROSPECTS FOR ENERGY FROM ALTERNATE SOURCES IN CANADA.
CANADIAN NUCLEAR ASSOCIATION ANNUAL INTERNATIONAL CONFERENCE, 16TH, TORONTO, ONTARIO, JUNE 13-16, 1976. VOL. 3: NUCLEAR ENERGY AND THE PUBLIC. TORONTO, CANADIAN NUCLEAR ASSOCIATION, 1976. P. 3-30.

THIS PAPER REVIEWS THE MAJOR ALTERNATE ENERGY SOURCES WHICH WILL BECOME AVAILABLE TO CANADA IN THE FUTURE. THESE SOURCES INCLUDE: SOLAR ENERGY; WIND ENERGY; TIDAL ENERGY; GEOTHERMAL ENERGY; OCEAN TEMPERATURE GRADIENT ENERGY; WAVE ENERGY; AND BIOMASS ENERGY.

1976-0624 PAVLECKA V H
METHOD AND DEVICE FOR POWER GENERATION USING WIND ENERGY.
GERMAN (FRG) PATENT NO. 2,535,297/A/, FEBRUARY 19, 1976. 33 P. (IN GERMAN)

THE PATENT DESCRIBES A SO-CALLED "WIND ENGINE" DRAWING PRIMARY ENERGY FROM WIND. THE DEVICE IS CHARACTERIZED BY A STATOR WHICH INCREASES THE VELOCITY OF THE AIR FLOW. THIS RELATIVELY VERY FAST AIR CURRENT DRIVES A TURBINE. THE SHAPE AND THE MODE OF ACTION OF THE STATOR--WHICH CONSISTS OF GUIDE BLADES--AND OF THE MOVING BLADES AND THE ROTOR ARE DESCRIBED. RECOMMENDED STRUCTURAL TYPES OF THE WIND ENGINE ARE ILLUSTRATED BY DRAWINGS.

1976-0625 POLAR ENERGY RESOURCES POTENTIAL. REPORT PREPARED FOR THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS, SECOND SESSION BY THE CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1976. 187 P.

THE STUDY COVERS BOTH ANTARCTIC AND ARCTIC ENERGY RESOURCES INCLUDING OIL, COAL, NATURAL GAS, HYDROELECTRIC POWER, GEOTHERMAL ENERGY, OIL SHALE, URANIUM, SOLAR ENERGY, AND WIND POWER. THE ENVIRONMENT, GEOLOGY, TOPOGRAPHY, CLIMATE, AND WEATHER ARE ALSO TREATED. CONSIDERATION IS GIVEN TO THE INTERNATIONAL RELATIONS INVOLVED IN ENERGY RESOURCE EXPLOITATION IN BOTH POLAR REGIONS, AND THE TECHNOLOGIES NECESSARY TO DEVELOP POLAR RESOURCES ARE DISCUSSED. THE POTENTIAL RESOURCES IN EACH AREA ARE DESCRIBED. RESOURCE POTENTIALS SOUTH OF 60 DEGREES IN ANTARCTICA AND NORTH OF 60 DEGREES IN THE ARCTIC ARE SUMMARIZED.

1976-0626 PORTER W H
ELECTRICAL GENERATING SYSTEM.
U.S. PATENT NO. 3,988,592, OCTOBER 26, 1976. 6 P.

AN ELECTRICAL GENERATING SYSTEM IS DESCRIBED IN WHICH A HERMETICALLY SEALED FLOTATION SPHERE, PREFERABLY CONSTRUCTED OF PLASTIC, IS ANCHORED TO A SEA BED. THE SPHERE CARRIES A CIRCUMFERENTIAL FENDER ON THE OUTSIDE THEREOF IN WHICH IS LOCATED A PLURALITY OF SCREWS OPEN TO SEAWATER WHICH GENERATE ELECTRICITY FROM THE ACTION OF GROUND SWELLS. A WIND TURBINE IS MOUNTED ON TOP OF THE SPHERE FOR GENERATING ELECTRICITY FROM WIND ACTION AND A SOLAR GENERATOR IS DISPOSED DIRECTLY BENEATH THE WIND TURBINE AND ON THE UPPER SURFACE OF THE SPHERE FOR GENERATING ENERGY FROM SOLAR HEAT. AN AIR COMPRESSOR IS DISPOSED BENEATH THE SPHERE FOR GENERATING ELECTRICITY FROM TIDAL ACTION.

1976-0627 PREUSS R, MORINO L
WECS INCOMPRESSIBLE COMPLEX CONFIGURATION AERODYNAMICS (WICCA).
NTIS, MAY 1976. 53 P.
PB-288474

A FINITE-ELEMENT METHOD FOR DETERMINING THE AERODYNAMIC LOADING ON ROTORS IS PRESENTED. THE REPORT DESCRIBES THE DEVELOPMENT OF THE FORMULATION FOR THE STEADY STATE AND NUMERICAL RESULTS FOR HORIZONTAL AXIS WINDMILLS. IT

IS BASED ON A GENERAL THEORY FOR INCOMPRESSIBLE POTENTIAL AERODYNAMICS FOR COMPLEX CONFIGURATIONS IN A ROTATING FRAME OF REFERENCE. IF A ROTOR IS ROTATING AT CONSTANT ANGULAR VELOCITY AND IS DIRECTED ALONG A UNIFORM WIND DISTRIBUTION, THE PROBLEM MAY BE SOLVED IN THE STEADY STATE FOR A FRAME OF REFERENCE ROTATING WITH THE ROTOR. A COMPUTER PROGRAM (WICCA) HAS BEEN DESIGNED TO INCORPORATE THE METHOD, AND RESULTS COMPARE FAVORABLY WITH AN EXISTING LIFTING SURFACE FORMATION. THE PROGRAM HAS BEEN MODIFIED TO INCLUDE THE HUB FOR ANALYSIS. FURTHER MODIFICATIONS ARE PLANNED TO STUDY THE EFFECT OF THE CONING ANGLE, CHORD LENGTH DISTRIBUTION, BLADE PITCH ANGLE DISTRIBUTION, AND AIRFOIL SECTION. THE METHOD MAY ALSO BE APPLIED TO UNSTEADY FLOW PROBLEMS SUCH AS NON-UNIFORM WIND DISTRIBUTIONS (WINDMILLS IN SHEAR WINDS). THE APPENDICES CONTAIN GRAPHS, THE VERIFICATION OF EXPRESSIONS FOR THE INDEFINITE DOUBLET AND SOURCE INTEGRALS, PROOF OF FAR WAKE, AND HUB GEOMETRY.

1976-0628 RAMAKUMAR R
TECHNICAL AND SOCIO-ECONOMIC ASPECTS OF SOLAR ENERGY AND RURAL DEVELOPMENT IN DEVELOPING COUNTRIES.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 162-176.

A STEP-BY-STEP APPROACH IS PRESENTED FOR THE ADOPTION OF TECHNOLOGIES DESIGNED TO EXPLOIT RENEWABLE (SOLAR) ENERGY SOURCES AT THE RURAL LEVEL. IT IS CENTERED AROUND THE ESTABLISHMENT OF RURAL ENERGY CENTERS TO IMPROVE THE BASIC LIVING ENVIRONMENT. IN DUE COURSE, THE ROLE OF THESE CENTERS IS TO BE EXPANDED TO ENCOMPASS AGRICULTURAL AND SMALL-SCALE INDUSTRIAL ACTIVITIES. THE TECHNICAL AND SOCIO-ECONOMIC ASPECTS OF THE STEP-BY-STEP INTRODUCTION OF SOLAR ENERGY SYSTEMS IN RURAL AREAS IN DEVELOPING COUNTRIES ARE DISCUSSED.

1976-0629 REDFIELD D
SOLAR ENERGY: ITS STATUS AND PROSPECTS.
RCA ENG. 22: 71-75, JUNE 1976.

THE DIFFERENT SUBPROGRAMS ENCOMPASSED BY THE NATIONAL PLAN FOR SOLAR RESEARCH AND DEVELOPMENT RECENTLY ISSUED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) ARE DESCRIBED BRIEFLY. OF THE SOLAR ELECTRIC APPLICATIONS CURRENTLY UNDER DEVELOPMENT, WIND ENERGY CONVERSION SYSTEMS AND SOLAR PHOTOVOLTAIC CONVERSION SYSTEMS ARE THE MOST ADVANCED.

1976-0630 REGIONAL WIND, INDIVIDUAL WIND: TWO STUDIES ASSESS WAYS IN WHICH WE CAN USE THE WIND. I. FILL THE POWER NEEDS FOR THE WHOLE OF LONG ISLAND.
SOL. AGE 1(3): 26-28, 1976.

THE USE OF WIND POWER PLANTS TO REPLACE EXISTING POWER PLANTS ON LONG ISLAND, NEW YORK, IS DISCUSSED. GENERATOR SCHEMES AND ECONOMIC CONSIDERATIONS ARE ANALYZED.

1976-0631 REPORT OF THE STATE ENERGY COMMITTEE OF SOUTH AUSTRALIA.
NTIS, MAY 1976. 185 P.
NP-23032

THIS REPORT ON SOUTH AUSTRALIAN ENERGY DISCUSSES THE PRINCIPAL ENERGY RESOURCES ALREADY IN USE, AND ENERGY SOURCES POTENTIALLY AVAILABLE TO SOUTH AUSTRALIA WHETHER OR NOT THE REQUIRED TECHNOLOGIES ARE FULLY DEVELOPED. IT CONSIDERS NATURALLY OCCURRING FORMS SUCH AS SOLAR ENERGY, WIND ENERGY, GEOTHERMAL ENERGY, AND HYDROLOGICAL SOURCES. ITS ALSO CONSIDERS SEVERAL DERIVED ENERGY TECHNOLOGIES SUCH AS HYDROGEN GAS, THE RECYLING OF WASTE MATERIAL, FUEL CELLS, AND THE RELATIVELY NOVEL MAGNETOHYDRODYNAMIC METHOD OF GENERATING ELECTRICITY.

1976-0632 RESEARCH, DEVELOPMENT AND USE OF WIND ENERGY IN THAILAND.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 108-114.

1976-0633 RI Z
PROCESS FOR STORING ELECTRICITY FOR A FAST ADVANCING CONVEYANCE AND DEVICE FOR STORING SUCH ELECTRICITY.
U.S. PATENT NO. 3,942,025, MARCH 2, 1976. 1 P.

A DEVICE FOR STORING ELECTRICITY FOR A FAST MOVING CONVEYANCE IS DESCRIBED AND CONSISTS OF A WINDMILL HAVING A ROTATING SHAFT WITH RADIALLY AND LINEARLY EXTENDING ARMS, THE LATTER HAVING ENDS DEFINING SUBSTANTIALLY CIRCULAR OPENINGS, THE SHAFT BEING DISPOSED ON A FAST MOVING CONVEYANCE; AND GENERATOR MEANS CONNECTED TO THE ROTATING SHAFTS OF THE WINDMILL FOR CAUSING ELECTRICITY TO BE GENERATED. THE WINDMILL INCLUDES A PLURALITY OF SUBSTANTIALLY BOWL-LIKE WINGS DISPOSED IN CIRCULAR OPENINGS, RESPECTIVELY, AND INCLUDING A BOTTOM PLATE PROVIDED AT A BOTTOM EDGE PORTION OF EACH OF THE WINGS.

1976-0634 SELLMAN D L
WIND MOTORS.
U.S. PATENT NO. 3,986,786, OCTOBER 19, 1976. 4 P.

WIND MOTORS ARE DESCRIBED WHICH ARE PROPELLED BY THE IMPACT OF THE WIND AGAINST THE VANES OF AN IMPELLER WHEEL. WIND CHANNELING DEVICES GATHER THE WIND FROM A LARGE AREA AND FUNNEL IT AT INCREASED DENSITY AND PRESSURE TO APPLY MULTIPLIED IMPACT AGAINST THE IMPELLER VANES.

1976-0635 SHEIBLY D W, GAHN R F
GELS AS BATTERY SEPARATORS FOR SOLUBLE ELECTRODE CELLS.
NTIS, JULY 20, 1976. 18 P.
PAT-APPL-707 124, NASA-CASE-LEW-12364-1, N76-28643

GELS ARE FORMED FROM SILICA POWDERS AND HYDROCHLORIC ACID. THE GELS CAN THEN BE IMPREGNATED INTO A POLYMERIC FOAM, AND THE RESULTANT SHEET MATERIAL CAN THEN BE USED IN APPLICATIONS WHERE THE TRANSPORT OF CHLORIDE IONS IS DESIRED. SPECIFICALLY DISCLOSED IS THE UTILIZATION OF THE SHEET IN ELECTRICALLY RECHARGEABLE REDOX FLOW CELLS WHICH FIND APPLICATION IN BULK POWER STORAGE SYSTEMS.

1976-0636 SHERMAN M M
THE DESIGN AND CONSTRUCTION OF LOW-COST WINDPOWERED WATER PUMPING SYSTEMS.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 76-104.

1976-0637 SHERMAN M M
DEVELOPMENT OF WIND ENERGY UTILIZATION IN ASIA AND THE PACIFIC.

UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 61-75.

1976-0638 SHORE J, PULLING F
INTEGRATED SOLAR DWELLING.
ALTERN. SOURCES ENERGY NO. 22: 8-9, SEPTEMBER 1976.

THE INTEGRATED SOLAR DWELLING IS AN INDEPENDENTLY SERVICED DWELLING BASED ON PRACTICAL EXPERIENCE OF THE VARIOUS SYSTEMS: SOLAR, WIND, WATER, FOOD AND SANITATION. IT IS LOCATED IN BRIGHTON, ENGLAND. THE FLOOR PLAN OF THE 36 SQ. M. LIVING UNIT LINKED TO A SOUTH FACING 38 SQ. M. CONSERVATORY IS SHOWN. THERE ARE 12 SQ. M. OF SOLAR HEATING PANELS. A WIND GENERATOR IS PROPOSED FOR LIGHTING. THE THERMAL PERFORMANCE AND INSULATION ARE DISCUSSED.

1976-0639 SUCIU E, MORINO L
WECS INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA).
NTIS, MAY 1976. 44 P.
ENGR-COMP-TN-76-01, PB80-191620

A METHOD IS DESCRIBED FOR COMPUTING THE DISTRIBUTION FOR A ZERO-THICKNESS HORIZONTAL AXIS WINDMILL, AS WELL AS FOR OBTAINING THE POWER COEFFICIENT. THE PROBLEM IS FORMULATED IN TERMS OF VELOCITY POTENTIAL, AND THE STUDY DEALS WITH A NONLINEAR FINITE-ELEMENT LIFTING-SURFACE ANALYSIS OF HORIZONTAL-AXIS WINDMILLS IN A STEADY INCOMPRESSIBLE, INVISCID, IRROTATIONAL FLOW, WITH A PRESCRIBED HELICOIDAL WAKE. A ZERO-ORDER-FINITE-ELEMENT ANALYSIS IS USED WITH A STRAIGHT-VORTEX LINE WAKE. THE CORRECT WAKE GEOMETRY IS OBTAINED AND THE PRESSURE COEFFICIENT CALCULATED USING BOTH LINEARIZED AND NONLINEAR FORMS OF THE BERNOULLI THEOREM. THE NUMERICAL RESULTS COMPARE WELL WITH THOSE OBTAINED WITH WINDMILL INCOMPRESSIBLE COMPLEX CONFIGURATION AERODYNAMICS (WICCA), A COMPUTER PROGRAM FOR SOLVING THE SAME PROBLEM WHICH USES A COMPLETELY DIFFERENT INTEGRAL EQUATION. A NUMBER OF SUGGESTIONS ARE OFFERED TO IMPROVE THE MODEL PRESENTED.

1976-0640 TECHNOLOGY ASSESSMENT AND FORECAST. SIXTH REPORT.
NTIS, JUNE 1976. 190 P.
PAT-036.3-7606, PB-254188

THE DOCUMENT REVIEWS 15 TECHNOLOGIES WHICH ARE THE SUBJECT OF HEAVY PATENTING BY FOREIGN RESIDENT INVENTORS, AND 22 TECHNOLOGIES WITH HIGH PATENT ACTIVITY. PATENT ACTIVITY IS REVIEWED IN SOLAR ENERGY TECHNOLOGY, THE PRODUCTION OF ENERGY FROM WASTE MATERIAL, AND WIND GENERATION OF ELECTRICITY.

1976-0641 TEWARI S K
A REVIEW OF EFFORTS MADE IN INDIA FOR WIND POWER UTILIZATION.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 105-107.

1976-0642 TROLL J H
DEVICE FOR THE UTILIZATION OF WIND ENERGY.
GERMAN (FRG) PATENT NO. 2,535,138/A/, FEBRUARY 19, 1976. 13 P. (IN GERMAN)

A DEVICE FOR THE UTILIZATION OF WIND ENERGY IS CLAIMED WHICH CAN BE OPERATED IN A WIDE RANGE OF WIND VELOCITIES AND ENABLES THE CONVERSION OF WIND ENERGY INTO MECHANICAL AND/OR ELECTRICAL POWER. THE OUTPUT OF THIS DEVICE WILL BE UNIFORM AT DIFFERENT WIND VELOCITIES.

1976-0643 THE UTILIZATION OF WIND ENERGY IN AUSTRALIA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 115-116.

1976-0644 WIND ENERGY MISSION ANALYSIS. APPENDIX.
NTIS, APRIL 1976. 268 P.
SAN/1075-1/2

THESE APPENDICES INCLUDE INFORMATION ON THE AVERAGE POWER DENSITY OF THE WIND FOR THE U.S. AND ITS TERRITORIES, CHARACTERISTICS OF THE VERTICAL AXIS MACHINE, STRUCTURAL ANALYSIS DETAILS, AERODYNAMIC ANALYSIS, COST FACTORS FOR WTG COST MODEL, EVALUATION OF UTILITY APPLICATIONS, INDUSTRIAL COST OF ELECTRICITY, NATIONAL IMPACT OF WECS, PUBLIC ACCEPTANCE, AND ENVIRONMENTAL ISSUES.

1976-0645 WIND ENERGY + WATER + AIR = FOOD.
MACH. DES. 48(27): 4, NOVEMBER 25, 1976.

HARNESSING THE WIND TO PRODUCE ELECTRICITY AND USING THE ELECTRICITY TO GET CHEMICALS FROM WATER AND AIR MAY PROVE TO BE AN IMPORTANT NEW METHOD OF PRODUCING FERTILIZER. LOCKHEED-CALIFORNIA IS INVESTIGATING THE TECHNICAL FEASIBILITY AND ECONOMICS OF THE PROCESS.

1976-0646 WIND POWER PROBLEMS.
SCI. DIG. 80: 20, OCTOBER 1976.

NASA'S EXPERIENCE WITH A 100 KW TURBINE IN SANDUSKY, OHIO, IS DESCRIBED. IN THE FIRST 9 MOS. OF OPERATION THE TURBINE LOGGED LESS THAN 30 HOURS OF OPERATION, DUE TO STRESSES ON THE BLADES.

1976-0647 WRIGHT J H, ROFFMAN H K
ENERGY SHORTAGE AND POTENTIAL ENVIRONMENTAL IMPACTS OF NONCONVENTIONAL ENERGY SOURCES.
AM. NUCL. SOC. TRANS. SUPPL. 23(1): 7-8, 1976.

1976-0648 YING S J
MULTIPLE CONTROL CIRCUIT FOR ELECTRICAL UNIT AND AUTOMATIC CONTROL CIRCUIT FOR WINDMILL GENERATOR.
ASME PAPER 76-DET-100, 1976. 3 P.

TWO CIRCUITS ARE INTRODUCED IN THIS PAPER. ONE IS DESIGNED FOR CONTROLLING AN ELECTRICAL UNIT AT MANY DIFFERENT LOCATIONS. THE PARTS REQUIRED FOR ONE CONTROL SET ARE JUST ONE NO (NORMAL OPEN) SWITCH AND ONE NC (NORMAL CLOSED) SWITCH. THE OTHER CIRCUIT IS DESIGNED FOR CONTROLLING THE OUTPUT OF UNSTEADY POWER SUPPLY, SUCH AS A WINDMILL-OPERATED GENERATOR. THE CONTROL CAN AUTOMATICALLY TURN ON THE CIRCUIT TO THE LOAD WHEN THE

VOLTAGE IS HIGH ENOUGH. THE CIRCUIT TO EACH LOAD IS CONTROLLED BY A SILICON-CONTROLLED RECTIFIER AND A ZENER DIODE. A VOLTAGE REGULATOR AND BATTERIES ARE USED TO STABILIZE THE VOLTAGE SUPPLYING TO THE ELECTRICAL UNITS.

1976-0649 ZIMMERMANN G
TRANSFORMER OF ENERGY DIRECTION FOR USE IN AERODYNAMIC AND HYDRODYNAMIC FLOW.
GERMAN (FRG) PATENT NO. 2,507,295/A/, JANUARY 25, 1977. 11 P. (IN GERMAN)

THE INVENTION REFERS TO A FLOW POWER ENGINE WHERE THE POWER WINGS, PICKING UP THE THRUST AND BEING ARRANGED AROUND THE AXIS OF THE ENGINE BY MEANS OF WING CARRIES, ARE BROUGHT INTO THE POSITION REQUIRED FOR POWER PICK-UP BY THE FLOW ITSELF. UNTIL THE NEXT POWER PICK-UP PHASE THE FLOW PUTS THEM INTO A POSITION IN WHICH THEY DO NOT PUT UP ANY RESISTANCE TO THE FLOW. IF THE FLOW DIRECTION IS CHANGED, E.G., ON TRANSITION FROM HIGH TIDE TO LOW TIDE, THE SENSE OF ROTATION DOES NOT CHANGE. THE MASS OF THE POWER WINGS IS EQUAL TO THAT OF THE AMOUNT OF WATER DISPLACED, E.G., BY MEANS OF AIR-FILLED CAVITIES, IN ORDER THAT THEY DO NOT CHANGE THEIR POSITION BY BUOYANCY OR GRAVITY. THE POWER WINGS FOLD ON THE CARRIERS TURNING AROUND THE WIND AXIS UNTIL A PROLONGATED STRAIGHT LINE IS FORMED. BY MEANS OF THE BRAKE ARM OR BRAKE ROD THEY ARE PREVENTED FROM FOLDING ANY FURTHER.

1976-0650 GARWOLI W N
INDIRECT USE OF SOLAR ENERGY.
AUST. PHYS. 13(11): 187, 1976.

THE RESEARCH IS CONSIDERED ON WIND ENERGY, ANAEROBIC DIGESTION OF ORGANIC WASTES, COLLECTION OF WIND ENERGY AT SEA, AND CONVERSION OF THE ENERGY TO H FOR STORAGE.

1975-0553 ADAMS A
YOUR ENERGY-EFFICIENT HOUSE: BUILDING AND REMODELING IDEAS.
CHARLOTTE, VERMONT, GARDEN WAY PUBL. CO., 1975. 118 P.

1975-0554 BADE P
FLAPPING-VANE WIND MACHINE AND ROD PISTON PUMP, AN INTEGRATED DELIVERY SYSTEM FOR LARGE WELL DEPTHS AND SMALL FLOW RATES.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 71-82.

1975-0555 BADE P
FLAPPING-VANE WIND MACHINE.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 83-88.

1975-0556 BOCKRIS J O
TIME AVAILABLE FOR THE RESEARCH, DEVELOPMENT, AND BUILDING OF A NEW ENERGY BASE.
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE. NEW YORK, JOHN WILEY AND SONS, INC., 1975. P. 21-43.

THE FOLLOWING TOPICS ARE COVERED: EXHAUSTION OF FOSSIL FUELS; ENERGY AND LIVING STANDARDS; AVAILABILITY OF VARIOUS ENERGY RESOURCES; FOSSIL FUELS; WATER POWER; TIDAL POWER; GEOTHERMAL POWER; WIND POWER; THE TIME EXHAUSTION OF THE WORLD'S FOSSIL FUELS; MATHEMATICAL MODELS FOR PREDICTING RESOURCE EXHAUSTION TIME; ESTIMATION OF THE EXHAUSTION OF FUEL SUPPLY; TIME NEEDED TO REALIZE A MAJOR TECHNOLOGICAL CHANGE; LIMITS TO GROWTH; LIMITS FOR THE SUPPLY OF ATOMIC ENERGY; AND THE NEGATIVE SIDE OF THE SHORT-TERM (UP TO 2000 A.D.) SITUATION.

1975-0557 BOCKRIS J O
SOURCES OF ABUNDANT, CLEAN ENERGY.
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE. NEW YORK, JOHN WILEY AND SONS, INC., 1975. P. 57-83.

THE FOLLOWING SOURCES OF ENERGY ARE DISCUSSED: SOLAR, GRAVITATIONAL (HYDROELECTRIC AND TIDES), WIND POWER, GEOTHERMAL, CONTROLLED FISSION, AND CONTROLLED FUSION.

1975-0558 BRUCKNER A, GHEORGHE A
SYSTEMATIC CONSIDERATIONS ABOUT A POWER GENERATION SCHEME. CONCEPT OF AIR-GENERATOR--STORAGE POND.
ENERGETICA 23(9-10): 233-238, SEPTEMBER-OCTOBER 1975. (IN RUMANIAN)

AN ANALYSIS OF A MODEL FOR POWER GENERATION USING WIND ENERGY, WITH A STORAGE POND, IS PRESENTED.

1975-0559 COMM R
REPORT TO THE SECRETARY OF THE INTERIOR OF THE ADVISORY COMMITTEE.
ENERGY COMMUN. 1(1): 57-103, 1975.

THE REPORT IS THE PRODUCT OF A FULL-YEAR EFFORT, EMPLOYING AN INTERDISCIPLINARY APPROACH, TO STUDY THE SITUATION AND PROBLEMS OF THE NATION'S ENERGY ECONOMY. SUBJECTS INCLUDE ELEMENTAL AND NEW TECHNOLOGY ENERGY SOURCES, SUCH AS WIND, SUN AND TIDES; PETROLEUM LIQUID FUELS; NATURAL GAS; COAL; WATER; NUCLEAR ENERGY; SYNTHETIC OILS; SYNTHETIC GAS. RECOMMENDATIONS ARE GIVEN FOR EACH.

1975-0560 CURL H
WINONA: TOWARDS AN ENERGY CONSERVING COMMUNITY.
MINNEAPOLIS, MINNESOTA, UNIVERSITY OF MINNESOTA, 1975.

THE UTILIZATION OF SOLAR ENERGY, WIND ENERGY, BIO-FUELS, AND AQUA/AGRICULTURE IS DISCUSSED. BIBLIOGRAPHIES ARE PRESENTED AND OTHER PERTINENT INFORMATION IS INCLUDED ON THESE SUBJECTS PRECEEDING THE PRESENTATION ON WINONA, MINNESOTA. THE APPLICATION OF ENERGY-CONSERVING TECHNOLOGY TO A TOTAL EXISTING COMMUNITY IS THEN EXAMINED IN DEPTH USING WINONA AS THE SAMPLE CITY. ITS POPULATION IS 27,000 PERSONS WITH THREE INSTITUTIONS OF HIGHER LEARNING.

1975-0561 DELPHIANS PLAN ENERGY-EFFICIENT AGRICULTURAL FACILITY.
SHERIDAN, OREGON, DELPHIAN FOUNDATION, 1975. 6 P.

A PRODUCTIVE RESEARCH AND EDUCATIONAL DEMONSTRATION PLAN OF EXPERIMENTAL TECHNOLOGIES SUCH AS SOLAR AND WIND ENERGY, AQUACULTURE, METHANE PRODUCTION, RECYCLED BY-PRODUCTS, BIOLOGICAL FILTRATION, AND POLYCULTURE ON ONE SITE IS PRESENTED. THE 1300-ACRE SITE IN OREGON WILL PRODUCE FOOD, FUEL, FIBER, AND PRESERVE THE ENVIRONMENT. THE LOW-ENTROPY (HENCE, THE NAME, LOW ENTROPY AGRICULTURAL FACILITY (LEAF I)) SYSTEMS ARE INTEGRATED INTO A COMPATIBLE NETWORK THAT MAINTAINS HIGH PRODUCTION AND ENSURES THE PRESERVATION OF THE ENVIRONMENT.

1975-0562 DOERING E
OVERVIEW OF THE ERDA SOLAR PROGRAM: A SYNOPSIS.
SELECTED AND EDITED PROCEEDINGS OF SOLAR ENERGY FOR VIRGINIA. SOLAR ENERGY FOR VIRGINIA CONFERENCE, RICHMOND, VIRGINIA, AUGUST 19, 1975. NTIS, 1975. P. 7-13.
CONF-7508105

1975-0563 DORNER H
EFFICIENCY AND ECONOMIC COMPARISON OF DIFFERENT WEC--(WIND ENERGY CONVERTER) ROTOR SYSTEMS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 43-70.

1975-0564 DUBACH P
SIMPLE ANEMOMETRIC EQUIPMENT.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 119-129.

1975-0565 ECCLI E
LOW-COST, ENERGY-EFFICIENT SHELTER FOR THE OWNER AND BUILDER.
EMMAUS, PENNSYLVANIA, RODALE PRESS, 1976. 408 P.

1975-0566 ENERGY HISTORY OF THE UNITED STATES 1776 TO 1976.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1975. 24 P.

A BICENTENNIAL ENERGY WALL CHART AND ACCOMPANYING MANUAL DEPICT THE HISTORY OF U.S. ENERGY USE SINCE 1776.

COLOR BARS FOR WOOD, COAL, ANIMAL ENERGY, WIND AND WATER POWER, GASEOUS AND LIQUID FUELS, ELECTRICITY, SOLAR ENERGY, GEOTHERMAL ENERGY, AND NUCLEAR FUELS HELP TIE SPECIFIC HISTORICAL EVENTS WITH ENERGY SOURCES. THE COLOR BARS ARE ARRANGED VERTICALLY IN A YEAR-BY-YEAR CHRONOLOGY AND HORIZONTALLY BY DECADES. PROJECTIONS TO THE YEAR 2001 PREDICT THE USES AND TECHNOLOGIES OF EACH ENERGY SOURCE AND THE POSSIBILITY OF NEW DISCOVERIES.

1975-0567 ENERGY: TRANSPORT, STORAGE AND CONVERSION.
THERMOFLUIDS CONFERENCE, PREPRINTS OF PAPERS. SYDNEY, AUSTRALIA, INSTITUTE OF ENGINEERING, NATIONAL CONFERENCE PUBLICATION NO. 75/9, 1975. 142 P.
THERMOFLUIDS CONFERENCE, BRISBANE, AUSTRALIA, DECEMBER 3-5, 1975.

THE VOLUME CONTAINS 19 PAPERS DEALING WITH POWER GENERATION BY UNCONVENTIONAL MEANS SUCH AS SOLAR, MHD, COAL GAS ENGINES, GEOTHERMAL, AND WIND. SEVERAL PAPERS DISCUSS THE METHODS OF POWER TRANSMISSION.

1975-0568 FAUEL P L
COMPARATIVE WIND TUNNEL INVESTIGATION OF SAIL PROFILES FOR WINDMILLS.
NTIS, FEBRUARY 1975. 20 P.
N77-13012

LOW SPEED WIND TUNNEL TESTS WERE CARRIED OUT TO DETERMINE SAIL PROFILES FOR IMPROVING THE PERFORMANCE OF CLASSICAL DUTCH WINDMILLS. RESULTS ARE PRESENTED IN GRAPHS, IN WHICH THE COEFFICIENT OF FORCE-IN-PLANE RELATED TO THE WIND VELOCITY IS DEPICTED AS FUNCTION OF THE RATIO BETWEEN CIRCUMFERENTIAL SPEED AND EFFECTIVE WIND VELOCITY. IT APPEARS THAT IMPROVEMENTS IN PERFORMANCE MAY BE OBTAINED BY CHANGING THE SHAPE OF THE SAILS.

1975-0569 FEDERAL WIND ENERGY PROGRAM. SUMMARY REPORT.
NTIS, OCTOBER 1975. 81 P.
ERDA-84

THIS PAPER PRESENTS A BRIEF OVERVIEW OF THE FEDERAL RESEARCH AND DEVELOPMENT ACTIVITIES IN THE FIELD OF WIND ENERGY AND INCLUDES ABSTRACTS OF THE INDIVIDUAL PROJECTS WHICH COMPRISE THE PROGRAM.

1975-0570 FRAENKEL P L
FOOD FROM WINDMILLS.
NTIS, NOVEMBER 1975. 83 P.
PB-297559

THIS REPORT DESCRIBES WORK DONE TO IMPROVE AND EVALUATE A SERIES OF WIND-MILLS DEVELOPED FOR IRRIGATING SMALL PLOTS OF LAND ON THE BANKS OF THE OMO RIVER IN ETHIOPIA, USING RIVER WATER. THE SYSTEMS WERE DEVELOPED BY THE AMERICAN MISSION FOR USE BY THE LOCAL PEOPLE IN ORDER TO PERMIT ALL YEAR ROUND CULTIVATION WHICH IS NOT OTHERWISE POSSIBLE. STATISTICAL INFORMATION IS INCLUDED IN THE FIVE APPENDICES.

1975-0571 FREEMAN B E
NEW WIND ENERGY SITE SELECTION METHODOLOGY. QUARTERLY REPORT NO 1, MARCH 17-JUNE 16, 1975.
NTIS, JULY 1975. 63 P.
PB-282832

THIS REPORT DISCUSSES NEW WIND ENERGY SITE SELECTION METHODOLOGY; SPECIFICALLY, FIELD DATA ACQUISITION, AND MATHEMATICAL MODEL DESIGN, DEVELOPMENT, AND DOCUMENTATION. THE MAJOR TASK WAS TO FORMULATE AND DEVELOP METEOROLOGICAL SIMULATION MODELS. THE SIGMET COMPUTER CODE WAS MODIFIED AND REORGANIZED FOR USE AS A MESOSCALE SIMULATION TOOL FOR THE WIND ENERGY SITING PROGRAM.

1975-0572 HAEUSSER W
WIND ENGINE.
GERMAN (FRG) PATENT NO. 2,401,214/A/, JULY 24, 1975. 5 P. (IN GERMAN)

THE INVENTION APPLIES TO A WIND ENGINE WITH A VERTICAL AXIS AND WORKING SURFACES FOR WIND WHICH MAY BE SWUNG AROUND RADIAL HORIZONTAL AXES. WHEN FACING THE WIND IN THEIR ROTATION, THEY ARE HELD IN PLACE BY A STOP. AT ALL OTHER POINTS OF THEIR ROTATION, THEY ARE AUTOMATICALLY SWUNG OUT OF THE WIND. AT HIGH WIND SPEEDS, AND THUS ALSO AT HIGH ROTATIONAL SPEEDS, A CENTRIFUGAL GOVERNOR MOVES THE STOP OUTWARD SO THAT THE WORKING SURFACE IS NO LONGER HELD IN THE WIND, THUS MAKING SURE THAT A GIVEN ROTATIONAL SPEED IS NOT EXCEEDED.

1975-0573 HARRIS F W, JOHNSON G L, HARMS W A, GOOLEY W E
ECONOMIC ANALYSIS OF A PROPOSED HYDROGEN FUEL SYSTEM FOR FARM APPLICATIONS.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 8TH ANNUAL, STILLWATER, OKLAHOMA, OCTOBER 1-2, 1975. STILLWATER, OKLAHOMA STATE UNIVERSITY, ENGINEERING EXTENSION, 1975. PAPER 4, 21 P.

THE PAPER IS CONCERNED WITH ESTIMATING THE COST TO THE FARMER OF EACH UNIT OF FUEL PRODUCED BY A CONCEPTUAL FARM HYDROGEN FUEL SYSTEM WHEREIN THE HYDROGEN IS PRODUCED ELECTROLYTICALLY AT THE FARM SITE USING ELECTRICITY DERIVED ENTIRELY FROM A WIND ENERGY COLLECTION SYSTEM. A DIGITAL COMPUTER PROGRAM THAT SIMULATED THE PROPOSED FARM FUEL SYSTEM IS DESCRIBED. ITS PURPOSE WAS TO ANSWER THE QUESTION OF WHAT MUST BE THE CAPACITY OF THE BULK HYDROGEN STORAGE FACILITY IN ORDER TO MATCH THE VARIABLE ENERGY SOURCE (WIND) TO THE VARIABLE DEMAND (FARM FUEL REQUIREMENTS). THE RESULTS OF THIS STUDY SHOW THAT THE PROPOSED FARM HYDROGEN FUEL SYSTEM CAN BE MADE ECONOMICALLY VIABLE IN THE FUTURE. IN ORDER FOR THIS TO OCCUR, THE SO-CALLED "PROJECTED TECHNOLOGY" OF THE ELECTROLYTIC PROCESS MUST BE REALIZED. OTHERWISE, THE HYDROGEN STORAGE REQUIREMENTS WILL BE SO GREAT THAT IT WILL BE DIFFICULT FOR THE SYSTEM TO COMPETE WITH OTHER NON-PETROLEUM MOBILE FUELS.

1975-0574 HERWIG L O
FEDERAL SOLAR RESEARCH PLANS.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12-14, 1975. PROCEEDINGS. P. 315-332. WASHINGTON, GOVERNMENT INSTITUTES, INC., 1975.

THE UTILIZATION OF SOLAR RADIATION THROUGH DIRECT AND INDIRECT CONVERSION INTO THERMAL ENERGY, ELECTRICITY, AND CLEAN FUELS IS DISCUSSED. SOLAR ENERGY FOR HEATING AND COOLING, WIND ENERGY CONVERSION, AND BIOCONVERSION TO FUELS, SOLAR THERMAL CONVERSION, PHOTOVOLTAIC CONVERSION, AND OCEAN THERMAL CONVERSION ARE ANALYZED. DATA IN TABULAR FORM ARE APPENDED.

1975-0575 HIGH COST OF FUEL REVIVES INTEREST IN COMMERCIAL SAILING VESSELS.
TRAFFIC WORLD 163(11): 105-106, SEPTEMBER 15, 1975.

A BRIEF EXAMINATION IS MADE OF THE TECHNICAL AND ECONOMIC ASPECTS OF THE USE OF SAIL SHIPS. MODERN DEVELOPMENTS IN ELECTRONIC NAVIGATION AIDS AND WEATHER DATA FROM RADAR MAY MAKE COMMERCIAL SAILING SHIPS

ECONOMICALLY FEASIBLE.

1975-0576 HOGAN I, FORD B, BOYLE G
WIND POWER!
UNDERCURRENTS NO. 11: 25-30, MAY/JUNE 1975.

1975-0577 HOVEY R W
WIND DRIVEN FANS: SIMPLIFIED ANALYSIS, DESIGN, AND CONSTRUCTION.
PHOENIX, CENTERLINE CORPORATION, 1975. 35 P.

A SIMPLIFIED ANALYSIS OF THE WINDMILL, ITS DESIGN AND APPLICATIONS ARE PRESENTED IN A MANNER EASY TO FOLLOW AND UNDERSTAND. DIAGRAMS, GRAPHS, AND SIMPLE MATHEMATICAL EQUATIONS ARE USED FOR DETAILED EXPLANATIONS OF THE CONSTRUCTION AND FORCES WHICH AFFECT THE OPERATION OF THE WINDMILL.

1975-0578 HURLEBAUS W
SUBGROUP 4: WIND ENERGY SYSTEMS.
MAGNITUDE AND DEPLOYMENT SCHEDULES OF ENERGY RESOURCES, CONFERENCE, PORTLAND, OREGON, JULY 21-23, 1975. PROCEEDINGS. CORVALLIS, OREGON STATE UNIVERSITY, 1975. P. 43-46.

AN ESTIMATE, ON THE BASIS OF PRESENTLY AVAILABLE INFORMATION, ON THE LIKELY DEPLOYMENT OF WIND ENERGY IS PRESENTED.

1975-0579 HYDROGEN AS ENERGY CARRIER. FUTURE POSSIBILITIES IN THE NETHERLANDS.
NTIS, SEPTEMBER 1975. 281 P.
N76-24723

THE APPLICATION OF HYDROGEN AS CARRIER FOR THERMAL ENERGY, PRODUCED BY NEW ENERGY SOURCES SUCH AS NUCLEAR REACTORS AND WIND AND SOLAR ENERGY GENERATORS, IS DISCUSSED. TOPICS DEALT WITH INCLUDE PRODUCTION, STORAGE, TRANSPORT AND DISTRIBUTION OF HYDROGEN, ASPECTS OF LOCATION BOUND USE, APPLICATION IN TRANSPORT VEHICLES, ENVIRONMENTAL AND SAFETY ASPECTS, AND PROBLEMS IN INTRODUCING HYDROGEN. CONCLUSIONS AND RECOMMENDATIONS FOR EACH OF THESE TOPICS ARE GIVEN AND, AS A GENERAL CONCLUSION, THERE ARE THOUGHT TO BE WIDE PERSPECTIVES FOR THE USE OF HYDROGEN AS CARRIER IN THE ENERGY SUPPLY IN THE NETHERLANDS. THE TECHNOLOGICAL PROBLEMS ARE CONSIDERED SURMOUNTABLE.

1975-0580 JAYADEV T S, SMITH R T
WIND-POWERED ELECTRIC UTILITY PLANTS.
ASME PAPER 75-WA/PET-1, 1975. 4 P.

THIS PAPER DESCRIBES THE GENERAL OPERATING MODES OF WIND-POWERED ELECTRIC UTILITY PLANTS UNDER CONSTANT-SPEED OR VARIABLE-SPEED CLASSIFICATIONS. IT IS SHOWN THAT FOR A PARTICULAR SET OF WIND FREQUENCY-VELOCITY SPECTRA THERE ARE A NUMBER OF ATTRACTIVE SYSTEM CONFIGURATIONS, SO FAR AS TOTAL YEARLY ENERGY PRODUCTION IS CONCERNED. THUS, DETAILED COST EFFECTIVENESS STUDIES AND ADDITIONAL RESEARCH WILL BE REQUIRED TO DEVELOP PRACTICAL WIND ELECTRIC CONVERSION SYSTEMS (WECS).

1975-0581 JOHNSON A L
BIOMASS ENERGY.
ASTRONAUT. AERONAUT. 13(11): 64-70, NOVEMBER 1975.

SOLAR ENERGY CONVERTERS SUCH AS SOLAR THERMAL ABSORBERS, PHOTOVOLTAIC CELLS, AND WINDMILLS REQUIRE ENERGY STORAGE AND, IN GENERAL, HIGH CAPITAL INVESTMENT. BOTH OF THESE DIFFICULTIES CAN BE CIRCUMVENTED BY UTILIZING THE STORED CHEMICAL ENERGY CREATED BY PHOTOSYNTHESES IN VEGETATION. BY USING APPROPRIATE PROCESSES AND ECONOMIC PROCEDURES, BIOMASS FUELS CAN BE PRODUCED AT COSTS WHICH ARE COMPETITIVE WITH THOSE OF COAL PRODUCTS.

1975-0582 KILLIAN H J, DUGGER G L, GREY J
SOLAR ENERGY FOR EARTH: AN AIAA ASSESSMENT.
NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, INC., 1975. 118 P.

DIRECT AND INDIRECT SOLAR ENERGY AND ITS POTENTIAL FOR REPLACEMENT OF FOSSIL FUELS ARE INVESTIGATED. TERRESTRIAL INSOLATION, SOLAR HEATING AND COOLING, SOLAR-THERMAL ELECTRIC POWER, PHOTOVOLTAIC POWER, GEOSYNCHRONOUS SATELLITE SOLAR POWER, WIND POWER, OCEAN THERMAL ENERGY CONVERSION, AND FUEL PRODUCTION (BIOMASS ENERGY) ARE THE PRINCIPAL TOPICS COVERED.

1975-0583 LEE H K, WIE S K
AEROELASTIC CHARACTERISTICS OF A ROTOR AND A WIND MILL.
J. KOREAN SOC. AERONAUT. SPACE SCI. 3(1): 7-15, 1975. (IN KOREAN)

IN THIS INVESTIGATION, HOVERING CHARACTERISTICS OF HINGELESS RIGID ROTOR OF HELICOPTER AND AERODYNAMIC CHARACTERISTICS OF WIND MILL ARE STUDIED. BASIC EQUATIONS OF MOTION OF BENDING-TORSION FLUTTER ARE FORMULATED UNDER THE ASSUMPTION THAT HINGELESS RIGID ROTOR AND WIND MILLS CAN BE CONSIDERED AS A SLENDER ROTATING BEAM AND OSCILLATING AERODYNAMIC FORCE WHICH ARE INDUCED BY THE HELICAL WAKE VORTEX SHEET IN THE CASE OF LOW PITCH ROTOR ARE INTRODUCED TO THIS EQUATION BY THE USE OF MODIFIED THEODOSEN FUNCTION.

1975-0584 MCCARTHY G
ENVIRONMENTAL CONSIDERATIONS FOR SOLAR ENERGY.
SELECTED AND EDITED PROCEEDINGS OF SOLAR ENERGY FOR VIRGINIA. SOLAR ENERGY FOR VIRGINIA CONFERENCE, RICHMOND, VIRGINIA, AUGUST 19, 1975. NTIS, 1975. P. 56-61.
CONF-7508105

THE ENVIRONMENTAL IMPACTS OF SOLAR POWER PLANTS, WIND TURBINES, AND BIOMASS PLANTATIONS ARE DISCUSSED AND CONTRASTED WITH THOSE FOR FOSSIL AND NUCLEAR FUELS.

1975-0585 MAGAI B S
PLANNING FOR ENERGY RESOURCE DEVELOPMENT.
ELECTR. INDIA 15(13): 27-32, 1975.

A GENERAL REVIEW IS PROVIDED OF THE NATIONAL ENERGY RESOURCES OF INDIA. THEY INCLUDE WIND POWER, ITDAL POWER, GEOTHERMAL ENERGY, AND NUCLEAR FISSION AND FUSION. THEIR PRESENT (1975) CONTRIBUTION TO INDIA'S TOTAL ENERGY REQUIREMENTS AND THE POSSIBILITY OF THEIR ACCELERATED DEVELOPMENT AND IMPACT ON THE NATIONAL ECONOMY ARE DISCUSSED.

1975-0586 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. SEMI-ANNUAL REPORT.
NTIS, 1975. 62 P.
PB80-188675

A THEORETICAL FORMULATION IS COMPLETED AND EXTENDED TO UNSTEADY FLOWS FOR ANALYSIS OF LIFTING-SURFACE WIND ENERGY CONVERSION SYSTEMS (WECS) AERODYNAMICS. ITS FORMULATION IS UNDERWAY. A NUMERICAL FORMULATION OF WINDMILL INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA) IS COMPLETED. THIS PROGRAM IS A MODIFICATION OF THE PROGRAM FOR INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS. WILSA IS COMPLETED, DEBUGGED, AND EXERCISED, AND THE RESULTS ARE DETAILED IN AN ATTACHMENT.

1975-0587 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. QUARTERLY REPORT NO. 2.
NTIS, 1975. 25 P.
PB80-188667

SEVERAL PROJECT GOALS ARE INCLUDED IN THIS REPORT: (1)DEVELOPMENT OF A FORMULATION AND COMPUTER PROGRAM FOR A COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS (WECS); (2)DEVELOPMENT OF A FORMULATION AND COMPUTER PROGRAM FOR A COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WECS; (3)INCLUSION OF THE HUB; AND (4)PRELIMINARY ANALYSIS OF THE VISCOUS EFFECTS. THE THEORETICAL FORMULATION FOR THE LIFTING-SURFACE AERODYNAMIC ANALYSIS OF WECS IS COMPLETED TOGETHER WITH NUMERICAL FORMULATION FOR WINDMILL LIFTING SURFACE AERODYNAMICS (WILSA).

1975-0588 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. QUARTERLY REPORT NO. 3.
NTIS, 1975. 43 P.
PB80-188659

THE THEORETICAL FORMULATION OF THE LIFTING-SURFACE AERODYNAMIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IS EXTENDED TO UNSTEADY FLOW AND THE FORMULATION IS INCLUDED. THE COMPLETED CORRESPONDING NUMERICAL FORMULATION FOR THE WINDMILL INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA) PROGRAM IS LISTED IN AN ATTACHMENT. THE POWER COEFFICIENT IS PRESENTED AS A FUNCTION OF ANGULAR SPEED. THE IMPROVED THEORETICAL FORMULATION FOR THE COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WECS IS BEING WRITTEN.

1975-0589 MORRELL W H
ENERGY MISER'S MANUAL.
ELIOT, MAINE, GRIST MILL, 1975. 68 P.

1975-0590 PARK J
AN AIR-OPERATED DEEP-WELL PUMP WITH TWO TYPES OF WINDMILLS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SU[illegible]
BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 1[illegible]3-1[illegible]7.

1975-0591 PETZRICK P A
ENERGY STORAGE TECHNOLOGY--A USER'S ANALYSIS.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12-14, 1975. PROCEEDINGS. P. 160-168. WASHINGTON, GOVERNMENT INSTITUTES, INC., 1975.

THE IMPORTANCE OF ENERGY STORAGE RESEARCH AND DEVELOPMENT IS BEING RECOGNIZED AS EVIDENCED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DECISION TO FUND PROGRAMS IN COMPRESSED AIR STORAGE, LOW TEMPERATURE THERMAL ENERGY STORAGE AND FLYWHEEL ENERGY STORAGE. AN ANALYSIS OF NAVY ENERGY DEMAND SHOWS THAT POTENTIAL NAVY APPLICATIONS FOR ENERGY STORAGE SYSTEMS INCLUDE: THE MATCHING OF ENERGY DEMAND AND SOURCES AT REMOTE BASES WHICH MAY BE SUPPLIED BY SOLAR, OCEANIC OR WIND POWER; THE LEVELING OF ENERGY DEMAND AND CONSERVATION OF ENERGY ONBOARD SHIPS, AIRCRAFT AND AT NAVY FACILITIES; AND, THE USE OF STORAGE DEVICES AS POWER SOURCES FOR VEHICLES AND WEAPONS SYSTEMS. DATA ARE SHOWN GRAPHICALLY AND TABULARLY.

1975-0592 PIKE A
CAMBRIDGE AUTONOMOUS HOUSE.
SOLAR ENERGY ARCHITECTURE AND PLANNING. CONFERENCE ON SOLAR ENERGY ARCHITECTURE AND PLANNING, LONDON, UK, APRIL 1975. P. 1-8.

A PROPOSED HOUSE HAS A BASIC MINIMUM LIVING AREA OF APPROXIMATELY 65 SQ. METERS ON TWO FLOORS. FOR MUCH OF THE YEAR AN OVERALL FLOOR AREA OF 111 SQ. METERS COULD BE USED FOR LIVING PURPOSES. THE DESIGN INCLUDES AN AEROGENERATOR, SOLAR STILL AND COLLECTOR, SOLAR COLLECTOR, AND INSULATING SHUTTERS ON THE GREENHOUSE PORTION AND WINDOWS. A COMPARISON OF AVERAGE EFFICIENCIES OF DIFFERENT ABSORBERS IS INCLUDED.

1975-0593 REVIEW AND SUMMARY OF SOLAR THERMAL CONVERSION PROGRAM PLANNING ASSISTANCE.
NTIS, JUNE 1975. 209 P.
ATR-75(7523-01)-1

THE SOLAR THERMAL CONVERSION PROGRAM PLAN IS DESCRIBED IN DETAIL. SECTIONS 2.0 THROUGH 5.0 COVER THE DISCUSSION AND DETAIL PLANNING COVERING THE OBJECTIVES, JUSTIFICATION, BASIC AND ALTERNATIVE PLANS, BUDGETS, AND SCHEDULES FOR THE SOLAR THERMAL SUB-UNIT PORTION OF THE SOLAR ELECTRIC APPLICATIONS EFFORT.

1975-0594 YOUNG R B, TIEDEMANN A F, MARIANOWSKI L G, CAMARA E H
PRODUCTION OF METHANE USING OFFSHORE WIND ENERGY. QUARTERLY PROGRESS REPORT, 1 APR - 30 JUN 1975.
NTIS, JULY 1975. 63 P.
AAI-ER-8374, PB80-129158

THE FEASIBILITY OF CONVERTING WIND ENERGY TO METHANE GAS WAS INVESTIGATED. THE BASIC APPROACH CONSISTS OF USING OFF-SHORE WINDS TO DRIVE GENERATORS WHICH SUPPLY ELECTRICITY TO ELECTROLYSIS CELLS. ELECTROLYSIS OF DISTILLED SEA WATER PRODUCES HYDROGEN. CARBON DIOXIDE IS DERIVED FROM UNDERWATER CARBONATE DEPOSITS. THESE GASES ARE COMBINED TO FORM METHANE. IN THIS REPORT PERIOD, IN-DEPTH THERMOCHEMICAL ANALYSES WERE MADE OF TWO CANDIDATE PROCESSES. THEIR EFFICIENCIES, MASS FLOWS, AND THERMODYNAMIC BALANCES WERE ESTABLISHED.

1975-0595 SAKR I A, SALEH M A
COMBINED SOLAR-WIND POWER PLANT FOR ARID ZONES IN EGYPT.
SOLAR USE NOW--A RESOURCE FOR PEOPLE: EXTENDED ABSTRACTS, 1975. INTERNATIONAL SOLAR ENERGY CONGRESS AND EXPOSITION, LOS ANGELES, JULY 28-AUGUST 1, 1975. ROCKVILLE, MARYLAND, INTERNATIONAL SOLAR ENERGY SOCIETY, 1975. P. 55-56.

1975-0596 SAN MARTIN R L
ENERGY RESEARCH AND DEVELOPMENT AT NEW MEXICO STATE UNIVERSITY, 1975.
NEW MEXICO WATER CONFERENCE, 20TH. ANNUAL, LAS CRUCES, NEW MEXICO, APRIL 3, 1975. LAS CRUCES, NEW MEXICO, NEW MEXICO STATE UNIVERSITY, OCTOBER 1975. P. 137-146.

CURRENT PROGRAMS AT THE UNIVERSITY INVOLVE RESEARCH IN THE FOLLOWING AREAS: ELECTRIC POWER, WATER FOR ENERGY, ENVIRONMENTAL IMPACT OF ENERGY DEVELOPMENT, ENERGY IN AGRICULTURE, THE USE OF SEWAGE AND REFUSE AS ENERGY SOURCES, GEOTHERMAL ENERGY, COAL ENERGY, WIND ENERGY, AND SOLAR ENERGY. SPECIFIC FACETS OF THESE PROGRAMS BEING RESEARCHED ARE SUMMARIZED.

1975-0597 SHARMAN H
WIND AND WATER SOURCES OF ENERGY IN THE UK.
ENERGY OPTIONS IN THE UK, SYMPOSIUM, LONDON, MARCH 1, 1975. PROCEEDINGS. LONDON, LATIMER NEW DIMENSIONS LTD., 1975. P. 51-64.

A SURVEY OF THE DEVELOPMENT OF TIDAL WATER SOURCES AND WIND POWER GENERATING PLANTS IS PRESENTED.

1975-0598 SHEFTER Y I
ISOPL'ZOVANIE ENERGII VETRA. (USE OF WIND ENERGY.)
MOSCOW, ENERGII, 1975. 177 P.

THIS BOOK CONSIDERS THE TECHNICAL AND ECONOMIC PREREQUISITES IN USING WIND ENERGY, AND THE EFFICIENCY OF ENERGY CONVERSION IN WIND UNITS. THE CONSTRUCTION OF NEW WIND UNITS IS DESCRIBED, AND THEIR TECHNICAL CHARACTERISTICS ARE GIVEN. GENERAL DATA ARE PRESENTED ON THE MODES OF OPERATION AND WIND RESOURCES IN THE TERRITORIES OF THE USSR. METHODS OF INCREASING THE RELIABILITY OF THE ENERGY SUPPLY BY INCREASING THE POWER AND BY USING VARIOUS MEANS OF STORAGE ARE PRESENTED. RECOMMENDATIONS ARE GIVEN ON THE USE OF WINDMILLS IN VARIOUS AREAS OF THE USSR.

1975-0599 SHERMAN M M
6,000 HAND-CRAFTED SAILWING WINDMILLS OF LASSITHIOU, GREECE, AND THEIR RELEVANCE TO WINDMILL DEVELOPMENT IN RURAL INDIA.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 89-93.

1975-0600 SHERMAN M M
AN INTERIM REPORT: THE DESIGN AND CONSTRUCTION OF AN APPROPRIATE WATER PUMPING WINDMILL FOR INDIAN AGRICULTURE.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 95-111.

1975-0601 SHUPE J W
ALTERNATE ENERGY SOURCES FOR HAWAII. PROCEEDINGS.
NTIS, MAY 1975. 52 P.
WORKSHOP ON ALTERNATIVE ENERGY SOURCES FOR HAWAII, HONOLULU, MAY 8-9, 1975.
PB80-191125

THIS WORKSHOP WAS DESIGNED TO INCORPORATE THE BEST CURRENT THINKING OF ENERGY EXPERTS IN DEVELOPING THE OPTIMUM PLAN FOR HAWAII'S ENERGY FUTURE AND TO PROVIDE NATIONAL VISIBILITY TO THE VARIETY AND ABUNDANCE OF NATURAL ENERGY RESOURCES IN THE STATE. FOCUS WAS ON AREAS OF ENERGY RESEARCH AND DEVELOPMENT CURRENTLY OF MAJOR INTEREST TO HAWAII. THESE INCLUDE GEOTHERMAL, WIND, SOLID WASTE, AND SOLAR ENERGY.

1975-0602 SITING ENERGY FACILITIES AT CAMP GRUBER, OKLAHOMA. EXECUTIVE SUMMARY.
NTIS, 1975. 27 P.
PB-246639

PRELIMINARY EVALUATION OF CAMP GRUBER MILITARY RESERVATION IN OKLAHOMA SHOWS IT TO BE A FEASIBLE SITE FOR MANY TYPES OF LARGE COMPLEX ENERGY FACILITIES. APPLYING STANDARD SITING CRITERIA (SUFFICIENT LAND, WATER SUPPLY, ATMOSPHERIC DISPERSION, MARKET POTENTIAL, LOW SOCIO-ECONOMIC AND ENVIRONMENTAL DAMAGE, LOW LABOR AND MATERIAL COSTS, TRANSPORTATION FACILITIES, AND UTILITIES), 24 APPROPRIATE USES ARE LISTED. THESE INCLUDE POWER PLANTS FIRED BY OIL, COAL, AND NUCLEAR FUELS AND POWER PLANTS USING WIND AND SOLAR ENERGY.

1975-0603 SMULDERS P T
WIND ENERGY IN DEVELOPING COUNTRIES: A RESEARCH PROGRAMME IN THE NETHERLANDS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 305-308.

1975-0604 SOLAR ENERGY. FROM PROTOTYPES TO WORKING UNITS BUT ALWAYS THE SAME OBSTACLE: THE COST.
ELECTR. IND. 88(2173): 181-182, 1975. (IN FRENCH)

THE FRACTION OF RADIATED ENERGY FROM THE SUN INTERCEPTED BY THE EARTH IS 20,000 TIMES GREATER THAN WORLD CONSUMPTION IN 1975. A HOUSE HEATED BY SOLAR ENERGY AND DISPLAYED AT THE 1975 PARIS FAIR HAD 45 SQ. MI. OF COLLECTOR PANELS, A WATER THERMAL STORAGE SYSTEM OF 3000 LITRES, 3 SQ. MI. OF PHOTOPILES, AND A WIND GENERATOR. A 400 W SOLAR GENERATOR USING SILICON PHOTOVOLTAIC CELLS HAS BEEN EMPLOYED TO DRIVE AN ELECTRIC PUMP TO DRAW 2700 LITRES/HOUR OF WATER FROM A DEPTH OF 20 M.

1975-0605 SQUIRE D R, WOOD B D
COLLECTOR DESIGN ANALYSIS FOR A SOLAR-AIR TURBINE POWER SYSTEM.
INTERNATIONAL SOLAR ENERGY CONGRESS AND EXPOSITION, LOS ANGELES, JULY 28-AUGUST 1, 1975. SOLAR USE NOW--A RESOURCE FOR PEOPLE. ROCKVILLE, MD., INTERNATIONAL SOLAR ENERGY SOCIETY, SMITHSONIAN RAD. BIOL. LAB., 1975. P. 73-74.

THE SOLAIR TURBINE POWER GENERATION CONCEPT DESCRIBED USES THE BUOYANCY OF SOLAR-HEATED AIR TO DRIVE A WINDMILL-TYPE TURBINE. A BLACK PLATE UNDER A GLASS COVER SHEET ABSORBS SOLAR RADIATION AND HEATS THE ADJACENT AIR. THE OBJECT OF THIS STUDY WAS TO DETERMINE THE ABSORBER SHAPE AND ORIENTATION WHICH WOULD OPTIMIZE THE SOLAR ENERGY COLLECTION AND AIR BUOYANCY THROUGHOUT THE YEAR.

1975-0606 STEFAN H, FORD D E
TEMPERATURE DYNAMICS IN DIMICTIC LAKES.
ASCE HYDRAUL. DIV. J. 101(1): 97-114, JANUARY 1975.

DAILY WATER TEMPERATURE PROFILES IN TEMPERATURE LAKES ARE PREDICTED FROM TIME-VARIABLE METEOROLOGICAL CONDITIONS AND LAKE MORPHOLOGY. A TOTAL ENERGY CONCEPT WHICH INCLUDES WIND ENERGY IS USED. THE METHOD OF ANALYSIS IS DERIVED AND ILLUSTRATED THROUGH CASE STUDIES. AGREEMENT OF PREDICTED AND MEASURED WATER TEMPERATURES IN TWO LAKES THROUGHOUT THE SUMMER SEASON IS GOOD.

1975-0607 SUN, WIND, AND WATER POWER: REVIVIFIES RECYCLED BUILDING.
BUILD. SYST. DES. 72(5): 7-9, 1975.

1975-0608 SUNG C S, EVEN J C
THE SELF-SUFFICIENT ENERGY SUPPLY TO RURAL IOWA AREAS.
OPER. RES. SOC. AM. BULL. 23(SUPPL.1): B-149, PAPER FP3.5, 1975. (ABSTRACT)

1975-0609 TABOR H
SOME REMARKS ON THE USE OF WIND AND SOLAR ENERGY IN SEMIARID AREAS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 5-7.

1975-0610 TEWARI S K
IT'S TIME TO TALK ABOUT WIND POWER.
SCI. TODAY, P. 15-22, NOVEMBER 1975.

DISCUSSED BRIEFLY ARE THE POSSIBILITIES AND ECONOMICS OF THE USE OF WIND POWER, ESPECIALLY IN INDIA. FOUR REASONS ARE MENTIONED WHY AT THIS TIME WIND ENERGY DOES NOT APPEAR ECONOMICALLY FAVORABLE.

1975-0611 THOMAS R, PUTHOFF R, SAVINO J, JOHNSON W
PLANS AND STATUS OF THE NASA-LEWIS RESEARCH CENTER WIND ENERGY PROJECT.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12, 1975. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1975. P. 290-314.

1975-0612 TINKER J
NUCLEAR TECHNOCRAT TILTS AT WINDMILLS.
NEW SCI. 68(974): 340-342, NOVEMBER 6, 1975.

DR. ISHRAT USMANI, FORMER HEAD OF PAKISTAN'S ATOMIC ENERGY COMMISSION AND NOW THE ENERGY ADVISER TO THE UN ENVIRONMENT PROGRAM, BELIEVES THAT NUCLEAR POWER HAS NO FUTURE IN THE DEVELOPING WORLD. DR. USMANI PREPARED A PAPER ON ENERGY'S IMPACT ON THE ENVIRONMENT FOR THE THIRD MEETING OF UNEP'S GOVERNING COUNCIL, APRIL 1975. THE REPORT WAS CONDENSED WHEN PRESENTED AT THE MEETING. THE ENVIRONMENTAL IMPACT OF OTHER ENERGY SOURCES WAS REVIEWED AND THEN THE IMPACT OF NUCLEAR FISSION ENERGY WAS RELATED.

1975-0613 TOLLESON S
WINDMILLS: ENERGY BLOWING IN THE WIND.
ELEMENTS 3(1): 32-41, 1975.

THE HISTORY OF WIND POWER IS REVIEWED WITH ITS UNCERTAIN BEGINNING, BUT BELIEVED TO DATE AS FAR BACK AS 2000 B.C. THE OPERATION OF THE SMITH-PUTNAM GENERATOR IN VERMONT FROM OCTOBER 1941 TO MARCH 1945 MARKED THE FIRST SYNCHRONOUS GENERATION OF POWER FROM THE WIND. IN 1951, CONGRESS REFUSED TO APPROPRIATE FUNDS FOR A PROTOTYPE PROJECT. A WINDMILL CHARGES THE BATTERIES OF A SMALL EXPERIMENTAL "URBAN CAR" WITH A RANGE OF 25 MILES AT THE UNIVERSITY OF OKLAHOMA. IN 1972, IT WAS PREDICTED THAT BY THE YEAR 2000, ABOUT 19 PERCENT OF THE U.S. ENERGY REQUIREMENTS COULD BE SUPPLIED BY WINDPOWER UTILIZED IN WINDY AREAS. A WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS IN 1973 SOUGHT TO ASSESS THE PRESENT STATE OF THE ART OF WIND ENERGY SYSTEMS TECHNCLOGY AND RECOMMENDED CONCRETE DIRECTIONS.

1975-0614 VARGO D J
WIND ENERGY DEVELOPMENTS IN THE 20TH CENTURY. REVISED.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1975. 20 P.

THE AUTHOR REVIEWS VARIOUS WIND ENERGY PROJECTS UNDERTAKEN IN THE 20TH CENTURY, INCLUDING THOSE IN DENMARK, RUSSIA, U.S., GREAT BRITAIN, FRANCE, AND GERMANY. FINALLY CURRENT PROJECTS OF NASA AND ERDA ARE DESCRIBED.

1975-0615 WALTERS R E, FANUCCI J B, LOTH J L, NESS N, PALMER G M
INNOVATIVE WIND MACHINES.
NTIS, SEPTEMBER 1975. 160 P.
TR-47, PB-252617

THIS REPORT DESCRIBES THEORETICAL AND EXPERIMENTAL RESEARCH CONCERNING THE EVALUATION OF TWO CONCEPTS FOR WIND ENERGY CONVERSION MACHINES. THE FIRST CONCEPT DESCRIBED IS THAT OF A VERTICAL AXIS PANEMONE DEVICE WITH CIRCULATION CONTROLLED AIRFOILS FOR THE BLADES. ALSO CONTAINED IS AN OUTLINE FOR A MORE EXACT FLOW THEORY, WHICH PROPERLY TAKES INTO ACCOUNT THE UNSTEADY AERODYNAMICS INVOLVED.

1975-0616 WIND ENERGY POTENTIAL IN NEW MEXICO.
SANTA FE, NEW MEXICO, ENERGY RESOURCES ADMINISTRATION, 1975. 190 P.

THE HISTORY AND STATE OF THE ART OF WIND TURBINES ARE BRIEFLY DISCUSSED. ESTIMATES OF WIND ENERGY AVAILABLE IN THE UNITED STATES ARE NOTED. ALTHOUGH A PRELIMINARY ESTIMATE OF THE WIND ENERGY POTENTIAL FOR NEW MEXICO SHOWS THAT IT IS MORE THAN ADEQUATE TO SERVE LOCAL NEEDS WITHOUT SEVERE ENVIRONMENTAL IMPACT, SEVERAL WINDIER REGIONS APPEAR MORE ATTRACTIVE FOR WIND TURBINE FIELDS DESIGNED TO GENERATE ENERGY FOR EXPORT.

1975-0617 WIND POWER.
A.S.E.'S SPECTRUM. ALTERNATIVE SOURCES ENERGY, P. 28-35, 1975.

1975-0618 WOODWARD J B, BECK R F, SCHER R, CARY C M
FEASIBILITY OF SAILING SHIPS FOR THE AMERICAN MERCHANT MARINE.
NTIS, FEBRUARY 1975. 103 P.
COM-75-10519

THE UNIVERSITY OF MICHIGAN HAS STUDIED THE POSSIBLE USE OF SAILING CARGO SHIPS IN THE CONTEMPORARY AMERICAN MERCHANT MARINE. THE STUDY WAS PROMOTED BY RECENT WORLD DEVELOPMENTS IN ENERGY SUPPLY AND ENVIRONMENTAL CONCERN, THE MOST SIGNIFICANT BEING THE SHARP RISE IN COST OF ENERGY REQUIRED TO DRIVE A POWERED SHIP. SECOND IS A COMPLEX SET OF CHANGES THAT CAN BE GENERALLY CLASSIFIED AS TECHNOLOGICAL ADVANCES, SUCH AS THE

IMPROVEMENTS IN MATERIALS THAT CAN BE USED FOR SAILS AND RIGGING, AND THE IMMENSE ADVANCES IN COMMUNICATION AND CONTROL TECHNOLOGY. A THIRD DEVELOPMENT IS THE CHANGE IN STANDARDS FOR SEAGOING, WHICH INCLUDES IMPROVEMENTS IN SAFETY STANDARDS, HABITABILITY STANDARDS AND MAJOR CHANGES IN WAGE STRUCTURES.

1974-0343 ARCHIBALD F
ELECTRONICS FOR HOMEBUILT WINDMILLS.
J. NEW ALCHEM. NO. 2: 1974.

1974-0344 ARCHIBALD F
WIND POWER WINDMILL ELECTRONICS.
J. NEW ALCHEM., 1974. 5 P.

1974-0345 ELLIOT I F
SOVIET ENERGY BALANCE: NATURAL GAS, OTHER FOSSIL FUELS, AND ALTERNATIVE POWER SOURCES.
NEW YORK, PRAEGER PUBLISHERS, 1974. 285 P.

1974-0346 FUTURE MEANS OF THERMAL POWER GENERATION IN NORWAY.
NTIS, JANUARY 1974. 249 P. (IN NORWEGIAN)
INIS-MF-1550

1974-0347 GALANIS N
INTRODUCTORY REMARKS (TO SESSION III: INTEGRATED SYSTEMS).
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974.
SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 188-198.

1974-0348 GALLAGHER J
ELECTRIC POWER GENERATION ON NOMAD BUOYS.
MACARTHUR WORKSHOP ON THE FEASIBILITY OF EXTRACTING USABLE ENERGY FROM THE FLORIDA CURRENT, PALM BEACH SHORE, FLORIDA, FEBRUARY 27, 1974. PROCEEDINGS. MIAMI, FLORIDA, 1974. P. 278-305.

WIND-DRIVEN, SOLAR, NUCLEAR AND MECHANICAL ELECTRICAL POWER GENERATING TECHNIQUES HAVE BEEN EXPLORED SINCE 1958 FOR USE ON THE DEEP OCEAN NOMAD BUOYS. THESE DEVICES HAVE DEMONSTRATED THAT THEY CAN RELIABLY SUPPLY LOW LEVEL, TRICKLE-CHARGE RATES OF ELECTRICAL ENERGY TO LEAD-ACID AND NI-CAD BATTERIES TO COMPENSATE FOR THE INTERMITTENT DEMAND OF THE ELECTRONICS SYSTEMS AND NAVIGATIONAL AIDS ON THE BUOYS. THE WIND AND SOLAR CELL COLLECTOR-GENERATOR SYSTEMS WERE SUCCESSFULLY TESTED AT SEA DURING THE PERIOD 1959-1967, AND WERE ESSENTIALLY OPERATIONAL SINCE 1967. THE SOLAR CELL GENERATOR APPEARS TO BE A MORE RELIABLE GENERATOR SYSTEM THAN THE WIND GENERATOR. NUCLEAR GENERATORS WERE ALSO TESTED IN NOMAD BUOYS IN THE GULF OF MEXICO SINCE 1964 AND PERFORMED SUCCESSFULLY. A RESONANT PENDULUM GENERATOR DESIGN WHICH UTILIZES WAVE MOTION AND IS HOUSED INSIDE THE BUOY HULL WAS SUCCESSFULLY TESTED IN THE LABORATORY, BUT HAS NOT BEEN TESTED AT SEA. THE HIGH ENERGY TIDAL CURRENT REGIME IN EASTERN LONG ISLAND SOUND IS VIEWED AS A POSSIBLE AREA FOR TESTING WATER-DRIVEN ELECTRICAL ENERGY COLLECTOR-GENERATORS IN CONCERT WITH WIND AND SOLAR SOURCES OF ENERGY.

1974-0349 HARNESSING THE WAYWARD WIND.
INT. OPER. ENG. 117(10): 8-10, OCTOBER 1974.

1974-0350 HERONEMUS W E, MCGOWAN J G
OCEAN THERMAL POWER AND WINDPOWER SYSTEMS--NATURAL SOLAR ENERGY CONVERSION FOR NEAR-TERM IMPACT ON WORLD ENERG MARKETS.
AM. ASTRONAUT. SOC. SCI. TECHNOL. SER. 35, 1975. ENERGY SYMPOSIUM: ENERGY DELTA/SUPPLY VS. DEMAND, 140TH ANNUAL MEETING OF A.A.A.S., SAN FRANCISCO, FEBRUARY 25-27, 1974. PAPER AAS74-031, P. 491-506.

THE POTENTIAL OF TWO ENERGY CONVERSION SYSTEMS WHICH USE THE NATURAL SOLAR COLLECTION OF THE EARTH AND ITS ATMOSPHERE OVER LAND AND SEA AS THEIR POWER INPUT IS DISCUSSED. THE FIRST CONCEPT, FOR LARGE SCALE POWER GENERATION, IS BASED ON A RANKINE CYCLE HEAT ENGINE DRIVEN BY THE THERMAL DIFFERENCE (15 TO 22 DEGREES CELSIUS) WHICH EXISTS BETWEEN THE WARM TROPICAL SURFACE WATERS OF THE OCEAN AND THE GREAT MASS OF COLD WATER BELOW. WINDPOWER, THE SECOND CONCEPT, IS DISCUSSED IN THE CONTEXT OF SMALL TO LARGE SCALE SYSTEMS COMPRISING A NUMBER OF METHODS FOR EXTRACTING A PORTION OF THE KINETIC ENERGY OF THE EARTH'S ATMOSPHERE. A BRIEF HISTORY AND A CURRENT STATUS REPORT ON RESEARCH ON THESE TWO CONCEPTS ARE PRESENTED. SUGGESTED CONFIGURATIONS FOR ENERGY DISTRIBUTION SYSTEMS UTILIZING THESE NATURAL ENERGY RESOURCES COMPLETE WITH ENERGY STORAGE AND TRANSMISSION SYSTEMS ARE GIVEN. IN ADDITION TO THE POTENTIAL IMPACT OF THESE SYSTEMS, THE RECOGNIZED TECHNOLOGICAL AND INSTITUTIONAL PROBLEMS STANDING IN THE WAY OF THEIR POTENTIAL IMPLEMENTATION ARE ENUMERATED.

1974-0351 KAYSER H
ENERGY GENERATION FROM SEA WAVES.
IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN ENVIRONMENT, HALIFAX, AUGUST 21-23, 1974.
PROCEEDINGS RECORD. VOL. 1, P. 240-243. NEW YORK, IEEE, 74CHO873-0 OCC, 1974.

WIND ENERGY WHICH IS INTERCHANGED THROUGH WIDE SURFACE AREAS OF THE OCEANS IS STORED IN SEA WAVES AS A MECHANICAL OSCILLATION. A SIMPLE SYSTEM IS DESCRIBED WHICH ENABLES THE CONVERSION OF THIS ENERGY OF OSCILLATION INTO HIGH PRESSURE WATER AND ELECTRIC POWER. IT IS POSSIBLE TO USE THIS WAVE-DRIVEN GENERATOR FOR POWER SUPPLY OF BUOYS FOR 1 KW OR MORE AS WELL AS FOR BIG STATIONARY POWER PLANTS OF SEVERAL HUNDRED KILOWATTS OF ELECTRIC POWER.

1974-0352 LJUNGSTROM O, SOEDERGAARD B
WIND POWER IN SWEDEN. A PRELIMINARY FEASIBILITY STUDY.
SWEDISH BOARD FOR TECHNICAL DEVELOPMENT, MAY 1974.

1974-0353 POWE R E, TOWNES H W, BLACKKETTER D O, BISHOP E H
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
ANNUAL PROGRESS REPORT 1 SEPTEMBER - 31 DECEMBER 1973.
NTIS, JANUARY 31, 1974. 93 P.
PB80-169899

INITIAL STAGES OF A DETAILED TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED. IT IS ANTICIPATED THAT THE SYSTEM WILL CONSIST OF AIRFOILS MOUNTED VERTICALLY ON CARRIAGES WHICH WILL MOVE AROUND A HORIZONTAL, CLOSED TRACK SYSTEM. THE ORIENTATION OF THE AIRFOILS, RELATIVE TO THE WINDS WILL BE AUTOMATICALLY CONTROLLED TO ENABLE A MAXIMUM POWER EXTRACTION FROM THE WIND. DURING THIS FIRST STAGE OF THE STUDY, THE PERFORMANCE SPECIFICATIONS FOR THE MAJOR SYSTEM COMPONENTS REQUIRED FOR CONVERTING WIND ENERGY TO MECHANICAL ENERGY HAVE BEEN ESTABLISHED, AND THE INTERFACE REQUIREMENTS BETWEEN THESE COMPONENTS HAVE BEEN IDENTIFIED. SEVERAL POSSIBLE ALTERNATIVES FOR MEETING THESE COMPONENTS AND INTERFACE CRITERIA HAVE BEEN SELECTED, AND A DETAILED STUDY OF A NUMBER OF THESE ALTERNATIVES IS REPORTED.

1974-0354 POWE R E, TOWNES H W
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.

QUARTERLY PROGRESS REPORT NO. 1, 1 JANUARY - 31 MARCH 1974.
NTIS, SEPTEMBER 30, 1974. 57 P.
PB80-170962

A THEORETICAL STUDY OF THE EXPECTED OUTPUT OF VARIOUS WIND ENERGY CONVERSION DEVICES HAS BEEN MADE. IT IS DEMONSTRATED ANALYTICALLY THAT THE MAXIMUM POSSIBLE WIND ENERGY EXTRACTION RATE WITH THE TRACKED VEHICLE-AIRFOIL DEVICE MAY BE AS MUCH AS 26 PERCENT GREATER THAN THAT FOR CONVENTIONAL WINDMILLS. ALSO, THE ALTERNATIVES AVAILABLE FOR THE FOUR MAJOR SUBSYSTEMS WERE EXAMINED AND A SPECIFIC OVERALL SYSTEM WAS SELECTED FOR MORE DETAILED STUDY. A COMPREHENSIVE MATHEMATICAL MODEL OF THIS SYSTEM WAS DEVELOPED IN ORDER TO PREDICT ITS PERFORMANCE. THIS MODEL INCORPORATES A SEARCH TECHNIQUE TO DETERMINE OPTIMUM CARRIAGE SPEED AND AIRFOIL ANGLE OF ATTACK FOR MAXIMUM SYSTEM POWER EXTRACTION. ACTUAL WIND SPECTRUM INFORMATION FOR A SPECIFIC GEOGRAPHIC LOCATION CAN BE USED IN CONJUNCTION WITH THE MODEL TO PREDICT ENERGY OUTPUT FROM THE SYSTEM OVER ANY DESIRED TIME PERIOD.

1974-0355 POWE R E, TOWNES H W, BISHOP E H, MARTINELL J
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
SEMI-ANNUAL PROGRESS REPORT. 1 JANUARY - JUNE 1974.
NTIS, JULY 31, 1974. 55 P.
PB80-170681

RESULTS OF A TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED. SPECIFIC ALTERNATIVES FOR THE MAJOR SYSTEM COMPONENTS WERE SELECTED FOR DETAILED ANALYSIS, AND A COMPREHENSIVE MATHEMATICAL MODEL OF THE RESULTING SYSTEM WAS DEVELOPED. THIS MODEL WAS PROGRAMMED FOR SOLUTION ON A DIGITAL COMPUTER, AND THE SYSTEM OPERATION WAS SIMULATED UNDER CONDITIONS SELECTED TO DEMONSTRATE THE EFFECTS OF CHANGES IN VARIOUS DESIGN PARAMETERS. IT IS SHOWN THAT A GREATER POWER OUTPUT MAY BE EXPECTED FROM THIS SYSTEM THAN FROM CONVENTIONAL WINDMILLS UNDER SIMILAR OPERATING CONDITIONS.

1974-0356 POWE R E, TOWNES H W
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
PROGRESS REPORT. (FINAL) 1 SEPTEMBER 1973 - 31 AUGUST 1974.
NTIS, SEPTEMBER 30, 1974. 85 P.
PB80-170962

THE TECHNICAL FEASIBILITY OF A UNIQUE MOMENTUM INTERCHANGE DEVICE FOR EXTRACTION OF ENERGY FROM THE WIND IS STUDIED. IT IS SHOWN THAT THE MAXIMUM POSSIBLE ENERGY EXTRACTION WITH THIS TRACKED VEHICLE-AIRFOIL DEVICE IS GREATER THAN THAT FOR A CONVENTIONAL WINDMILL. A COMPREHENSIVE MATHEMATICAL MODEL IS DEVELOPED FOR THE DEVICE AND THIS MODEL IS PROGRAMMED FOR SOLUTION ON A DIGITAL COMPUTER. THE PROGRAM IS WRITTEN SO THAT WIND SPECTRUM DATA FOR ANY GEOGRAPHIC LOCATION CAN BE USED TO DETERMINE MONTHLY ENERGY OUTPUT FOR THAT LOCATION. INDICATIONS ARE THAT THIS DEVICE COULD MAKE SIGNIFICANT CONTRIBUTIONS TO ELECTRICAL POWER REQUIREMENTS. FOR EXAMPLE, A SYSTEM 8 KM LONG AND CONSISTING OF AIRFOILS 12 METERS IN LENGTH WITH A 3 METER CHORD COULD SUPPLY THE ELECTRICAL ENERGY NEEDS OF ABOUT 17,000 PEOPLE. RESULTS ARE PRESENTED IN A FORM WHICH INDICATES THE EFFECT OF CHANGING VARIOUS DESIGN PARAMETERS. IN ADDITION, COMPARISONS OF THE ENERGY OUTPUT OF THE TRACKED VEHICLE-AIRFOIL SYSTEM WITH TYPICAL WINDMILLS ARE MADE. IT IS FOUND THAT THE MONTHLY ENERGY OUTPUT PER UNIT OF SWEPT AREA FOR THE TRACKED VEHICLE-AIRFOIL SYSTEM MAY BE AS MUCH AS 54 PERCENT GREATER THAN THAT FOR AN EFFICIENT WINDMILL OPERATING IN THE SAME LOCATION.

1974-0357 PUTNAM P C
POWER FROM THE WIND.
NEW YORK, VAN NOSTRAND REINHOLD COMPANY, 1974. 236 P.

1974-0358 RAMAKUMAR R, ALLISON H J, HUGHES W L
ECONOMICS OF SOLAR AND WIND ENERGY SYSTEMS FOR LARGE SCALE POWER GENERATION.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 7TH ANNUAL, STILLWATER, OKLAHOMA, OCTOBER 9-10, 1974. STILLWATER, OKLAHOMA STATE UNIVERSITY, COLLEGE OF ENGINEERING, 1974. PAPER 11, 19 P.

A CASE IS MADE FOR THE CONTINUED DEVELOPMENT OF SOLAR AND WIND ENERGY SYSTEMS TO PROVIDE VIABLE ALTERNATIVES TO FOSSIL FUELS IN THE YEARS TO COME. A SIMPLIFIED ECONOMIC ANALYSIS OF SOLAR AND WIND ENERGY SYSTEMS OF THE TYPE BEING DEVELOPED AT OKLAHOMA STATE UNIVERSITY IS PRESENTED AND THE CALCULATED GENERATION COSTS IN MILLS PER KWH ARE COMPARED WITH THOSE OF CONVENTIONAL FUEL-BURNING SYSTEMS FOR DIFFERENT FUEL COSTS, LOAD FACTORS, AND INTEREST RATES. THE RESULTS SHOW THAT CERTAIN ASPECTS OF SOLAR AND WIND ENERGY CONVERSION CAN, AT PRESENT, GENERATE ENERGY AT COSTS COMPETITIVE WITH CONVENTIONAL SYSTEMS AND THAT MORE FAVORABLE CONDITIONS CAN BE EXPECTED IN THE FUTURE AS FOSSIL FUELS BECOME SCARCE AND FUEL COSTS FURTHER GO UP AS PREDICTED.

1974-0359 SEMINAR WINDENERGIE. (SEMINAR ON WIND POWER).
JUELICH, GERMANY, KERNFORSCHUNGSANLAGE, OCTOBER 1974.
SEMINAR ON WIND POWER, JUELICH, GERMANY, SEPTEMBER 12, 1974.

1974-0360 THALLER L H
ELECTRICALLY RECHARGEABLE REDOX FLOW CELLS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 9TH. PROCEEDINGS. NEW YORK, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1974. PAPER 749142, P. 924-928.

AN ELECTROCHEMICAL BULK POWER STORAGE CONCEPT, WHICH THE AUTHORS HAVE NAMED A RECHARGEABLE REDOX FLOW CELL IS DESCRIBED. THIS SCHEME, BASED ON PUMPING A REDOX COUPLE THROUGH A POWER CONVERSION SECTION, APPEARS TO OFFER HIGH OVERALL EFFICIENCY, NO CYCLE LIFE LIMITATIONS FOR THE ELECTRODES, AND DEEP DISCHARGE CAPABILITY.

1974-0361 VILLECCO M
ENERGY CONSERVATION IN BUILDING DESIGN.
WASHINGTON, D.C., AMERICAN INSTITUTE OF ARCHITECTS, 1974. 156 P.

1974-0362 WADE N
WINDMILLS: THE RESURRECTION OF AN ANCIENT ENERGY TECHNOLOGY.
ENERGY: USE, CONSERVATION, AND SUPPLY. EDITED BY PHILIP H. ABELSON. WASHINGTON, D.C., AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1974. P. 128-130.

1973-0158 ALWARD R, ACHESON A, LAWAND T A
INTEGRATION OF SOLAR STILLS INTO MINIMUM COST DWELLINGS FOR ARID AREAS.
SUN IN THE SERVICE OF MANKIND. INTERNATIONAL CONGRESS ON THE SUN IN THE SERVICE OF MANKIND, PARIS, JULY 2, 1973. PAPER E16, 12 P.
CONF-730747--(E)

A STUDY HAS BEEN MADE OF THE INTEGRATION OF SOLAR DISTILLATION UNITS, FOR FRESH WATER PROVISION, INTO THE STRUCTURE OF MINIMUM COST HOUSING FOR ARID AREAS. THE STILLS ARE INCORPORATED INTO THE ROOF SERVING AS A COVERING ELEMENT IN ADDITION TO THEIR NORMAL DISTILLATION FUNCTION. A STANDARDIZED WATER RECYCLE UNIT HAS BEEN DEVELOPED WHICH MAKES USE OF SOLAR AND WIND ENERGIES AS THE ONLY POWER INPUTS TO THE SYSTEM, THUS REDUCING BOTH POLLUTION EFFECTS AND OPERATING COSTS. CONTAINED WITHIN THIS WATER RECYCLE UNIT ARE WATER COLLECTION, STORAGE AND PURIFICATION SYSTEMS INTEGRATED WITH WASTE WATER AND SEWAGE STORAGE AND TREATMENT FACILITIES PERMITTING MINIMUM CONSUMPTION AND MAXIMUM RE-USE OF THE WATER. THE SOLAR STILLS ACT AS WATER PURIFICATION UNITS, RENDERING SHOWER WASTE AND SALINE WATER POTABLE. DETAILS OF CONSTRUCTION AND SYSTEM OPERATION ARE OUTLINED AND EXPERIMENTAL RESULTS OBTAINED THROUGH ACTUAL USAGE BY A FAMILY ARE PROVIDED.

1973-0159 GIBBONS B
REBUILT WINDCHARGERS.
ALTERN. SOURCES ENERGY NO. 8: JANUARY 1973.

1973-0160 JACOBS M L
EXPERIENCE WITH JACOBS WIND-DRIVEN ELECTRIC GENERATING PLANT, 1931-1957.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 155-158.
PB-231341

ENGINEERING, CONSTRUCTION, PERFORMANCE, ELECTRIC OUTPUT, AND DIFFERENT USES OF THE WIND ELECTRIC 2500- TO 3000 WATT PLANT ARE OUTLINED. AFTER SEVERAL YEARS OF TESTING DIFFERENT TYPES OF WINDMILLS, THE THREE BLADE AEROPLANE TYPE OF PROPELLER WAS FOUND TO BE FAR SUPERIOR IN POWER OUTPUT. BY MEANS OF A FLYBALL GOVERNOR OPERATED, VARIABLE PITCH SPEED CONTROL, THE MAXIMUM SPEED OF THE PROPELLER WAS ACCURATELY AND EASILY CONTROLLED, TO PREVENT EXCESSIVE SPEEDS IN HIGH WINDS AND STORMS. THE THREE BLADE PROPELLER WAS FOUND TO BE NECESSARY TO PREVENT EXCESSIVE VIBRATION WHENEVER THE SHIFT OF THE WIND DIRECTION REQUIRED THE PLANT TO CHANGE ITS FACING DIRECTION ON THE TOWER.

1973-0161 MORSE F H
NSF PRESENTATION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 244-253.
PB-231341

WIND ENERGY CONVERSION RESEARCH IS CONSIDERED IN THE FRAMEWORK OF THE NATIONAL ENERGY PROBLEM. RESEARCH AND DEVELOPMENT EFFORTS FOR THE PRACTICAL APPLICATION OF SOLAR ENERGY--INCLUDING WIND ENERGY--AS ALTERNATIVE ENERGY SUPPLIES ARE ASSESSED FOR HEATING AND COOLING OF BUILDINGS, PHOTOVOLTAICS, SOLAR THERMAL ENERGY CONVERSION, WIND ENERGY CONVERSION, OCEAN THERMAL ENERGY CONVERSION, PHOTOSYNTHETIC PRODUCTION OF ORGANIC MATTER AND CONVERSION OF ORGANIC MATTER INTO FUELS.

1973-0162 POWE R E, TOWNES H W, BLACKKETTER D O
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT. QUARTERLY PROGRESS REPORT NO. 3.
NTIS, OCTOBER 31, 1973. 150 P.
PB80-170665

FIRST PHASE RESULTS OF A DETAILED TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED.

1973-0163 STAFF REPORT ON WIND POWER. (FEDERAL POWER COMMISSION).
NTIS, SEPTEMBER 1973. 13 P.
PB-231955

THE TEN-PAGE PAMPHLET STATES THAT WHILE THERE IS A GENUINE INTEREST ON THE PART OF ALL ELECTRIC UTILITIES TODAY IN ECONOMICAL AND NON-POLLUTING SOURCES OF ELECTRIC POWER, THE PRACTICAL POTENTIAL FOR WIND-POWER DEVICES IS AT PRESENT LIMITED, AND REASONABLE SOLUTIONS FOR SPACE REQUIREMENTS AND LAND USE PROBLEMS HAVE NOT YET BEEN DEVELOPED.

1972-0061 GORLAND S H, KEMPKE E E
ROTOR WINDAGE LOSSES FOR LUNDELL ALTERNATORS. FINAL REPORT.
NTIS, 1972. 10 P.
N72-20452, NASA-TM-X-68079

1972-0062 NOTE ON THE UTILIZATION OF WIND POWER FOR PROVIDING INDUSTRY ELECTRIC POWER.
PARIS, FRANCE, REPORT AEROWATT T.AW 10472, 1972. 17 P.

DESIGN CRITERIA ARE GIVEN FOR 4 KVA UP TO 100 KVA WIND GENERATORS TO BE BUILT BY AEROWATT, BASED ON EXPERIENCES WITH THE 800 KVA BEST WIND TURBINE AND THE VARIABLE PITCH PROPELLER BUILT BY AEROWATT.

1972-0063 SCHAEPER H R A
TECHNOLOGICAL ADAPTATIONS TO AEOLIAN ENERGY UTILIZATION IN THE ANTILLEAN CARIBBEAN.
IEEE REGION 3 CONVENTION, 10TH ANNUAL, KNOXVILLE, TENNESSEE, APRIL 10-12, 1972. PROCEEDINGS. PAPER. NEW YORK, IEEE, 72CHO591-8 REG III, 1972.

1971-0044 BERNSTEIN T, STICHMAN J H, MILLER J G
SHIELDED ROTATING CUP VELOMETER FOR MOUNTAIN SITES.
IEEE FALL ELECTRONICS CONFERENCE, CHICAGO, OCTOBER 18-20, 1971. PROCEEDINGS, P. 304-309.

THIS UNIT WAS DEVELOPED FOR USE AT MOUNTAIN PEAK SITES IN A SEVERE ENVIRONMENT WHERE THE ROTATING CUPS ARE ENCLOSED IN A HOUSING WHICH LIFTS ON RADIO COMMAND FOR 5 MINUTES EACH HOUR TO OBTAIN A READING. THE WIND INFORMATION IS TRANSMITTED BY RADIO TELEMETRY.

1970-0033 KHARITONOV V P
EXPERIMENTAL CHARACTERISTICS OF A SUBMERGED CENTRIFUGAL ELECTRIC PUMP COMBINED WITH A WIND ENGINE.
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NTIS, SEPTEMBER 2, 1969. 8 P. EDITED TRANSLATION OF ARTICLE BY M. OLAECHEA IN NAUCHNOIZSLED. INST. GIDROMETEOROL. PRIBOROSTR. TR. (USSR) NO. 17: 15-18, 1967. SEE 1967-0021.
FTD-HT-23-341-69, AD-696229

AN INVESTIGATION WAS MADE OF THE TRANSIENT RESPONSE OF ROTATING WINDMILL AND CUP ANEMOMETERS. IN GENERAL, THE EXPERIMENTS CONFIRMED THE CONTENTION THAT ROTATING ANEMOMETERS INDICATE THE AVERAGE WIND VELOCITY AS BEING HIGHER OR LOWER THAN THE ACTUAL VALUE, DEPENDING ON THE CIRCUMSTANCES. THE CAUSE FOR THIS DISCREPANCY IS THE DIFFERENCE IN THE EFFECTIVE AERODYNAMIC MOMENTS DURING THE ACCELERATION AND THE DECELERATION OF THE ROTOR. THE COMPARISON OF THE TRANSIENT RESPONSE OF CUP AND WINDMILL ANEMOMETERS SHOWED THAT FOR THE LATTER DEVICE THE TIME CONSTANT OF THE TRANSIENT PROCESS APPROXIMATING THE DECELERATION WAS FOUR TIMES GREATER THAN THE TIME CONSTANT DURING THE ACCELERATION. FOR THE CUP ANEMOMETER THIS RATIO WAS ONE TO SIX. A COMPARATIVE EVALUATION OF THE AVERAGE WIND VELOCITY INDICATION BY A ROTATING ANEMOMETER USING A RESTRAINED ANEMOMETER AS A REFERENCE WAS ALSO MADE. IT WAS FOUND THAT THE ROTATING ANEMOMETER INDICATED HIGHER AVERAGE WIND VELOCITY FOR VELOCITIES UP TO 10-11 M/SEC., AND LOWER AVERAGE WIND VELOCITY FOR HIGHER VALUES. THE RESULTS OF THE INVESTIGATION INDICATE THAT TRUE RESULTS CAN BE OBTAINED ONLY FROM A SIMULTANEOUS STUDY OF THE WIND STRUCTURE AND THE DYNAMIC PROPERTIES OF THE WIND GAGES.

1968-0026 HARRIS R I
MEASUREMENTS OF WIND STRUCTURE AT HEIGHTS UP TO 598 FEET ABOVE GROUND LEVEL.
SYMPOSIUM ON WIND EFFECTS ON BUILDINGS AND STRUCTURES, LOUGHBOROUGH, UNIVERSITY OF TECHNOLOGY, ENGLAND, APRIL 2-4, 1968. PROCEEDINGS. VOL. 1, PAPER 1. 35 P.

WIND MEASUREMENTS MADE SIMULTANEOUSLY AT 12 HEIGHTS BETWEEN 54 FT. AND 598 FT. ABOVE GROUND LEVEL DURING A WINTER GALE ARE REPORTED, TOTAL DURATION OF THE RECORD BEING 30 MINUTES. COMPUTER RESULTS INCLUDE INCREASE OF MEAN WIND DIRECTION WITH HEIGHT, CHANGE OF RMS GUST SPEED AND INTENSITY OF TURBULENCE WITH HEIGHT. AUTO AND CROSS-CORRELATIONS TOGETHER WITH POWER SPECTRA ARE ALSO PRESENTED, AND SIMPLE COMPARISONS MADE WITH RESULTS OBTAINED BY OTHER WORKERS.

1968-0027 WILSON A
COMMENTS ON BRACE RESEARCH INSTITUTE WINDMILL.
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1968-0028 WIND SUPPLIES ALTERNATIVE ENERGY TO HEAT HOUSE FOR VERENDRYE MEMBER.
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A HOMEMADE WIND ELECTRIC GENERATOR SYSTEM IS DESCRIBED. THE TOWER-MOUNTED FOUR-BLADED AIRCRAFT PROPELLER TYPE 20 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE DRIVES A GROUND-LEVEL AC GENERATOR WHICH FEEDS POWER DIRECTLY TO RESISTANCE HEATERS.

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1964-0079 RAMAMOORTHY M
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INST. ENG. INDIA J. 44 (6PT.EL3): 211, 1964.

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1957-0029 TROMP C
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A WINDPOWERED GENERATOR SYSTEM IS DESCRIBED WHICH USES A WINDMILL TO CONVERT MECHANICAL ENERGY TO ELECTRICAL ENERGY FOR A THREE PHASE (NETWORK) VOLTAGE OF CONSTANT AMPLITUDE AND FREQUENCY. THE GENERATOR SYSTEM CONTROLS THE WINDMILL BY THE NUMBER OF REVOLUTIONS SO THAT THE POWER DRAWN FROM THE WIND FOR A GIVEN WIND VELOCITY IS MAXIMUM. A GENERATOR REVOLUTION WHICH IS PROPORTIONAL TO WIND VELOCITY IS ACHIEVED. THE STATOR OF THE GENERATOR IS LINKED DIRECTLY TO THE NETWORK AND A FEED CONVERTER AT THE ROTOR TAKES CARE OF CONSTANT VOLTAGE AND FREQUENCY AT THE STATOR.

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1952-0042 ANTENNA TOWERS AS WIND TOWER GENERATION PLANTS. FINAL REPORT.
ELEKTROTECH. Z. 73(4): 95-96, 1952. ALSO NTIS, FEBRUARY 1974. 10 P.
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1926-0021 BETZ A
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GOTTINGEN, GERMANY, VANDENHOECK AND RUPPRECHT, 1926. 64 P.

1926-0022 DONATH
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THE UTILIZATION OF WIND POWER IN LARGE INDUSTRIAL PLANTS IN ITS PRESENT STAGE OF TECHNICAL DEVELOPMENT FROM AN ECONOMIC STANDPOINT.
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THIS INCLUDES THEORETICAL DISCUSSIONS ON THE POSSIBLE USE OF WIND POWER ENERGY FOR INDUSTRY.

INDEXES

The following indexes (author, subject, report number, and conference proceedings) are for the Third Supplement only. If the Third Supplement is merged with the earlier three volumes the indexes provided with those must be retained, or the new Cumulative Indexes for all four volumes must be acquired. The Cumulative Indexes include more in-depth indexing of the Basic Volume and First Supplement than in the indexes originally provided with those volumes. That, plus the fact that use of the Cumulative Indexes means searching one index instead of four, makes this a very useful tool for anyone having all four volumes of ENERGY FROM THE WIND. The Cumulative Indexes are available separately. For information contact Publications, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523.

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