

Status of US Offshore Wind Projects: A 2023 Scorecard

by

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Status of US Offshore Wind Projects

Introduction

The Biden administration has made offshore wind a centerpiece of its plan to achieve net zero greenhouse gas emissions by 2050. In March 2021 it set a target of having 11,000 GW of offshore wind in operation by 2030 with a pathway to 110 GW by 2050. To provide financial incentives to attract developers, a series of federal tax credits were enacted, culminating with the passage of the Inflation Reduction Act (IRA) in 2022 which provided Investment Tax Credits of up to 50% of the capital cost of a project.

In response seven northeast states have committed to goals totaling over 42 GW by 2040. This includes New Jersey (11,000 GW by 2040), New York (9,000 GW by 2035), Massachusetts (5,600 GW by 2030), Connecticut (2,000 GW by 2030), Maryland (1,200 MW by 2030) and Virginia (5,200 GW by 2030). In support of those goals, the various states have enacted legislation which provides for subsidized guaranteed rates for offshore wind to be paid to developers over a contract period (typically 20 years).

These guaranteed offtake prices are set forth in contracts or orders from state public utility commissions and generally increase over the term of the contract at a fixed annual escalation rate of 1-3%.

Beginning in 2017, those seven states have awarded contracts for more than 20 GW of offshore wind projects to be built in lease areas offshore in the Atlantic Ocean. Most of these projects were procured in competitive solicitations in which price was one consideration along with commitments to in-state economic development.

STATUS OF US OFFSHORE WIND PROJECTS
(December 2023)

Project	Capacity (MW)	Builders	State	Award Date	Commercial Operation	Estimated	Notes
						LCOE (\$/MWH)	
Block Island Wind	30	Orsted	RI	2010	2016	\$ 244.00	1
CVOW	12	Dominion Energy	VA	2018	2020	\$ 730.00	2
Vineyard Wind 1	400	Avangrid/CIP	MA	2019	2023	\$ 93.00	3
Vineyard Wind 2	400	Avangrid/CIP	MA	2019	2024	\$ 83.00	4
South Fork Wind	132	Orsted/Eversource	NY	2017	2024	\$ 180.00	5
Skipjack Wind 1	120	Orsted	MD	2017	2024	\$ 157.43	6
Revolution Wind 1	704	Orsted/Eversource	CT/RI	2018	2026	\$ 157.43	7
Coastal Virginia Offshore Wind	2587	Dominion Energy	VA	2022	2026	\$ 87.00	8
Skipjack Wind 2	846	Orsted	MD	2021	2026	\$ 103.54	9
Momentum Wind	809	US Wind	MD	2021	2028	\$ 94.36	10
Atlantic Shores Wind 1	1510	Shell/EDF	NJ	2021	2028	\$ 106.18	11
Attentive Energy 1	1400	Total Energies/Rise/Corio	NY	2023	2030	\$ 145.07	12
Community Offshore Wind	1300	National Grid/RWE	NY	2023	2030	\$ 145.07	12
Excelsior Wind	1300	CIP	NY	2023	2030	\$ 145.07	12
Empire Wind 1	816	Equinor/BP	NY	2019	2026	\$ 118.38	13
Sunrise Wind 1	924	Orsted	NY	2019	2026	\$ 110.37	14
Beacon Wind 1	1230	Equinor/BP	NY	2021	2027	\$ 118.00	15
Empire Wind 2	1260	Equinor/BP	NY	2021	2028	\$ 107.50	16
Southcoast/Mayflower Wind 1	404	Shell/EDF/ENGIE	MA	2020	2028	\$ 88.13	17
Southcoast/Mayflower Wind 2	400	Shell/EDF/ENGIE	MA	2020	2029	\$ 88.13	17
Ocean Wind 1	1100	Orsted	NJ	2019	2026	\$ 116.75	18
Ocean Wind 2	1148	Orsted	NJ	2021	2029	\$ 98.40	18
Commonwealth Wind	1223	Avangrid	MA	2021	2027	\$ 98.40	19
Park City Wind	804	Avangrid	CT	2019	2025	\$ 79.80	20
Revolution Wind 2	884	Orsted/Eversource	RI	2023	2030	??	21

Source: Whitestrand Consulting LLC

Operating		42 MW	FID Pending		4230 MW
Under Construction		932 MW	On Hold		4230 MW
FID Taken		3411 MW	Cancelled		5963 MW

Notes

- 1 Pilot Demonstration Project
- 2 Regulated Utility Pilot Demonstration Project
- 3 \$74 PPA (2017\$) escalated @ 2.5%/yr plus estimated market value of NE-ISO capacity payments
- 4 \$65 PPA (2017\$) escalated @ 2.5%/yr plus estimated market value of NE-ISO capacity payments
- 5 Blended \$137 PPA (2017\$) escalated @ 2%/yr
- 7 \$131 PPA (2012\$) escalated @ 1%/yr
- 8 \$131 PPA (2012\$) escalated @ 1%/yr
- 6 Regulated Utility Project (Net of \$32/MWH PTC)
- 9 \$71.61 PPA (2012\$) escalated @ 2%/yr
- 10 \$54.17 PPA (2012\$) escalated @ 3%/yr
- 11 Atlantic Shores seeking OREC price adjustments
- 12 Price subject to adjustment for inflation and interconnection costs
- 13 PSC denied requested 35% PPA increase to \$159.64
- 14 PSC denied requested 27% PPA increase to \$139.99
- 15 PSC denied requested 62% PPA increase to \$190.82
- 16 PSC denied requested 66% PPA increase to \$177.84
- 17 Projects cancelled with \$60 million penalty
- 18 Projects cancelled with potential forfeiture of \$300 million guarantees
- 19 Project cancelled with \$48 million penalty
- 20 Project cancelled with \$16 million penalty
- 21 Rhode Island Energy rejected proposed PPA as being too expensive for ratepayers

Discussion

Operating

The only projects currently in commercial operation are the two small pilot demonstration projects – Block Island Wind (30 MW) and the Coastal Virginia Pilot project (12 MW). Both employ small 6 MW wind turbines and have been in operation since 2010 and 2016 respectively.

Their LOCE costs are much higher than feasible for any commercial offshore wind project but were considered acceptable due to their small size and their status as R&D projects, meant to gather experience in development, construction and operation of offshore wind facilities.

The Block Island windfarm has operated at about 41% capacity factor, below projects for large scale projects which are expected to deliver the equivalent of 45-47% of rated full power. The project experienced several months of unplanned downtime in the summer of 2021 due to turbine blade stress fatigue and erosion exposing undersea cables.

The two turbine Virginia pilot project has operated at a 46% capacity factor since it began operating in 2021.

These very small pilot projects have proven relatively successful this far but, given their size and number is not clear how much they have in fact demonstrated that is relevant to the to the much larger turbines and sizes of wind farms being constructed or proposed.

Under Construction

As of the end of 2023 two projects were in active construction and nearing commercial operation. The Southfork wind project has recently begun transmitting power to the NY grid from the initial turbine and offshore substation while the remaking units are completed. Thus it marks a key milestone in the progress of US offshore wind. At 132 MW (12 11MW turbines) it is a relatively small commitment with favorable economics for Orsted and Eversource, the project developers. With an estimated LCOE of \$180/WMH and access to the ITC of at least 30%, the developers are likely to achieve their expected returns within a relatively short period.

The larger 800MW Vineyard Wind project is being developed for MA by a partnership of Avangrid and Copenhagen Infrastructure Partners (CIP). It is also nearing commercial operation which is expected in early 2024. This project had a much lower LCOE which is comparable to prices for projects (Commonwealth and Park City) which Avangrid has cancelled due to cost concerns.

Presumably the Vineyard partners have secured more favorable financing terms which have allowed them to proceed here. Recently, they announced deals with for debt and tax equity financing that have made \$3.6 billion available from large US banks. In addition to the guaranteed PPA pricing, they also can retain revenues from

sales of capacity to the NE-ISO grid operator. Although the resulting LCOE of \$83-94/MWH) appears to be below the minimum required to support a positive investment decision, there may be additional factors, including the desire to show a commitment to US offshore wind, that may have contributed to the partners decision to proceed.

Final Investment Decision (FID) Taken

Three additional projects have reached favorable decisions to proceed with investments on the part of the investors who now committed to procurement of materials and services required to begin construction in 2024. Skipjack Wind (120 MW) by Orsted in MD has an LCOE value of \$157.43/MWH which provides a level of financial support such that the developers expected returns are projected to meet investment criteria.

Orsted and Eversource have also reached FID approval for the Revolution Wind 1 project to provide 400 MW to RI and 304 MW to CT beginning in 2026. This project has an LCOE of \$98.73 which also appears below the minimum currently required by investors. It is expected that the project will qualify for a 40% ITC which will add the equivalent of about \$20/MWH to the LCOE value. On this basis, the project may marginally meet required investment criteria.

FID Pending

With the recent selection of projects by NYSERDA for development in NY, there are seven projects which are proceeding pending a final investment decision. The Marwin (248 MW) project was awarded ORECs in 2017 at the same level as Skipjack 1 which has reached a favorable FID. Skipjack Wind 2 (846 MW) and Momentum Wind (809 MW) in MD and the Atlantic Shores 1 (1510 MW) project in NJ received approved PPA or OREC prices in 2021. These prices now appear to be below values required to support a favorable FID given their stage of development and cost increases from 2021-2023.

The developers of these projects will in all likelihood try to negotiate higher LCOE prices or, failing that, seek to re-bid the projects into new procurements, if permitted by state authorities. FIDs for these projects are expected in 2024.

The remaining three projects comprise 4000 MW of awards announce by NYSERDA in November 2023. While they have not yet received OREC or PPA approval by the NY PSC, NYSERDA has indicated that the average OREC price of the chosen project is \$145.07/MWH. Under conditions of the procurement, this price is subject to adjustment to reflect inflation from award until COP approval by BOEM according to a set formula for material, labor and commodity indices. The price may also be adjusted upward to reflect interconnection costs which will be passed through to ratepayers, It is likely therefore that the final LCOE will be in the range \$150-160/WMH. This in effect establishes a new benchmark for additional solicitations and awards to be announced in 2024.

On Hold

7.0 Conclusions

The official NJ offshore wind policy goal envisions having 7,500 MW of offshore wind in service by 2035 and 11,000 by 2040. Offshore wind is economically not viable without major subsidies in the form of Federal tax credits and guaranteed above market power prices. The former is passed on the US taxpayers while the latter is a cost borne by NJ electric rate payers.

The Federal investment tax subsidies will total more than \$20 billion for 11,000 MW of offshore wind capacity. As detailed in this report, that large number is dwarfed by the extra cost to NJ ratepayers of generation and transmission system expansion needed to accommodate moving 11,000 MW of generation from off the coastline to the PJM grid.

These ratepayer subsidies will exceed \$100 billion over 20 years and raise electric customer rates by 55%, 70% and 85% for residential, commercial and industrial customers. It is important for all stakeholders to understand what the full cost of this program is before decisions are taken that will be irrevocable and commit the residents of the state to paying for a large portion of these costs or incurring charges for cancelation of projects which prove even more expensive than estimated.



The Author

Edward P. O'Donnell is a principal in Whitestrand Consulting LLC. He has spent 35 years in the nuclear power industry as an engineer, manager and executive with responsibilities for design and licensing of numerous plants in the US and abroad. He was also responsible for corporate planning and rate matters for a NJ nuclear utility and has testified in utility rate proceedings before the NJ BPU.

He was responsible for managing the successful sale of nuclear units in NJ and PA and as a consultant for advising clients on the sale and purchase of nuclear plants. In this role he forecasted future costs and performance of plants for re-financing as merchant power suppliers in a de-regulated electrical energy market and performed analyses of the economic viability of nuclear plants in comparison with alternative fossil and renewable energy facilities.

Mr. O'Donnell holds an M.S. in Nuclear Engineering from Columbia University and has been a licensed Professional Engineer in NJ. He is also a registered

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