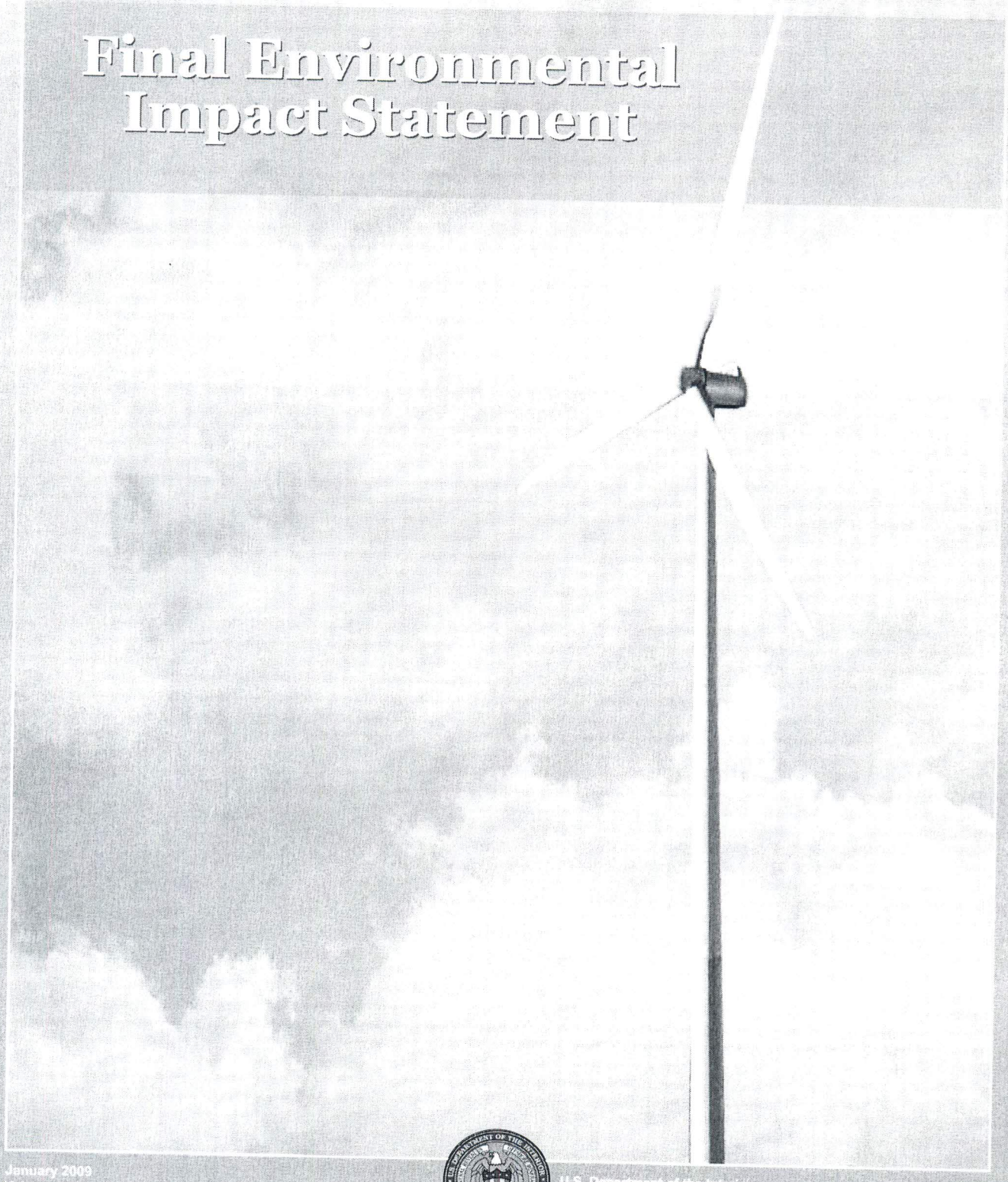
MMS EIS-EA
OCS Publication No. 2008-040

CAPE WIND ENERGY PROJECT

Final Environmental Impact Statement



January 2009
Volume 1 of 3

U.S. Department of the Interior
Minerals Management Service

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED

The underlying purpose and need to which the MMS is responding is to provide an alternative energy facility that utilizes the unique wind resources in waters offshore of New England using a technology that is currently available, technically feasible, and economically viable, that can interconnect with and deliver electricity to the New England Power Pool (NEPOOL), and make a substantial contribution to enhancing the region's electrical reliability and achieving the renewable energy requirements under the Massachusetts and regional renewable portfolio standards (RPS).

Cape Wind Associates, LLC (the applicant) proposes to build, operate, and eventually decommission a wind energy facility with a maximum electric output of 454 megawatts (MW) in Nantucket Sound off the coast of Massachusetts. The proposed action would generate electricity from wind energy resources on the Federal OCS. The applicant seeks to commence construction of the proposed action in 2009 and begin full operation in 2011.

The applicant requests a lease, easement, right-of-way (ROW) and any other related approvals from Minerals Management Service (MMS) necessary to authorize construction and operation of the proposed action. The MMS's authority to approve, deny, or modify the Cape Wind Energy Project derives from the Energy Policy Act of 2005 (EPAct – http://www.mms.gov/offshore/PDFs/hr6_textconfrept.pdf). Section 388 of the EPAct amended the OCS Lands Act by adding subsection 8(p), which authorizes the Department of the Interior (DOI) to grant leases, easements or ROWs on OCS lands for activities that produce or support production, transportation, or transmission of energy from sources other than oil and gas, such as wind power.

The Massachusetts and other regional RPSs mandate that a certain amount of electricity come from renewable energy sources, such as wind. Specifically, the Massachusetts RPS regulations at 225 CMR 14.00 require that all retail electricity providers in the state utilize new renewable energy sources for at least four percent of their power supply in 2009 and increasing this percentage by one percent each year until the Massachusetts Division of Energy Resources (DOER) suspends the annual increase.

Since 1995, the Massachusetts Energy Facilities Siting Board (EFSB) has authorized more than a dozen fossil fueled power plants with nominal generating capacities that range from approximately 200 MW to 1500 MW, with an average generating capacity of approximately 500 MW. The applicant seeks to construct a similar large size "commercial" scale project that would satisfy a substantial portion of the projected Massachusetts 2009 RPS requirements,[1] while also providing the generation capacity needed to respond to the magnitude of the regional reliability requirements.[2]

The NEPOOL operates as a tightly integrated system for purposes of both dispatch and compliance with reliability standards, including standards as to adequacy of generation resources. The Independent System Operation New England (ISO-NE) 2005 Regional System Plan (RSP05) for NEPOOL considered

[1] Based on the distribution of wind speeds monitored at the site, the net annual energy production the proposed action would deliver to the regional transmission grid would be 1,600 giga watt hours (GWh) (equivalent to an average of 182.6 MW), which would be approximately 75 percent of the 2009 projected RPS requirement of 2,100 GWh (2004, MA RPS Annual Compliance Report).

[2] NEISO conducted a system-wide analysis of energy demand and concluded that New England needs approximately 170 MW of additional electricity production resources before the summer of 2010 and increasing annually to 2100 MWs of additional capacity by 2014 to meet New England's electricity reliability requirements (ISO Regional System Plan, 2005).

2.0 DESCRIPTION OF PROPOSED ACTION

2.1 PROJECT DESCRIPTION

The proposed action entails the construction, operation, and decommissioning of 130 WTGs located in a grid pattern on and near Horseshoe Shoal in Nantucket Sound, Massachusetts, as well as an ESP, inner-array cables, and two transmission cables. Each of the 130 WTGs would generate electricity independently of each other. Solid dielectric submarine inner-array cables from each WTG would interconnect within the grid and terminate at their spread junctions on the ESP. The ESP would serve as the common interconnection point for all of the WTGs. The proposed submarine transmission cable system is approximately 12.5 mile (20.1 km) in length (7.6 mile [12.2 km] within the Massachusetts 3.5 mile [5.6 km] territorial line) from the ESP to the landfall location in Yarmouth. The two submarine transmission cables would travel north to northeast in Nantucket Sound into Lewis Bay past the westerly side of Egg Island, and then make landfall at New Hampshire Avenue. The applicant seeks to commence construction in 2009 and begin operation in 2010.

2.1.1 Wind Turbine Generator

Each turbine is pitch-regulated with active yaw to allow it to turn into the wind, and has a three-blade rotor. The main components of the WTG are the rotor, transmission system, generator, yaw system, and the control and electrical systems, which are located within the nacelle (see Figure 2.1.1-1, in Appendix A). The nacelle is the portion of the WTG that encompasses the drive train and supporting electromotive generating systems that produce the wind-generated energy. The WTGs nacelle would be mounted on a manufactured tubular conical steel tower, supported by a monopile foundation system. A pre-fabricated access platform and service vessel landing (approximately 32 ft [10 m]) from mean lower low water (MLLW) would be provided at the base of the tower. The rotor has three blades manufactured from fiberglass-reinforced epoxy, mounted on the hub. The monopiles within the proposed action area would utilize two different diameter foundation types depending on water depth. The proposed action is designed for a maximum electrical energy capacity of 468 MW (130 WTG's each capable of producing up to 3.6 MW), however the maximum delivered capacity is approximately 454 MW (due to line losses, etc.) Water depths up to 40 ft (0 to 12.2 m) would utilize a 16.75 ft (5.1 m) diameter monopile and water depths of 40 to 50 ft (12.2 to 15.2 m) would utilize an 18.0 ft (5.5 m) diameter monopile.

Each WTG has an energy generating capacity of 3.6 MW ± and the proposed action is designed for a maximum delivered electrical energy capacity of approximately 454 MW. The generating capacity is based on the design wind velocity of 30 miles per hour (mph) (13.4 meters per second [m/s]) and greater, up to the maximum operational velocity of 55 mph (24.5 m/s). Based on the average wind speed in Nantucket Sound of 19.75 mph (8.8 m/s), there would be an average generation capacity of approximately 182.6 MW, and the net energy production delivered to the regional transmission grid would be approximately 1,600 gigawatt hours/year (GWh/y). The actual amount may vary depending upon the actual turbines in the supply chain at the time of construction, which have varying cut-in and cut-out speeds.

In order to generate maximum wind energy production, the WTGs would be arranged in specific parallel rows in a grid pattern. For this area of Nantucket Sound, the wind power density analysis conducted by the applicant determined that orientation of the array in a northwest to southeast alignment provides optimal wind energy potential for the WTGs. This alignment would position the WTGs perpendicular to prevailing winds, which are generally from the northwest in the winter and from the southwest in the summer for this geographic area in Nantucket Sound. The WTGs would have a computer-controlled yaw system that ensures that the nacelle is always turned into the wind and perpendicular to the rotor. In addition to maximizing potential wind energy production, the WTGs must

maintenance crews cannot be removed due to weather issues. These accommodations would utilize waste storage holding tanks that would be pumped to the service vessel for proper disposal. All equipment would be contained within an enclosed weather-protected service area.

Maintenance and service access to the ESP would normally be by service boat. A boat landing dock consisting of a fender structure with ladder is attached to the ESP to allow boat landing and transfer of personnel and equipment and temporary docking of the service craft. The ESP would have a helicopter deck to allow personnel access when conditions preclude vessel transport, and for emergency evacuation. Equipment and material transfer would be by a crane mounted on the ESP.

2.2 SPACE REQUIREMENTS

Submerged Land

The 130 WTGs and the ESP would occupy 0.67 acres (0.003 square kilometers [km^2]) of submerged land. The 33 kV inner-array cables (ranging in diameter from 5.19 in [132 millimeters [mm]] to 6.45 in [164 mm] depending on the required current load for sections of the cable) would occupy approximately 4.35 acres (0.018 km^2). The 115 kV transmission line, consisting of two circuits of two 7.75 in (197 mm) cable would occupy 1.54 acres (0.006 km^2) beneath federal waters. An additional 2.38 acres (0.01 km^2) beneath Massachusetts state waters would be occupied by the 115 kV transmission line. Scour protection for the WTGs would include a combination of scour mats and rock armor. Under the proposed scour protection plan, scour mats to be used at 106 WTGs would cover 1.96 acres (0.008 km^2) and rock armor to be used at 24 WTGs would cover 8.75 acres (0.04 km^2). Should the scour mats prove ineffective in any area, they would be replaced with rock armor. The worst case scenario would be replacement of the scour mats around all WTGs and the ESP. Under this scenario, the scour protection would cover 47.82 acres (0.19 km^2). The project facilities would occupy 0.12 percent (19.41 acres) of the total project area of 25 square miles (64.7 km^2) with scour mats and 0.35 percent (56.76 acres) with rock armor (see Table 5.3.2-3 for additional information).

During installation of the WTGs, ESP, cable, and scour protection, it is anticipated that between 820 and 866 acres (3.31 and 3.5 km^2) (depending on the method of scour protection) would be temporarily disturbed. This represents between 5.1 and 5.4 percent of the total project area.

Onshore

The proposed onshore transmission cable route to its intersection with the NSTAR Electric ROW would be located entirely along existing paved ROWs where other underground utilities already exist. All of the roadways within Yarmouth and Barnstable in which the proposed transmission cable would be placed are town owned and maintained roads with the exception of Routes 6 and 28, which are owned and maintained by MassHighway. A portion of the onshore transmission cable route would also be located underground within the existing maintained NSTAR Electric ROW.

2.3 CONSTRUCTION METHODOLOGY AND SCHEDULE

2.3.1 Schedule

The anticipated schedule for the permitting of the proposed action and its construction is provided in Figure 2.3.1-1. The anticipated construction sequence is as follows: (1) the onshore ductbanks would be installed; (2) the ESP and onshore 115 kV cables would be installed; (3) the monopiles, scour protection, WTGs, and submarine 33 kV and 115 kV cables would be installed; and (4) full operation would begin.