Technical Progress Report

Field Verification Program for Small Wind Turbines,
Block Island, Rhode Island

Quarterly Report for the Period October to December 1999

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Task 1: Host site installation

The activities for this task are well under way. Site surveys of the proposed host sites have been accomplished and negotiations with the site owners have begun. Historical monthly power use data has been obtained from the Power Company to be analyzed for the determination of potential power cost savings for most of the host sites. Our attorneys have prepared draft contracts between Offshore Services and the host site owners. A draft "Weekly Energy Production Reading and O&M Log Form" has been developed and faxed to Doug Hooker for review and comment. Two of the five wind turbines have been ordered from the manufacturer and are ready to ship, awaiting the favorable weather for pouring the concrete foundations. Much of the supporting equipment for the operation and data collection phases of the project have been ordered and received. Payment requests for approximately 30 percent of the work have been submitted and approved. An abstract for a research paper on the project to be presented at the American Wind Energy Association "Wind Power 2000" conference in Palm Springs, CA has been submitted to AWEA for their review. (copy of abstract enclosed)

The present status of each of the five project wind turbines follows:

- 1) **Block Island Goose and Garden Greenhouse:** This site (see enclosed photos) meets all the required setbacks and has the abutter permissions required to obtain a building permit with out requiring any zoning variances. The foundation has been surveyed and staked out and is awaiting a favorable weather for excavation and pouring. The deep storage batteries required to store the wind turbine energy and the DC Load Center have been delivered and installed. (See enclosed photos) The additional 4 kW inverter has been ordered. The anticipated construction time line is: February: Inverter and Data Logging system to be installed. March: foundation to be dug and poured, April: tower and turbine to be assembled and erected. May: Turbine to be commissioned, data collection starts.
- 2) **Town of New Shoreham, Transfer Station:** This site (see enclosed photos) was submitted to DOE in the original proposal because of its unobstructed exposure to the prevailing westerly winds and its "light industrial" setting. The proposal to place a wind turbine at this site was put on the agenda and discussed a regular Town Council Meeting on November 17th, 1999 (See enclosed draft copy of meeting minutes.) The Town Council recommended that we consider the "Coast Guard Station Facility" as an alternative site because its remote location would mean less impact on the transfer station neighborhood. The Coast Guard Station (which was recently acquired from the US DOT) would be a better site than the Transfer Station because it consumes over twice the amount of the electric utility power thus offering much better

economics for a renewable energy system. If DOE approved the proposed site change, the Transfer Station would remain a backup municipal site in case of permitting problems at the Coast Guard Station and the School. A letter to US DOE formally requesting the site change is forthcoming. The anticipated construction time line is: February: Zoning Application to be submitted, March Zoning Hearing, April: foundation to be dug and poured, May: tower and turbine to be assembled and erected. June: Turbine to be commissioned, data collection starts.

- 3) **Town of New Shoreham, Block Island School.** This site (see enclosed photos) provides the best economics of the four Block Island utility interconnected sites because the school has a high use of utility power which will allow high wind turbine power utilization, good economics, and a very short payback period. We made a presentation to the School Committee in October and received a favorable response. The School is presently in the middle of a \$ 4.3 million physical plant upgrade that is nearing final evaluation and approval by the School Board. Siting for the wind turbine can not be finalized until the footprint of the new classrooms and gym are known. We expect to get final approval for the wind turbine site location in February. The anticipated construction timeline is: February: School Committee final site approval, Zoning Application to be submitted, March Zoning Hearing, April: foundation to be dug and poured, May: tower and turbine to be assembled and erected. June: Turbine to be commissioned, data collection starts.
- 4) **Richard Littlefield Residence:** This site is at the very end of the utility distribution network and will be used to measure the impact of distributed generation on the network. Negotiations with the owner are underway and should be resolved by the end of February. The anticipated construction timeline is: February: Owner negotiations to be finalized, Zoning Application to be submitted, March: Zoning Hearing, April: foundation to be dug and poured, May: tower and turbine to be assembled and erected. June: Turbine to be commissioned, data collection starts.
- 5) **Ron Steele Residence:** This site is at the southern end of the island. After sending the Steeles the information packet with the plans of the wind turbine, and meeting with them to discuss the project, we found that they were concerned about the large size of the wind turbine. The siting of the turbine to meet the required zoning setbacks on their small lot would put the turbine only a few feet from the house. They thanked us for the opportunity to participate in the project but declined to proceed with the contract negotiations. Subsequently, we are in discussions with three other potential residential host site owners to find a replacement site. Two of these sites would be better than the Steele site because the lots are larger and offer better exposure to the prevailing west wind would give potentially greater turbine output. When a potential replacement site is selected, we will formally contact DOE with a site change proposal.

END OF REPORT

PAPER PROPOSAL TO AWEA (ABSTRACT)

Wind Powering America Project Update: Field Verification Program for Small Wind Turbines, Block Island, Rhode Island

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In June of 1999, at the annual AWEA conference in Burlington, VT, Secretary of Energy Bill Richardson announced that the Block Island Small Wind Turbine Field Verification Program would receive an award under the new Federal Government's "Wind Powering America" Program. The Block Island proposal received a high number of evaluation points and the highest level of funding (\$250,000) out of a dozen other proposed projects.

The proposal is to install and monitor five 10 kW residential wind turbines on 25 meter towers on Block Island Rhode Island. Block Island was proposed because of its excellent wind resource and because its dependence on a diesel generating plant results in some of the highest electrical costs in the United States, (\$.32 / kilowatt hour).

The proposal will install the wind turbines in a variety of locations and under a variety of ownership (municipal government, residential, commercial, and an educational institution). Block Island's abundant wind resource and harsh marine environment will provide an opportunity for accelerated reliability testing for turbine resistance to the salty, abrasive air-stream.

The project will evaluate the new Bergey Wind Power Company Excel-S/E wind turbine which is an enhanced version of the well-established Bergey 7 meter diameter, 10 kW grid-intertie variable-speed wind turbine. The "S/E" enhancements are a more powerful permanent-magnet alternator and a new UL-certified inverter system, the Gridtek 10.

The local utility has a number of circuits that experience low voltage at the ends of the distribution system during peak demand periods. One of the project objectives is to place a wind turbine at the very end of the local distribution network to measure the effect of adding distributed power sources on the distribution system.

Lastly, the Block Island Power Company is currently under a consent decree with the EPA which mandates the installation of Selective Catalytic Reduction (SCR) equipment on their diesels to reach "Lowest Achievable Emissions Reduction" (LAER) in the next 18 months. This action will cost millions of dollars and will likely raise utility rates an additional 30% (to an average of \$.42 per kWh). The installation of five modern wind turbines on Block Island will demonstrate to the Island residents that wind power is an economically attractive alternative source of clean, renewable, energy.

This paper will describe the project, provide an update on siting, zoning, installation, and data collection issues, and discuss the expected benefits of the project.

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island Goose and Garden Greenhouse Wind Turbine Site.

Upper Left shows existing 1 kW wind turbine to be replaced by DOE 10 kW wind turbine.

Upper right shows wind turbine site looking northwest.

Lower right shows view of abutting property and terrain looking northeast from wind turbine site.

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island Goose and Garden Greenhouse Site

Photos show 24 volt Battery bank, 3300 amp hours or 80 kWh
and Wind Turbine DC Source Center on wall above batteries.

Note first of two 4 kW inverters on panel to left of DC source
Center.

Second inverter, Data Logger and AC kWh meters yet to be
installed

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island Transfer Station Wind Turbine Site.

Upper Left shows Transfer Station and wind turbine site looking north east.

Upper right shows wind turbine site looking southwest from transfer station

Lower right shows view of the Coast Guard Station wind turbine site looking southwest from the transfer station site. Note the breakwater and the "Chief's House" 1 mile away.

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island Coast Guard Station Proposed Site

Upper left shows wind turbine site from “Chief’s House” building looking west towards breakwater.

Upper right shows tower foundation site (in foreground) looking west.

Lower right shows “Chief’s House” (nearest building) from wind turbine tower location looking southeast.

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island Coast Guard Station Proposed Site (Aerial View)

Upper right shows wind turbine site looking northwest and
shows entire Coast Guard Complex (4 buildings)

Lower right shows wind turbine site, harbor entrance and
Block Island's beautiful Great Salt Pond in the background.

**DOE Field Verification Program for Small Wind Turbines
Block Island Project**

Picture Date 1/30/00

Block Island School Wind Turbine Site.

Upper Left shows wind turbine site in distance (near pine tree) looking northwest from the school .

Upper right shows wind turbine site looking northwest (near pine tree).

Lower right shows school from wind turbine site looking southeast.