PRODUCTION OF POWER BY MEANS OF WIND-DRIVEN GENERATOR

HEARING

BEFORE THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS HOUSE OF REPRESENTATIVES

EIGHTY-SECOND CONGRESS

FIRST SESSION

ON

H. R. 4286

A BILL AUTHORIZING INVESTIGATION, RESEARCH, AND DEVELOPMENT WORK BY THE SECRETARY OF THE INTERIOR AND THE CONSTRUCTION AND OPERATION OF FACILITIES, INCLUDING NOT MORE THAN ONE DEMONSTRATION PLANT, TO DETERMINE AND DEMONSTRATE THE ECONOMIC FEASIBILITY OF PRODUCING ELECTRIC POWER AND ENERGY BY MEANS OF A WIND-DRIVEN GENERATOR OPERATED IN CONJUNCTION WITH AN ELECTRIC POWER SYSTEM, AND FOR OTHER PURPOSES

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structure is heavy enough to carry and drive a 21,600-kilowatt generator. Practically the only difference in the total cost between an 800-kilowatt and a 21,600-kilowatt unit is the difference in the cost of the generators, gears, and shafting of the two units. The cost of the main structure, foundations, etc., is identical.

Roughly, any 200-foot diameter deflector-unit structure will cost $170,000, excluding the generator and shafting. An 800-kilowatt generator with its gear and shafting will cost approximately $14,400, making the cost of the whole machine $184,400, or $230 per kilowatt.

On the other hand, if we had a location where the wind-duration curve indicated a 40-mile-per-hour wind velocity for enough hours of the year to warrant a 6,400-kilowatt generator, our total cost would be about $266,000, or $42 per kilowatt. This wide difference ($42 to $230 per kilowatt) shows how difficult it is in general terms to talk about the cost per kilowatt of capacity for a wind-driven power plant. My calculations indicate that a 200-foot diameter deflector turbine will require about 200 tons of welded structural and plate steel, which at today's prices should not cost over $0.20 per pound when erected, or $80,000 for the structure.

All other items excluding the generator, gears, etc., would run the cost up to approximately $170,000. Assuming our wind-duration curve to show the economic size of the generator to be 3,750 kilowatts, the total cost including the generator would be approximately $257,000, or about $68.50 per kilowatt.

To get a 7,500-kilowatt unit we would mount two of the 3,750-kilowatt-equipped machines on one turntable at a cost of about $513,000. This figure does not include the cost of land, transmission line, transformers, or the supervisory control system. Nor does it include the cost of the special engineering which would be required for each individual site where an installation is seriously considered. One big item of cost that applies to the first installation is for research and design. Another item of cost not considered, which may be of small or great moment, is "for improvement of the terrain" around the site of the installation. Cutting down trees and smoothing off hilltops and rough places around the installation can often produce increased wind velocities that will result in much higher output for the unit. Personally, I feel that the estimate of the cost of the project called for in this bill, as forecast by Mr. Warne in his testimony, is well on the high side. I feel that the Bureau of Reclamation will find much less research necessary than it anticipates. The same applies to the actual labor and materials cost for the pilot unit.

In conclusion, I will repeat my former statement that I am convinced that the time has arrived when we can build practical and dependable wind-driven power plants that will produce energy at lower cost than from any other source.

The CHAIRMAN. Thank you kindly. At this point I would like to have inserted in the record, a letter from the Jacobs Wind Electric Co., Inc., of Minneapolis, Minn.

The letter is as follows:

THE JACOBS WIND ELECTRIC CO., INC.,
Minneapolis 11, Minn., October 5, 1951.

MR. JOHN R. MURDOCK,
Congressional Representative (Arizona),
Washington, D. C.

DEAR MR. MURDOCK: It has recently come to our attention that you are sponsoring a bill to finance experimental development of a wind-electric plant, and we are very much interested in the contemplated kilowatt-hour rated output and the wind velocity necessary to secure this output, of the experimental machine designed by Percy H. Thomas. Could you supply us with the estimated kilowatt output in a 20-mile per hour wind of the plant Mr. Thomas proposes—giving also the propeller diameter.

The reason we are interested is that our company is the oldest and leading manufacturer of wind-electric plants in the world, having started engineering and development work on wind-electric plants in 1922, and we now have many thousands of our plants operating in almost every spot on earth. Our oldest production models have been operating nearly 25 years. We supplied the 110-volt plant that furnished electricity for Admiral Byrd's Arctic expedition in 1933, and which was in perfect condition 13 years later, when Admiral Byrd again returned to the Antarctic.

We are enclosing literature which describes briefly the construction and type of our plant. The circular enclosed refers mainly to the d. c.-type, designed for farm and ranch lighting purposes. However, we have done experimental engineering on larger wheels, and are currently doing development work on an a.c.-type of synchronous generator, designed as supplementary power for a. c. high-line current: We have followed very closely all the development and engineering work in the past few years on experimental models, such as the one tried out on Mount Washington, that was wrecked in a windstorm, and other developments of a similar nature in Europe.

We have patented and produced a type of variable pitch propeller blade control which has proven to be far more accurate and positive in its speed regulation an in the prevention of windstorm damage to the plant and equipment than any other wind-electric plant governing system ever developed. Our plants automatically change the pitch of the propeller to relieve the terrific wind pressure which would otherwise be applied against the propeller blades, damaging them, in high winds and storms. Our plants have withstood every hurricane and storm that has hit the West Indies in recent years; and in our own city of Minneapolis two of our test plants, operating continuously, withstood the more than 100 mile per hour winds which struck this city in July of this year. I recently returned from South America and stopped at various West Indies points where hurricane winds up to 135 miles per hour in past years have subjected our plants operating on the various islands to severe wind pressures. No plant has been blown down down from these storms.

Our plants in the small sizes that we build are at present operating on airway beacons, lighthouse service, and protecting many thousands of miles of pipelines in this and foreign countries, through a system of corrosion prevention known as cathodic protection, and whever average wind conditions prevail, our wind-electric plants are protecting America's pipelines, by keeping them charged with d. c. negative potential.

We would like to point out the possibility of also having developed 5-kilowatt a. c. generators, mounted on 75-foot towers, and considerable numbers of them distributed over large areas, so that some of them will be producing current all the time. For instance, 5-kilowatt generators could be produced, with a 60 or 70-foot tower, for a cost of from $1,000 to $1,500 each, which on the bases of $1,000 each would have a rated capacity of 5,000 kilowatts per $100,000 investment, and the entire investment would not be subject to storm damage in case of a single tornado, and at no time would all of the generating plants be idle. The idea we have been working on for some time is to take a line, for instance, from Minneapolis to Great Falls, Mont., and install a series of these 5-kilowatt plants at several mile intervals, which could be directly connected into existing power lines, as boosters, and secure maximum monthly kilowatt-hour output per dollar of building and installation cost. No additional special transmission lines or other extra cost would have to be added.

Frankly, we are interested in the development of this type of plant, because our regular farm lighting business in the past 5 years has been drastically reduced through the building of rural REA lines in the Western States, and we believe there is a need and practical field for utilizing the tremendous and unlimited power of the wind, as supplementary power to generate current for highlines through the widespread installation of wind-driven booster plants, which we believe should be installed along existing high lines at frequent intervals. Thus their output would not unbalance any particular power circuits to which they may be attached.

We are giving you the above general details for your information, and would appreciate hearing from you regarding the possible development and use also of supplementary wind-electric plants along the lines we have suggested, because we believe there is a field for also developing the widely spread, quantity use of small wind-driven high-line booster plants.

We will appreciate your views, and look forward to your reply.

Yours very truly,

M. L. JACOBS, *General Manager.*

The CHAIRMAN. The committee stands adjourned at the call of the Chair.

(Whereupon, at 12 noon the committee adjourned.)

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