Maryland Public Service Commission

Maryland Offshore Wind Roadmap to 8.5 GW

Submitted to the Maryland General Assembly

Annapolis, Maryland

Pursuant to House Bill 1296 of 2024

§7-704.1 of Public Utilities Article,

Annotated Code of Maryland

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Table of Contents

Figures

Tables

Section 1: About this Report

Senate Bill 1161/House Bill 1296 - Electricity - Offshore Wind Projects - Alterations Act (HB 1296) required the Public Service Commission (Commission) to open a revised Round 2 proceeding in 2024.[1] The legislation also required the Commission, with the assistance of the Department of General Services (DGS), the Maryland Energy Administration (MEA), and other interested state units, to develop a plan for achieving a total of 8,500 megawatts (MW) of offshore wind energy capacity by 2031. Specifically, §7-704.1 of the Public Utilities Article (PUA) requires the plan to include:

1. A schedule of offshore wind energy procurements and proposed amounts of offshore wind energy for procurement through 2031; and

2. Recommendations on multijurisdictional offshore wind energy procurements and any additional offshore wind energy procurement recommendations.

The state agencies met several times in 2024 to discuss offshore wind issues and to finalize the language in the study. The Commission also opened Public Conference 63 (PC 63) to solicit input from industry and other interested parties.[2] The Commission thanks the respondents to PC 63 for their thoughtful insight and recommendations. The Commission also thanks the state agencies that participated in the formation of this study including DGS, MEA, the Department of Natural Resources (DNR), the Department of Labor, the Department of Commerce, and the Governor's Office of Small, Minority, & Women Business Affairs. In coordination with MEA and DGS, the Commission presents a plan to meet the 8,500 MW offshore wind capacity goal.[3]

The plan discusses the challenges of meeting the current 8.5 GW goal without additional lease areas and coordination with the federal government and neighboring states. The report also provides a number of recommendations to facilitate offshore wind procurements in Maryland. The plan touches on several additional topics not required by HB 1296; however, supply chain, workforce development, and diversity, equity, inclusion, and justice issues are not included in this report. These topics will be addressed in two subsequent companion reports produced by National Renewable Energy Laboratory (NREL) and the National Offshore Wind Research and Development Consortium (NOWRDC) for MEA on behalf of the Central Atlantic states. These reports are expected to be published in January 2025. The plan includes discussion and

[1] Acts of Maryland 2024, Chapter 431 (House Bill 1296).
[2] Please see Appendix A for more detail on PC 63.
[3] It is important to note that the goal is currently unreachable by 2031 due to the constraints discussed in Sections 6 and 7.

recommendations on offshore wind transmission issues. A full offshore wind transmission review is currently underway between the Commission, MEA, and PJM Interconnection, Inc. (PJM), the regional grid operator, which is expected to be published in 2025.

Section 2: An Introduction to Offshore Wind Technology

2.1: Offshore Wind Technology

Wind has been used by humans for a variety of purposes for thousands of years including windmills to mill grain or pump water and modern turbines to produce electricity.[4] Onshore wind has been used in the United States to produce electricity at a utility-scale since 1980.[5] Offshore wind is still a nascent industry in the United States with only three projects operational, the first of which was finished in 2016.[6]

Offshore wind is essentially the aquatic equivalent of onshore wind. All wind turbines function in a similar manner. When the wind blows over the blades of a wind turbine, the blades spin. Those blades are connected to a drive shaft which turns an electric generator and produces electricity.[7] Most offshore wind turbines are horizontal-axis models meaning they have three blades that operate at the top of the tower.[8] The major differences between land-based and offshore wind are the potential scales of the projects in terms of turbine size and the power produced, the complexity of the installation process, and the time it takes to build a project from beginning to end.[9] The turbines for offshore wind projects are much larger than their onshore counterparts mostly due to the difference in the physical constraints of transporting equipment on land versus the ocean. Figure 1 illustrates the offshore wind resources in the Atlantic Ocean near Maryland.

[4] Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office. (2024, August 21). *Top 10 things you didn't know about wind power | department of energy*. Top 10 Things You Didn't Know About Wind Power. https://www.energy.gov/eere/wind/articles/top-10-things-you-didnt-know-about-wind-power.

[5] Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office. (n.d.-b). History of U.S. Wind Energy. https://www.energy.gov/eere/wind/history-us-wind-energy.

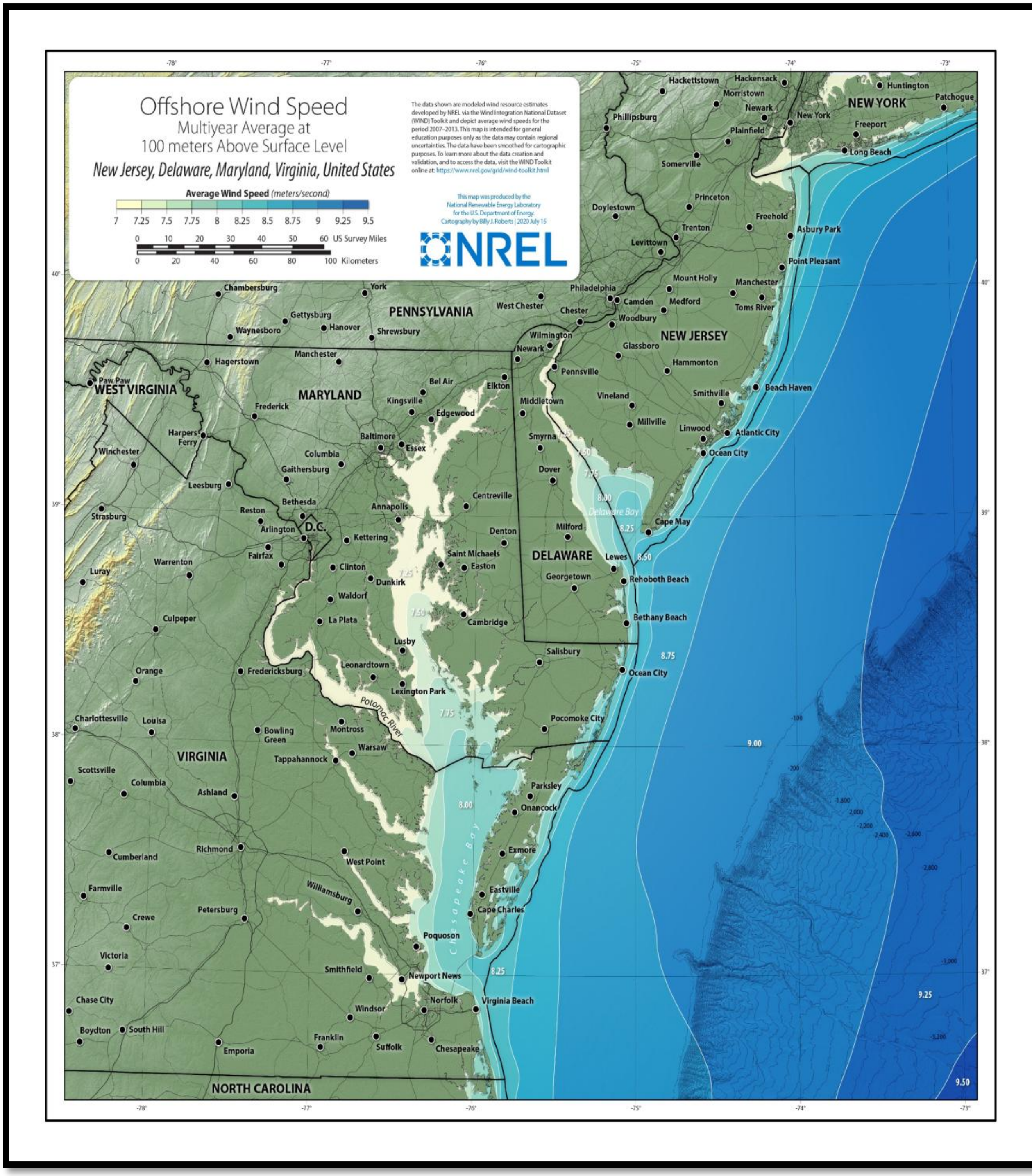
[6] Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office. (2024, August 21). *Top 10 things you didn't know about wind power | department of energy*. Top 10 Things You Didn't Know About Wind Power. https://www.energy.gov/eere/wind/articles/top-10-things-you-didnt-know-about-wind-power.

[7] Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office. (n.d.). How Do Wind Turbines Work? https://www.energy.gov/eere/wind/how-do-wind-turbines-work.

[8] *Id.*

[9] *How Offshore Wind Works*. Offshore Wind Maryland. (2024, August 19). https://offshorewindmaryland.org/how-offshore-wind-works/.

FIGURE 1 : VIRGINIA-MARYLAND-NEW JERSEY-DELAWARE OFFSHORE WIND SPEED AT 100 METERS[10]



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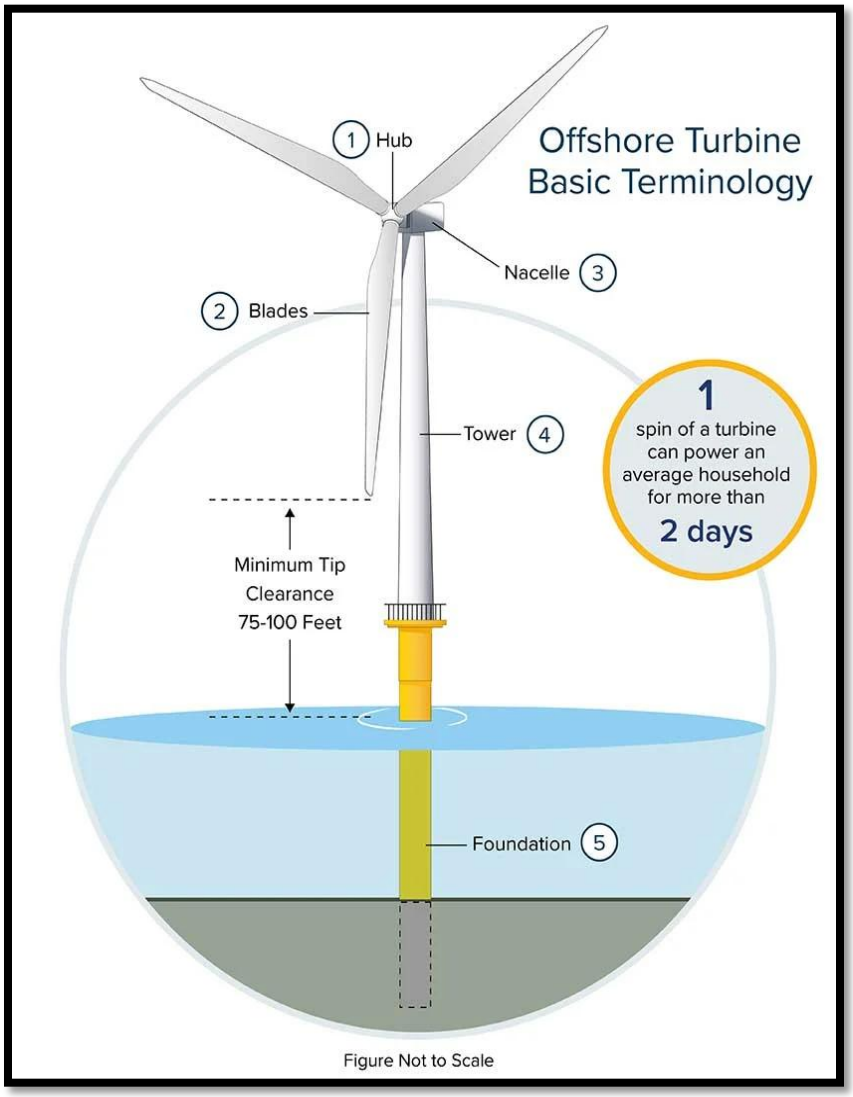
[10] Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office. (n.d.). *Virginia-Maryland-New Jersey-Delaware offshore wind speed at 100 meters*. WINDExchange. https://windexchange.energy.gov/maps-data/346.

Each turbine is made of several different components as illustrated in Figure 2. The blades move from the wind to make energy. The hub supports the blades. The nacelle contains the components that convert the energy captured by the blades into electricity. The tower supports the other components of the turbine and the foundation secures everything to the ocean floor.

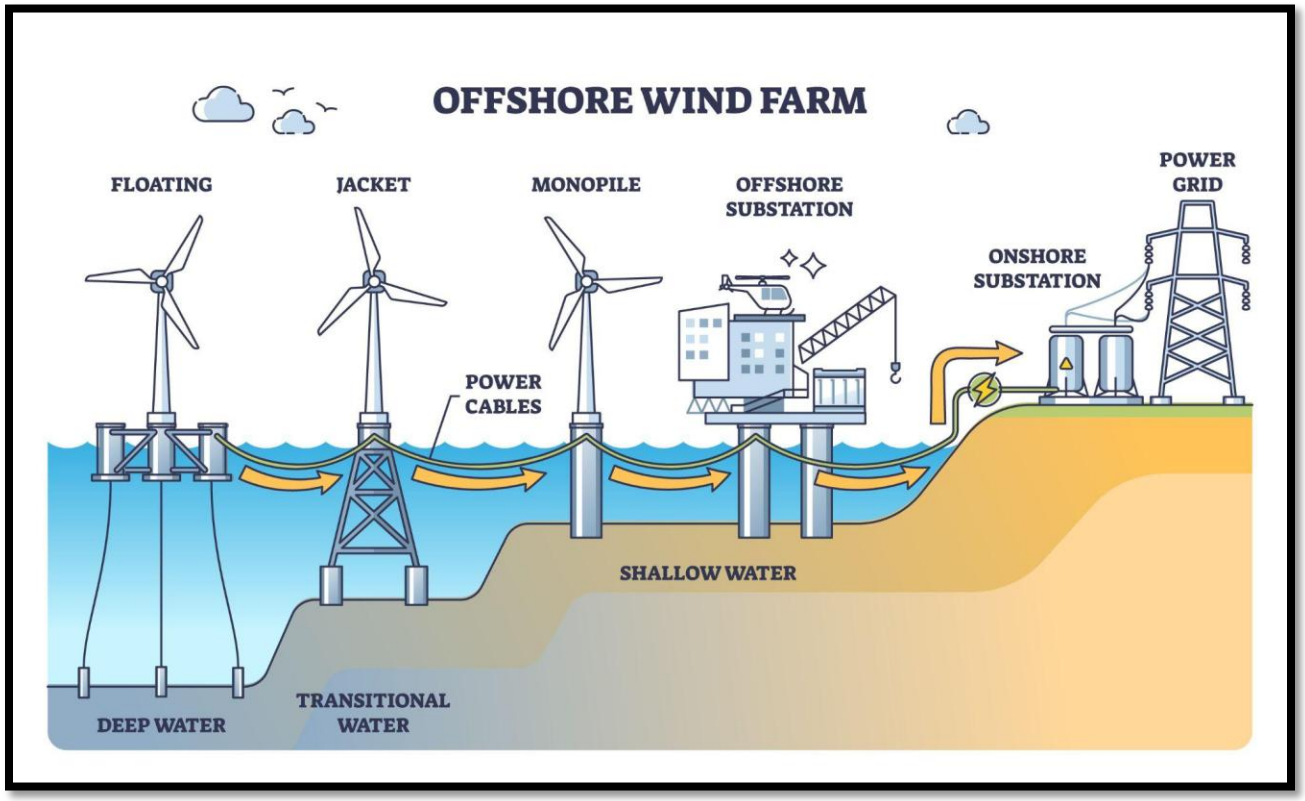
FIGURE 2 TURBINE COMPONENTS[11]



Each offshore wind project has several components to generate electricity and deliver it to customers onshore. Figure 3 below illustrates the basic overview of a project.

[11] *Offshore Wind 101*. NYSERDA. (n.d.). https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/About-Offshore-Wind/Offshore-Wind-101.

FIGURE 3 OFFSHORE WIND PROJECT OVERVIEW[12,13]



1. Offshore Wind Turbine Generator: The wind turbine generator consists of a rotor (blades & hub), a nacelle (which houses the components generating electricity), a tower, and a transition piece that connects the tower to the foundation. Some turbines may not have a transition piece as the tower directly connects to the foundation. Towers and transition pieces are made from steel and concrete, and blades are constructed out of composite materials.
2. Foundations & Substructions: These structures support the offshore wind turbines. The support structure can be fixed to the ocean floor or utilize floating turbine technology that moors the floating foundation platform in place to a fixed foundation on the seafloor. The structures are manufactured from steel or concrete.[14] There are many

[12] How Offshore Wind Works. Offshore Wind Maryland. (2024, August 19). https://offshorewindmaryland.org/how-offshore-wind-works/.

[13] VectorMine. (n.d.). *Offshore wind farm with turbine stations at sea or ocean outline diagram stock illustration*. iStock. Retrieved December 12, 2024, from https://www.istockphoto.com/vector/offshore-wind-farm-with-turbine-stations-at-sea-or-ocean-outline-diagram-gm2076708319-564944289?searchscope=image%2Cfilm.

[14] Ocean depths of 60 meters or fewer are ideal for fixed bottom foundations while waters 60 meters or greater are ideal for floating turbines anchored into the seabed. All commercial turbines installed off the coast of the United States to date are fixed bottom foundations. The University of Maine deployed the Volturnus, a 1:8 scale floating offshore wind turbine prototype in 2013 and is expected to deploy Aqua Ventus, a 11 MW full scale prototype in 2024.

foundation types; however, the monopile foundation is the most widely used foundation type among operational fixed bottom projects.

3. Inter-Array Cables: These cables connect multiple turbines together and deliver electricity to a centralized offshore substation or multiple substations within the offshore wind project. Inter-array cables are buried beneath the seafloor for fixed bottom projects and float in the water column for floating projects.
4. Offshore Substation: The offshore substation collects the electricity from the offshore wind project and prepares it to be sent to an onshore substation.
5. Export Cable: Electricity from the wind project is exported from the offshore substation to an onshore substation via one, or more, export cables. Export cables are either buried beneath the seafloor or float in the water column consistent with inter-array cables.
6. Onshore Substation: Export cables deliver power to an onshore substation that connects and synchronizes it to the regional power grid.

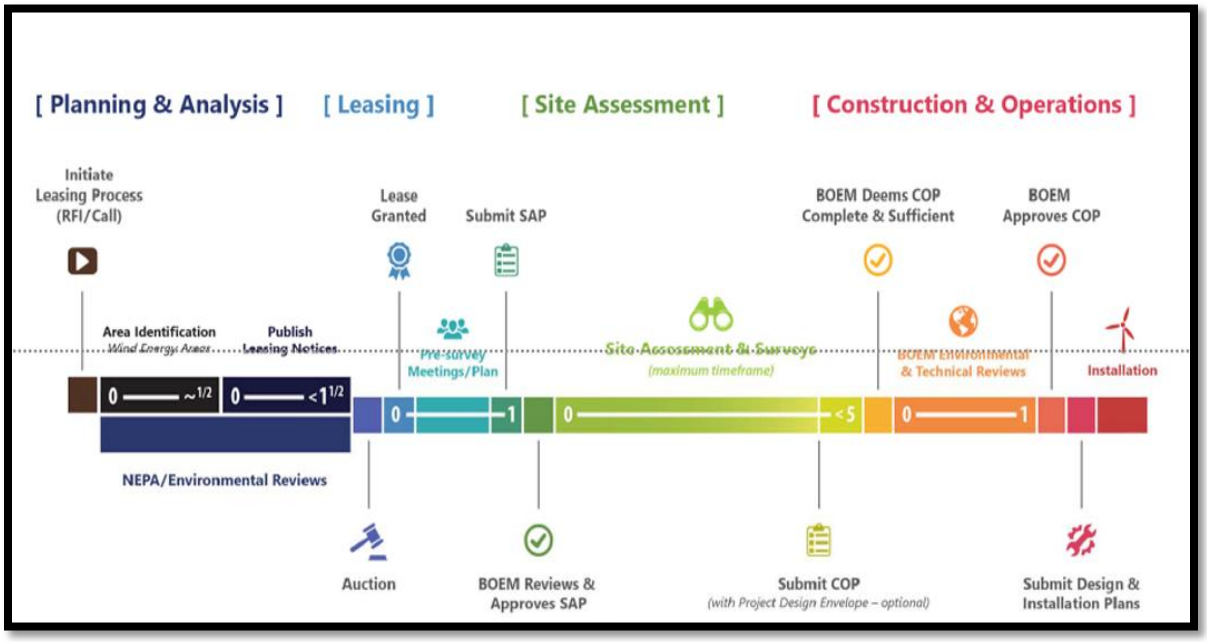
2.2: Federal Role and Supporting Policy

The federal government is responsible for offshore wind siting, leasing, permitting through the National Environmental Policy Act (NEPA) process, and environmental, health and safety enforcement during construction and operations phases of project development. The Bureau of Ocean Energy Management (BOEM), under the US Department of the Interior (DOI), is the federal agency responsible for managing the development of the energy, mineral, and geological resources in federal waters. Part of the agency's responsibility is to oversee offshore renewable energy development on the Atlantic Outer Continental Shelf (OCS). BOEM issues leases, easements, and rights of way for renewable energy development and is required to coordinate with other federal agencies and state, local, and tribal governments impacted by the development of a renewable energy project. The process includes four phases: planning, leasing, site assessment, and construction and operation. On average, the entire process is estimated by BOEM to take up to 10 years from start to finish.[15] The Bureau of Safety and Environmental Enforcement (BSEE), BOEM's sister agency within DOI, takes charge once a project reaches the construction and operations and maintenance (O&M) phases.

There are two federal laws that establish the regulatory framework for offshore wind. First, the Federal Power Act defines wholesale sales and transmission in interstate commerce to the federal government and generation, distribution, and retail sales to the states. Second, the Energy Policy Act of 2005 authorized BOEM to oversee offshore renewable energy development, including offshore wind, on the Atlantic OCS.

[15] This does not include the 20-30 years of operation of a project.

FIGURE 4 OVERVIEW OF BOEM SITING AND LEASING PROCESS[16]



2.3: State Role

At the state level, project approval processes vary and depend on state environmental, transmission interconnection, and procurement laws and regulations. Some states have environmental reviews similar to the federal NEPA process with their own requirements. All of the projects will have to interconnect onshore and can be subject to state and local interconnection review. For electricity offtake and financing mechanisms like power purchase agreements (PPA) and offshore wind renewable energy credits (ORECs), these are often competitive processes with their own approval processes through regulatory commissions or other state agencies.

Section 3: Offshore Wind Market in the United States

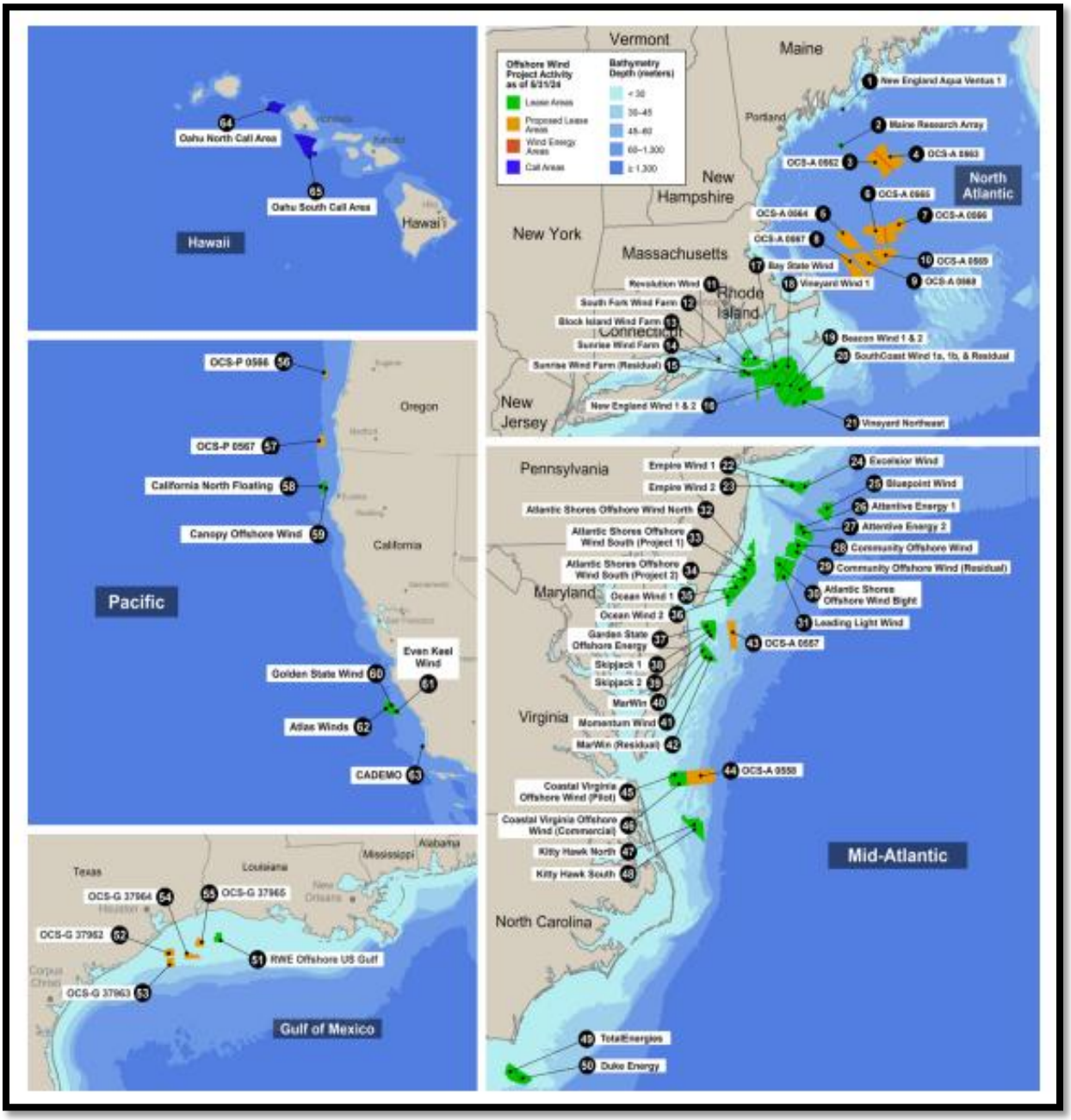
3.1: Federal Offshore Wind Lease Areas

The offshore wind market in the United States involves both federal and state processes. BOEM controls the federal process. After planning for and conducting analysis on potential areas for offshore wind development, BOEM issues leases and grants through a competitive process. There are approximately 65 lease areas, wind energy areas, and call areas for offshore wind development with BOEM as illustrated in the figure below. BOEM recently released its five-year

[16] BOEM. (n.d.). *Renewable Energy Leasing Process Poster.* Fact Sheets. https://www.boem.gov/sites/default/files/documents/renewable-energy/Leasing-Process-Poster.pdf.

leasing schedule which includes the Central Atlantic 2 lease auction occurring sometime between June 2025 and June 2026.[17]

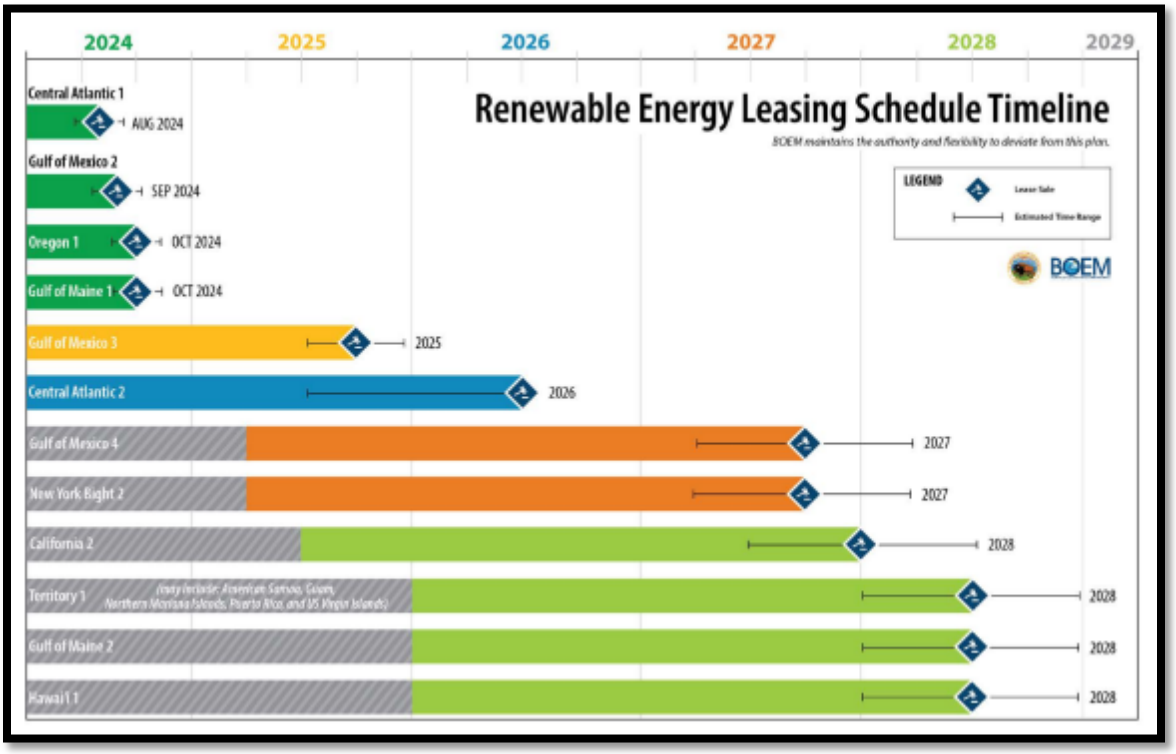
FIGURE 5 SUMMARY OF BOEM OFFSHORE WIND LEASE AREAS, WIND ENERGY AREAS, AND CALL AREAS[18]



[17] *Lease and Grant Information*. Bureau of Ocean Energy Management. (2024, August 12). https://www.boem.gov/renewable-energy/lease-and-grant-information.

[18] The National Renewable Energy Laboratory. (2024, August). Offshore Wind Market Report: 2024 Edition. https://www.nrel.gov/docs/fy24osti/90525.pdf, page v.

FIGURE 6 *BOEM'S FIVE-YEAR LEASING SCHEDULE*[19]



The United States has a goal of 30 gigawatts (GW) of offshore wind by 2030.[20] In total, 12 commercial-scale projects have been approved by BOEM for a total of 15 GW of generation. More details are provided in Appendix B.

[19] BOEM. (2024, April). Renewable Energy Leasing Schedule. https://www.boem.gov/sites/default/files/documents/renewable-energy/RELS%20Information%20Sheet%20Handout%20v3.pdf.

[20] The United States Government. (2024, September 5). Fact sheet: Biden-Harris Administration hits offshore wind milestone, continues to advance clean energy opportunities. The White House. https://www.whitehouse.gov/briefing-room/statements-releases/2024/09/05/fact-sheet-biden-harris-administration-hits-offshore-wind-milestone-continues-to-advance-clean-energy-opportunities/#:~:text=Recognizing%20the%20urgency%20of%20catalyzing,and%20promoting%20ocean%20co%2Duse.

TABLE 1 SUMMARY OF PROJECTS WITH APPROVED CONSTRUCTION AND OPERATION PLANS

Project Name	Lease Number	State Financing Agreement
South Fork Wind Farm	OCS-A 0517	New York
Vineyard Wind 1	OCS-A 0501	Massachusetts
Ocean Wind 1[21]	*OCS-A 0498*	*New Jersey*
Revolution Wind	OCS-A 0486	Connecticut
Coastal Virginia Offshore Wind (Commercial)	OCS-A 0483	Virginia
Empire Wind 1	OCS-A 0512	New York
Empire Wind 2[22]	*OCS-A 0512*	*New York*
Sunrise Wind	OCS-A 0487	New York
New England Wind 1	OCS-A 0534	Massachusetts
New England Wind 2	OCS-A 0561	Massachusetts
Atlantic Shores South	OCS-A 0499	New Jersey
MarWin and Momentum Wind	OCS-A 0490	Maryland

3.2: State Offshore Wind Goals

States set their own energy policies and goals. States often establish financing mechanisms such as PPAs and ORECs for projects supporting the achievement of the state's goals. The table below summarizes the current goals by state. It is noteworthy that five states in the Central Atlantic region have goals totaling 23,900 megawatts (MW) in capacity.[23] States have committed to develop a total of 87,930 MWs in the next few decades.

[21] Ørsted stopped development of this project as of October 31, 2023. Ørsted. (2023, October 31). Ørsted ceases development of Ocean Wind 1 and Ocean Wind 2 and takes final investment decision on Revolution Wind. Ørsted Ceases Development of Ocean Wind 1 and Ocean Wind 2. https://us.orsted.com/news-archive/2023/10/orsted-ceases-development-of-ocean-wind-1-and-ocean-wind-2.

[22] Equinor is seeking a new financing arrangement for this project as of January 3, 2024. Equinor. (2024, January 3). Empire wind 2 offshore wind project announces reset, seeks New Offtake Opportunities. Equinor. https://www.equinor.com/news/20240103-empire-wind-2-offshore-wind-project-announces-reset

[23] 1,000 MW is equivalent to 1 GW.

TABLE 2 SUMMARY OF STATE OFFSHORE WIND TARGETS[24],[25]

State	Capacity (MW)	Target Year
California	25,000	2045
Connecticut	2,000	2030
Delaware	1,200	N/A
Louisiana	5,000	2035
Maine	3,000	2040
Maryland	8,500	2031
Massachusetts	5,600	2035
New Jersey	11,000	2040
New York	9,000	2035
North Carolina	8,000	2040
Oregon	3,000	2030
Rhode Island	1,430	2030
Virginia	5,200	2034
Total	**87,930**	

3.3: Supply Chain Investments

In addition to the state financing mechanisms, there have been investments made in the broader offshore wind market and supply chain. Standing up the supply chain is important to the success of the offshore wind industry and creates economic opportunities across the country. There are proposed investments of approximately $10.4 billion including manufacturing, ports, vessels, workforce development, and research as illustrated in the table below.[26] In Maryland, US Wind has committed to investing in Sparrows Point Steel and partnering with Hellenic Cable for two manufacturing facilities in the state.[27]

[24] The National Renewable Energy Laboratory. (2024, August). Offshore Wind Market Report: 2024 Edition. https://www.nrel.gov/docs/fy24osti/90525.pdf, pages 23-25.
[25] Delaware Senate Bill 265. https://legis.delaware.gov/json/BillDetail/GenerateHtmlDocumentEngrossment?engrossmentId=36511&docTypeId=6.
[26] The American Clean Power Association (ACP). (2024, October 2). The Economic Benefits of Offshore Wind. ACP. https://cleanpower.org/resources/interactive-map-the-economic-benefits-of-offshore-wind/.
[27] Maillog No. 312157. Direct Testimony of Jeffrey Grybowski, page 9.

TABLE 3 SUMMARY OF OSW MARKET AND SUPPLY CHAIN INVESTMENTS

Investment Type	Amount ($)	Number
Manufacturing	$6,385,070,000	30
Ports	$2,840,400,000	23
Vessels	$992,000,000	23
Workforce Development	$102,200,000	21
Research	$86,220,000	15
Total	**$10,405,890,000**	**112**

Section 4: Maryland Climate, Emissions Reduction, and Renewable Energy Goals

In 2009, the General Assembly passed the Greenhouse Gas Reduction Act (GGRA). The GGRA established a statewide goal of reducing greenhouse gas emissions by 25 percent from 2006 levels by 2020. In 2016, the GGRA was reauthorized with a revised goal of a 40 percent reduction from 2006 levels by 2030. In 2022, the GGRA was amended by the Climate Solutions Now Act requiring a 60 percent reduction from 2006 levels by 2031 and for the state to be net-zero in terms of greenhouse gas emissions by 2045. GGRA seeks to reduce economy-wide emissions through four key sectors including agriculture, buildings, power sector, and transportation.

In 2004, the General Assembly created the Renewable Portfolio Standard (RPS). The purpose of the RPS is to reduce the greenhouse gas emissions attributable to the electricity supply in Maryland by incentivizing renewable energy resources through renewable energy credits (RECs). RECs are bought and sold via a multi-state market operated by PJM's Generation Attribute Tracking System (GATS).[28] The RPS has been amended numerous times including with the Offshore Wind Energy Act of 2013 (MOSWEA) and the Clean Energy Jobs Act of 2019 (CEJA). The current goals of the RPS are to reach 52.5 percent of Maryland's electricity from renewable energy by 2030 including 50 percent from Tier 1 renewable sources and 2.5 percent from Tier 2 renewable sources. Of the Tier 1 resources, there are carve-outs for solar energy, offshore wind, and geothermal systems at 14.5 percent, an amount set by the Commission, and 1 percent, respectively.

Additional climate, emissions reduction, and energy related programs authorized in statute include the following.

[28] About GATS. PJM. (2024). https://www.pjm-eis.com/getting-started/about-GATS.aspx.

1. The Brighter Tomorrow Act: Passed in 2024, requires the Commission to establish a Small Solar Energy Generating System incentive program.
2. The WARMTH Act: Passed in 2024, established geothermal network pilots for natural gas utilities.
3. EmPOWER: Originally passed in 2008, updated in 2024 to require the State's energy efficiency and demand response programs target greenhouse gas emissions reductions.
4. The Energy Storage Program: Passed in 2023, requires the Commission to implement an energy storage program to meet the State's 3,000-megawatt goal.
5. Community Solar Program: Passed in 2023, made the former pilot program into a permanent program.
6. Healthy Air Act: Passed in 2006, required the State to participate in the Regional Greenhouse Gas Initiative (RGGI).
7. Net Energy Metering: Passed in 1997, required the Commission to establish a net energy metering program to incentivize certain renewable and clean energy generation.

Section 5: Maryland Offshore Wind Legislative History

Offshore wind is Maryland's largest renewable energy resource and will be a central pillar to the state's plan to reach its decarbonization goals. In 2013, MOSWEA was enacted into law to support the offshore wind industry, the economy, and the renewable and climate goals of the State. The bill amended Maryland's RPS goal to source 25 percent of all electricity consumed in the State from renewable energy by the year 2020 and created a "carve-out" for offshore wind not to exceed 2.5 percent of all in-state electricity sales.[29] The offshore wind carve out would be met through the Maryland OREC Program administered by the Commission. The Commission approved 348 MW of offshore wind capacity during the Round 1 OREC reviews in 2017.[30]

In 2019, CEJA was enacted into law which increased Maryland's RPS goal to source 50 percent of all electricity consumed in the State from renewable energy by the year 2030 and required a minimum of 1,200 MW of offshore wind capacity in addition to the approved Round 1 projects.[31] The Commission approved an additional 1,654.5 MW of offshore wind capacity during the Round 2 OREC review in 2021.[32] At the conclusion of Round 2, Maryland's OREC program supported 2,022.5 MW of offshore wind capacity. In 2022, an act concerning

[29] Acts of Maryland 2013, Chapter 3 (HB-226/SB-275).
[30] US Wind Inc.'s Maryland Offshore Wind (248 MW) and Ørsted's Skipjack 1 (120 MW) projects.
[31] Acts of Maryland 2019, Chapter 757 (HB-1158/SB-516).
[32] US Wind Inc.'s Momentum Wind (808.5 MW) and Ørsted's Skipjack 2 (846 MW) projects.

Renewable Energy Portfolio Standard and Renewable Energy Credits - Offshore Wind was enacted which shifted OREC compliance from electricity suppliers to electric utilities.[33]

In 2023, the Promoting Offshore Wind Energy Resources Act (POWER Act) was enacted which established a new goal to achieve 8.5 GW[34] of offshore wind capacity by 2031 and it created a second offshore wind procurement mechanism within DGS.[35] Additionally, the POWER Act required the Commission to request that PJM Interconnection (PJM) conduct an analysis of transmission system upgrade and expansion options for both onshore and offshore infrastructure.

In January 2024, one of Maryland's offshore wind developers withdrew its approved projects from the OREC program.[36] This withdrawal prompted the enactment of HB 1296 which made alterations to both of Maryland's offshore wind procurement mechanisms and required the Commission, DGS, and MEA to produce this report.[37] Maryland currently has 1,056.5 MW of approved offshore wind capacity through the OREC program and no capacity approved through DGS' procurement mechanism.[38] The Commission is currently reviewing US Wind's revised Round 2 OREC application for its 1,710 MW project.

Section 6: Reaching State Offshore Wind Goals

The POWER Act sets a goal for Maryland to achieve 8.5 GW of offshore wind capacity by 2031 which may be satisfied, in part, through either the OREC Program or DGS' offshore wind procurement. MEA estimates Maryland's 8,500 MW offshore wind goal would require federal offshore wind lease areas totaling 350,000 - 525,000 acres. Delaware recently passed the Delaware Energy Solutions Act of 2024 which authorizes the State to procure up to 1,200 MW of offshore wind capacity.[39] MEA estimates an additional 49,000 - 74,000 acres of federal offshore wind lease areas would be needed to accommodate Delaware's goal. The combined offshore wind goals of 9,700 MW for Maryland and Delaware would require 399,000 - 599,000 acres of federal offshore wind lease areas.[40]

[33] Acts of Maryland 2022, Chapter 578 (HB622/SB526).
[34] 1 GW is equivalent to 1,000 MW.
[35] Acts of Maryland 2023, Chapter 95 (HB793/SB781).
[36] Ørsted's Skipjack 1 & 2 (966 MW) projects.
[37] Acts of Maryland 2024, Chapter 431 (HB1296/SB1161).
[38] DGS is currently negotiating a sole source offshore wind procurement with Ørsted.
[39] Acts of Delaware 2024, (SB 256).
[40] MEA calculates the acreage needs using capacity density assumptions of 4 MW/kM^2 and 6 MW/kM^2, for high and low estimates, respectively.

TABLE 4 STATE OFFSHORE WIND GOAL LEASE ACREAGE REQUIREMENTS

State	Capacity	Acreage Needs - Low	Acreage Needs - High
Delaware	1,200 MW	49,421 Acres	74,132 Acres
Maryland	8,500 MW	350,065 Acres	525,098 Acres
Total	**9,700 MW**	**399,486 Acres**	**599,230 Acres**

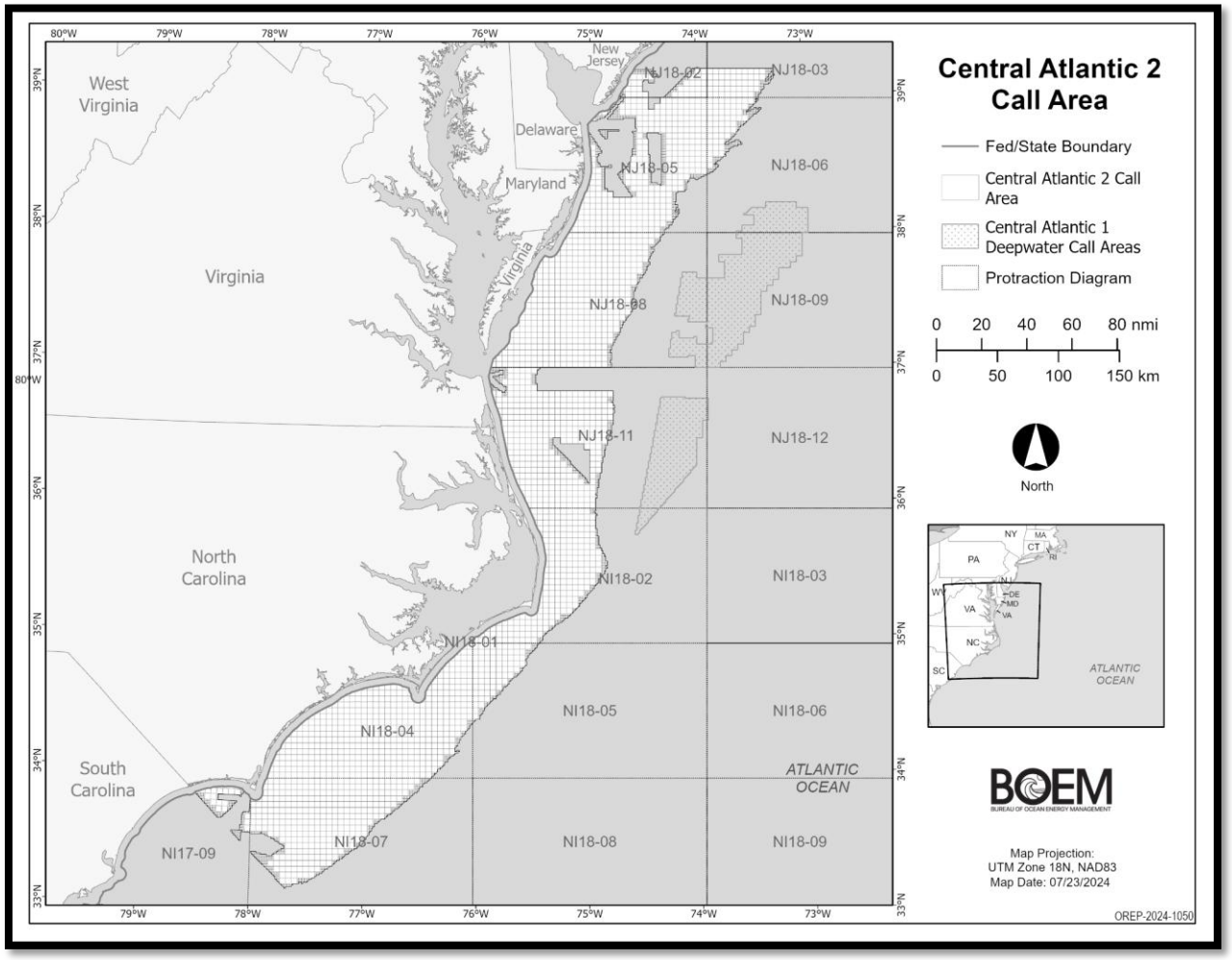
Of the existing lease areas, BOEM currently has 10 commercial leases and one research lease in the Central Atlantic Region (DE, MD, VA, and NC). Four of the Central Atlantic lease areas (OCS-A 0482, OCS-A 0519, OCS-A 0557, and OCS-A 0490) are located directly off the coast of Maryland and Delaware and could reasonably interconnect into the PJM power grid on the Delmarva Peninsula. One lease area (OCS-A 0490) is controlled by US Wind which is currently working through the Revised Round 2 OREC process and the remaining three are currently uncommitted. These lease areas total 278,000 acres which MEA estimates could accommodate 4,500 - 6,700 MW of offshore wind capacity. The Delmarva lease areas are not large enough to accommodate Maryland's offshore wind goal or the combined Maryland and Delaware goals. MEA estimates an additional 72,000 - 247,000 acres would be needed to accommodate Maryland's offshore wind goal and 122,000 - 321,000 acres to accommodate the combined Maryland and Delaware goals.

On August 21, 2024, BOEM announced the start of the Central Atlantic 2 Leasing Process with a Call for Information and Nominations (Call).[41] The Call Area totals nearly 13.5 million acres in the Central Atlantic but areas under consideration will be significantly reduced during the siting and identification process as ocean stakeholders and the public provide input. The areas under consideration in shallow water areas are anticipated to have compatibility issues with competing industries while the deep-water areas better suited for floating offshore wind pose significant technical challenges. Floating offshore wind technical challenges were explored in a recent NREL study titled "*Challenges and Opportunities for Floating Offshore Wind Energy in Ultradeep Waters of the Central Atlantic.*"[42] It is unclear at this time if the Central Atlantic 2 leasing process will yield enough additional lease acreage to accommodate Maryland's offshore wind goal. In addition, BOEM's five-year leasing schedule could be significantly delayed or canceled during the second Trump Administration.

[41] Prior to this announcement, Maryland and BOEM entered into a memorandum of understanding (MOU) on June 7, 2024, to outline how to plan for and implement the State's offshore wind and climate change goals and the Federal offshore wind and climate goals. https://governor.maryland.gov/Documents/Signed%20Maryland-BOEM%20MOU.pdf.

[42] The National Renewable Energy Laboratory. (2024, August). Challenges and Opportunities for Floating Offshore Wind Energy in Ultradeep Waters of the Central Atlantic. https://www.nrel.gov/docs/fy24osti/90608.pdf.

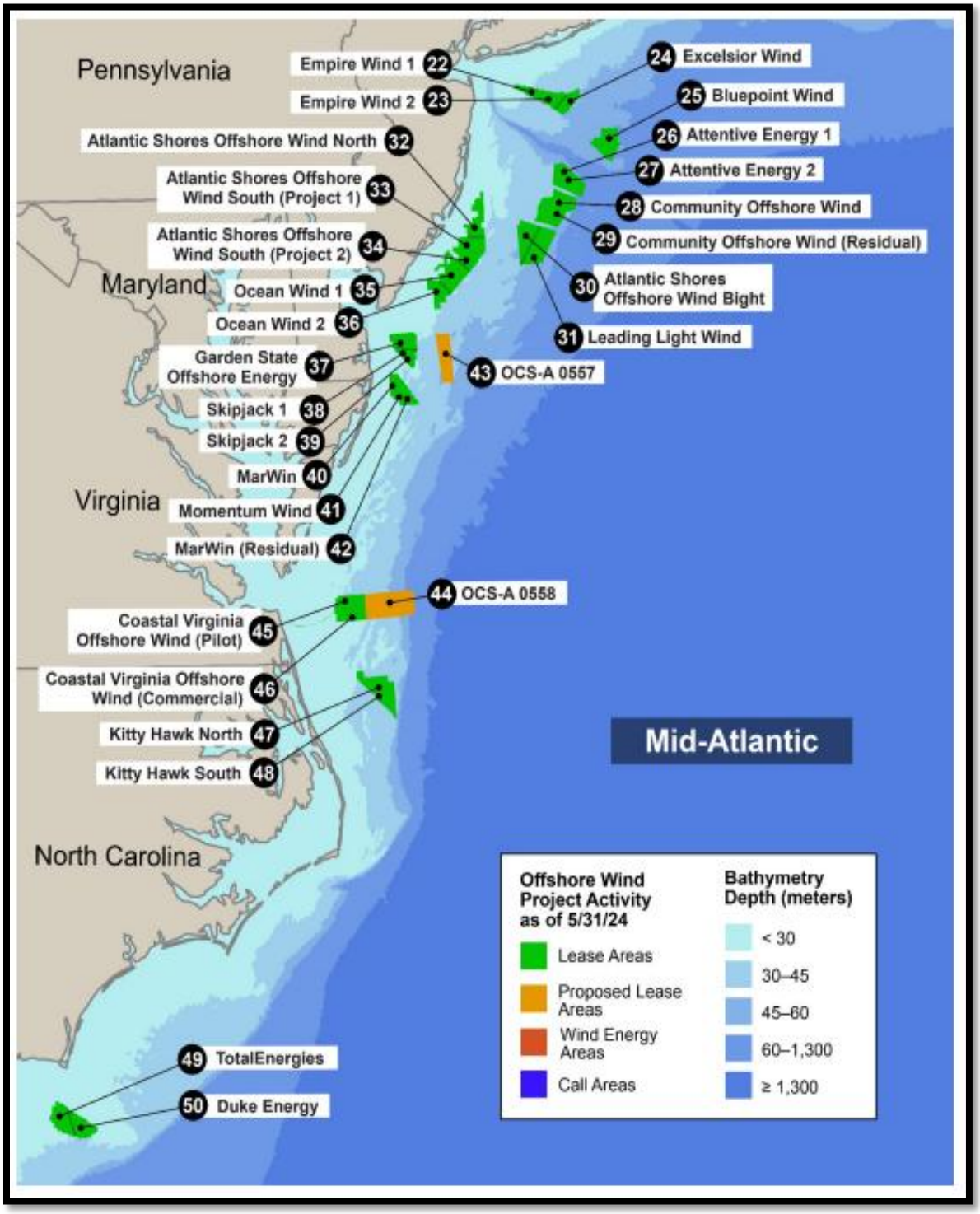
FIGURE 7 CENTRAL ATLANTIC 2 CALL AREA MAP[43]



In the event BOEM's Central Atlantic 2 leasing process does not yield the necessary amount of additional acreage, Maryland will have to look at alternatives. There are two additional lease areas off the coast of southern New Jersey (OCS-A 0498 and OCS-A 0532) which total 160,000 acres. MEA estimates these lease areas could accommodate 2,600 - 3,900 MW of offshore wind capacity. Taking the New Jersey lease areas and Delmarva Peninsula lease areas into consideration together, the six lease areas total 438,000 acres which MEA estimates could accommodate between 7,100 - 10,600 MW of offshore wind capacity which would satisfy Maryland and Delaware offshore wind goals if developed; however, it would leave New Jersey with less acreage to satisfy its 11,000 MW goal.

[43] *Central Atlantic*. Bureau of Ocean Energy Management. (2024a, December 3). https://www.boem.gov/renewable-energy/state-activities/central-atlantic.

FIGURE 8 *CENTRAL ATLANTIC LEASE AREAS*[44]



[44] The National Renewable Energy Laboratory. (2024, August). Offshore Wind Market Report: 2024 Edition. https://www.nrel.gov/docs/fy24osti/90525.pdf, page 14.

TABLE 5 FEDERAL LEASE AREAS RELEVANT TO MARYLAND

Lease	Effective Year	Location[45]	Developer	Acres	Est. Capacity - Low (MW)[46]	Est. Capacity - High (MW)[47]
OCS-A 0498	2016	NJ	Ørsted	75,526	1,223	1,834
OCS-A 0532	2016	NJ	Ørsted	84,955	1,375	2,063
OCS-A 0482	2012	DE	Ørsted	70,098	1,135	1,702
OCS-A 0519	2018	DE	Ørsted	26,332	426	639
OCS-A 0557	2024	DE/MD	Equinor	101,767	1,647	2,471
OCS-A 0490	2014	MD	US Wind	79,707	1,290	1,935
	Total			**438,385**	**7,096**	**10,644**

These lease areas are currently uncommitted to any State offshore wind procurement mechanism as the leaseholder canceled project development in October 2023. The Southern lease (OCS-A 0532) is the more appealing option for Maryland as it is geographically closer and has few complications. The Northern lease area (OCS-A 0498) has significant complications that could increase project costs and extend the development timeline. The project has received all but one required permit and any modifications to the project design to meet Maryland's needs would require additional federal review of all existing permits.[48] Depending on the severity of the modifications, the additional federal review could take more than one year to complete. In addition, there is significant local opposition to these projects and offshore wind generally and unilateral involvement of Maryland could exacerbate this issue and create tensions between the Maryland and New Jersey governments. To avoid creating tensions between Maryland and New Jersey, it may be best to work collaboratively on an intergovernmental offshore wind procurement process. An intergovernmental transmission procurement process could be held in tandem as well.

In summary, the current goal of achieving 8.5 GW of offshore wind capacity by 2031 is not attainable without additional federal lease areas. It is essential that Maryland work

[45] From North to South
[46] MEA utilizes capacity density assumptions of 4 MW/kM^2 for the low estimates.
[47] MEA utilizes capacity density assumptions of 6 MW/kM^2 for the high estimates.
[48] Ocean Wind 1 Project. Ocean Wind 1 Project | Permitting Dashboard. (2019, October 30). https://www.permits.performance.gov/permitting-project/fast-41-covered-projects/ocean-wind-1-project

collaboratively with federal agencies and neighboring states to address the offshore wind acreage shortfall. In addition, the deadline could be extended from 2031 to either 2035 or 2040 to allow for more time to meet the 8.5 GW goal.

Section 7: Transmission Concerns

7.1: Transmission Challenges

Transmission is an important component of offshore wind development. The costs are currently included in OREC prices as well as the DGS procurement. While the Commission and MEA are engaged in a separate process with PJM focused on transmission under the POWER Act, it is important to highlight some of the relevant issues in this report. Transmission ultimately impacts how much generation the State can bring ashore, the total costs Marylanders will pay for the generation, and the total benefits the State sees from projects.

Currently, the statute requires qualified offshore wind projects to interconnect on the Delmarva Peninsula or with a project that will be approved under the POWER Act by the Commission. There are limitations with interconnecting to the Delmarva Peninsula including limited points of interconnection and a lower quality of existing infrastructure in terms of the voltages that can be supported in comparison to other areas like the BGE and Pepco territories. The State should consider expanding interconnection options within Maryland to ensure the benefits of the projects flow directly to ratepayers. Pairing additional interconnection options within the state with potential multi-jurisdictional transmission options discussed further below could help address the current interconnection limitations.

The electricity generated from offshore wind projects can be transmitted via high voltage alternating current (HVAC) or high voltage direct current (HVDC). HVAC infrastructure is common in the US while only five HVDC transmission lines exist today.[49] HVAC has historically been less expensive than HVDC; however, HVDC makes sense for offshore wind. HVDC suits longer distance transmission projects better, is suitable for submarine transmission, can assist in power flow control, and support weaker alternating current (AC) grids (like the current infrastructure in Delmarva).[50,51] One of the main constraints to implementing HVDC technology

[49] On the Road to Increased Transmission: High-Voltage Direct Current. NREL. (2024, June 12). https://www.nrel.gov/news/program/2024/on-the-road-to-increased-transmission-high-voltage-direct-current.html#:~:text=HVAC%20lines%20typically%20use%20three,narrower%20than%20their%20HVAC%20counterparts.

[50] Renewable Energy and Inter-Island Power Transmission - NREL. (2011, May 6). https://www.nrel.gov/docs/fy11osti/51819.pdf.

[51] The Brattle Group. (2023, September 19). The Operational and Market Benefits of HVDC to System Operators. https://www.brattle.com/wp-content/uploads/2023/09/The-Operational-and-Market-Benefits-of-HVDC-to-System-Operators-Report-Summary.pdf.

for near-term and future offshore wind projects will be supply chain constraints with estimated times in the 2030s.[52]

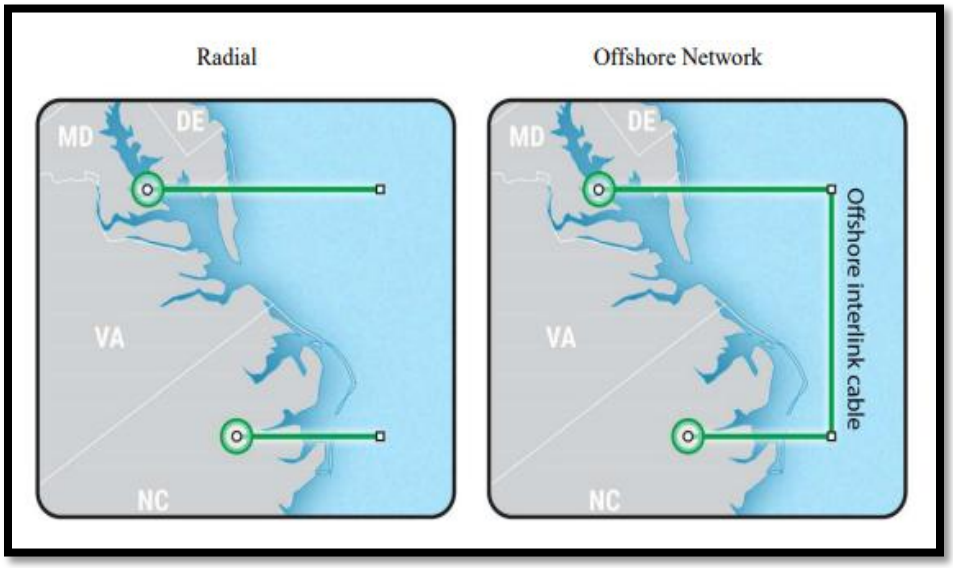
Offshore wind projects need to request to interconnect onshore with PJM. If the interconnection of their project will require upgrades to the grid, attachment facilities, or network, then the project is responsible for covering those costs.[53] These costs are accounted for in the overall costs of the project and are subsequently a factor in the final price for any state financing mechanism the project receives. The total upgrade costs can be hundreds of millions of dollars.[54]

7.2: Radial and Networked Transmission Systems

All early offshore wind projects approved in the United States have radial transmission connections. Radial connections are where each project runs a transmission line to an interconnection point onshore in comparison to a network connection where multiple projects are connected to each other and interconnection points onshore.[55] There are costs and benefits associated with both transmission models. Radial connections have been the preferred method early in the development of the US offshore wind industry because there is less coordination and planning involved. However, as the industry continues to grow, the benefits of creating offshore transmission networks will likely outweigh the additional costs.[56]

[52] DNV Group. (2024a, March 15). What Can We Expect Next for HVDC? https://www.dnv.com/article/2023-was-a-pivotal-year-for-HVDC/.
[53] Axum Energy Ventures, LLC. (2020, August 31). Generation Interconnection System Impact Study Report. https://www.psc.state.md.us/electricity/wp-content/uploads/sites/2/MD-OSW-Analyses-2-3-1__-8-31-2020_FINAL.pdf, page 5.
[54] *Id*. at Attachment 2.
[55] The National Renewable Energy Laboratory. (2024, March). Atlantic Offshore Wind Transmission Study. https://www.nrel.gov/docs/fy24osti/88003.pdf, page 5.
[56] *Id*. at page v.

FIGURE 9 ILLUSTRATION OF RADIAL AND NETWORKED TRANSMISSION SYSTEMS[57]



Ultimately, coordination among several states or regions in the United States could enable large transmission networks to support offshore wind projects for years to come. These multi-state, multi-regional, or multi-jurisdictional transmission networks can deliver benefits far outweighing their costs and make it easier for future projects to develop. The biggest challenge is getting the necessary parties involved to discuss and agree on the details of a network. States across the country are in different phases of offshore wind development. There are also multiple regional transmission operators (RTOs) or independent system operators (ISOs) that oversee transmission for numerous states. Federal involvement in the process may be needed to assist with facilitating agreements. Ultimately, the states will likely need to get started without federal assistance.

The POWER Act required the Commission to request that PJM conduct an analysis of transmission system upgrade and expansion options for both onshore and offshore infrastructure. In coordination with the MEA, the Commission requested PJM to conduct the analysis required by the POWER Act. PJM agreed and has been working on the analysis. The Commission, MEA, and PJM have been meeting monthly beginning in October 2023.[58] The parameters of the study are being finalized with the Commission, MEA, the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources, and PJM. It is anticipated that the analysis will be available in 2025. Recommendations on multi-jurisdictional transmission systems are discussed in Section 11.

[57] *Id*. at page vi.

[58] The Maryland Department of Natural Resources' Power Plant Research Program (PPRP) has also been helping with the analysis.

Section 8: Offshore Wind Procurement Mechanisms in Other States

8.1: Power Purchase Agreements

There are several different methods of offshore wind financing mechanisms currently deployed across the United States with variations on how each state implements those mechanisms. One method is to competitively bid PPAs which are for fixed-rate prices and can be executed via a contract or order from a state regulator. The offshore wind developer agrees to provide a certain quantity of electricity under the agreement.[59] The offshore wind developer then negotiates a contract with the local electric utilities for the utilities to purchase the electricity generated from the offshore wind project.[60] PPAs have been used in Maine, Rhode Island, Connecticut, New York,[61] and Massachusetts.

8.2: ORECS

A second method is to competitively bid ORECs. ORECs are similar to PPAs in that they are for fixed-rate prices and can be executed via contracts or regulatory orders. The major differences are that ORECs are one megawatt equivalents used to satisfy state renewable or clean energy standards and they are bundled products. The generation and renewable attributes are sold together. Both methods reduce risk and create some financial security for offshore wind projects.[62] New York, New Jersey, and Maryland currently have OREC agreements with offshore wind projects. One variation on the OREC model that has been used by New York is indexed ORECs. Under this variation, a generator receives the difference between a predetermined contract price and a reference price.[63] New York used the average of the previous month's energy and capacity prices across zones J and K of the New York Independent System Operator (NYISO) zones as the reference price.[64]

[59] The National Renewable Energy Laboratory. (2020, June). Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. https://www.nrel.gov/docs/fy20osti/76079.pdf, pages 7-12.

[60] Under a PPA, the RECs can also be sold to the electric utilities who then either use them for compliance or sell them to the electricity suppliers if the market is deregulated.

[61] Only one NY project has a PPA, SouthFork Wind. The rest have ORECs.

[62] The National Renewable Energy Laboratory. (2020, June). Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. https://www.nrel.gov/docs/fy20osti/76079.pdf, pages 23-24.

[63] *Id*. at pages 24-26.

[64] New York Public Service Commission Approves New Contracting Structure for Large-Scale Project Renewable Energy Credits. Hodgson Russ LLP. (2020, January 22). https://www.hodgsonruss.com/newsroom/publications/New-York-Public-Service-Commission-Approves-New-Contracting-Structure-for-Large-Scale-Project-Renewable-Energy-Credits.

8.3: Utility Rate Recovery

The final method is utility-owned rate recovery. This requires the utility to own and operate the offshore wind project. This method is currently only deployed by Virginia where Dominion Energy owns the Coastal Virginia lease area. Under this financing methodology, the state's utility commission will determine the final rates through normal utility rate making processes such as rate cases.

Some states have begun the leasing process with BOEM and do not yet have lease areas to arrange financial agreements with offshore wind projects. Other states have not formally entered into financing agreements with projects at this time. There are additional financing and procurement mechanisms deployed in Europe to fund offshore wind projects including feed-in tariffs and contracts for difference; however, these methods are not discussed in this report as they raise legal challenges.[65]

8.4: Multi-Jurisdictional Procurements

Multi-jurisdictional or multi-state offshore wind procurements are relatively new in the United States where multiple states coordinate offshore wind procurements. The benefit of a multi-jurisdictional procurement is that it allows states to procure offshore wind in larger amounts at a lower cost which can result in reduced ratepayer impacts and increased supply chain investment and job creation for participating states and wider region. In October 2023, Massachusetts, Rhode Island, and Connecticut signed a Memorandum of Understanding (MOU) to coordinate the nation's first multi-jurisdictional offshore wind procurement process. The MOU provides guidelines and a framework for the three states to hold coordinated offshore wind procurements and established a goal to jointly procure 6 GW of offshore wind capacity.[66] In September 2024, Massachusetts and Rhode Island announced they had selected 2,878 MW of capacity through this multi-jurisdictional procurement process. Connecticut ultimately did not select any capacity from this coordinated offshore wind procurement as internal reviews (as of November 13, 2024) are still ongoing and a decision would be made sometime in the future.[67]

[65] The National Renewable Energy Laboratory. (2020, June). Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. https://www.nrel.gov/docs/fy20osti/76079.pdf, pages 22-23.

[66] https://portal.ct.gov/-/media/deep/energy/procurements/marict-offshore-wind-procurement-collaboration-memorandum-of-understanding--final-10323-cem-sig.pdf.

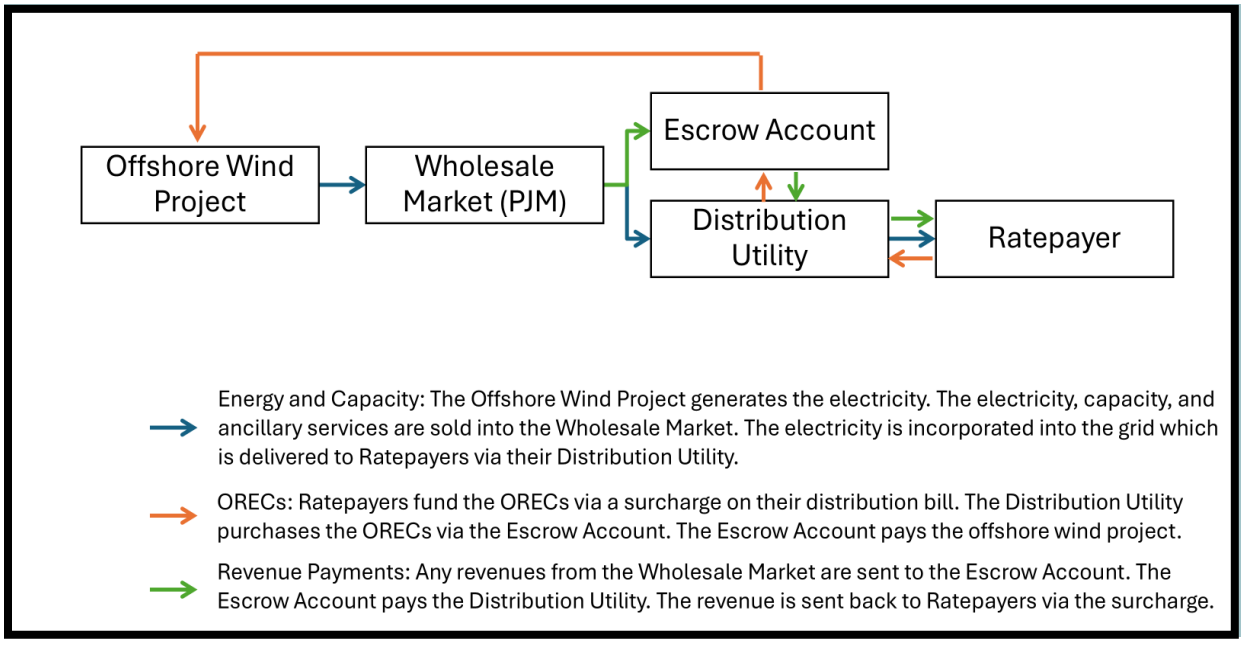
[67] https://insideclimatenews.org/news/13112024/new-england-offshore-wind-pact-weakened-after-connecticut-sits-out/.

Section 9: Maryland Offshore Wind Procurement Mechanisms

9.1: Maryland OREC Program

The OREC program provides a state subsidy to qualified offshore wind projects approved by the Commission. OREC projects must be located in a federally designated renewable energy lease area on the Atlantic OCS, at least 10 miles from the coast of Maryland, and interconnect into PJM somewhere on the Delmarva Peninsula. One OREC is equal to one megawatt-hour (MWh) of electricity generation and an OREC includes both the energy and environmental attributes of that electricity. OREC projects sell electricity into PJM's energy markets and sell ORECs to Maryland's electric utilities which then retire the ORECs for compliance with Maryland's RPS. The electric utilities pass the OREC compliance costs onto Maryland's electric ratepayers. The PJM electricity revenues from the projects are rebated to Maryland's electric ratepayers. This means Maryland's ratepayers ultimately only incentivize the environmental attribute of the OREC. The Commission will appoint an escrow account administrator which will manage all of these transactions. The OREC Program includes ratepayer protections by capping the Round 1 projects projected rate increase for residential customers to $1.50 (2012$) on a monthly basis and non-residential customers to 1.5 percent on an annual basis. Round 2 projects have a rate increase cap of $0.88 (2018$) on a monthly basis for residential customers and 0.9 percent annually for non-residential customers. The OREC price is also capped at $190 (2012$). Qualified offshore wind projects can only be approved by the Commission if they provide a positive net benefit to Maryland's economy, public health, and environment along with all other requirements specified above.

FIGURE 10 MD OREC PROCESS



9.2: DGS Offshore Wind Pilot Procurement

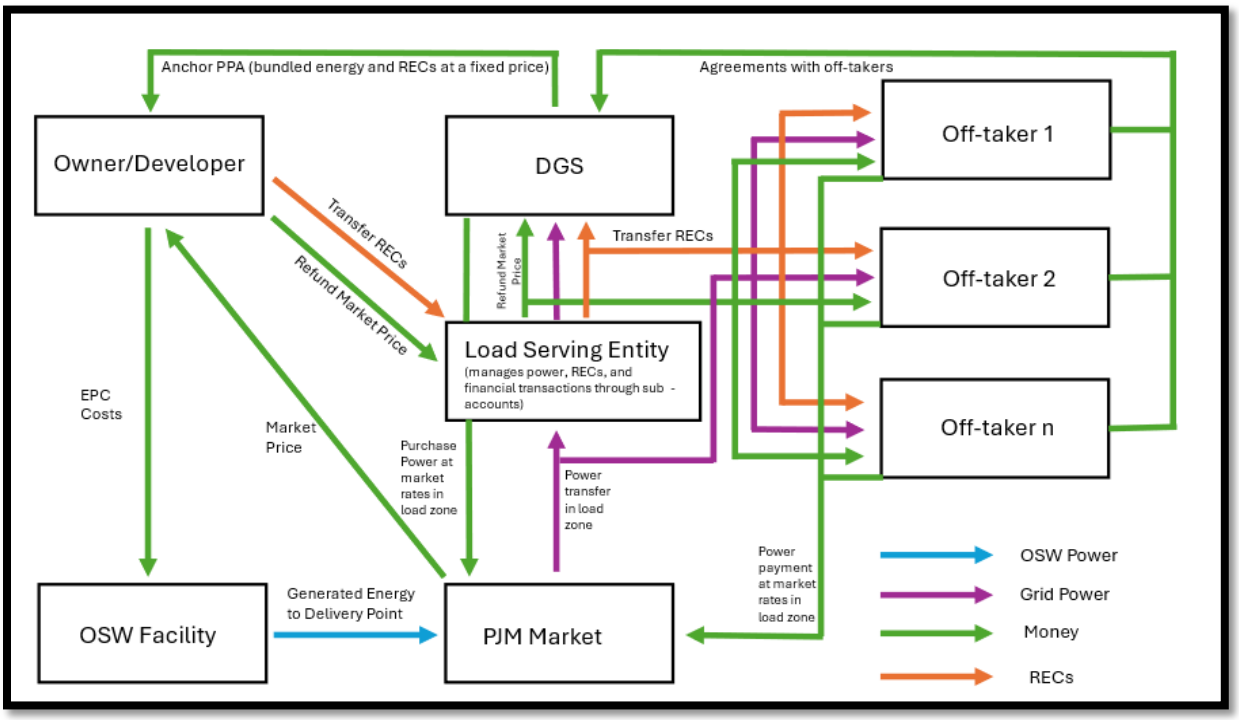
The POWER Act of 2023 instructed DGS to issue a solicitation on or before July 31, 2024, to enter contracts of not less than 20 years to purchase offshore wind power and associated Tier 1 RECs from a qualified vendor. The evaluation criteria for proposals shall take into consideration the social cost of greenhouse gas emissions and the State's climate goals.

Per statute, a contract with an offshore wind developer shall include a community benefit agreement that requires, among other things, that the developer provide a plan to:

1. Promote increased opportunities for local business and small, minority, women-owned and veteran-owned business in the clean energy industry;
2. Facilitate a steady supply of highly skilled craft workers who shall be paid not less than the prevailing wage rate determined by the Commissioner of Labor and Industry, Title 17, Subtitle 2 of the State Finance and Procurement Article;
3. Provide for financial and technical assistance to support monitoring and mitigation of wildlife and habitat impacts associated with the proposed offshore wind project;
4. Provide for mitigating the impacts of the construction and operation of the proposed offshore wind project on fisheries, which may include a description for how the project would follow the U.S. Bureau of Ocean Energy Management Draft Fisheries Mitigation Guidance;
5. Use domestic iron, steel and manufactured goods to the greatest extent practicable; and
6. Use locally and domestically manufactured construction materials and components.

HB 1296 amended the POWER Act to require a second solicitation before December 31, 2025. The amendment removed the upper limit to the amount of power DGS may purchase and since DGS' evaluation must consider the state's goal to reach 8,500 MW of offshore wind energy capacity by 2031, DGS could be in the position of purchasing more power than is used in state government operations. The result is that DGS is actively seeking off-takers to purchase any additional power.

FIGURE 11 DGS OFFSHORE WIND PROCUREMENT PROCESS[68]



Comparing ORECs with the DGS procurement method, there are two main differences. First, DGS's model is more akin to a PPA with the addition of potential off-taker agreements. Second, OREC compliance costs are ultimately paid for by ratepayers while the DGS procurement method is paid for with tax dollars by the State which may have serious implications for annual State budgets. Ratepayer funding comes from utility bills which do not currently account for the income of the customer. Tax dollars are paid by taxpayers based on their income which is more equitable for low-income taxpayers. While neither method is perfect, it may be worth exploring additional ways to address renewable energy and climate cost impacts to low- and moderate-income customers via their utility rates.

[68] Agreements with off-takers - DGS enters contracts with one or more entities to sell excess power.
Anchor PPA - DGS enters a PPA with the developer to purchase offshore wind power bundled with RECs.
EPC Costs - Developer builds facility.
Generated Energy to Delivery Point - Seller schedules the Facility's power in the PJM market.
Market Price - PJM purchases the power at the point of interconnection.
Refund Market Price - Developer refunds the power payments from PJM. The Load Serving Entity (LSE) manages the financial transaction and apportions the funds to DGS and the off-takers.
Transfer RECs - RECs are transferred from the developer to DGS and off-takers. The LSE manages the transfers. The LSE retires and/or sells RECs for DGS.
Power transfer in the load zone - DGS and off-takers purchase power in their respective load zones. The LSE manages the power transfer for DGS. The off-takers transfer power from PJM directly into their subaccounts.
Power payment at market rates in the load zone - DGS and off-takers pay PJM for power. The LSE manages DGS's financial transactions. The off-takers pay PJM directly.

Section 10: Maryland Offshore Wind Procurement Schedule

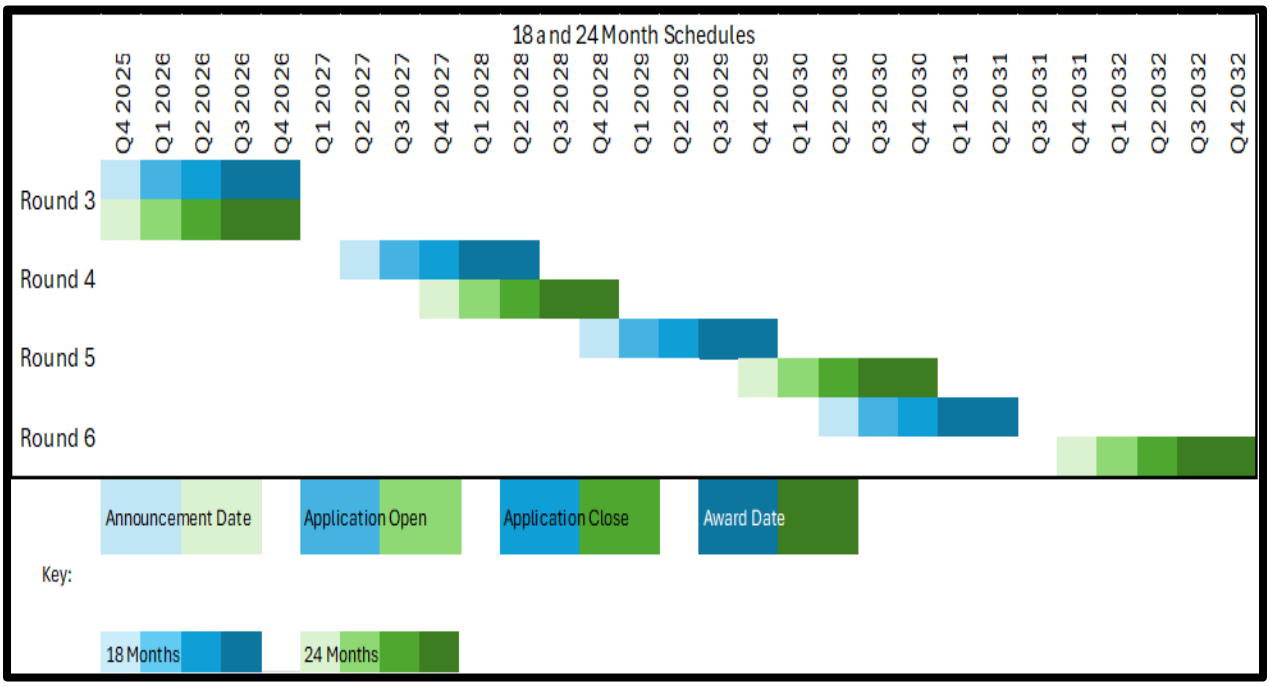
10.1 Procurement Schedules

HB 1296 requires the state agencies to develop "a schedule of offshore wind energy procurements and proposed amounts of offshore wind energy for procurement through 2031." After reviewing the input from PC 63 and best practices from around the country, the state agencies recommend the General Assembly adopt a new procurement schedule. The State should continue to use the OREC model with some updates discussed in Section 11. Proposed schedules occurring on an 18-month and 24-month frequency are highlighted below in *Table 6*.

TABLE 6 MARYLAND OFFSHORE WIND PROCUREMENT SCHEDULE

18-Month Frequency						
Round	Capacity Goal (MW)	Announcement Date	Application Open	Application Close	Award Date	Estimated COD Date
3	800 - 2,400	Q4 2025	Q1 2026	Q2 2026	Q4 2026	2031 - 2032
4	800 - 2,400	Q2 2027	Q3 2027	Q4 2027	Q2 2028	2033 - 2034
5	800 - 2,400	Q4 2028	Q1 2029	Q2 2029	Q4 2029	2035 - 2036
6	800 - 2,400	Q2 2030	Q3 2030	Q4 2030	Q2 2031	2037 - 2038
24-month Frequency						
Round	Capacity Goal (MW)	Announcement Date	Application Open	Application Close	Award Date	Estimated COD Date
3	800 - 2,400	Q4 2025	Q1 2026	Q2 2026	Q4 2026	2031 - 2032
4	800 - 2,400	Q4 2027	Q1 2028	Q2 2028	Q4 2028	2033 - 2034
5	800 - 2,400	Q4 2029	Q1 2030	Q2 2030	Q4 2030	2035 - 2036
6	800 - 2,400	Q4 2031	Q1 2032	Q2 2032	Q4 2032	2037 - 2038

FIGURE 12 *18- AND 24-MONTH PROCUREMENT SCHEDULES*



The proposed 18-month offshore wind schedule would enable the completion of four additional rounds (3, 4, 5, and 6) of offshore wind procurement through December 2031, while the proposed 24- month offshore wind procurement schedule would enable the completion of three additional rounds (3, 4, and 5).

10.2: OREC Application Schedule

The application and review process for each round of offshore wind procurement is based on the Commission's existing OREC Application and Review schedule. This OREC Application Schedule was adopted in the Code of Maryland Regulations (COMAR) 20.61.06.01 at the conclusion of Rulemaking 75 (RM 75) in 2023. The OREC Application process schedule can be found below in Table 7 below.

TABLE 7 OREC APPLICATION SCHEDULE

Event	Date[69]	Days
(Optional) Commission Notice of Application Period	November 2	(60)
Application Period Opens	January 1	0
Application Period Closes	May 1	120
Administrative Completeness Deadline	May 31	150
Commission Order Deadline	November 27	330

[69] Dates will need to be adjusted during a leap year including 2028, 2032, 2036 and so on.

The state agencies note that this recommendation does not imply that ORECs are the only path forward. Particularly, the DGS procurement method could also be a viable option in the future. At the time of this report, DGS has not concluded its first round of offshore wind procurement. Once additional information is available, it could be worth revisiting if the DGS procurement method should be incorporated into the State's offshore wind procurement schedule in the future depending on the results of the first round.

Section 11. Recommendations - OREC Program Modernization

11.1: Overall Process Recommendations

1. Authorize Additional Rounds of OREC Procurement to reach 8.5 GW approved by 2031 and operational by 2035 or 2040

   The General Assembly should adopt the OREC program as the primary offshore wind procurement mechanism for the State. The Commission should be given specific authority by the legislature to procure up to 8.5 GW of offshore wind capacity through additional OREC application rounds (Rounds 3, 4, 5, and 6). It may be prudent to update the language in statute to denote that projects should be approved by 2031 and operational by 2035 or 2040. Similar legislative authority is not needed for DGS' pilot offshore wind procurement mechanism as HB 1296 removed the upper limits on that mechanism.

2. OREC Procurement Schedule

   The General Assembly should give specific authority to the Commission to adopt, by order or regulation, either the 18-month or 24-month schedule specified earlier in this report. The State agencies further recommend the legislature should not prescribe an offshore wind schedule in statute, only the frequency the procurements should occur (e.g. 18- or 24-month schedule). This would afford the Commission ample flexibility to respond to unforeseen events as it holds additional OREC application periods. Formally authorizing the Commission to establish an OREC schedule would provide transparency and market certainty for developers and manufacturers to plan project development and investments in the supply chain and workforce. The Commission should be afforded flexibility to adjust the schedule as needed to account for the DGS procurement mechanism and any unforeseen issues.

3. Authorize Multi-Jurisdictional OREC Procurements

The General Assembly should specifically authorize the Commission to enter into agreements to participate in a multi-jurisdictional offshore wind procurement process. The benefit of a multi-jurisdictional procurement is that it allows states to procure offshore wind in larger amounts at a lower cost which can result in reduced ratepayer impacts and increased supply chain investment and job creation for the region. Multi-jurisdictional offshore wind procurements have already occurred in New England where Massachusetts, Rhode Island, and Connecticut recently announced an award of 2.8 GW of capacity.[70]

In 2020, Virginia, North Carolina, and Maryland signed an MOU creating the Southeast and Mid-Atlantic Regional Transformative Partnership for Offshore Wind Energy Resources (SMART-POWER). The SMART-POWER Agreement provides the framework for collaboration between the three states on offshore wind generation, supply chain, and workforce development; however, the agreement does not address multi-jurisdictional offshore wind procurement.[71]

The State agencies recommend MEA and the Commission initiate discussions with other SMART-POWER states to include multi-jurisdictional offshore wind procurement as a topic of the collaboration. Further, it could be beneficial for the SMART-POWER states to reach out to additional states, such as Delaware and New Jersey, and invite them to the partnership. If multi-jurisdictional offshore wind procurement is agreed upon as a new topic by the SMART-POWER states, then the existing MOU would need to be amended. If additional states are added to the partnership, all existing SMART-POWER states would need to agree. If the SMART-POWER states cannot agree on adding the multi-jurisdictional offshore wind procurement and additional states to the agreement, then a new MOU may need to be created between interested states. Multi-jurisdictional offshore wind procurements may be pursued in tandem with multi-jurisdictional transmission procurements discussed in Recommendation 13.

[70] Massachusetts, Rhode Island, and Connecticut Sign First-Time Agreement for Multi-State Offshore Wind Procurement. Mass.gov. (2023, October 4). https://www.mass.gov/news/massachusetts-rhode-island-and-connecticut-sign-first-time-agreement-for-multi-state-offshore-wind-procurement.

[71] Maryland Energy Administration. (n.d.). SmartPower Fact Sheet. https://energy.maryland.gov/SiteAssets/Pages/Info/renewable/offshorewind/SmartPower%20Factsheet%20(4).pdf.

4. Replace Ratepayer Impact Caps with Societal Cost Test

The General Assembly should discontinue use of the ratepayer impact caps in future OREC application rounds. The ratepayer impact caps should be replaced with a benefits-cost analysis (BCA) which are widely used for large energy infrastructure projects and general business decisions. The ratepayer impact caps provide advance notice of the maximum amount the state will allow offshore wind developers to recoup project costs from Maryland electric ratepayers; however, the ratepayer impact caps also limit offshore wind projects from reaching economies of scale (at least 1,000 MW) and undermine the role and responsibility of the Office of People's Counsel (OPC) and other parties during OREC application proceedings.

There are multiple types of BCAs. The Commission has utilized BCAs in EmPOWER Maryland, its Electric Vehicle pilot, its Energy Storage pilot, and other proceedings. The Commission has also undertaken a Unified Benefit Cost Analysis (UBCA) proceeding to enable a similar methodology to be used across cases at the Commission for a variety of renewable, clean, and distributed energy resources.[72] Utilizing the UBCA methodology for future OREC proceedings would align the review process with the existing requirement that all offshore wind projects be a net benefit to Maryland's economy, environment, and public health. The Commission and other participating agencies including the Commission's Technical Staff, OPC, and MEA would retain their respective discretion regarding projected ratepayer impacts from OREC approvals.

5. Remove the OREC Price Cap

The General Assembly should remove the OREC price cap of $190 (2012$). When MOSWEA was enacted in 2013, the OREC price cap was a necessary and useful tool to limit costs to electric ratepayers in the State; however, it quickly became irrelevant as project costs declined rapidly in the following years. Similar to the ratepayer impact caps, the OREC price cap provides advance notice of the maximum amount the state is willing to pay. The OREC Price cap may also undermine the role and responsibility of the Commission and other participating state agencies during OREC application proceedings. Removing the OREC Price cap would provide the Commission with greater discretion during future OREC application periods.

[72] Case No. 9674. https://webpscxb.psc.state.md.us/DMS/case/9674.

6. OREC Price Indexing

The General Assembly should enable the OREC price to include price indexing based on inflation, interest rates, and engineering, procurement, and construction (EPC) costs. Since 2022, the offshore wind industry has faced economic headwinds resulting from high inflation, increases in interest rates, and global supply chain bottlenecks. These economic pressures have led offshore wind projects to renegotiate contracts or cancel projects altogether. In response, many states with offshore wind procurements began including price indexing into their project pricing. Price indexing allows the approved project cost ($/MWh) to float up or down as offshore wind project capital costs fluctuate in the time between project approvals and final investment decisions as they can occur years apart. Some states have instituted a cap on price indexing including Massachusetts which capped it to a 15 percent increase. Maryland should specifically authorize OREC price indexing through legislation and cap it to a 15 percent increase; however, there should be no cap on a decrease. This will necessitate a change to the OREC price schedule and may require additional review; however, this should be left to the Commission's discretion.

7. OREC Price Schedule Flexibility

The General Assembly should increase the OREC price schedule length from 20 years to 30 or 35 years. Increasing the length of the OREC price schedule would not change the overall cost of an offshore wind project; however, it would decrease residential and non-residential ratepayer impacts on a monthly and annual basis. A longer OREC price schedule would guarantee project revenues on a longer time frame which would also reduce financial risk to developers as they could arrange project financing over a longer time period.

8. Withdrawal Process

The General Assembly should authorize the Commission to adopt, by order or regulation, an OREC withdrawal and cancellation process. In January 2024, one of Maryland's offshore wind developers withdrew its projects from the OREC program. The main issue is that Maryland offshore wind statute and regulations are silent on the process and requirements of a withdrawal process, so it was handled purely at the Commission's discretion. While the developer provided an explanation and justification for its withdrawal, little to no verifiable evidence and documentation was provided to confirm the developer's statements. The OREC program should include a formal

withdrawal process with verifiable documentation requirements; however, this process may require input from other stakeholders.

The General Assembly should allow the Commission and other participating stakeholders to determine any penalties during an OREC withdrawal or cancellation review. Some state offshore wind procurement mechanisms have implemented strict penalties on developers that withdraw or cancel project contracts or approvals. The most notable example is Ørsted's $125 million penalty payment to New Jersey for the cancellation of the Ocean Wind 1 and 2 projects. Ultimately, these penalty costs will be recouped through future project costs once the offshore wind project is rebid into a future procurement process. This artificially increases the cost of offshore wind development and ratepayer impacts and should be avoided.

9. Change 'Sell' to 'Offer'

PUA §7–704.2(c)(3)(i) requires qualified offshore wind projects to sell all energy, capacity, and ancillary services associated with the creation of ORECs into the markets operated by PJM for each OREC that projects receive payment. The General Assembly should modify the word "sell" to "offer." This change helps to eliminate potential legal issues and issues for future projects in the PJM interconnection queue.

11.2: Application Requirement Recommendations

10. Establish a $3 million OREC Application Deposit

The General Assembly should create a new OREC Program requirement that developers provide a $3 million application deposit into an escrow account. The purpose of the application deposit is to reimburse the State for resources expended during the OREC application review process if the developer withdraws from the program or cancels the project. If the developer does not withdraw or cancel the project, then the deposit shall be returned to the developer once the project reaches commercial operation. The deposit can be held in escrow by the Commission or the OREC escrow account administrator if one has already been selected by the Commission.

11. Replace OSWBDF Deposit Formula

The General Assembly should replace the formula governing developer payments into the Maryland Offshore Wind Business Development Fund (OSWBDF) administered by

MEA. The OREC program currently requires offshore wind developers that receive an OREC approval to deposit $6 million into the OSWBDF over the course of two years.[73] The main issue with this flat deposit is that large and small project approvals are treated the same despite placing differing demands on the local offshore wind supply chain and workforce. A more progressive and responsive formula would require developers to deposit $10,000 per MW of approved capacity. The deposit could be made over several years; however, the deposit should not be waived if a developer withdraws from the OREC program or cancels the project. The OSWBDF is administered by MEA and supports the agency's grant programs to support offshore wind supply chain, workforce, and education programs in the State.[74] This includes the Maryland Offshore Wind Supply Chain Investment Program and the Maryland Offshore Wind Education and Workforce Training Program.

12. Establish Offshore Wind Environmental Science Fund at DNR

The General Assembly should create a new Offshore Wind Environmental Science Fund at DNR. The purpose of the Science Fund is to finance research projects focusing on the nexus between the offshore wind industry and the environment, ecosystems, habitats, wildlife, and fisheries and other similar topics. DNR should also be given specific authority to utilize the science fund to participate and coordinate with inter-governmental and regional initiatives or organizations' activities that align with the purpose of the fund. The Science Fund would receive funding through future OREC project approvals. The OREC Program should require a Science Fund deposit formula of $5,000 per MW of approved capacity. The deposit could be made over several years; however, the deposit should not be waived if a developer withdraws from the OREC program or cancels the project. DNR should be required to coordinate with the Commission, MEA, and other interested state agencies on the use of the Science Fund.

11.3: Transmission Interconnection Recommendations

13. Point of Interconnection: Definition of Qualified Offshore Wind Project

The current definition for a qualified offshore wind project requires interconnection at a point located on the Delmarva Peninsula or through an offshore wind transmission

[73] The OSWBDF was created by MOSWEA legislation in 2013 and is not a sub account of the Strategic Energy Investment Fund.

[74] This deposit formula is based on a similar formula implemented by New Jersey and New York; however, funding is directed towards environmental science research.

project selected by the Commission under the POWER Act.[75] As discussed earlier in this report, there are limitations to the current points of interconnection and transmission infrastructure available on the Delmarva Peninsula. To ensure the State is able to meet its 8,500 MW goal, it may be worth exploring expanding interconnection options to expand opportunities for future projects. For the current definition, some potential options are:

a. Removing the requirement in PUA §7–701(k)(2)(i) altogether; or

b. Changing the requirement in PUA §7–701(k)(2)(i) from Delmarva Peninsula to Maryland (in its entirety) and the Delmarva Peninsula.

These could be limited to projects that utilize radial connections to allow more flexibility for projects using multi-state or multi-jurisdictional offshore transmission networks. Ultimately, the State should consider expanding transmission options within Maryland to maximize the benefits of future offshore wind projects that are delivered to ratepayers.

14. Multi-State/Multi-Jurisdictional Transmission Systems

The General Assembly should authorize the Commission and MEA to enter into agreements on behalf of the State regarding multi-jurisdictional offshore wind transmission procurements. The optimal long-term transmission solution for the State and the region would likely be an offshore transmission network as it may lead to lower transmission costs and grid efficiencies. This will require the support and participation of other states, RTOs/ISOs, and potentially the federal government.

SMART-POWER could be expanded to include multi-jurisdictional transmission planning as a topic of the collaboration. Additionally, it could be beneficial for the SMART-POWER states to reach out to additional states, such as Delaware and New Jersey, to invite them to the partnership. If multi-jurisdictional transmission procurements are agreed upon as a new topic for the SMART-POWER states, then the MOU would need to be amended. If the SMART-POWER states cannot agree on adding the transmission issue, then a new MOU may need to be created between interested states. Multi-jurisdictional transmission procurements may be pursued in tandem with multi-jurisdictional offshore wind procurements previously discussed in Recommendation 3.

[75] PUA §7–701(k)(2).

11.4 Other Recommendation

15. Condense Offshore Wind Supplier Diversity and Minority Business Enterprise Reports into One Report

    PUA §7–704.1(g)(3) requires the Commission to report to the Governor and General Assembly on the compliance of approved offshore wind projects with the minority business enterprise participation goals outlined in statute. PUA §7–704.5 requires the Commission to report to the General Assembly on the information collected under the Commission's Supplier Diversity Program regarding offshore wind developers. The General Assembly should modify either statute to condense the reports into one report. Both reports include similar information pulled from the semi-annual reports filed with the Commission by the approved offshore wind projects. The Commission could include all the information from both reports in one report filed by December 31 of each year to ensure the Governor and General Assembly receive the information before the start of the next legislative session.

Appendix A: PC 63 Comment Summary

The Commission received several comments through PC 63 addressing issues related to the procurement process, transmission, and economic development. The Commission received comments from a total of six respondents; however, two respondents marked their comments as confidential. Regarding the procurement process, there were four general themes and recommendations throughout the public comments.

1. Two traits are requested in future procurement processes: transparency and flexibility. Transparency gives developers more certainty on the expectations of the process and the likely outcomes. Flexibility gives developers the opportunity to propose creative solutions to the issues the State would like addressed.
2. There should be a clear schedule that developers can easily follow.
3. The financing mechanism should include risk sharing mechanisms like inflation adjustments or interest rate true-ups and be for longer periods of time such as 30 years instead of the current 20 years for ORECs.
4. The entity overseeing the procurement process should have full authority to make decisions and the evaluation criteria used to evaluate proposals should be clear and upfront.
5. The terms of the funding mechanism should be binding and provide certainty to the awardee.
6. Multi-state procurements are recommended. A single procurement mechanism would need to be agreed upon by all participating states with the rules for the process set in advance.
7. Price caps, 20-year awards, and rigid commercial operation date requirements should be removed from statute.
8. Each round of procurement should set a minimum goal to award 800 - 1,000 MW with the ability to procure more so as not to limit the State.
9. Procurements should occur every 18 - 24 months.

In terms of transmission, the comments echoed how important transmission is to the development of future offshore wind projects. While the transmission study required by the POWER Act is currently underway with the Commission, MEA, and PJM, comments stressed the need to continue with that process. There were also recommendations to increase the flexibility of where projects can interconnect or remove the requirement to interconnect into the Delmarva Peninsula entirely.

For economic development, there were recommendations to separate the economic needs of the State from the generation procurements with a separate process. Developers also request the State conduct its own supply chain and workforce development mapping that developers

can use when coming up with proposals. MEA worked with NREL on this mapping and the finished report will be available in 2025.

Appendix B: Summary of BOEM Review Status by Project/Lease Area[76,77,78]

The projects in Table 8 are operational and generating electricity. Block Island was the first project completed in the United States while South Fork is the first utility-scale project completed.

TABLE 8 OPERATIONAL PROJECTS

Project Name	Lease Number	Leaseholder	Location	State Financing Mechanism	Capacity (MW)
Block Island Wind Farm	N/A (State Lease)	Ørsted	Rhode Island	PPA with RI	30 MW
Coastal Virginia Offshore Wind (Pilot)	OCS-A 0497	Dominion Energy	Virginia	Utility Rate Recovery	12 MW
South Fork Wind Farm	OCS-A 0517	Ørsted & Eversource	Rhode Island/ Massachusetts/ Connecticut	OREC with NY	132 MW

The projects in Table 9 have completed the full review process with BOEM including their environmental reviews and construction and operation plans (COP) approved. They can begin construction and move into operations upon completion. Several projects are in the process of finalizing or renegotiating state financing agreements prior to proceeding with construction.

[76] Offshore Wind Projects. Northeast Ocean Data Portal. (2024). https://www.northeastoceandata.org/offshore-wind-projects/.
[77] Offshore Renewable Activities. Bureau of Ocean Energy Management. (2023, September 27). https://www.boem.gov/renewable-energy/offshore-renewable-activities.
[78] The National Renewable Energy Laboratory. (2024, August). Offshore Wind Market Report: 2024 Edition. https://www.nrel.gov/docs/fy24osti/90525.pdf, pages 10-21.

TABLE 9 PROJECTS WITH APPROVED PERMITTING

Project Name	Lease Number	Leaseholder	Location	State Financing Mechanism	Capacity (MW)
Vineyard Wind 1	OCS-A 0501	Avangrid	Rhode Island/ Massachusetts/ Connecticut	PPA with MA	806 MW
Ocean Wind 1	OCS-A 0498	Ørsted	New Jersey	N/A	1,100 MW
Revolution Wind	OCS-A 0486	Ørsted	Rhode Island/ Massachusetts/ Connecticut	PPA with RI (400 MW) and PPA with CT (304 MW)	704 MW
Coastal Virginia Offshore Wind (Commercial)	OCS-A 0483	Dominion Energy	Virginia	Utility Rate Recovery	2,600 MW
Empire Wind 1 and Empire Wind 2	OCS-A 0512	Equinor	New York	OREC with NY	810 MW (1) and 621 (2): 1,431 MW total
Sunrise Wind	OCS-A 0487	Ørsted	Rhode Island/ Massachusetts/ Connecticut	OREC with NY	924 MW
New England Wind 1	OCS-A 0534	Avangrid	Massachusetts	PPA with MA	791 MW
New England Wind 2	OCS-A 0561	Commonwealth Wind LLC	Massachusetts	TBD	853 MW
Atlantic Shores South	OCS-A 0499	Shell & EDF Renewables	New Jersey	OREC with NJ	1,510 MW
MarWin and Momentum Wind	OCS-A 0490	US Wind Inc.	Maryland	OREC with MD	1,710 MW

The projects in Table 10 have submitted their construction and operation plans for BOEM review and are at various stages of review. Some projects may also be undergoing state financing mechanism reviews simultaneously or have already been approved by a state for financing.

TABLE 10 PROJECTS UNDERGOING REVIEW

Project Name	Lease Number	Leaseholder	Location	State Financing Mechanism	Estimated Capacity (MW)	Status
SouthCoast Wind	OCS-A 0521	EDP Renewables and ENGIE	Rhode Island/ Massachusetts/ Connecticut	PPA with MA	1,087 MW	Draft Environmental Impact Statement (EIS)
Coastal Virginia Offshore Wind South (formerly Kitty Hawk North)	OCS-A 0559	Dominion Energy	Virginia/North Carolina	Utility Rate Recovery	631 MW	Notice of Intent (NOI) to Prepare an EIS
Kitty Hawk South	OCS-A 0508	Avangrid	North Carolina	TBD	1,351 MW	NOI
Atlantic Shores North	OCS-A 0549	Shell & EDF Renewables	New Jersey	TBD	1,313 MW	NOI
Vineyard Northeast	OCS-A 0522	Vineyard Northeast LLC	Rhode Island/ Massachusetts/ Connecticut	TBD	2,600 MW	NOI
Beacon Wind	OCS-A 0520	BP	Rhode Island/ Massachusetts/ Connecticut	TBD	2,085 MW	Final Environmental Assessment (EA) for Additional Site Assessment Activities
Skipjack Wind 1 & 2	OCS-A 0519	Ørsted	Delaware	TBD	968 MW	COP Withdrawn
Garden State Offshore Energy	OCS-A 0482	Ørsted	Delaware	TBD	1,080 MW	COP Submitted
Excelsior Wind	OCS-A 0544	Vineyard Mid-Atlantic LLC	New York	TBD	697 MW	Site Assessment Plan (SAP) Approved
Leading Light Wind	OCS-A 0542	Invenergy Wind Offshore, LLC and energyRe	New Jersey	TBD	2,100 - 2,400 MW	Letter in lieu of SAP being reviewed[79]

[79] Projects can determine if they would like to use existing data or obtain new data. A letter in lieu of a site assessment plan indicates the project plans to use existing data instead of obtaining new data.

Attentive Energy 1	OCS-A 0538	Attentive Energy LLC	New Jersey	TBD	1,365 MW	SAP Approved
Attentive Energy 2	OCS-A 0538	Attentive Energy LLC	New Jersey	OREC with NJ	1,342 MW	SAP Approved
Atlantic Shores Offshore Wind Bight	OCS-A 0541	Atlantic Shores Offshore Wind Bight, LLC	New Jersey	OREC with NJ	1,510 NW	SAP Submitted
Bluepoint Wind	OCS-A 0537	Bluepoint Wind, LLC	New York	TBD	1,158 MW	Letter in lieu of SAP being reviewed

Table 11 describes other lease areas, wind energy areas, and call areas currently in the planning process with BOEM.

TABLE 11 OTHER LEASE AREAS, WIND ENERGY AREAS, AND CALL AREAS

Name	Lease Number	Leaseholder	Location	Estimated Capacity (MW)	Description
Gulf of Maine Research Lease	OCS-A 0553	State of Maine	Maine	144	Floating offshore wind energy research lease.
Bay State Wind	OCS-A 0500	Bay State Wind LLC	Rhode Island/ Massachusetts/ Connecticut	2,334 MW	No official activity on BOEM website.
Community Offshore Wind	OCS-A 0539	Community Offshore Wind, LLC	New Jersey	1,314 MW	No official activity on BOEM website.
Ocean Wind 2	OCS-A 0532	Ørsted	New Jersey	1,375 MW	No official activity on BOEM website.
TotalEnergies Carolina Long Bay	OCS-A 0545	TotalEnergies Carolina Long Bay, LLC	North Carolina/ South Carolina	889 MW	Early Development Phase
Cinergy Corp	OCS-A 0546	Cinergy Corp	North Carolina/ South Carolina	893 MW	Early Development Phase
Equinor	OCS-A 0557	Equinor	Delaware	1,642 MW	Early Development Phase
Dominion	OCS-A 0558	Dominion	Virginia	2,857 MW	Early Development Phase

Avangrid	OCS-A 0564 and OCS-A 0568	Avangrid	Maine	1,786 MW and 2,172 MW	Early Development Phase
Invenergy NE Offshore Wind, LLC	OCS-A 0562 and OCS-A 0567	Invenergy NE Offshore Wind, LLC	Maine	1,964 MW and 1,993 MW	Early Development Phase
Gulf of Mexico	OCS-G 37334	N/A	Gulf of Mexico	1,659 MW	Request for Competitive Interest
Invenergy California Offshore LLC	OCS-P 0565	Invenergy California Offshore LLC	California	1,302 MW	Early Development Phase
Golden State Wind LLC	OCS-P 0564	Golden State Wind LLC	California	l 1,302 MW	Early Development Phase
Atlas Offshore Wind LLC	OCS-P 0563	Atlas Offshore Wind LLC	California	1,296 MW	Early Development Phase
California North Floating LLC	OCS-P 0562	California North Floating LLC	California	1,117 MW	Early Development Phase
Canopy Offshore Wind, LLC	OCS-P 0561	Canopy Offshore Wind, LLC	California	1,025 MW	Early Development Phase