

Wind Farm Sites

Instrumentation and Data Acquisition Systems

Project Characteristics

- *Offshore Wind Farm Site Instrumentation Selection/Evaluation*
- *System Design and Installation*
- *Wind, Wave and Current Data Acquisition and Telemetry*
- *Reporting*
- *Calculation of Design Parameters*

Cape Wind Associates, LLC proposed to develop a wind-driven energy generation facility within Nantucket Sound offshore from Cape Cod, MA. The proposed development consists of 130 individual wind turbines each capable of generating a maximum of 420 megawatts electric power. As part of the development process, Cape Wind has the need to install a meteorological and ocean condition scientific data acquisition tower. Although the monopole tower was designed and installed by others, Woods Hole Group was on the project design team from the project onset and worked with the designers for issues related to the instrumentation and power system required for the instrumentation systems.

The 60-meter monopole tower with a deck 30 feet off the sea surface is a tripod-based design located in 13 feet of seawater. The tower is instrumented with 13 meteorological instruments and one sub sea instrument. The 13 instruments are located at three levels: 20, 40, and 60 m above sea level. An Acoustic Doppler Current Profiler for measuring wave height and direction, current speed and direction, water level and water temperature is installed in 20 feet of water, 500 ft from the tower base.

The meteorological instruments consist of three sets of conventional three-cup anemometers and separate direction vane instruments, as well as three tri-axial ultrasonic anemometers. Temperature and barometric pressure are measured at the 60 m and 10 m levels. Redundant data loggers record all of the outputs from each the sensors.

The primary data acquisition and data telemetry system is the Woods Hole Group SeaTeam. This proprietary

system is capable of communicating with all the instruments, buffering locally the data for radio transmission, and acting as the overall watchdog for the data acquisition system.

The SeaTeam is also the controller and data processor for the WAVES ADCP. At a user selected rate, the SeaTeam communicates with a base station, 16 miles from the tower via a 900 MHz radio telemetry system.

Other instrumentation on the tower is related to lighting for aviation and marine safety. The status of the marine and aviation lights are monitored through the SeaTeam system, as well the system battery level and a fog detector/fog horn sensor. All status conditions are part of the overall data stream monitored with each radio transmission.

WHG provides daily quality assurance checks of the systems and system performance monitoring. On a monthly basis, detailed reports are generated that depict the site conditions. Woods Hole Group is responsible for overall system performance, and performs routine and emergency service calls to the wind tower

Results from the analysis are used to select an appropriate site, support environmental permit applications, and provide design parameters for initial turbine design.

