Researchers eye monitoring system for offshore wind energy impacts

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The next generation of wind energy facilities in the United States may be built offshore where winds are stronger, floating platforms could be utilized, and links to power grids may already exist.

Though the development of such offshore wind towers locally is still in the conceptual stage, there already is concern over the potential impacts that the huge, rotating blades of wind turbines could have on seabirds and bats. Even attempting to monitor such impacts is daunting.

The Northwest National Marine Renewable Energy Center at Oregon State University has received a three-year, $600,000 grant from the U.S. Department of Energy to develop a multi-sensor array to record the interactions – including impacts – of birds and bats on the blades, platforms and towers of wind turbines.

“Unfortunately, the usual way to document the impact of wind turbines on birds and bats is to collect the carcasses,” said Robert Suryan, an OSU seabird expert who is principal investigator on the project. “That would be hard to do out in the ocean. Even on shore, surveys are limited at large or remote facilities and can be compromised by scavengers that remove the carcasses.”

So the researchers are coming up with a different approach – synchronizing an array of sensors that will include accelerometers to measure variations in blade movement from impact, visual and infrared cameras, and acoustic devices to record strikes and identify the bird or

bat involved. The monitoring system will be designed to run continuously and on multiple turbines at once to estimate the potential impact of the entire wind farm.

The project team led by Suryan includes co-principal investigators Roberto Albertani, an OSU engineer, and Brian Polagye, an engineer from the University of Washington.

“This is the first foray into offshore wind energy for the Northwest National Marine Renewable Energy Center,” said Belinda Batten, who directs the center, which is a joint effort between OSU and the University of Washington. “It builds upon our strengths in wave and tidal energy, and our efforts to gauge potential environmental impacts of new forms of renewable energy.”

Though the researchers’ focus will be on an array for offshore turbines, the sensors will have potential usage in terrestrial facilities as well, pointed out Suryan, an assistant professor of fisheries and wildlife at OSU, who works at the university’s Hatfield Marine Science Center in Newport.

The technologies for the array are not new, the researchers say, but integrating the instruments and developing automated strike detection software to capture events – and then remotely transmit relevant data – has not been done. In addition to the engineering challenge, the researchers must account for the impact of the rugged Pacific Ocean, where winter storms frequently produce 20- and 30-foot waves.

“In Oregon, many seabirds are heavy-bodied and fly close to the surface of the ocean – possibly below the sweep of the rotor blades,” Suryan said. “Potential collision with the lower tower and base is still a concern and will be monitored by this system. Studies are needed to identify which species fly at altitudes that might put them at risk of blade impact;

we know less about how far and frequently bats move offshore.

“There is also the issue with platforms, which might attract birds as a roosting area,” Suryan added. “Some of it may depend on how far offshore they might be.”

The researchers will spend much of the next three years developing their instrumentation array and synchronizing the instruments. They will test their instrument array on land in Newport and on experimental turbines at Mesalands Community College in New Mexico and the National Renewable Energy Laboratory in Colorado.

“There is a big push in New England to develop offshore wind energy, as well as in areas where oil and gas platforms already exist,” Suryan said. “One possibility is to use those platforms for hydroelectric power generation from the currents below, and wind energy from turbines above the surface. Our project was funded from an initiative to remove market barriers for developing offshore wind facilities, especially floating platforms that can be used in deep water.

“Regardless of where wind energy platforms are built – on land, or at sea – placement is critical,” he added. “You want to avoid major flyways and travel corridors.”

Provided by Oregon State University