

Benchmarking New Jersey's Offshore Wind Initiatives

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American Rostock

At the Paulsboro Marine Terminal in Gloucester County, the first of the massive monopiles that will serve as the underwater foundations for the turbines of Ørsted's Ocean Wind 1 wind farm off the New Jersey shore is nearing completion. The behemoth structure is over the length of a football field. When its paint job is completed, it will be the first major offshore wind component produced in the United States, marking the effective launch of an offshore wind manufacturing industry that promises to bring thousands of jobs to New Jersey.¹

Inside Blast & Paint Building No. 1, Ocean Wind 1's first monopile has been sanded and is getting its final coat of paint to protect it from the elements. Three hundred feet long and 32 feet in diameter, weighing 3 million pounds and built out of 4-inch-thick steel, the mammoth monopile is the first down payment on Governor Murphy's promise that the offshore wind industry will use New Jersey-manufactured components and be built by unionized New Jersey workers.

Inside the adjacent Circ Weld building, sparks fly above the steel scaffolding as a welder, his face shield down, finishes work on a second Ørsted monopile. A second worker in hard hat and orange vest stands in the open end of the monopile, looking small in the mouth of the giant steel cylinder. Outside, other rolled steel sections sit ready for welding and assembly for a dozen more monopiles that will be completed this summer.

"This factory has the potential to become a clone of our sister factory in Germany that currently employs over a thousand manufacturing workers," said Lee Laurendeau, CEO of EEW American Offshore Structures, comparing Paulsboro's potential to EEW's principal monopile manufacturing plant in Rostock, Germany.²

But it isn't yet, and future expansion plans are dependent on legislative action.

Inaugurated with great fanfare at a beam-signing ceremony that drew Governor Phil Murphy, then-Senate President Steve Sweeney, U.S. House Majority Whip Steny Hoyer (D-Md.) and a slew of top federal and state officials, the Paulsboro monopile plant was hailed as the first major investment to create a U.S. -based manufacturing facility employing American workers to supply components to the emerging offshore wind industry.³

EEW AOS is a partnership of Ørsted, the industry-leading Danish offshore wind developer, and EEW, the leading German manufacturer. Together, the Paulsboro facility, with \$250 million in pledged funding, and the New Jersey Wind Port, being built by the New Jersey Economic Development Authority with \$637.7 million in funding as a manufacturing, assembly and staging facility on Delaware Bay in Salem County were touted as the one-two punch that would make New Jersey the national leader in the offshore wind industry.



The first monopile welded together by EEW AOS workers in Paulsboro for Ørsted’s Ocean Wind 1 project sits in the factory yard in March 2023, dwarfing the workforce that assembled it.

SOURCE: Photo courtesy of EEW AOS

Today, 100 employees work at Paulsboro’s EEW AOS plant. Orsted put up \$160 million to fund Phase 1, making it the dominant partner in the project, and the New Jersey Department of Transportation contributed site work.

However, EEW AOS is already more than a year behind schedule on its planned Phase 2 development – the construction of four buildings, including of plate-cutting and rolling mills, that would add 437 permanent manufacturing jobs and transform Paulsboro into “a complete end-to-end monopile fabrication facility capable of producing up to 100 finished MPs [monopiles] per year from flat steel plate.”⁴

Anticipating that Phase 2 expansion, Atlantic Shores signed a contract with EEW AOS in December that would make its Atlantic Shores 1 offshore wind farm the first to use monopiles fully manufactured at the Paulsboro plant.

EEW AOS is not alone in its troubles. Nationwide and industrywide, offshore wind projects are facing stiff economic challenges. EEW AOS Phase 2 is dependent on offshore wind generation projects moving forward, but that is contingent on legislative action.

Ørsted, which is prepared to put up \$200 million for Phase 2 and assist EEW AOS in pursuing \$200 million in additional financing from a supportive U.S. Department of Energy, has been locked in negotiations for months with New Jersey state officials over the use of federal offshore wind tax

credits created under the 2020 Stimulus Act and under the Inflation Reduction Act by the Biden Administration.⁵

Ørsted's argument is that material, labor and borrowing costs have soared in the runaway global inflation that followed the Covid-19 pandemic and have wreaked havoc with the original cost projections the company made in 2019. New Jersey is currently the only state that does not allow full use of the federal tax credits by offshore wind developers. Existing state regulations require that tax benefits obtained by offshore wind projects after submitting their Offshore Wind Energy Certificate (OREC) price to the Board of Public Utilities be returned to the ratepayer.

New York and other states already allow companies the use of the federal tax credits, putting New Jersey at a competitive disadvantage in the competition for green energy jobs and manufacturing if it fails to follow suit.

New York has emerged as a particularly aggressive competitor for offshore wind jobs, with Governor Kathy Hochul announcing a \$500 million investment to develop New York's offshore wind supply chain and port infrastructure in 2022. The Port of Albany received U.S. Environmental Protection Agency approval in February for a \$350 million offshore wind turbine tower manufacturing facility, and General Electric announced plans in January to construct a pair of manufacturing facilities to build wind turbine blades and nacelles at the Port of Coeymans 15 miles further south.⁶

The Murphy Administration and legislative leaders have been in discussions on a bill to authorize Ørsted to retain the full federal tax credits. Failing to change the current tax credit statute would put the next stage of the Paulsboro investment in doubt.⁷

Tim Sullivan, CEO of the New Jersey Economic Development Authority, issued a stern warning to the Assembly Budget Committee at a May 17 hearing that New Jersey is in danger of losing its first mover advantage in the offshore wind industry. "The question facing New Jersey is whether we want to lead, follow, or be left behind while other states in our region capture the extraordinary economic, environmental, and energy benefits from renewable energy," Sullivan wrote in an op ed underscoring that message three days later."⁸

The New Jersey Board of Public Utilities, with Governor Murphy's backing, has been more aggressive than any other state in requiring offshore wind consortiums seeking to sell power to New Jersey to use parts manufactured in New Jersey and invest in New Jersey-based facilities.⁹

"The potential economic impact to New Jersey is enormous," Laurendeau said. "EEW has already contracted with over 250 New Jersey-based companies who have supported our project, and we are only getting started."¹⁰

Both Ørsted, whose Ocean Wind 1 wind farm was scheduled for completion in 2025, and Atlantic Shores, whose Atlantic Shores Wind 1 is on track to be fully operational by 2028, agreed to use

monopiles manufactured in Paulsboro for their wind farms as part of their winning bids on the BPU's first two solicitations for companies to sell power generated by offshore wind to New Jersey customers.¹¹

But with construction on hold for months, EEW AOS may be unable to meet delivery requirements.

In fact, EEW AOS already may be technically in default in its Atlantic Shores contract because it will be unable to build the new Phase 2 facilities and deliver the 100 monopiles promised by 2026. However, Atlantic Shores has been a strong supporter of the EEW AOS factory, providing funding to support hiring and training of the factory's new workforce. Atlantic Shores officials toured the EEW AOS plant with Sweeney, an international vice president with the Ironworkers Union, on May 19.



A welder on steel scaffolding and a second worker inside the mouth of a monopile section in the Circ Weld Building are dwarfed by the massive monopile section.

SOURCE: Photo by Mark Magyar

Delays in developing Phase 2 of the EEW AOS plant in Paulsboro, and following up with an additional \$101 million Phase 3 option that would bring total employment to 800 and expand the facility's capacity from 100 to 166 monopiles per year,¹² would exacerbate competitive issues for both New Jersey and EEW AOS.

The State of Maryland is more likely to move forward aggressively in its plans to bring a monopile manufacturing plant to the old Sparrows Point Bethlehem Steel Shipyard if Paulsboro's problems persist

In March 2023, Maryland Governor Wes Moore announced that U.S. Wind and Tradeport Atlantic will build an offshore wind manufacturing yard at Sparrows Point, and that Ørsted "has committed to using Tradeport Atlantic as a logistics hub to assemble advanced foundation components for offshore wind turbines using materials produced on the Eastern Shore at Crystal Steel."

Moore, who more than quadrupled Maryland's offshore wind goal from 2 gigawatts to 8.5 gigawatts by 2035, asserted that the projects would create 15,000 jobs.¹³

While Maryland's effort lags years behind New Jersey, the Sparrows Point threat underscores the increasingly competitive nature of the offshore wind economy.

New Jersey's Offshore Wind Commitment

Governor Phil Murphy's commitment in September to bring 11 gigawatts of electricity generated by offshore wind to New Jersey by 2040 underscored the state's commitment to be the dominant player in the burgeoning offshore wind industry on the Atlantic Seaboard.¹⁴

It is not only a key component of a broad green energy strategy to fight climate change that includes nuclear power, solar energy and other alternative technologies, but also an economic development and job creation strategy designed to ensure that New Jersey workers manufacture the monopiles, assemble the turbines and ship them out to sea from New Jersey ports.

New Jersey's full-bore commitment to offshore wind is not without controversy. Concerns have been raised about the impact on residential and business utility bills, and both utilities and manufacturers worry about the impact of the past year's inflation in steel prices and labor costs on their original cost calculations.¹⁵

Furthermore, a recent Fairleigh Dickinson University poll showed public concern about the impact of preliminary offshore wind activities off the New Jersey coast on whale strandings, despite findings by federal officials and near-unanimous agreement by environmentalists that the soundings have no more impact on marine life than the thousands of offshore wind turbines in operation around the globe.¹⁶

The whale strandings were seized upon by Shore residents opposed to offshore wind development and it quickly turned into a partisan issue. Senate Republicans put together an ad hoc committee to hold an anti-offshore wind hearing on May 3,¹⁷ and Assembly Democrats responded with a May 18 hearing to demonstrate the lack of scientific evidence linking offshore wind activities to whale strandings.¹⁸

The National Oceanic and Atmospheric Administration declared an Unusual Mortality Event of humpback whale strandings from Maine to Florida in April 2017 – long before large-scale offshore wind activities started off Massachusetts, New York and more recently New Jersey. Shawn LaTourette, commissioner of the New Jersey Department of Protection, said climate change’s rising ocean temperatures are driving bait fish upon which whales prey into the “shipping superhighway” of the Port of New York and New Jersey. Necropsies of dead whale often show evidence of boat strikes or entanglements with fishing equipment.¹⁹

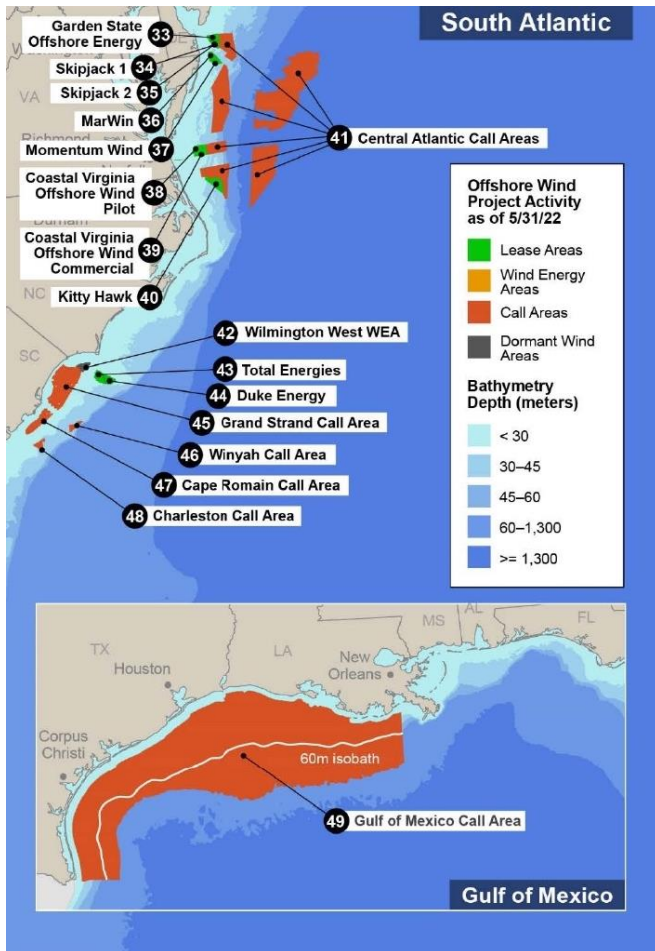
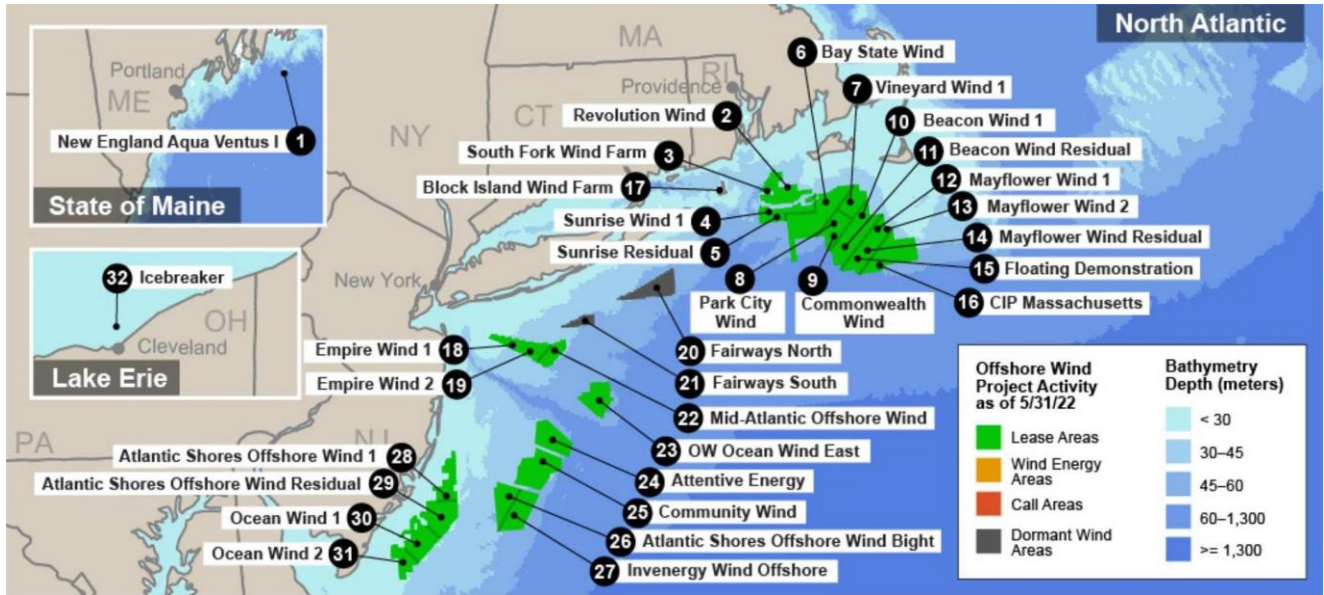
LaTourette said the best way to help marine populations is to fight climate change, and that the development of offshore wind technology projects is vital to meeting the state’s climate change goals. If offshore wind development moves forward as planned, “we would be in a position of generating somewhere between 30 and 45 percent of our consumable electricity from offshore wind sources,” LaTourette said at the Sweeney Center’s Offshore Wind Technology Conference in May.²⁰

New Jersey’s 11-gigawatt goal, which would provide enough electricity to power more than 4.5 million homes, is the second-largest in the nation after California’s 25-gigawatt target. But the Pacific’s deep water mean that California will have to rely on floating offshore wind turbines whose technology is still in development, while New Jersey and other Atlantic continental shelf states are able to install monopile turbines fixed to the ocean bottom similar to those that have been used in Danish and British waters since the 1990s.²¹

New Jersey is forging ahead at a time of unprecedented growth in the global offshore wind industry. Europe’s 27.9 gigawatts of electricity generated from offshore wind represents 55% of the world total, but China added 13.8 gigawatts in a single year in 2021 to become the No. 1 offshore wind producer in the world.²²

By comparison, the small 30-megawatt Block Island Wind Farm with five turbines in Rhode Island and a two-turbine pilot project off Virginia Beach are the only operating offshore wind projects in the United States. But that will change rapidly over the next decade.²³

Seventeen offshore wind projects projected to produce 18.6 gigawatts are in the permitting stage from Maine to North Carolina, including four New Jersey projects by the Ocean Wind and Atlantic Shores groups that would generate 4.8 gigawatts.²⁴



ATLANTIC SEABOARD LEASES

Ocean Wind I and II and Atlantic Shore Offshore Wind 1 (#30, 31 and 28 above) have all been approved by the New Jersey Board of Public Utilities.

The federal Department of the Interior is expediting a regional environmental review of the six New York Bight lease areas that further off the Jersey Shore (#22-#27 above).

Garden State Offshore Energy #33 left), co-owned by Ørsted and PSEG, is located in Delaware Bay and would also supply energy to New Jersey,

SOURCE: U.S. Department of Energy, Offshore Wind Market Report, 2022 ³⁰

Another 16 gigawatts in potential wind power are under site control, including 5.5 gigawatts in the New York Bight stretching from Monmouth County to Cape May County that drew winning bids totaling more than \$4.3 billion in February 2022 that testified to the industry’s belief that there were significant profits to be made in offshore wind generation.²⁵

More than any other state, New Jersey has fought to ensure that it would be “the Epicenter of the Job-rich Offshore Wind Industry,” as the South Jersey Port Corporation put it when it announced a projected \$250 million state investment on the site of a defunct petrochemical plant at the Paulsboro Marine Terminal, where EEW and Ørsted will manufacture the steel monopiles that will hold up the offshore wind turbines.²⁶

The \$400 million private investment the companies are slated to make in the Paulsboro plant would be the largest private investment in offshore wind manufacturing in the nation and would employ more than 800 workers when it is fully up and running.²⁷ The monopiles – up to 400 feet high, 40 feet in diameter, made of 5 ½ thick steel plate and weighing 5 million pounds each – would be barged down the Delaware lengthwise.²⁸

The Paulsboro project was followed by the announcement that the New Jersey Wind Port would be built at Lower Alloways Creek on Delaware Bay as a 220-acre marshaling, manufacturing and assembly area for the massive wind turbines and towers that need to be shipped out to the offshore lease areas vertically and would not fit under the Delaware River bridges.²⁹



Overhead of New Jersey Wind Port being built on Delaware Bay in Lower Alloways Creek.

SOURCE: New Jersey Economic Development Authority

The project, with \$637.7 million in secured funding, is the nation's largest port infrastructure project to support offshore wind and is projected to create 1,500 union jobs and generate \$500 million in economic activity.³¹

In October 2022, the New Jersey became the first state to create a transmission solution for offshore wind when the Board of Public Utilities approved \$1.08 billion to upgrade the existing onshore power grid, including a new substation at JCP&L's Larrabee substation in Howell to serve as the interconnection point for the first 6.4 megawatts of electricity generated by New Jersey's offshore wind turbines.³²

However, the BPU delayed choosing to build a single backbone offshore transmission corridor to carry the power generated by wind farms up to 60 miles offshore in order to preserve its option to seek direct federal funding that may become available to avert costs for consumers. The federal infrastructure law signed by Biden includes substantial tax credits for offshore wind farm operations, but not for transmission lines.³³

The BPU followed up its Larrabee award with an April 25, 2023, request to the PJM Grid to include interconnection proposals for 11 gigawatts of offshore wind power from New Jersey in its Regional Transmission Expansion Planning for 2040.³⁴

Developing Offshore Wind in New Jersey

One year after Rhode Island inked its agreement with Deepwater Wind for the Block Island Wind Farm pilot, Senate President Steve Sweeney sponsored New Jersey's Offshore Wind Renewable Energy Credit legislation. The bill was signed into law in 2010 by Governor Chris Christie, who pledged to make New Jersey "a national leader in the wind-power movement."³⁵

But for eight years under Christie, the New Jersey Board of Public Utilities failed to enact the rules and regulations needed to allow the program to go forward and rejected a series of proposals by Fishermen's Energy, the Atlantic City-based company that had the support of both the local fisheries industry and environmentalists and wanted to build New Jersey's first offshore wind farm.³⁶

Meanwhile, land-based wind generation tripled from 40 gigawatts to 130 gigawatts between 2010 and 2021, with most of the growth in the Republican heartland states stretching from the Dakotas to Texas. Sixteen states get at least 15% of their electricity from land-based wind farms, led by Iowa (55%), South Dakota (52%) and (45%).³⁷

In 2017 Phil Murphy, the Democratic candidate for governor, campaigned on a clean energy platform that promoted offshore wind. Governor Murphy issued an executive order just eight days after taking office in January 2018 requiring the BPU to establish an Offshore Wind Energy

Certificate program (OREC) to govern how offshore wind projects would be funded and how revenues would flow back to utility customers, and then take bids for the creation of the first 1.1-gigawatt wind farm off the New Jersey Shore.³⁸

The BPU also worked with the EDA and other state agencies to put together an Offshore Wind Strategic Plan that emphasized not only the critical role that offshore wind would play in reducing greenhouse gas emissions to achieve Murphy's goal of zero net emissions by 2050, but also how to bring new facilities, supply chain businesses and job growth to the state.³⁹

Murphy's initial aim to install 3.5 gigawatts by 2030 was superseded by a 7.5-gigawatt target by 2035 established in the 2019 Energy Master Plan, and then in September by his 11-gigawatt goal for 2040.⁴⁰

Ocean Wind I, a joint venture of Ørsted and PSEG, won the first 1.1 gigawatt OREC contract on June 21, 2019, just in time to apply for federal tax credits that were soon to expire.⁴¹

Two years later, in June 2021, Ørsted and PSEG won a 1.148-gigawatt OREC contract for Ocean Wind II in the second round of solicitations, along with Atlantic Shores Offshore Wind, a 50-50 collaboration between Shell New Energies US LLC and EDF Renewables North America, which won an OREC contract to generate 1.51 gigawatts of electricity annually.⁴²

Meanwhile, the state Economic Development Authority kept its focus on creating onshore jobs, announcing first that EEW and Ørsted would build a monopile manufacturing facility at the Paulsboro Marine Terminal and then that the state would finance a new Wind Port at Lower Alloways Creek as a manufacturing, assembly and shipping area for turbines and towers.

How New Jersey Stacks Up

Competition among states to stake an early position in the developing offshore wind industry and win a large share of the jobs to be created in the green energy boom has ramped up over the past five years.

Currently, Massachusetts is ahead on overall offshore wind farm development, and New Jersey has been leading in investment in supply chain manufacturing and port infrastructure.

New Jersey's target of 11 gigawatts of electricity produced by offshore wind by 2040 is the highest on the East Coast, followed by New York's 9 gigawatts by 2035, Maryland's 8.5 by 2035, North Carolina's 8 by 2040, and Virginia's 5.2 by 2034. However, Massachusetts' stated goal of 5.7 gigawatts by 2027 has the most ambitious deadline.⁴³

New York's \$2 billion South Fork Wind project, with its 12 offshore wind turbines, is under construction 35 miles east of Montauk and will generate 132 megawatts, enough to power 70,000 Long Island homes, when it goes on-line in 2023.⁴⁴

However, the first true commercial-scale offshore wind farm under construction is Massachusetts' Vineyard Wind 1. Located 15 miles south of Martha's Vineyard and 30 miles east of Hyannis, where its power will come ashore, Vineyard Wind's 62 turbines will generate 800 megawatts and provide enough power for 400,000 homes.⁴⁵

Of the 17 projects totaling 18.6 gigawatts in various stages of environmental review, Massachusetts' two SouthCoast Wind projects (formerly Mayflower Wind) and New Jersey's Ocean Wind I are next on the list with 2025 construction dates. New Jersey has 4.8 gigawatts under review with its four Ocean Wind and Atlantic Shores projects, followed by Massachusetts (3.2), New York (3.0), Virginia (2.64) and North Carolina (2.5).⁴⁶

Meanwhile, the U.S. Bureau of Ocean Energy Management announced that it would conduct a regional environmental review of the six areas leased in the New York Bight totaling \$4.7 billion earlier this year. The final environmental impact statement would be released in 2024, potentially enabling their projected 5.6 gigawatts to be included in President Biden's 30-gigawatt target for 2030.⁴⁷

Onshore, New Jersey's \$637.7 million Wind Port is the single largest offshore wind port facility project in the nation, followed by a \$200 million to \$250 million upgrade of the South Brooklyn Manne Terminal and a \$157 million upgrade of the infrastructure and heavy lift facilities at the State Pier in New London, Connecticut.

The Paulsboro Marine Terminal's fully built \$550 million monopile facility would be one of the nation's largest manufacturing and supply chain projects, along with the \$350 million Port of Albany project to manufacture towers, the proposed GE wind turbine plant at the Port of Coeymans in New York, and a pair of \$200 million facilities to array and export cables in Massachusetts and South Carolina.⁴⁸

The Costs and Benefits of Offshore Wind

The New Jersey Board of Public Utilities, which sets rates for nuclear energy, natural gas and other power sources, establishes an Offshore Wind Regional Energy Certificate (OREC) rate for offshore wind projects that is locked in for 20 years with an annual inflation cost adjustment.

Ocean Wind I received a \$98.10 per megawatt hour rate in 2019, while Ocean Wind II and Atlantic Shores were awarded OREC rates of \$84.03 and \$86.62 in 2021. Atlantic Shores received a 2.5% annual cost adjustment, while the two Ocean Wind projects got 2%.

This put New Jersey's projects in the middle of the pack of the 15 Power Purchase Agreements reviewed by the University of Delaware's Special Initiative on Offshore Wind in 2022.⁴⁹

The official OREC price is not the actual cost to the consumer. The net levelized OREC price is \$46.46 per megawatt hour for Ocean Wind 1, \$42.30 for Ocean Wind II and \$58.51 for Atlantic Shores – far below the \$98.10, \$84.03 and \$86.62 OREC list prices.

The out-of-pocket cost to customers of New Jersey utilities when all three projects come online is \$4.95 a month for residential, about \$42 for commercial and about \$222 for industrial customers. This does not include the cost of transmission lines, for which bids have not yet been awarded, or substation or other onshore improvements.⁵⁰

The BPU's decision to lock in a price for electricity produced from offshore wind for 20 years, as most states do, or 25 years in the case of New York, exposes both developers and consumers to price risk.

Over the past decade, prices for electricity produced by offshore wind dropped by more than 50% in Europe.⁵¹ But at the same time, high inflation, spiking steel prices, high interest rates and supply chain issues played havoc with the cost-benefit analysis models that went into offshore wind industry calculations.

Avangrid, developer of a 1.2 gigabyte Commonwealth Wind project, asked Massachusetts last year if it can renegotiate its price, and PSEG sold its 25% stake in Ørsted's Ocean Wind I in January 2023 after expressing concerns over the project's profit margins in an earnings call with investors last fall.⁵²

The University of Delaware report found that smaller offshore wind projects – those generating below 800 megawatts – are generally the costliest.

The 90-megawatt South Fork project now under construction in New York came in at a \$160 cost, while Maryland's 120-megawatt Skipjack 1 has a \$166 per megawatt rate.⁵³

The three lowest prices were the Massachusetts projects, which came in at \$65 to \$74. "Why are Massachusetts prices lowest? Massachusetts evaluated their bids based primarily (75%) on the price of energy, with 25% on qualitative factors including economic development," the University of Delaware noted, adding that Massachusetts also set an 800-megawatt minimum for its projects.⁵⁴

U.S. Offshore Wind Purchase Agreements by State							
State	Project	Capacity (MW)	Year 1 (COD)	Year 1 Price (\$/MWh)	Price Escal. Rate (%/year)	PPA or OREC Tenure (years)	Average Year 1 Price by State
Massachusetts	Vineyard Wind	400	2023	\$74.00	2.50%	20	\$69.75
	Vineyard Wind	400	2023	\$65.00	2.50%	20	
	Mayflower Wind	804	2025	\$70.26	0	20	
New Jersey	Atlantic Shores	1509.6	2028	\$86.62	2.50%	20	\$89.58
NJ	Ocean Wind I	1104	2024	\$98.10	2%	20	
NJ	Ocean Wind II	1148	2029	\$84.03	2%	20	
New York	South Fork	90	2023	\$160.00	2%	20	\$113.49
NY	South Fork	40	2023	\$86.00	2%	20	
NY	Sunrise Wind	880	2024	\$110.37	0.00%	25	
NY	Empire Wind	816	2024	\$99.08	2.00%	25	
NY	Empire Wind 2	1260	2026	\$107.50	0	25	
NY	Beacon Wind	1230	2028	\$118.00	0	25	
Connecticut	Revolution	304	2024	\$99.50	0	20	\$115.17
Rhode Island	Revolution	400	2024	\$98.43	0	20	\$119.31
Maryland	Skipjack 1	120	2022	\$166.00	1.50%	20	\$122.45
	Skipjack 2	846	2026	\$86.30	3.00%	20	
	US Wind 1	248	2022	\$166.00	1.00%	20	
	US Wind 2	808.5	2026	\$71.50	2.00%	20	

New Jersey wind purchase agreements are second-lowest in cost to Massachusetts. The price fixed in the above chart is higher than the actual cost to the consumer after revenues from the project are returned to the ratepayer. The net electricity cost of Ocean Wind II, for example, is \$42.30 per megawatt -- half the \$84.03 Year 1 OREC cost.

Source: Special Initiative on Offshore Wind, University of Delaware⁵³

New Jersey's higher cost is most likely attributable to its decision to put more emphasis on economic development and job creation by encouraging developers to agree to build facilities, use local manufacturers and hire New Jersey workers. "Recent New Jersey bids were evaluated

on price as 50% of the rankings, economic and environmental benefits 40%, and likelihood of completing the project 10%,” the University of Delaware report pointed out.⁵⁵

The three New Jersey projects will provide enough electricity to power \$1.65 million New Jersey homes and avert 7 million tons of harmful emissions – 3/8 of the total current greenhouse gas emissions from the electricity sector.

However, the New Jersey BPU chose to emphasize the economic benefits of the Ocean Wind II and Atlantic Shores projects ahead of the environmental protection and rate impacts in its fact sheets announcing the OREC awards.

The Atlantic Shores project is expected to generate \$1.9 billion in economic activity and create 3,100 jobs, while Ocean Wind II will add \$1.7 billion to the New Jersey economy and create 3,700 jobs, the BPU noted.⁵⁶

Both projects agreed to use monopiles manufactured at the Paulsboro Marine Terminal (where Ocean Wind’s lead developer, Ørsted, is a partner) and to each build factories at the New Jersey Wind Port to assemble nacelles, the turbine part that houses the components that convert the mechanical energy of the rotating blades into electrical energy.

Atlantic Shores is partnering with Vestas on its nacelle factory, while Ørsted planned to bring in GE as its manufacturing partner.

Both companies will conduct marshaling activities at the New Jersey Wind Port for shipping their components out to sea. Atlantic Shores will also set up a green hydrogen pilot facility that will use wind energy to produce hydrogen to be blended with natural gas to reduce greenhouse gas emissions. Ørsted will work on a truck electrification pilot project at Port Newark. Finally, both companies are required by the BPU to contribute \$10,000 per megawatt hour to fund research initiatives, wildlife and fisheries monitoring at a total cost of \$26.6 million.⁵⁷

Next Up: Offshore Wind Farms in the New York Bight

The February 2022 lease sale in the New York Bight is projected to produce 5.6 gigawatts of electricity, which would make it the largest single source of offshore wind power in the country and a linchpin in the nation’s offshore wind and climate change strategy.⁵⁹

The lease sale also demonstrated the confidence that the offshore wind industry has in its future development in American waters.

While Ocean Wind and Atlantic Shores paid \$1,624 and \$1.625 per square kilometer in their 2016 winning bids, the six winning consortiums paid \$1.635 million to \$2.64 million per square kilometer in last year’s auction. That was more money for a single square kilometer than the \$1.1

million and \$1.2 million total prices paid by Ocean Wind for their entire lease areas just six years before. This time, the winning bids ranged from \$285 million to a record \$1.1 billion.⁶⁰

Similar prices were paid in the auction for offshore wind lease areas off California this year.⁶¹

While Ocean Wind and Atlantic Shores were clearly going to send the electricity they generated to New Jersey, the six consortiums that won leases in the New York Bight could choose to sell their

THE ASTRONOMICAL RISE IN OFFSHORE LEASE BID PRICES					
Offshore wind leases went from less than \$1,700 per square kilometer off the New Jersey Shore in 2016 to \$2.3 million to \$2.6 million a in 2016.					
Winning Bidder	Lease	Lease Location	Year	Lease Price (2022\$)	Price per km ² (2022\$)
Garden State Wind	OCS-A 0482/ OCS-	Delaware	2012	N/A	N/A
Coastal Virginia Offshore Wind Pilot	OCS-A 0483/ OCS-	Virginia	2013	\$1,971,276	\$4,323
Revolution Wind/ South Fork Wind Farm	OCS-A 0486/ OCS-	Massachusetts/Rhode Island	2013	\$1,903,181	\$4,803
Sunrise Wind	OCS-A 0487	Massachusetts/Rhode Island	2013	\$1,903,181	\$4,277
Marwin/ Momentum Wind	OCS-A 0490	Maryland	2014	\$10,553,535	\$32,673
Ocean Wind	OCS-A 0498/ OCA-	New Jersey	2016	\$1,054,690	\$1,625
Atlantic Shores	OCS-A 0499	New Jersey	2016	\$1,205,011	\$1,624
Baystate Wind	OCS-A 0500	Massachusetts	2015	\$341,474	\$583
Vineyard Wind	OCS-A 0501/ OCS-	Massachusetts	2015	\$182,336	\$270
Empire Wind	OCS-A 0512	New York	2016	\$48,611,290	\$151,437
Kitty Hawk	OCS-A 0508	North Carolina	2017	\$10,592,835	\$21,400
Beacon Wind	OCS-A 0520	Massachusetts	2018	\$154,525,000	\$296,593
Mayflower	OCS-A 0521	Massachusetts	2018	\$154,525,000	\$299,467
CIP Massachusetts	OCS-A 0522	Massachusetts	2018	\$154,639,500	\$288,057
OW Ocean Winds east	OCS-A 0537	New York/New Jersey	2022	\$765,000,000	\$2,643,039
Attentive Energy	OCS-A 0538	New York/New Jersey	2022	\$795,000,000	\$2,472,980
Community Wind	OCS-A 0539	New York/New Jersey	2022	\$1,100,000,000	\$2,378,569
Atlantic Shores Offshore Wind Bight	OCS-A 0541	New York/New Jersey	2022	\$780,000,000	\$2,531,449
Invenergy	OCS-A 0542	New York/New Jersey	2022	\$645,000,000	\$2,072,760
Mid-Atlantic Offshore	OCS-A 0544	New York/New Jersey	2022	\$285,000,000	\$1,635,660
Total Energies	OCS-A 0545	North Carolina	2022	\$160,000,000	\$720,721
Duke Energy	OCS-A 0546	North Carolina	2022	\$155,000,000	\$695,067

SOURCE: U.S. Department of Energy, Offshore Wind Market Report 2022

electricity to New Jersey, New York or to both states for reasons that could include geographical proximity, ease of transmission, corporate ownership or price.

Both New Jersey and New York will need significant amounts of electricity from New York Bight wind farms to meet their goals of 11 and 9 gigawatts generated from offshore wind, which could set off bidding wars between New Jersey's BPU against the New York State Energy Research and Development Authority.

It would seem logical for New Jersey and New York to set up a regional partnership, but the two states are on different electric grids. New Jersey is part of the 13-state PJM Interconnection that includes three other offshore wind states – Delaware, Maryland and Virginia – and large inland states like Pennsylvania, Ohio and Illinois. Meanwhile, New York State has its own New York Independent System Operator (NYISO) grid.

While the U.S. Office of Energy Efficiency and Renewable Energy lists the New York Bight as being in New York/New Jersey waters, four of the six lease areas representing 4.2 gigawatts of its projected 5.6-gigawatt total lie off Ocean, Burlington, Atlantic and Cape May counties and would be likely candidates to ship at least some of their power to New Jersey through the transmission system being developed by the New Jersey BPU.⁶²

The four, running from south to north, with U.S. Department of Energy projections for electricity generation, are:

- Invenergy Wind Offshore (Invenergy and Lighthouse Energy), 934 megawatts, \$645 million bid
- Atlantic Shores Offshore Wind Bight (Shell and EDF), 924 megawatts, \$780 million
- Community Wind (BWE and National Grid), 1.387 gigawatts, \$1.1 billion
- Attentive Energy (Total Energies), 964 megawatts, \$795 million

The U.S. Department of Energy (USDOE) projections, however, are far lower than corporate expectations. Invenergy, the only fully U.S.-owned company to win a lease in the New York Bight, projects its lease area will produce over 2 gigawatts of electricity, as does Atlantic Shores for its Atlantic Shores Offshore Wind Bight tract. Both projections are more than twice the U.S. Department of Energy projections.

The fifth lease area, the OW Ocean Winds East (EDPR and Engle), which sold for \$765 million and is projected by the USDOE at 858 megawatts, is equidistant from Monmouth County and Long Island.

The sixth and smallest lease in potential power generation, the Mid-Atlantic Offshore Wind (CIP), which went for a \$285 million bid and is projected by USDOE at 523 megawatts, is located just east of Empire Wind 1 and 2, two of New York State's largest offshore projects with 816

megawatts and 1.26 gigawatts of projected electricity generation. While the sites are equidistant from Monmouth County and Long Island, it would be logical for Mid-Atlantic to sell to New York and go ashore wherever Equinor and BP, the owners of Empire Wind, bring in their transmission line.⁶³

Further south, Ørsted and PSEG also own the 1-gigabyte Garden State Wind Energy project, located in Delaware waters 20 miles south of Avalon at the southern end of Delaware Bay. The BPU awarded the site to Garden State Wind Energy in 2019, but it has yet to move forward for permitting.⁶⁴

While offshore wind projects generally take six years to eight years to build, including permitting, the U.S. Department of the Interior has put the New York Bight leases on a fast track for a regional environmental review, promising a two-year turnaround on permitting rather than the usual four years and a decision by 2024.⁶⁵

That would complete federal permitting while President Biden is still in office, with the key decision-making on rates and purchases then shifting to the New Jersey BPU and other state agencies.

Like the New Jersey BPU's second solicitation award to Ocean Wind II and Atlantic Shores, New Jersey's agreements to purchase power from offshore wind developers in the New York Bight would be expected to encourage bidders to use Paulsboro and the New Jersey Wind Port for monopile and nacelle manufacturing, turbine assembly and shipping, and potentially make other New Jersey investments.

The monopile manufacturing facility at Paulsboro and the nacelle manufacturing and turbine assembly operations at the Wind Port – with their built-in customer base of offshore wind companies supplying power to New Jersey – would fulfill the goal set forth in the New Jersey Offshore Wind Master Plan to make New Jersey the epicenter of the offshore wind industry.

Whether New Jersey can succeed in its goal to make Paulsboro the dominant domestic monopile manufacturer and the New Jersey Wind Port the preferred staging area for offshore wind farms up and down the Atlantic coast remains to be seen. The New Jersey Wind Port, the first in the nation built and designed specifically to service the new offshore wind industry, is the only East Coast port with the ability to co-locate manufacturing and marshaling facilities, which reduces costs for offshore wind developers.

In addition to Maryland's plan to build its own manufacturing and staging facility at Sparrows Point, various entities have announced plans to build assembly and staging facilities in Salem, Massachusetts; Providence, Rhode Island; Bridgeport, Connecticut; Brooklyn, N.Y., and Portsmouth, Virginia. Only the Brooklyn port project, however, had put up substantial funding.⁶⁶

Regional cooperation on offshore wind planning and facility siting would seem to make sense, but true cooperation among states has been rare, although Massachusetts and four other New England states recently issued a joint request for proposals on regional transmission lines.⁶⁷

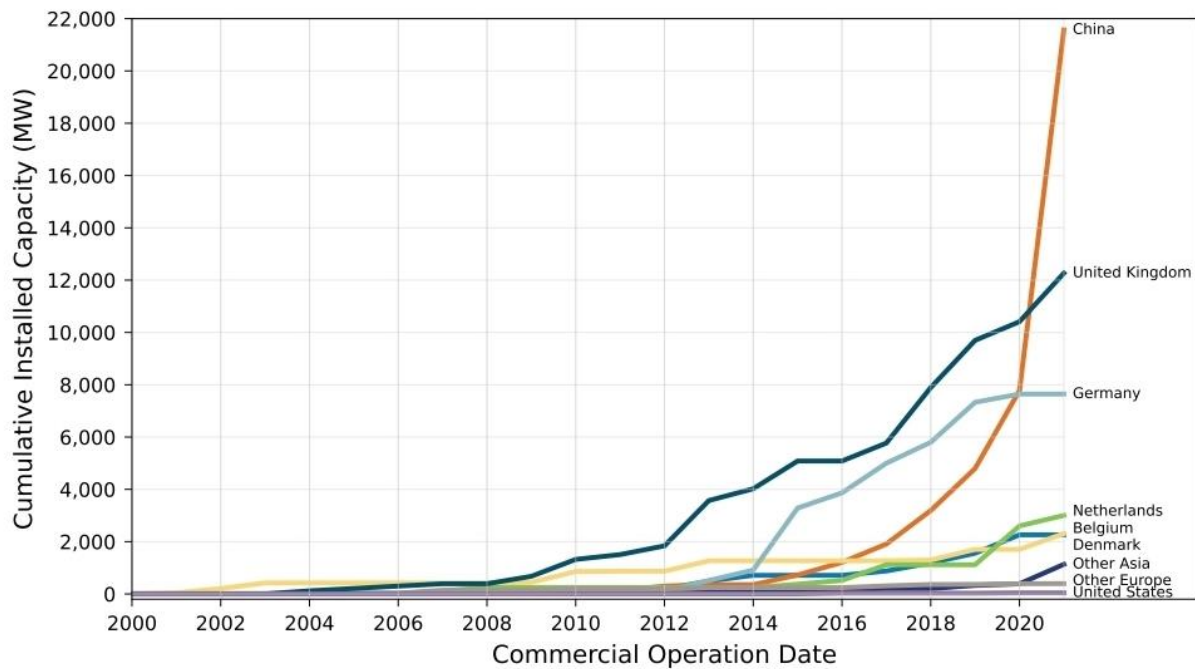
THE WORLD STAGE

New Jersey and the United States are nascent players in the global offshore wind industry, where China is emerging as a major new force in the market.

Europe, where the offshore wind industry was born three decades ago, remains the largest producer of offshore wind energy with 27.9 gigawatts, or 55.1% of total world production.

However, Asia soared to 22.7 gigawatts in 2021, as China added 13.8 gigawatts in 2021, passing the United Kingdom and Germany to become the world leader in electricity generated from offshore wind.⁶⁸

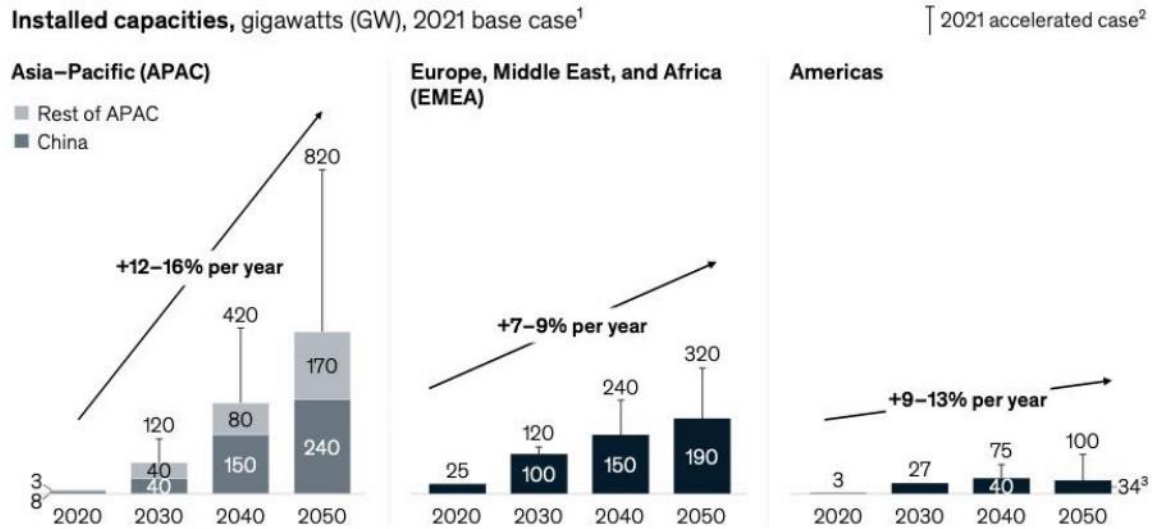
COMMERCIAL WORLD WIND CAPACITY BY COUNTRY



China far outstripped the United Kingdom and Germany, previously the world leaders in offshore wind capacity through a massive program that added 13.8 gigawatts in a single year.

SOURCE: U.S. Department of Energy, Offshore Wind Market Report, 2022⁶⁹

ASIA PROJECTED AS FASTEST-GROWING OFFSHORE WIND ENERGY MARKET



McKinsey projects that the Asia-Pacific region will be the largest generator of electricity from offshore wind over the next three decades.

SOURCE: McKinsey Global Energy Perspectives⁷⁰

By comparison, the United States, with 42 megawatts in its miniscule Block Island and Virginia wind farm pilots is just a statistical blip and will remain so until Ocean Wind I and comparable Massachusetts projects come online.

McKinsey Global Energy Perspectives projects that offshore wind will generate 800 gigawatts in the Asia/Pacific sector by 2050, including some 450 gigawatts in China alone.

According to McKinsey, this output will dwarf the 100 gigawatts projected to be produced in the United States by mid-century and the 320 gigawatts in Europe, the Middle East and Africa, which are projected to have the slowest growth rate.⁷¹

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About the Author

Mark J. Magyar serves as Director of the Steve Sweeney Center for Public Policy at Rowan University. He served as Deputy Executive Director and Policy Director for the New Jersey Senate Democratic Office and as Deputy Chief of Policy for Republican Governor Whitman. An award-winning Statehouse reporter for New Jersey Spotlight, The Record of Hackensack and the Asbury Park Press, he served as editor of New Jersey Reporter. He taught Labor Studies at Rutgers University and currently teaches in Rowan's Master of Public Policy program.

About the Sweeney Center

Founded in February 2022, the Steve Sweeney Center for Public Policy is part of the College for Humanities and Social Sciences at Rowan University. Its mission is to bring together policy experts from government, academia, business, labor and nonprofits to develop pragmatic solutions to New Jersey's most difficult policy issues. The Sweeney Center's Multi-Year Budget Workgroup develops five-year revenue and spending projections for the state budget. The Center hosted a conference on Offshore Wind Technology at Rowan earlier this month and recently launched the Rowan School Regionalization Institute to advance K-12 regionalization initiatives throughout the state.

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