

# **Status of US Offshore Wind Projects: A Mid-2024 Scorecard**

**by**

**Edward P. O'Donnell**



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## **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 30,000 GW of offshore wind in operation by 2030<sup>1</sup> 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)<sup>2</sup> 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 42.7 GW by 2040<sup>3</sup>. This includes New Jersey (11,000 GW by 2040), New York (9,000 GW by 2035), Massachusetts (5,600 GW 2030), Connecticut (2,000 GW by 2030), Maryland (8,500 MW by 2031) 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 20-25 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 25 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.


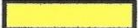




Offshore wind requires substantial upfront capital investment and so these projects are very sensitive to interest rates, inflation and supply chain support which can affect construction costs and schedules and financing terms. The favorable macroeconomic environment in 2018-2021 led developers to sign contracts at increasingly lower subsidized prices in the expectation that capital costs would be below \$4000/MW<sup>4</sup> and that developers could finance these costs and still meet investment targets of 10-12% for their Internal Rate of Return (IRR)<sup>5</sup>. Those projections have proven extremely optimistic as higher inflation, rising interest rates and supply chain issues have driven capital costs up by more than 50% to \$6000/MW<sup>6</sup> over the period 2021-2023 and have adversely affected many of the projects. This is now threatening to derail the goals of the states and the Biden White House for offshore wind.

Table 1 below provides the status of all the projects proposed and approved to date across the seven states, along with their builders, their proposed dates and the Levelized Cost of Energy (LCOE) embodied in their state approved contracts for power.

**STATUS OF US OFFSHORE WIND PROJECTS**  
(June 2024)

Project	Capacity (MW)	Builders	State	Award Date	Commercial Operation	Estimated	Notes
						LCOE (\$/MWH)	
Block Island Wind	30	Orsted	RI	2010	2016	\$ 244.00	(a)
CVOW	12	Dominion Energy	VA	2018	2020	\$ 780.00	(b)
South Fork Wind	132	Orsted/Eversource	NY	2017	2024	\$ 180.00	(e)
Vineyard Wind 1	400	Avangrid/CIP	MA	2019	2024	\$ 93.00	(c)
Vineyard Wind 2	400	Avangrid/CIP	MA	2019	2024	\$ 83.00	(d)
Coastal Virginia Offshore Wind	2587	Dominion Energy	VA	2022	2026	\$ 77.00	(g)
Revolution Wind 1	704	Orsted/Eversource	CT/RI	2018	2026	\$ 98.73	(f)
Sunrise Wind 1	924	Orsted	NY	2024	2026	\$ 146.00	(n)
Empire Wind 1	810	Equinor/BP	NY	2024	2026	\$ 155.00	(m)
Attentive Energy 2	1324	Total Energies/Rise/Corio	NJ	2024	2032	\$ 165.14	(v)
Leading Light Wind	2400	Invenergy	NJ	2024	2032	\$ 139.53	(w)
Marwin 1	248	US Wind	MD	2021	2026	\$ 157.43	(h)
Momentum Wind	809	US Wind	MD	2021	2028	\$ 94.36	(j)
Atlantic Shores Wind 1	1510	Shell/EDF	NJ	2021	2028	\$ 106.18	(k)
Beacon Wind 1	1230	Equinor/BP	NY	2021	2027	\$ 118.00	(o)
Empire Wind 2	1260	Equinor/BP	NY	2021	2028	\$ 107.50	(p)
Attentive Energy 1	1400	Total Energies/Rise/Corio	NY	2023	2030	\$ 145.07	(l)
Community Offshore Wind	1300	National Grid/RWE	NY	2023	2030	\$ 145.07	(l)
Excelsior Wind	1300	CIP	NY	2023	2030	\$ 145.07	(l)
Southcoast Wind 1	404	Shell/EDF/ENGIE	MA	2020	2028	\$ 88.13	(q)
Southcoast Wind 2	400	Shell/EDF/ENGIE	MA	2020	2029	\$ 88.13	(q)
Ocean Wind 1	1100	Orsted	NJ	2019	2026	\$ 116.75	(r)
Ocean Wind 2	1148	Orsted	NJ	2021	2029	\$ 98.40	(r)
Skipjack Wind 1	120	Orsted	MD	2017	2025	\$ 157.43	(h)
Skipjack Wind 2	846	Orsted	MD	2021	2026	\$ 103.54	(i)
Commonwealth Wind	1223	Avangrid	MA	2021	2027	\$ 98.40	(s)
Park City Wind	804	Avangrid	CT	2019	2025	\$ 79.80	(t)
Revolution Wind 2	884	Orsted/Eversource	RI	2023	2030	??	(u)
<b>Total</b>	<b>25,709</b>						

Source: Whitstrand Consulting LLC

Operating		174 MW	FID Pending		4782 MW
Under Construction		3387 MW	On Hold		2319 MW
Final Investment Decision (FID) Taken		1628 MW	Cancelled		13431 MW

**Notes**

- (a) Pilot Demonstration Project
- (b) Regulated Utility Pilot Demonstration Project
- (c) \$74 PPA (2017\$) escalated @ 2.5%/yr plus estimated market value of NE-ISO capacity payments
- (d) \$65 PPA (2017\$) escalated @ 2.5%/yr plus estimated market value of NE-ISO capacity payments
- (e) Blended \$137 PPA (2017\$) escalated @ 2%/yr
- (f) RI PPA \$98.425 for 400 MW; CT PPA \$99 for 200MW and \$98.25 for 104 MW
- (g) Regulated Utility Project LCOE Net of PTC and REC credits
- (h) \$131.9 PPA (2012\$) escalated @ 1%/yr
- (i) \$71.61 PPA (2012\$) escalated @ 2%/yr
- (j) \$54.17 PPA (2012\$) escalated @ 3%/yr
- (k) \$86.62 OREC (2028\$) escalated @ 2.5%/yr
- (l) Price subject to adjustment for inflation and interconnection costs
- (m) Project re-bid after PSC denied requested 35% PPA increase to \$159.64
- (n) Project re-bid after PSC denied requested 27% PPA increase to \$139.99
- (o) PSC denied requested 62% PPA increase to \$190.82
- (p) PSC denied requested 66% PPA increase to \$177.84
- (q) Projects cancelled with \$60 million penalty
- (r) Projects cancelled with potential forfeiture of \$300 million guarantees
- (s) Project cancelled with \$48 million penalty
- (t) Project cancelled with \$16 million penalty
- (u) Rhode Island Energy rejected proposed PPA as being too expensive for ratepayers
- (v) \$112.50/MWH (2032) escalated at 2.5%/yr
- (w) \$131/MWH (2032) escalated at 3%/yr

## **Levelized Cost of Energy (LCOE)**

A key parameter for any commercial energy project is its Levelized Cost of Energy (LCOE)\* which is a useful metric for comparing the cost of different projects within or across technologies and time frames. Table 1 above shows the estimated LCOE for the US offshore wind projects that have been awarded contracts by the various states from 2017-2024.

These values are based on prices per megawatt-hour (MWH) for power produced and included in contracts for Offshore Renewable Energy Certificates (ORECs) or in Power Purchase Agreements (PPAs). Thus, they are the primary source of revenue for the developer and determine the projected Internal Rate of Return (IRR) for the project given its cost structure (equity, debt, O&M, etc.). This is the primary metric when making a Final Investment Decision (FID) on whether to proceed with a project from the planning/permitting stage to construction.

The LCOE values shown have been adjusted in some cases for additional revenues available to the project from sale of capacity or tax credits not embedded in the OREC or PPA prices.

In general, the OREC or PPA contracts require the return of revenue received from the sale of energy, capacity or Renewable Energy Certificated (RECs) in wholesale markets conducted by regional transmission system operators such as PJM, NY-ISO or the NE-ISO. Thus, they represent an offset to the LCOE contract prices to the ratepayer or consumer and have been estimated to have a market value of \$50-60/MWH over the period 2026-2050. The difference between the LCOE in Table 1 and this market price represents the degree to which the project is being subsidized by ratepayers.

The following is a discussion of the projects in each of the categories in Table 1.

### **Operating (174 MW)**

Two of the three 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<sup>7</sup>, 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

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\* LCOE is calculated based on the Net Present Value (NPV) of the OREC or PPA revenues over the 20 year term of the contract divided by the NPV of the ORECs generated over the same period.

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<sup>8</sup>.

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.

The first utility scale offshore wind project to reach commercial operations is the Southfork Wind project which in March 2024 reached full power in NY. 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<sup>9</sup> and access to the ITC of at least 30%, the developers are likely to achieve their expected returns within a relatively short period.

### **Under Construction (3387 MW)**

As of June 2024, two projects were in active construction. The 800 MW Vineyard Wind project is being developed for MA by a partnership of Avangrid and Copenhagen Infrastructure Partners (CIP). It is nearing commercial operation which is expected in 2024. This project has a much lower LCOE<sup>10</sup> which is comparable to prices for projects (Commonwealth and Park City) which Avangrid has cancelled due to cost concerns.

According to the Vineyard partners, they have secured more favorable financing terms which have allowed them to proceed here. In late 2023, they announced deals for debt and tax equity financing that have made \$3.6 billion available from large US banks<sup>11</sup>. 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.

The largest US facility under construction is the Coastal Virginia Offshore Wind (CVOW) project. This involves 176 14.7 MW turbines capable of generating 2587 MW of power. Not only is it the largest, but the project is also unique in being developed as a regulated utility generating asset. The utility involved, Dominion Energy, has received approval from the VA State Corporation Commission (SCC) to pass costs through to state ratepayers while receiving a return of 9.7% on prudently incurred capital investment.

Being a regulated project, CVOW is also the most transparent in revealing construction and operating costs which must be reviewed and approved by the SCC. The most current filing<sup>14</sup> indicates that Dominion projects a capital cost of \$9.8 billion or about \$3.8 million/MW. Based on this value and including forecast operating

expense, Dominion has estimated the LOCE at \$77/MWH. This value is net of the Production Tax Credit (PTC) and credit for sale of RECs which will be passed through to ratepayers. The value of these additional elements is estimated to be about \$30/MWH so the all-in LCOE is about \$107/MWH.

Like any utility project, costs may increase and still be passed through if deemed prudently incurred. The SCC has agreed that ratepayers will share increased capital costs up to \$10.8 billion (\$4.2 million/MW). Increases above that level would be borne solely by Dominion up to \$13.7 billion (\$5.3 million/MW) at which point the project would be reviewed again by the SCC. In addition, the project cost is capped by statute at \$125/MWH in 2018\$ or about \$160/MWH in 2024.

In support of the project, Dominion has contracted for the construction of Charybdis, a Wind Turbine Installation Vessel (WTIV) to be built as the first such ship to be in compliance with the Jones Act which requires all vessels involved in moving material and passengers between US points to be US built and crewed by American citizens or residents. In addition to using Charybdis in its own project, Dominion has contracted it for use by other developers in US projects. Completion of the ship has been delayed, complicating supply chain issues for those projects while raising costs and has been cited as a factor in decisions deferring or cancelling some projects.

The conventional wisdom is that competitive bidding for projects by non-utility companies which are exposed to market economics produces lower costs to ratepayers. Given the comparison of CVOW costs and LCOE to that of other US projects being undertaken by experienced European developers, it appears that, at least in the case of Dominion Energy, the regulated model is proving superior. Much remains to be seen, however, if CVOW can be built as proposed.

### **Final Investment Decision (FID) Taken (1628 MW)**

Two additional projects have reached favorable decisions to proceed with investments and are now committed to procurement of materials and services required to begin construction in 2024. Orsted and Eversource have 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<sup>13</sup> which 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.

Orsted has also recently reached FID approval for the 924 MW Sunrise Wind 1 project as a result of a successful re-bid in NY which raised its LCOE from about \$110/MWH to \$146/MWH. This re-bid opportunity was provided by NYSERA after the NY PSC denied a request for an increase to \$140/MWH. Despite being higher than the price denied by the PSC, NYSERDA finalized the new contract<sup>37</sup> on June 3, 2024. Construction is expected to begin this year with commercial operation in 2026.

## **FID Pending (4782MW)**

After the cancellation of various projects in 2023, due to insufficient OREC pricing, various states have now adopted a policy of allowing those projects to re-bid into new rounds of procurement with the aim of resurrecting those projects by awarding them more lucrative OREC pricing terms, including inflation adjustment factors. At the same time, IRS has relaxed the rules<sup>41</sup> for qualifying for a 10% bonus ITC, allowing the developers to receive 40% of their capital cost returned as a Federal tax credit which may be used or sold.

Allowing such re-bid opportunities will raise tax and ratepayer subsidies and can be expected to result in increased public opposition and legal challenges. However, the state agencies responsible for meeting offshore wind targets view them as necessary to help developers meet internal criteria for reaching positive FID approval in order to proceed with the projects.

Such a re-bid opportunity resulted in awards of new contracts by NYSERDA<sup>37</sup> for Sunrise 1 which as noted has reached FID and Empire Wind 1 (810 MW) which increased its OREC price from \$118 to \$155/MWH. However, its owner Equinor is seeking another investment partner and will not reach FID until later in 2024.

The Marwin (248 MW) project was awarded ORECs in 2017<sup>15</sup> but has yet to reach a favorable FID. Its OREC price of \$157/MWH is the same as Skipjack Wind 1 which was cancelled earlier in 2024.

In February 2024, NJ BPU announced awards<sup>39</sup> from its Third Solicitation to Attentive Energy Wind 2 (1324 MW) and Leading Light Wind (2400 MW). The OREC prices of \$165 and \$140/MWH respectively were 45% higher than awards in the 2021 Second Solicitation and contain inflation adjustment provision which could raise them another 15%. The BPU awards have been challenged by ratepayer groups who have filed appeals which may not be decided until 2025. As a result, no FID is expected on these projects this year.

## **On Hold (2319 MW)**

Momentum Wind (809 MW) in MD and the Atlantic Shores 1 (1510 MW) project in NJ received approved PPA or OREC prices in 2021<sup>16</sup>. 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. In the case of Atlantic Shores 1<sup>17</sup>, project developer Shell has indicated that a minimum short-term IRR of 6-8%<sup>18</sup> would be required for offshore wind projects to reach a favorable FID. Given current cost levels and financing conditions, an estimated 50% increase in its approved OREC pricing would be required to meet that hurdle rate.

It is expected that these projects will seek opportunities to re-bid those contracts in new procurements planned by MD and NJ in 2024.

## **Cancelled (13,431 MW)**

The year 2023 was not a good one for offshore wind along the east coast. Six projects totaling more than 5000 MW were outright cancelled by the developers. As indicated on Table 1 their LCOEs averaged about \$95/MWH. All were awarded in 2019-2020 and have been impacted by adverse macroeconomic developments and supply chain issues which have rendered them not investable at those approved OREC or PPA prices. Shell/EDF and Avangrid incurred cancellation charges of \$16-60 million to vacate their contracts in MA and CT<sup>24</sup>. Orsted forfeited \$125 million in guarantees after it cancelled the Ocean Wind 1 and 2 projects in NJ.

Skipjack Wind 1 (120 MW) and 2 (846 MW) in MD were both cancelled by Orsted this year in MD despite the first phase having an LCOE value of \$157.43/MWH<sup>12</sup>. But the second larger phase only had a contract at \$103.54/MWH which rendered the combined project not economically feasible.

In July 2023, Rhode Island Energy announced<sup>28</sup> that it was rejecting a proposal from Orsted/Eversource to build the 884 MW Revolution Wind 2 project. The proposed PPA cost was deemed "too expensive for customers to bear" and not in alignment with existing offshore wind PPAs. While the proposed pricing has not been disclosed, the fact that no negotiated PPA was achieved indicates that it was substantially higher than any existing LCOE, and well over \$100/MWH.

The developers and states hoped 2024 would allow them to reset and move forward with new projects. However, thus far another five projects totaling 7468 MW have been cancelled in NY alone. The Beacon Wind 1 (1230 MW) Empire Wind 2 (1260 MW) were cancelled in January 2024<sup>36</sup> as their OREC prices of \$110-118/MWH could not support financing.

In a surprising development, all three projects awarded provisional contracts in October 2023<sup>19</sup> under NYSEDA's Third Solicitation were cancelled in April 2024<sup>38</sup> after GE, their turbine supplier, announced that it could not provide the 18 MW machines on which they had based their bids. As a result, the agreed upon \$145/MW OREC price was no longer viable to proceed with more numerous smaller turbines.

It is expected that these projects will also seek opportunities to re-bid in upcoming procurements in NY or NJ.

## **Transmission Upgrade Costs**

It is recognized that bringing large amounts of offshore wind power onto the grid will require major new installation and upgrades of both offshore and onshore transmission facilities including undersea high voltage cables, offshore and onshore substations and AC/DC converters, switchyards and underground and overhead lines through existing or new rights of way.



The initial offshore wind projects have been approved using radial connections between the offshore turbines and substations and an onshore Point of Connection (POI) and substation which transmits the energy into the grid for distribution to load centers. It has been acknowledged<sup>29</sup> that such a radial connection scheme involving many dispersed POIs is not optimal in terms of cost, reliability or environmental impact. State and regional transmission system operators in PJM, NY and NE have advocated integrated solutions up to and including the development of offshore transmission system “backbones” that would interconnect multiple offshore wind farms with each other and with a limited number of onshore POIs capable of receiving large amounts of offshore wind.

Thus far, little actual progress has been made on such integrated solutions. Most of the projects approved to date involve radial connections each with its own POI. The cost of these interconnections as well as gaining approval from the regional system operator is the responsibility of the project developer who will pass on some or all of the cost involved to ratepayers. In the case of Atlantic Shores 1, the added LCOE for the transmission system interconnection and upgrade has been estimated at \$8/MWH or the equivalent of about \$500 million in cost or \$0.33 million/MW. This would be passed through to ratepayers as an addition to the approved OREC price, raising it to \$114/MWH.

The cost in \$/MW is expected to increase substantially with greater amounts of power and integration which would require new substations and lines and upgrading of existing lines and onshore infrastructure. On Long Island the construction of the Propel NY transmission project to bring 3 MW of offshore wind power into the grid has been estimated at \$3.8 billion<sup>31</sup> or \$1.3 million/MW. Bids in NJ to accommodate 6400 MW of power through a single POI at Sea Girt similarly averaged \$1.3 million/MW<sup>32</sup>. Studies of multi-state integrated offshore transmission systems along the Pacific coast range from \$10 billion for 7.2 MW (\$1.4 million/MW) to \$42 billion for 25.8 MW (\$1.6 million/MW)<sup>33</sup>. The cost of a similar offshore wind transmission backbone in the Netherlands has been estimated at \$37.5 billion to accommodate 22 GW of power (\$1.8 million/MW)<sup>34</sup>.

Apart from the costs of upgrading and expanding the transmission system to accommodate the various state goals for offshore wind, the planning and approval process for executing those changes and allocating the costs fairly is fraught with potential delay from state and Federal regulatory agencies as well as resistance from various stakeholder interests who may object on economic or environmental grounds leading to litigation resulting in schedule and cost impacts which will prevent these targets from being realized.

The recent Order 1920<sup>40</sup> by the Federal Energy Regulatory Commission (FERC) which oversees interstate transmission projects and rates is an attempt to require long range planning and re-allocate costs for renewable energy, but is controversial and

sure to be challenged in court and further delay resolution of transmission issues surrounding offshore wind.

**Summary**

For the nascent US offshore wind industry, 2023 administered a dose of sobering reality. The first half of 2024 has seen more of the same. The heady days of 2019-2021, in which near zero interest rates and inflation, easy financing with political and public support, resulted in falling prices on contracts awarded for thousands of MW of offshore wind across the northeast. Despite the boost to such projects injected with the extra tax credits provided with the Inflation Reduction Act of 2022, more than 15,000 MW or 60% of projects have been cancelled or stalled. Aside from Dominion’s regulated project, developers have committed to construct only 2600 MW of capacity to come online before end of the decade, far short of Federal and state goals.

Table 2 below summarizes the goals and current status of projects by state showing those committed (in operation, under construction or having reached favorable FID) together with procurements for new capacity announced thus far for 2024.

**Table 2 – Status of State Offshore Wind Projects**

	<b>Committed (MW)</b>	<b>Announced 2024 Procurements (Maximum MW)</b>	<b>Goal (MW)</b>
Massachusetts	800	3,600	5,600
Connecticut	304	1,200	2,000
Rhode Island	430	1,200	1,430
New York	1,056	4,000	9,000
New Jersey	0	4,000	11,000
Maryland	0	2,000	8,500
Virginia	<u>2,599</u>	<u>0</u>	<u>5,200</u>
Total	5,189	16,000	42,730

The three New England states have conducted a joint procurement for up to 6,000 MW and have received bids for 5,454 MW, including re-bids for several previously cancelled projects<sup>42</sup>. New Jersey will receive bids by July 10 for up to 4000 MW with awards to be announced by year end. New York and Maryland also plan to seek additional capacity this year.

As indicated, despite the new procurements, the ambitious goals of the seven Atlantic coast states remain just that, but it is clear that the goalposts have moved further out with much higher costs. The various states are attempting to revive cancelled projects by allowing re-bids along with new project awards at significantly higher OREC prices. Based on the prices in the most recent NY awards the LCOE for these

new contracts are expected to be in the range of \$180-200/MWH or higher after inflation adjustments up to 15% are applied.

As noted, the levelized value of the market price of non-wind power over the period 2026-2050 is estimated to be about \$50-60/MWH<sup>30</sup>. Thus, the rate subsidy needed for these new awards could be \$120-150/MWH. At that price, to get to the goal of 42.7 MW, the total rate subsidy would top \$450 billion. Associated transmission system upgrades will add another \$150 billion, so the total added cost of offshore wind in electric rates in the seven mid-Atlantic and northeast states could exceed a half trillion dollars and, based on results for NJ, raise average rates by more than 65% across the region<sup>35</sup>.

With a growing public awareness of the rate impact of offshore wind and opposition being led by shore communities to the economic and environmental impact of offshore wind, it remains to be seen whether state leaders will have the political will and support to bring these goals any closer to reality. By the end 2024 we may not have a final answer but we will have a good indication of which way the wind is blowing.

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### **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 Enrolled Agent, authorized to represent individual and business entities before the IRS on tax matters.*

