

Chasing the wind

Deep-water turbine farms could overshadow near-shore projects like Nantucket Sound's

By Beth Daley, Globe Staff | July 20, 2009

Could the proposed Nantucket Sound wind farm become obsolete before it is even built?

Aesthetic concerns have stalled the Cape Wind project, which would erect 130 turbines 5 to 13 miles from Cape Cod and Nantucket. But technological advances in recent years are allowing developers elsewhere to consider building wind turbines farther from shore, where they would be less visible.

Last month, the US Department of the Interior granted the nation's first ocean leases for exploring the feasibility of large wind farms, with most of the sites 12 to 18 miles off New Jersey and Delaware. New York power companies are exploring the possibility of a vast wind farm 13 miles off the Rockaways. And a 120-turbine farm has been proposed 48 miles off New Bedford.

If these and similar projects prove viable, some wind energy specialists and developers say, they could leapfrog closer-to-shore projects like Cape Wind. Winds are often stronger and more sustained farther from shore.

Yet these proposed wind farms face enormous hurdles. Most will require new, unproven structural designs to withstand fiercer seas and deeper water. They are farther from the onshore electrical grid and more expensive to build. Only one deep-water project exists in the world - a two-turbine test farm 12 miles off the east coast of Scotland in about 150 feet of water.

"People do take Cape Wind into account and try to avoid the same kind of controversy," said Walt Musial, principal engineer of the National Renewable Energy Laboratory in Colorado, part of the US Department of Energy. "But the trade-off is that the deeper the project is, the greater the technical risk in terms of reliability, survivability, and . . . payback."

The Cape Wind project is proposed in what wind energy specialists say is probably the best place on the East Coast to build the nation's first wind farm: in protected shallow waters close to shore. That allows developers to use technology already proven for land-based wind turbines, driving an enormous single steel pole into the seabed and placing a turbine on top.

But in water 100 to 200 feet deep, that same structure loses stability and can cost too much. So a race is now on to construct wind turbines using much the same technology as used for oil rigs. This method would involve driving pilings into the seabed and mounting a structure on top. The turbines are built on land, carried by barges, and then placed on the structure.

In even deeper water, such as on the West Coast, or in the Gulf of Maine, scientists envision floating turbines anchored to the seabed, although most acknowledge the technology is still years away from being economically viable. Blue H, the company proposing a project off New Bedford, hopes to test its design for floating turbines in US waters by 2011.

“Projects in shallow waters visible from shore have been proposed in the US and many have had public support but others have had some resistance,” said Habib Dagher, director of the Advanced Structures and Composites Center at the University of Maine, which wants to host a deep-water wind research center at the university and test designs in deep state waters 3 miles from shore. “In Maine, our goal for large-scale commercial development is to go about 20 miles offshore so you don’t see the structures from land, and to capture the best winds. But it’s a big learning curve for that depth.”

Wind turbines need to be about 20 miles offshore to be invisible from land, many wind researchers say, although those that are at least 13 miles offshore are barely visible most of the time.

There is no rule about how far away an offshore wind park must be to win public support, said Willett Kempton, professor of marine policy at the University of Delaware. Yet surveys he conducted of thousands of coastal residents show there is little opposition to projects at least 8 miles offshore. Yet with no turbines built offshore in the United States, he added, it is hard to gauge public reaction.

Given the opposition to Cape Wind, developers are acutely sensitive to public perceptions. Deepwater Wind, which is hoping to build a two-phase project in partnership with Rhode Island, moved most of the proposed turbines farther offshore than the state had requested to improve aesthetics, wind power, and safety for birds. The company wants to construct up to eight turbines near Block Island, using a structure anchored to the seabed. Then it plans to build an additional 110 turbines about 15 to 18 miles out in federal waters to generate power for sale to the electrical grid. The company also received two of the federal exploratory leases 12 to 18 miles off New Jersey.

“Our philosophy is as far from the coastline as possible,” said Jim Lanard, managing director of Deepwater. “We think wind parks are a beautiful sight, but we understand some people don’t like them. The turbines can look - even though they are not - chaotically placed near shore because they are spinning at different times and speeds.”

Bluewater Wind LLC, which also won two exploratory federal leases, is using technology similar to Cape Wind’s for two large projects 14 to 18 miles off New Jersey and Delaware. Founder and president Peter Mandelstam said the relatively shallow water, strong winds, and proven technology will make it faster and easier to build and maintain a wind farm.

Musial, of the National Renewable Energy Laboratory, said it makes more sense to build nearer-to-shore projects first, to work out technical problems, before jumping ahead to more challenging conditions farther out at sea.

Closer-to-shore wind turbines are certainly not being abandoned.

The Cape Wind project is waiting for a final federal sign-off. And Massachusetts recently unveiled a draft ocean zoning plan that designates six areas within 3 miles of shore where up to 10 wind turbines could be built in each, but only if most communities want them. The state also set aside two areas for large-scale wind farms offshore from two nearly empty islands.

Ian Bowles, Massachusetts secretary of Energy and Environmental Affairs, said a suite of wind farms - onshore and those at varying distances offshore - are needed to meet ambitious national and state renewable energy goals.

"We are going to need all this and a lot more," he said.