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PLENTY
IT'S EASY BEING GREEN

Leasing the ocean for wind harvesting

Researching wind and wave energy twelve miles from the coast

By Emily Waltz

At a point beginning three nautical miles from the U.S. coastline and extending 200 nautical miles seaward lie the vast, federally-controlled waters of the outer continental shelf. There the winds and waves are consistent, the currents strong, and the human activities minimal: conditions ideal for marine renewable energy projects.

Federal laws limit the leasing of the outer continental shelf for energy harvesting almost entirely to oil and gas explorers. Or at least until now. A federal agency in April announced 16 candidates will be leased blocks of the shelf for renewable energy projects.

For about the cost of renting a New York City studio apartment, lessees get nine square miles of ocean floor and a five-year rental agreement. Ten candidates proposed off-shore wind projects and six proposed ocean current or wave conversion experiments. The leases will be located off the coasts of New Jersey, Delaware, Georgia, southeastern Florida, and northern California.

The leases are vital to building a viable ocean renewables industry, say experts. State waters—those within three miles of the shore for most states—can be leased for alternative energy development, but the environmental and social impacts are greater closer to shore. As a result, many proposals are tabled.

"For these projects to move us in any meaningful way toward energy security and price stability, you're talking about putting hundreds to thousands of turbines offshore, and that can only happen if you can get over the horizon—about 12 nautical miles out," says George Hagerman, a marine renewable energy

researcher at Virginia Tech.

There's a mix of pluses and minuses to these far off-shore projects. A wind park twelve miles from shore is barely visible, avoids recreational activities and shipping routes, and, according to some researchers, won't interfere with the flight paths of migratory birds, which tend to hug the shore. The noise during construction, which can be harmful to fish, is about the same regardless of the distance from shore. The construction costs of building further at sea, however, are higher.

Less clear are the environmental implications of ocean current and wave energy devices, both nascent technologies. But as a general rule, the further from shore, the smaller the impact, says Hagerman.

Wave conversion devices are installed at or near the surface of the water and extract energy from the motion of the waves, calming the water as it passes. If the devices are anchored too close to shore, there may not be enough sea space for the waves to re-establish themselves. The lack of wave energy could alter the transport of sediment and contribute to coastal erosion.

There are several designs in development. Some use wave action to move components of the device and drive hydraulic energy converters. Other devices are like mini reservoirs at sea that are filled by incoming waves. The water is released to fall back toward the ocean surface and the energy of the falling water is used to turn hydro turbines.

Ocean current harvesting devices are underwater turbines anchored to the sea floor with blades that are turned by the force of the current. Few prototypes have been tested in the ocean, so researchers don't know how fish and marine mammals will interact with the turbines. Some scientists worry large-scale projects could actually slow the speed of the current.

So, for now, the federal government asks developers to move slowly. The leased sites on the outer continental shelf can only be used for small-scale experiments and testing. Further leasing and environmental assessment will be required before commercial projects can proceed. Some developers will need permits from another 20 or so federal agencies before they get the all-clear.

Executives at Bluewater Wind applied to lease sites off the coasts of New Jersey and Delaware where they plan to build meteorological towers that measure wind strength. If all goes well, the company will build two wind parks generating about 400 megawatts of power wind parks, says Jim Lanard, a spokesperson for the company. To assuage concerns from local residents, the company created panoramic virtual images displaying the visibility of the turbines 11 nautical miles from the Delaware shore.

Researchers at Florida Atlantic University hope to lease an area of the Gulf Stream near Fort Lauderdale, Florida. They plan to test ocean current conversion devices and eventually build a test range where companies can hook up their prototypes and send electricity back to shore through a cable.

The possibility of opening the outer continental shelf to renewable energy projects emerged when Congress passed the 2005 Energy Policy Act. The law granted the Minerals Management Service (MMS) the lead role in leasing the shelf and required the agency to come up with a permanent system for encouraging commercial development of renewable energy. The rules were to be finalized by spring 2006, a deadline the agency still hasn't met.

"There has been a lot of pressure on the agency from developers to start moving ahead," says Carolyn Elefant, an attorney in D.C. who specializes in regulation of ocean renewables. "I think somebody over there [at MMS] started thinking that if they didn't do something, there might be a court case." The leasing scheme announced in April is a temporary solution to allow developers to get testing equipment

into the water while they await the delinquent rules, she says.

Some would say the federal leasing plan is far more than a couple years late. At least 25 off-shore wind parks have been built in European waters, but not a single turbine is yet operating in US territory.

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