

Winds of Change on North Carolina's Coast

✦ The Issue

North Carolina has made a commitment to increase the use of renewable energy throughout the state. Good science is the first step to achieving that goal. To evaluate the feasibility of harvesting wind energy along the North Carolina coast, researchers from the University of North Carolina at Chapel Hill have teamed with Duke Energy to install three demonstration wind turbines in the Pamlico Sound. The turbines will provide a research testbed for evaluating the challenges and determining the requirements for any future larger-scale wind energy efforts off the state's coast.

✦ The RENCi Project

To fully capitalize on this valuable research investment, RENCi will identify and deploy a suite of meteorological sensors and ecological measurement equipment to support the research goals of the project's university, industry and government partners. RENCi will also develop the underlying architecture needed to manage and integrate the enormous amount of data the sensors will collect 24/7.

Data collected from the instruments will allow researchers to determine the amount and variability of wind energy in the North Carolina coastal environment, refine wind turbine cost projections, track potential impacts on marine life and evaluate the turbines' ability to withstand tropical storms.

RENCi will deploy this suite of equipment on a 100-meter meteorology tower and an 800-square-foot research platform that will sit in the water near the turbines. The equipment will measure winds, temperature, precipitation, subsurface currents and wave activity. In addition, a radar system, acoustic monitoring, and thermographic and visual imaging equipment will detect bird, bat, fish and marine mammal activity to document the impact of the turbines on these species.

✦ The Expertise

RENCi brings to the project a robust body of experience in deploying and using advanced sensing equipment, as well as expertise in designing complex data integration systems.

RENCi Senior Scientist Brian Blanton assisted the demonstration project early on by summarizing the tropical storm hazard in the Pamlico Sound using models developed for the North Carolina Floodplain Mapping Project.

In addition, RENCi's team of experts in sensor deployment, data integration and management will ensure that the high volume of valuable research data collected for the demonstration project is handled in the most efficient and useful way possible to meet the project's research needs.

✦ The Partners

University of North Carolina at Chapel Hill
North Carolina State University
East Carolina University
Department of Energy National Renewable Energy Laboratory

✦ The Impact

Small-scale test projects are a critical component of the overall goal to reduce our dependence on non-renewable energy sources. Although offshore wind farms operating in other areas of the world can serve as models for projects in the United States, it is crucial to conduct on-the-ground research that can address the unique characteristics of the coastal environments where offshore wind farms may be constructed. For example, the potential effects of tropical storms and associated storm surge, which frequently impact the North Carolina coastline, have not been studied before.

This demonstration project, which will begin installing turbines in summer 2011, may be the first to place wind turbines in water in the United States. Research findings from the project will inform the development of any future large-scale wind farm off North Carolina's coast, so that future wind harvesting efforts may be deployed in an effective, efficient and environmentally responsible manner. The project is also likely to have a national impact by informing coastal wind energy efforts in other states.