

# Fall, 2021 Offshore Wind Update

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## 1. Introduction

I've seen evidence that the projects covered in similar earlier posts are making progress. I've also found an excellent DOE Source on Offshore Wind referenced here<sup>1</sup> and this will provide most of the content in this post. Last similar posts are linked below:

<https://energycentral.com/c/cp/2021-east-coast-offshore-wind-update>

<https://energycentral.com/c/cp/2021-offshore-wind-%E2%80%93-west-coast-turbines-and-other-developments>

## 2. U.S. Offshore Wind, In General

First I need to clarify some terms that are used when discussing offshore wind energy.

### 2.1. Federal Leasing Process

**Bureau of Ocean Energy Management (BOEM)** oversees leasing of the **Outer Continental Shelf (OCS)** energy and mineral resources in an environmentally and economically responsible way. This includes administering the leasing program for OCS renewable energy resources...<sup>2</sup>

The OCS consists of the seabed lying seaward of State submerged lands and extending to the outer limits of United States jurisdiction (at least 200 nautical miles from the coast)... BOEM divides the OCS into 26 **planning areas**. Planning areas are an administrative division used as the initial basis for considering what areas to lease.

**Wind Energy Area (WEA):** BOEM works with its Federal, state, local, and tribal partners to identify areas of the... OCS that appear most suitable for commercial wind energy activities, while presenting the fewest apparent environmental and user conflicts.

A **lease sale** is the process by which BOEM provides the right to apply for authorization to explore and develop the resources within the leased area. Typically, a lease sale consists of many **OCS blocks**. Each block covers an area that is no more than 5,760 acres (a three-mile by three-mile area).

**Call for Information and Nominations (or "Call")?** The purpose of the Call is to gauge specific interest in acquiring commercial wind leases in one or more specific "**Call Areas**."

Once a given lease is identified, an auction is conducted and a given potential developer is awarded the lease. There are still many processes for the developer to go through before the final approval to start the development can be granted. There are also other stake-holders with their own processes and approvals. See the figure below for current projects and areas.

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<sup>1</sup> See pages ii through v for the authors of this document, U.S. Department of Energy, Office of Renewable Energy and Energy Efficiency (EERE), "Offshore Wind Market Report: 2021 Edition,"

[https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition\\_Final.pdf](https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition_Final.pdf)

<sup>2</sup> <https://www.boem.gov/renewable-energy/renewable-energy-program-overview>

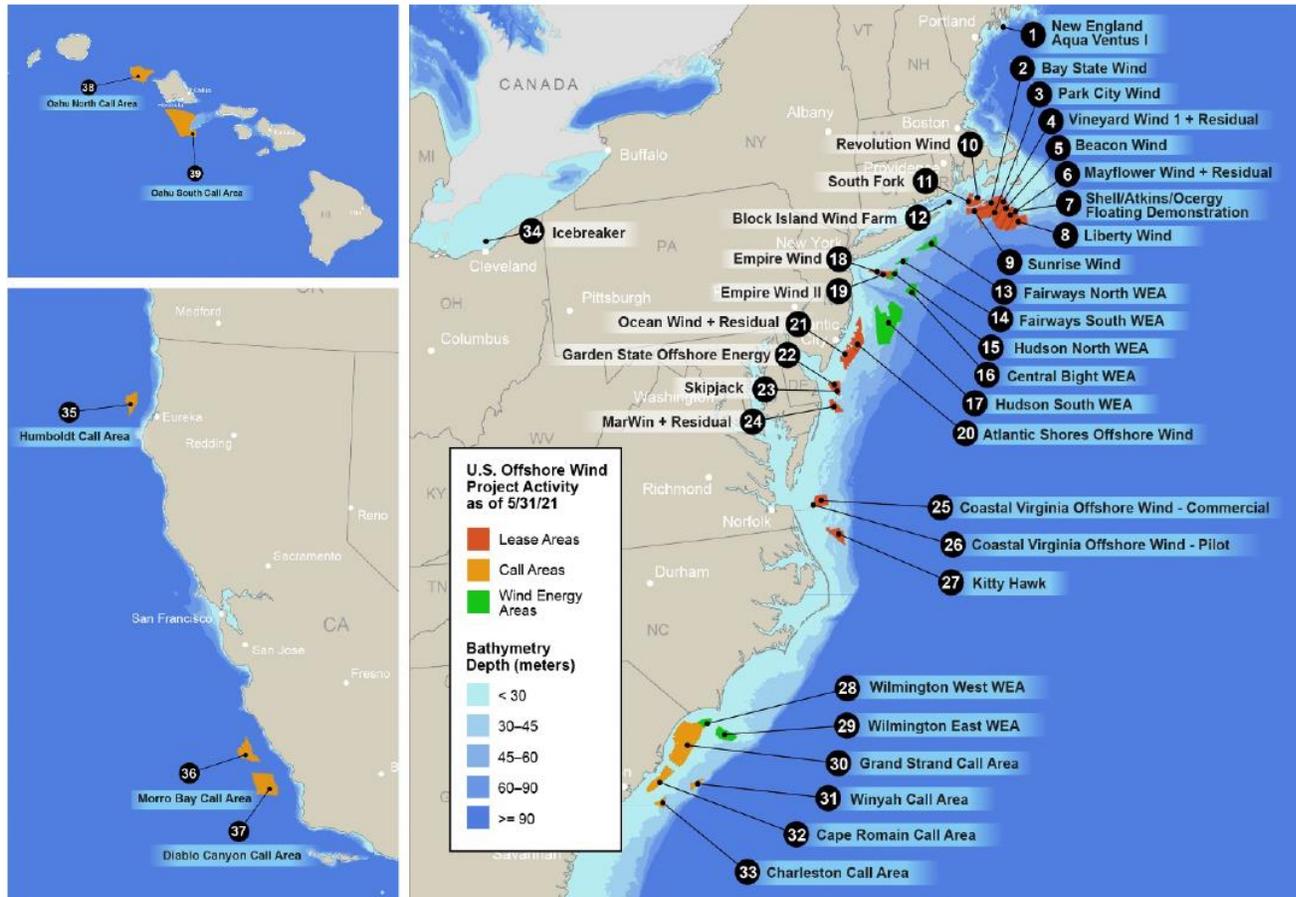


Figure ES-1. Locations of U.S. offshore wind pipeline activity and Call Areas as of May 31, 2021. Map created by NREL

## 2.2. U.S Market

In 2020, the U.S. offshore wind energy project development and operational pipeline grew to a potential generating capacity of 35,324 megawatts (MW). Specifically, the pipeline experienced a 24% increase in 2020, up from 28,521 MW in 2019. The 35,324 MW that make up the U.S. offshore wind energy project pipeline comprise two operating projects: the Block Island Wind Farm (30 MW) and the Coastal Virginia Offshore Wind pilot project (12 MW). Beyond this, one project, Vineyard Wind 1 [800 MW] is fully approved, and has received all permits, an offtake contract to sell the power, and an interconnection agreement to deliver it to the grid. In addition, there are 15 projects in the pipeline that have reached the permitting phase, with either a **Construction and Operations Plan (COP)** or an **offtake agreement** for the sale of electricity, 16 commercial leases in federal waters that have gained exclusive site control, and seven wind energy areas that can be leased at the discretion of the federal government in the future. BOEM has also designated nine Call Areas where future offshore wind energy development is being considered. The pipeline includes three projects located in state waters: the operating Block Island Wind Farm, the Aqua Ventus I floating-wind project in Maine, and the Lake Erie Energy Development Corporation Icebreaker Wind project. A map of the current pipeline activity is shown in Figure ES-1 (above).<sup>1</sup>

Further, the Biden Administration announced a 30-gigawatt (GW)-by-2030 national offshore wind energy goal and states continue to adopt their own offshore wind procurement mandates. The federal target to install 30 GW of capacity by 2030 is the first U.S. national offshore wind energy goal. To make progress toward this goal, BOEM aims to evaluate at least 16 Construction and Operations Plans by 2025 and work with the U.S. Department of Energy, U.S. Department of Commerce, and industry stakeholders to minimize environmental impacts and ensure the coexistence of offshore wind energy with other ocean users. Beyond the national level goal, states are aiming to procure at least 39,298 MW of offshore wind capacity by 2040. These federal and state deployment goals can help provide the U.S. offshore wind industry with more confidence that a sustained market will develop, increasing new investment in domestic manufacturing, vessels, and ports necessary for sustained, long-term deployment.

## 2.3. Cost and Price Trends

The levelized procurement price of U.S. offshore wind energy projects ranges between \$96/MWh (Vineyard Wind 1) and \$71/MWh (Mayflower Wind) for projects commencing commercial operations between 2022 and 2025. These prices from power purchase agreements and offshore renewable energy certificates are based on a total of 5.5 GW of signed agreements. Mayflower Wind's (all-inclusive) procurement price of \$71/MWh is among the lowest-priced offshore wind energy projects announced globally.<sup>1</sup>

## 3. Projects Status

The one most imminent project is reviewed below. All projects and pre-project areas are described on the tables on the pages 5 & 6.

### 3.1. East Coast

#### 3.1.1. Vineyard Wind

Vineyard Wind 1 became the first fully approved commercial offshore wind energy project in the United States. After 3 years of review, Avangrid and Copenhagen Infrastructure Partners' 800-MW Vineyard Wind 1 project received a Record of Decision, indicating the approval of the project's COP in May 2021. The project had previously completed state and local permitting requirements in June 2019 and received an interconnect agreement from the Independent System Operator-New England in July 2020. With a revision to its COP in December 2020, Vineyard Wind reported it was switching from MHI-Vestas 9.5-MW wind turbines to GE 13-MW Haliade-X wind turbines. The project has reported plans to be fully connected to the grid by 2024. <sup>1</sup>

The subcontractors for this project are starting to receive their notices to proceed:

Prysmian obtains the notice to proceed for the \$230 million cabling project.<sup>3</sup>

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<sup>3</sup> Windfair, News Release from Prysmian Group, "Vineyard offshore wind farm project in the US goes forward," Oct 1, 2021, <https://w3.windfair.net/wind-energy/pr/38865-prysmian-vineyard-wind-usa-wind-farm-offshore-commercial-scale-cables-energy-cables-cable-system-connection-installation>

*Under the contract awarded in 2019, by Vineyard Wind, LLC, a US offshore wind development owned by funds of Copenhagen Infrastructure Partners and by Avangrid Renewables (part of the Iberdrola Group), Prysmian Group will develop a submarine power cable system project which will deliver clean energy to the mainland power grid. The Group is responsible for the design, manufacture, installation and commissioning of an HVAC (High Voltage Alternating Current) cable system composed of two 220 kV three-core cables utilizing extruded XLPE insulation. The project requires a total of 83 miles of power cables. The submarine cables will be produced in Prysmian Group's centers of excellence for the production of submarine cables in Pikkala, Finland, and Arco Felice, Italy. Installation operations will be performed by Prysmian Group's state-of-the-art cable laying vessels Cable Enterprise and Ulisse. Delivery and commissioning of the project are scheduled for Q4 2023.*

*Prysmian will also provide PRY-CAM permanent monitoring solutions, the Group's breakthrough technology that allows on-line, accurate and reliable in-depth information helping electric assets owners to increase uptime, asset longevity and safety, while reducing maintenance costs and risks.*

### **3.2. Infrastructure**

*Two U.S.-flagged offshore wind installation and support vessels were announced. Construction of the first U.S.-flagged wind turbine installation vessel, Charybdis, began at the Keppel AMFELS shipyard in Brownsville, Texas, in 2020. The new vessel is 472 feet long and designed by GustoMSC. Lloyd's Register and Northeast Technical Services Co., Inc. also announced plans to construct a U.S.-flagged wind turbine installation vessel; however, as of May 31, 2021, construction has not yet started.<sup>1</sup>*

## **4. Technology**

*The three leading wind turbine manufacturers have announced the development of larger offshore wind turbines ranging from 12- to 15-MW. The expected 12- to 15-MW offshore wind turbine class is now under full development, with Siemens Gamesa, Vestas, and GE all reporting their intention to have wind turbines at these nameplate ratings available for purchase by 2024 or sooner. U.S. orders indicate that most projects in the current pipeline will obtain wind turbines from one of these original equipment manufacturers.<sup>1</sup>*

## **5. Projects**

Note that the table on the following page was copied from reference 1, but first I moved it to Excel and did quite a bit of editing to make it smaller, eliminating rows that I thought held little value for my readers and making other changes to fit it on the page.

\	Location	Project Name	Developer	Status	Foundation Type	Wind Turbine	Offtake Agreement	Estimated Commercial Operation Date	Project Power (MW)
1	ME	New England Aqua Ventus I	Univ. of Maine/RWE/Mitsubishi	Permitting	Floating	TBD	PPA (ME)	2023	12
2	MA	Bay State Wind	Ørsted/Eversource	Site Control	Fixed Bottom	TBD	TBD	TBD	2,277
3	MA	Park City Wind	Avangrid/Copenhagen Infrastructure Partners	Permitting	Fixed Bottom	TBD	PPA (CT)	2025	804
4	MA	Vineyard Wind 1+Residual	Avangrid/Copenhagen Infrastructure Partners	Approved	Fixed Bottom	13-MW GE Haliade-X	PPA (MA)	2023	1221
5	MA	Beacon Wind	Equinor/BP	Permitting	Fixed Bottom	TBD	OREC (NY)	2026	1230
6	MA	Mayflower Wind + Residual	Energias de Portugal Renováveis/Shell	Permitting	Fixed Bottom	TBD	PPA (MA)	2025	1551
7	MA	Shell/Atkins/Ocergy Floating Demonstration	Shell/Atkins/Ocergy	Permitting	Floating	TBD	PPA (MA)	2025	10
8	MA	Liberty Wind	Avangrid/Copenhagen Infrastructure Partners	Site Control	Fixed Bottom	TBD	TBD	TBD	1607
9	MA	Sunrise Wind	Ørsted/Eversource	Permitting	Fixed Bottom	TBD	OREC (NY)	2024	880
10	RI	Revolution Wind	Ørsted/Eversource	Permitting	Fixed Bottom	8-MW SG DD-167	PPA (RI & CT)	2023	704
11	RI	South Fork	Ørsted/Eversource	Permitting	Fixed Bottom	TBD	PPA (NY)	2023	130
12	RI	Block Island Wind Farm	Ørsted/Eversource	Operating	Fixed Bottom	6-MW GE Haliade 150 m	PPA (RI)	2016	30
13	NY	Fairways North WEA	N/A	WEA	Fixed Bottom	TBD	N/A	N/A	1071
14	NY	Fairways South WEA	N/A	WEA	Fixed Bottom	TBD	N/A	N/A	289
15	NY	Hudson North WEA	N/A	WEA	Fixed Bottom	TBD	N/A	N/A	523
16	NY	Central Bight WEA	N/A	WEA	Fixed Bottom	TBD	N/A	N/A	1,028
17	NY	Hudson South WEA	N/A	WEA	Fixed Bottom	TBD	N/A	N/A	6,890
18	NY	Empire Wind	Equinor/BP	Permitting	Fixed Bottom	TBD	OREC (NY)	2024	816
19	NY	Empire Wind II	Equinor/BP	Permitting	Fixed Bottom	TBD	OREC (NY)	2028	1,260
20	NJ	Atlantic Shores Offshore Wind	EDF/Shell	Site Control	Fixed Bottom	TBD	OREC (NJ)	TBD	2,500
21	NJ	Ocean Wind + Residual	Ørsted/PSEG	Permitting	Fixed Bottom	13-MW GE Haliade-X	OREC (NJ)	2024	1,947
22	DE	Garden State Offshore Energy	Ørsted/PSEG	Site Control	Fixed Bottom	TBD	TBD	TBD	1,050
23	DE	Skipjack	Ørsted	Permitting	Fixed Bottom	13-MW GE Haliade-X	OREC (MD)	2026	120
24	MD	MarWin + Residual	US Wind	Permitting	Fixed Bottom	TBD	OREC (MD)	2023	966
25	VA	Coastal Virginia Offshore Wind - Commercial	Dominion Energy	Permitting	Fixed Bottom	14-MW SG 222 m	Utility Owned	2024	2,640
26	VA	Coastal Virginia Offshore Wind - Pilot	Dominion Energy	Operating	Fixed Bottom	6-MW SWT 164 m	Utility Owned	2021	12
27	NC	Kitty Hawk	Avangrid	Permitting	Fixed Bottom	TBD	TBD	2024	1,485
28	NC	Wilmington West WEA	N/A	WEA	Fixed Bottom	N/A	N/A	N/A	627
29	NC	Wilmington East WEA	N/A	WEA	Fixed Bottom	N/A	N/A	N/A	1,623
30	SC	Grand Strand Call Area	N/A	Call Area	Fixed Bottom	N/A	N/A	N/A	N/A
31	SC	Winyah Call Area	N/A	Call Area	Fixed Bottom	N/A	N/A	N/A	N/A
32	SC	Cape Romain Call Area	N/A	Call Area	Fixed Bottom	N/A	N/A	N/A	N/A
33	SC	Charleston Call Area	N/A	Call Area	Fixed Bottom	N/A	N/A	N/A	N/A
34	OH	Ice Breaker	LEEDCo/Fred Olsen	Permitting	Fixed Bottom	TBD	PPA	2023	21
35	CA	Humboldt Call Area	N/A	Call Area	Floating	N/A	N/A	N/A	N/A
36	CA	Morro Bay Call Area	N/A	Call Area	Floating	N/A	N/A	N/A	N/A
37	CA	Diablo Canyon Call Area	N/A	Call Area	Floating	N/A	N/A	N/A	N/A
38	HI	Oahu North Call Area	N/A	Call Area	Floating	N/A	N/A	N/A	N/A
39	HI	Oahu South Call Area	N/A	Call Area	Floating	N/A	N/A	N/A	N/A

See table below for the “Status” Column in the above table. See subsection 2.1 regarding Wind Energy Area and Call Area. Note that these are each a pre-lease status.

Step	Phase Name	Start Criteria	End Criteria
1	Planning	Starts when a developer or regulatory agency initiates the formal site control process	Ends when a developer obtains control of a site (e.g., through competitive auction or a determination of no competitive interest in an unsolicited lease area (United States only))
2	Site Control	Begins when a developer obtains site control (e.g., a lease or other contract)	Ends when the developer files major permit applications (e.g., a Construction and Operations Plan for projects in the United States)
3	Permitting = Site Control + Offtake Pathway	Starts when the developer files major permit applications (e.g., a Construction and Operations Plan and an offtake agreement for electricity production)	Ends when regulatory entities authorize the project to proceed with construction and certify its offtake agreement
4	Approved	Starts when a project receives regulatory approval for construction activities and its offtake agreement	Ends when sponsor announces a “financial investment decision” and has signed contracts for construction work packages
5	Financial Close	Begins when sponsor announces a financial investment decision and has signed contracts for major construction work packages	Ends when the project begins major construction work
6	Under Construction	Starts when construction is initiated <sup>13</sup>	Ends when all wind turbines have been installed and the project is connected to and generating power to a land-based electrical grid
7	Operating	Starts when all wind turbines are installed and transmitting power to the grid; COD marks the official transition from construction to operation	Ends when the project has begun a formal process to decommission and stops feeding power to the grid
8	Decommissioned	Starts when the project has begun the formal process to decommission and stops transmitting power to the grid	Ends when the site has been fully restored and lease payments are no longer being made
9	On Hold/Cancelled	Starts if a sponsor stops development activities, discontinues lease payments, or abandons a prospective site	Ends when a sponsor restarts project development activity