U.S. offshore wind is under sail, but challenges remain

By Ella Foley Gannon, Esq., J. Daniel Skees, Esq., and Scott D. Clausen, Esq., Morgan, Lewis & Bockius LLP

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The electric system across the United States is under stress from environmental and policy challenges, but a historically untapped resource is primed to make significant inroads over the coming years. For the last decade, electric generation from wind production has been growing all over the continental U.S. According to the U.S. Energy Information Administration (https://bit.ly/3CpMe0q), the total amount of electricity produced by wind generation domestically has increased from 6 billion kWh in 2000 to 338 billion kWh in 2020, and as of last year wind generation was more than 8% of the total utility-scale generation operating in the U.S.

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Yet despite that growth and the corresponding reduction in carbon emissions, one source of wind power – offshore wind production, the generation of electricity from wind turbines stationed in the ocean -- is almost entirely missing. Even with its thousands of miles of coastline, the U.S. only has about 30 MW of offshore wind production from a single operating utility-scale wind farm. This pales in comparison to other parts of the world, particularly Europe, which has more than 25 GW of grid-connected offshore wind capacity from more than 100 offshore wind farms.

But as the Biden administration, state governments, and utilities prioritize addressing climate change by further reducing carbon emissions, the U.S. has looked to the European example; if current plans hold, the U.S. may soon rival Europe in its use of offshore wind.

Through a mixture of legislation and executive actions, several Atlantic states plus Oregon have set ambitious targets for offshore wind totaling 41.5 GW. And many of these states have at least one offshore wind project with a power purchase agreement in place or that has been approved to receive offshore wind renewable energy credits — called ORECs — under state renewable programs.

The federal government is also moving forward at an unprecedented pace with the necessary environmental reviews for several projects on the East Coast, with a goal of starting the reviews for 10 projects this year. And while most of the development interest has been concentrated between Massachusetts and Virginia, several areas have also been identified off North Carolina and South Carolina for potential development.

There is also significant interest in developing offshore wind in the Great Lakes region and the West Coast. In the Great Lakes, the 20.7 MW Icebreaker Wind project near Cleveland continues to move forward and hopes to begin construction next year. The hope is that this project will be the first of many in the region.

On the Pacific Coast, the Bureau of Ocean Energy Management (BOEM) designated five "call areas" for potential development — three off the California Coast and two off the coast of Oahu. Development of these Pacific sites, and many sites in the Great Lakes Region, will require floating turbines because of the depths in those areas.

Adding to the optimism for the offshore wind is the recent final approval of the Vineyard Wind project off Massachusetts. This project will consist of 62 13-MW turbines with a generating capacity of 800 MW. And the developers of the project — Avangrid and Copenhagen Infrastructure Partners — recently secured financing from nine banks totaling $2.3 billion to construct the project. With the final approval and financing in place, construction of an onshore substation is ready to begin with construction of the offshore facilities to follow.

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Several states are also positioning themselves to become hubs for offshore wind development. States are redeveloping port facilities to accommodate the large components of offshore turbines and some are planning to construct large fabrication facilities at or near the ports for turbine towers, nacelles (the housing containing

the generator and gears), and other large components. The U.S. maritime industry is also taking notice, and the keel has already been laid on the first Jones Act-compliant turbine installation vessel in Brownsville, Texas. Several more Jones Act installation vessels along with vessels needed to transport workers and components from port to the installation site are in the planning stages.

Whether the commitments, goals, and purchase agreements result in installed turbines remains an open question. The environmental permitting process has remained challenging for offshore wind developers, with reviews by BOEM taking years to complete. And even when BOEM permitted the first project in line, Vineyard Wind off the coast of Martha's Vineyard, to proceed, several lawsuits have been filed criticizing BOEM's approach under federal environmental laws.

There is significant tension between offshore developers, the fishing industry, and some residents who oppose the projects. In addition, the ability to interconnect to the onshore electric grid remains a work in progress and will require significant upgrades to the electric system largely financed by the offshore wind developers. Those upgrades, too, require extensive regulatory proceedings with uncertainty as to the ultimate cost and in-service date of the needed infrastructure improvements.

Nevertheless, there is significant reason for optimism. As President Bidden calls for more action to address climate change by slashing greenhouse gas emission, he is prioritizing offshore wind development as a critical component of the U.S. to meet its recent commitments. His administration has taken aggressive actions to designate new areas for offshore wind leases and announced plans to complete review of 16 Construction and Operation Plans by 2025, which are the final BOEM environmental approvals. Also underway are efforts to improve the domestic supply chain for turbines, vessels and port infrastructure necessary to build a significant and self-sustaining offshore wind industry.

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As Secretary of Energy Jennifer Granholm has explained in supporting the Biden administration's offshore wind development goals, "DOE is going to marshal every resource we have to get as many American companies, using as many sheets of American steel, employing as many American workers as possible in offshore wind energy — driving economic growth from coast to coast." If these goals are realized, in a few years more and more of the nation's electricity will flow onshore with the ocean wind.

About the authors



Ella Foley Gannon (L), a partner at **Morgan, Lewis & Bockius LLP**, is deputy chair of the firm's global litigation practice and advises clients on a wide range of climate change issues. She is located in the San Francisco office and can be reached at ella.gannon@morganlewis.com. **J. Daniel Skees** (C), a partner at the firm in the Washington, D.C., office, represents electric utilities before the Federal Energy Regulatory Commission and other agencies on rate, regulatory and transaction matters. He handles rate and tariff proceedings, electric utility and holding company transactions, utility financing, electric markets and trading issues, reliability standards development and compliance, including cybersecurity requirements, administrative litigation, and electric transmission and generation development. He can be reached at daniel.skees@morganlewis.com. **Scott D. Clausen** (R), an associate at the firm in Washington, D.C., represents and advises clients in litigation, transactional, and regulatory matters before the U.S. Nuclear Regulatory Commission, Department of Labor and other state and federal agencies. He advises utilities on state regulatory matters and counsels companies that are developing and deploying low or zero carbon technologies as part of their sustainability and decarbonization strategies. He can be reached at scott.clausen@morganlewis.com.

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