

Winds of change: Connecticut starts to see signs of offshore turbine development

THE FIRST IN A SERIES OF ARTICLES ABOUT VARIOUS FACETS OF OFFSHORE WIND DEVELOPMENT IMPACTING CONNECTICUT

By Nancy Balcom

Today, just seven turbines harness the power of North Atlantic winds along the East Coast—five 328-foot towers offshore from Block Island, R.I., and two twice that height in waters off Virginia.

Over the next several years, thousands of even larger electricity-producing machines are expected to rise from the sea floor from Maine to Florida, mimicking scenes already common in Europe. Evolving rapidly, the offshore wind industry represents a new area of engagement for Connecticut Sea Grant and Sea Grant programs nationwide. As such, I have begun working my way up a new learning curve to understand this energy source and explore how Sea Grant should share knowledge and assess related needs, concerns and opportunities.

Recognizing this emerging need, National Sea Grant established an offshore wind extension liaison, Jen McCann, director of R.I. Sea Grant extension. The National Oceanic and Atmospheric Administration provided \$350,000 to jumpstart Sea Grant's capacity to serve its constituents as offshore renewable energy is incorporated into our marine ecology, economy and communities. The seven Northeast Sea Grant programs in partnership with NOAA's Northeast Fisheries Science Center and the U.S. Department of Energy's Wind Energy Technologies Office and Water Power Technologies Office jointly funded six social science projects, currently underway, to better understand the effects of ocean renewable energy on community resilience and economies.

As these broader efforts advance, Connecticut Sea Grant staff are delving into the specifics of our state's involvement with offshore wind. Although no wind farms are planned for Long Island Sound, projects in nearby ocean waters will affect Connecticut. Like other Sea Grant programs, we are looking to define our place in this complicated and dynamic field involving federal and state regulators, business, commercial fishermen and environmental groups. Even as my self-education continues, I want to share what I've learned thus far. This first of several articles is not a comprehensive explanation of the pros, cons and tradeoffs associated with offshore wind, but an overview of relevant state government actions and the three offshore wind projects impacting Connecticut: Revolution Wind, Beacon Wind and Park City Wind.

Public understanding is important because offshore wind energy may soon be powering our homes. Supplies of oil and natural gas, which we have traditionally relied upon to power our cars, heat our homes and light our way, are limited, finite and contribute to climate change. While nuclear energy provides power without carbon emissions, the waste it generates remains problematic. Renewable energy sources—wind, solar, geothermal and hydropower—are replenished continuously.

CONNECTICUT SETS THE STAGE

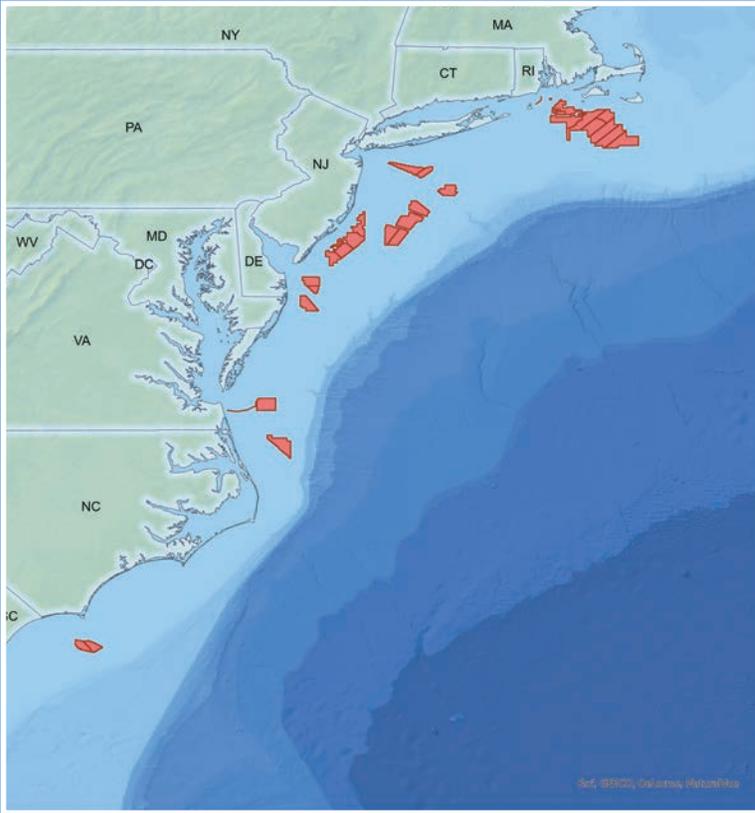
In recent years, Gov. Ned Lamont, the Connecticut General Assembly and the Connecticut Department of Energy and



Environmental Protection (CT DEEP) have taken steps to reduce our reliance on fossil fuels by turning to carbon-free renewable energy sources such as solar and offshore wind power.

In May 2019, Lamont announced a public-private partnership between the Connecticut Port Authority, Gateway New London LLC and joint venture partners Ørsted and Eversource that included a plan to redevelop the New London State Pier into a world-class, state-of-the-art port facility. In June 2019, Governor Lamont signed House Bill 7156, *An Act Concerning the Procurement of Energy Derived from Offshore Wind*, authorizing the development of wind energy in Connecticut and the purchase of up to 2,000 megawatts (MW) of power, equivalent to powering one million homes. (A megawatt is the unit used to measure bulk electrical power, equivalent to one million watts or 1,000 kilowatts). In December 2019, CT DEEP contracted with Avangrid to provide 804 MW of power (about 14% of Connecticut's required electricity supply) through Park City Wind.

The governor signed Public Act 22-5, *An Act Concerning Climate Change Mitigation* last May, which codified into law the 2040 zero-carbon electric grid goal he had established through the executive order three years earlier. The goal is to power 100% of the state's electricity needs from sources other than natural gas and oil by 2040.



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The red area in the top right, identified by the federal Bureau of Ocean Energy (BOEM) as “Commercial Leases Offshore Rhode Island/Massachusetts,” is where the Avangrid, Equinor, and Eversource/Ørsted projects and several other wind projects are expected to be located. Red areas to the south are proposed locations of other wind farms. (Map courtesy of BOEM)

More information on the leases and project can be found on the BOEM website:
<https://www.boem.gov/renewable-energy/state-activities>
<https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south>.

Photo page 4, top: State Pier in New London is busy with the activity of cranes and work crews renovating the site into a staging area for offshore wind assembly. Photo: Nancy Balcom

Right, the turbines located offshore from Block Island are 328 feet high, while those being planned for other sites on the East Coast are expected to be more than three times that height. Photo: Nat Trumbull





STATE PIER AND THE REVOLUTION WIND PROJECT

Last August, my colleague Syma Ebbin and I toured State Pier to see more than \$250 million in renovation activities.

Some of the leaders of the State Pier construction project led a tour for CTSG's Syma Ebbin, second from left, and Nancy Balcom (not shown) last summer. Photo: Nancy Balcom

Anyone routinely driving I-95 northbound on the Gold Star Bridge over the Thames River may catch glimpses of the changing pier area just south of the bridge. We were met by representatives of the Connecticut Port Authority, AECOM, Kiewit Infrastructure Co., Ørsted and Eversource. The two companies formed a partnership called Northeast Offshore that the pier renovations will serve.

“The old State Pier is being upgraded to a new, heavy-lift capable port,” said Andrew Lavigne, manager of business development and special projects, “with two heavy-lift pads, each able to handle loads of 5,000 pounds per square foot.

“More than seven acres of water between the fingers of the old pier and the State Pier were filled in with 400,000 cubic yards

of material to create the terminal platform,” he added. Still-exposed areas of the deck under construction revealed arrays of steel piles driven 80-120 feet into the riverbed to bear the future weight of cranes and cargo. Once the renovations are completed, Eversource and Ørsted will enter into a 10-year lease agreement to use the pier for pre-assembly and staging for at least three of their currently awarded offshore wind projects (Revolution Wind, South Fork Wind, Sunrise Wind), supplying power to Connecticut, Rhode Island and New York.

“These renovations, as envisioned for decades by studies indicating the facility’s underutilization, will also facilitate a five-fold increase in use from about one vessel per month to six by supporting a greater range of cargo,” Lavigne said. Unlike other East Coast port facilities, State Pier has no overhead restrictions from bridges or hurricane barriers, making it ideal for supporting the movement of massive wind turbine components offshore.

Ørsted, a Danish company and world’s leading offshore wind developer, partnered with Eversource in 2019. The companies have an agreement with Dominion Energy to charter its massive new vessel, *Charybdis*, being specially built in Texas for offshore wind turbine installation. Costing \$500 million and named after a formidable Greek mythology sea monster,



Dominion Energy’s *Charybdis*, currently under construction in Texas, will be the first Jones Act compliant offshore wind turbine installation vessel in the United States. The vessel’s first use is slated to be at State Pier in New London. Image: GustoMSC



Because of its location in front of the Gold Star Bridge, State Pier is free of obstructions and uniquely suited to handle the large components needed for the offshore wind industry. Photo: Judy Benson

its first deployments will be from State Pier to support the construction of Revolution Wind and Sunrise Wind. According to Dominion Energy's website, the 472-foot-long vessel is equipped with sturdy "legs" that will stabilize it on the seafloor in water depths up to 213 feet as the ship self-elevates. The 58,000 square foot main deck supports a crane capable of lifting 2,200 tons.

The Revolution Wind lease area is projected to produce 704 megawatts (MW) of power, supplying electricity to 350,000 Connecticut and Rhode Island homes. The turbines will be located 20 miles east of Block Island and 12 miles southwest of Martha's Vineyard. Landfall will be at the Quonset Business Park in Narragansett Bay, R.I. with the onshore substation in North Kingstown, R.I.

EQUINOR'S BEACON WIND PROJECT AND ITS LONG ISLAND SOUND CABLE ROUTE

Equinor is a 50-year-old international company that has been building offshore wind farms for over a decade. The company is developing two lease areas for the Empire Wind and Beacon Wind projects, expected to supply 3.3 gigawatts (GW) of power—enough for approximately two million New York homes, explained EJ Marohn, marine affairs manager for Equinor, during a meeting last July with Connecticut Sea Grant.

Kristin Kelleher, community engagement manager, was among the Equinor staff answering questions at a community meeting hosted by Mystic Aquarium in October.

"The Empire Wind lease area is located in the New York Bight south of Long Island while the Beacon Wind lease area is 20 miles south of Nantucket and 60 miles east of Montauk," she explained. "There will be approximately 80 turbines in the Beacon Wind 1 project area to produce 1,230 MW of power, installed in a 1 x 1 nautical mile grid layout...developed with input from relevant officials and fishermen."

Equinor staff indicated Beacon Wind turbines will be up to 1,083 feet tall, only a few hundred feet shorter than the Empire State Building. One rotation of one turbine can power a home for about 1.5 days, according to the information provided. Construction will begin in 2025; first power is expected to be generated in the late 2020s.

Alternating current (AC) power generated by the turbines will be converted to direct current (DC) at an offshore substation facility. From there, it will travel approximately 202 nautical miles via high-voltage underwater cables to the New York City power grid. The path of the cables will traverse the length of Long Island Sound in New York waters, installed to a target depth of three to six feet.

Tom Cunningham, public affairs manager for Equinor, said this is the longest cable route planned thus far for their wind projects.

"It will weave through the East River to the Astoria power complex in Queens, where it will be brought ashore on previously-developed industrial land," he said. "This routing will allow for minimal onshore disruption. We are applying lessons learned from past cable installations in Long Island Sound and we wish to minimize any impacts."

He added that the company expects its transmission cables will cross over a dozen existing pipeline and cable assets along the route. Michelle Fogarty, environmental surveys manager, explained that Equinor is using the Long Island Sound Blue Plan, a marine spatial plan developed in Connecticut, to inform decisions related to the cable route.

"Not only are technical needs and costs considered, but we are also incorporating information on the most sensitive areas along the proposed route," she said.

Elizabeth Marchetti, fisheries liaison officer for Equinor, added: "Based on information from fishermen, we also shifted the cable route further west."

Equinor planners will also be mindful of the Rhode Island Special Area Management Plan (SAMP) as well as the newly designated National Estuarine Research Reserve (NERR) in Connecticut.

Equinor is in the process of conducting environmental impact assessments to support permits, including current bird, bat, fish and marine mammal populations. Additional funds to support regional wildlife conservation and fisheries research is under development as part of an agreement with the New York State Energy Research and Development Authority, Fogarty noted.





A site on Bridgeport harbor was being remediated last summer in preparation for the Avangrid-Park City Wind project, which is expected to complete a lease agreement for the property in the coming months.

AVANGRID AND PARK CITY WIND

Avangrid Renewables LLC will be building Park City Wind, recalling the nickname for Bridgeport, the city where its staging area will be located. Avangrid was awarded the lease in 2019 in the same federal waters as Revolution Wind, Beacon Wind and other projects. The clustered leases take advantage of the strongest winds on the East Coast. Transmission cables from Park City Wind will come ashore in Barnstable, Mass., to a newly constructed substation, according to Avangrid's website. Scheduled to be completed in 2026, Park City Wind is expected to power 400,000 Connecticut homes annually.

Barnum Landing, a 15-acre parcel in Bridgeport, is anticipated to be the base of operations during the construction phase. Once construction is completed, three acres will be used for an operations and maintenance hub.

At a September conference of Environmental Business Council of New England, Sarah Lewis, Connecticut bids commitment manager for Avangrid, talked about the significant job creation expected over the life of this project and an anticipated \$890 million in direct economic benefits. The company will help develop a skilled offshore wind workforce in partnership with vocational schools and universities, and



Gary Yerman, right, owner of New London Seafood Distributors, talks with a representative of Equinor, developers of the Beacon Wind project, at a public meeting at Mystic Aquarium on Oct. 3. Photos: Judy Benson

through labor and pre-apprenticeship programs, she said.

Power generation through renewable energy is critical to reducing both our dependence on fossil fuels and greenhouse gas emissions. Yet, it is no small matter that the U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM)'s proposed lease areas along the Atlantic coast may eventually support thousands of wind turbines. Potential impacts to living resources, communities and the environment must be investigated and monitored by individual companies for each lease area, but how will any associated cumulative impacts be measured or determined? These and other questions will be explored in future installments.

In the next article, commercial and recreational fishing impacts, concerns and opportunities will be considered.

MORE INFORMATION:

Federal Bureau of Ocean Energy Management: <https://www.boem.gov/renewable-energy>
 Northeast Sea Grant Consortium Ocean Renewable Energy Initiative: <https://www.northeastseagrant.com/initiatives/ocean-renewable-energy>
 National Sea Grant Offshore Wind Energy Liaison: <https://www.seagrantenergy.org/>
 Interactive map of proposed projects: <https://www.seagrantenergy.org/where-is-owc-being-developed>
 National Renewable Energy Laboratory: <https://www.nrel.gov/>
 Ocean energy research projects funded by Northeast Sea Grant Consortium, NOAA and DOE: <https://seagrant.mit.edu/2022/05/19/six-ocean-energy-projects-announced/>
 Connecticut Sea Grant offshore wind web page: <https://seagrant.uconn.edu/offshore-wind-connecticut/>



s To Len reflects on the journey that led him to the CT Sea Grant art project