

A low-angle, close-up photograph of a white offshore wind turbine. The central hub and two blades are visible against a bright, overcast sky. The bottom right corner of the image is cut off by a diagonal line, revealing a vibrant blue ocean with white-capped waves. The entire image is set against a solid blue background that occupies the right and bottom portions of the frame.

# Offshore Wind

## MARKET REPORT

MAY 2023



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# Executive Summary

**The U.S. has 42 MW of offshore wind capacity online with a swelling pipeline totaling nearly 51,400 MW.** The U.S. has 32 leases in active development. Within these leases, there are 18 projects in early development and 18 projects in advanced development. Early development projects make up the majority of the pipeline, representing 33,875 MW. There are 16,564 MW of projects in advanced development, and 938 MW under construction. In total, there are 51,377 MW of offshore wind in the U.S. pipeline, 84% of which, or 43,115 MW is on the East Coast with the remaining 8,262 MW spread across five leases on the West Coast. Offshore wind capacity in the pipeline could power more than 20 million homes.

**The U.S. currently lags the global offshore wind market in terms of installed capacity.** China leads the world with over 31,400 MW of offshore wind capacity installed, much of it built in the last few years. The U.K., long the largest offshore wind market, now sits in second with over 13,900 MW.

**New York leads all states with a total of 4,362 MW of offshore capacity in the pipeline, with 132 MW under construction via the South Fork Wind Farm.** New Jersey follows with 3,758 MW of capacity in the pipeline, all of which is in advanced development. Massachusetts is the only other state with an offshore wind farm under construction. Vineyard Wind's 806 MW project is expected to complete construction in 2023. It represents 25% of the state's 3,242 MW of capacity in the pipeline.

**BOEM held two lease sales on the East Coast and one lease sale on the West Coast in 2022, generating nearly \$5.4 billion in federal revenue from winning bids.** In the New York Bight, BOEM's auction of six leases lasted three days, drawing winning bids totaling nearly \$4.4 billion. Further south, an auction for two leases in the Carolina Long Bay generated \$315 million. Finally, a much-anticipated sale of five leases off the coast of Central and Northern California drew winning bids totaling \$757 million.

**The New York Bight lease auction represented new heights in terms of lease area cost.** Sale prices ranged from a low of \$6,147/acre to as much as \$9,933/acre, averaging \$8,313/acre across six leases. High lease prices in the New York Bight can be explained by increased demand for offshore wind from two nearby states (New York and New Jersey) with well-defined offshore wind goals and procurement schedules. The other 2022 lease auctions, in Carolina Long Bay and off the coast of Northern and Central California, had lower prices. In the former, lease prices averaged \$2,657/acre while lease prices averaged just \$1,910 off California. In 2018, the auction of three leases off the coasts of Massachusetts and Rhode Island yielded lease prices ranging from \$1,021/acre to \$1,060/acre.

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## Executive Summary *(continued)*

### **BOEM has issued a Record of Decision (ROD) for two projects – Vineyard Wind and South Fork Wind, allowing construction to move forward.**

Ten other projects have submitted Construction and Operations Plans (COPs) and are awaiting final environmental review and ultimately, RODs. BOEM has published a draft Environmental Impact Statement (EIS) for seven of these projects, moving them one step closer to a final decision.

### **To date, ten states have combined to set offshore wind procurement targets totaling more than 81,000 MW.**

States are the driving force behind offshore wind procurement. In 2022, Louisiana (5 GW by 2035) and California (2 – 5 GW by 2030 and 25 GW by 2045) set offshore wind procurement targets for the first time. In New Jersey, Governor Phil Murphy increased the state’s offshore wind target from 7,500 MW by 2035 to 11,000 MW by 2040. In April 2023, Maryland lawmakers passed a bill setting the state’s offshore wind target to 8.5 GW by 2031.

**Offshore wind is driving domestic shipbuilding.** There are at least 21 known crew transfer vessels (CTVs) that have been ordered or are already under construction in the U.S., with one existing vessel retrofit to serve as a CTV. Additionally, there are three service operation vessels (SOVs) ordered or under construction with three more existing vessels being retrofit as SOVs to serve the U.S. offshore wind industry. While Dominion Energy’s *Charybdis* wind turbine installation vessel (WTIV) stands out as the sole WTIV currently under construction, there are plans to build vessels for feeder installation strategies and similar installation solutions. In total, there are more than 30 new or retrofit vessels ordered or under construction at U.S. shipyards, with more in the pipeline.

**The offshore wind supply chain is set to grow.** There are currently two cable facilities and one offshore substation facility in operation. However, there are an additional fourteen facilities announced or under construction that are set to become operational in the coming years. Where an investment amount is publicly available, announcements of manufacturing facilities for major offshore wind components top \$1.7 billion. With three state solicitations closed or set to close in 2023, with awards pending, additional supply chain investment announcements should be expected.

**Offshore wind costs are increasing due to supply chain disruptions, commodity price increases, and inflation.** While not yet reflected in the data, developers have expressed concern that rising project costs due to inflation, supply chain constraints, and other economic disruptions cast doubt on the economic viability of projects. One item of concern is steel costs. By weight, offshore wind uses more steel than any other material. While steel prices have started to come down from pandemic peaks, prices in North America and North Europe remained 52% and 69% above January 2019 prices at the end of 2022.

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# Offshore Wind **Capacity** and **Project Pipeline**



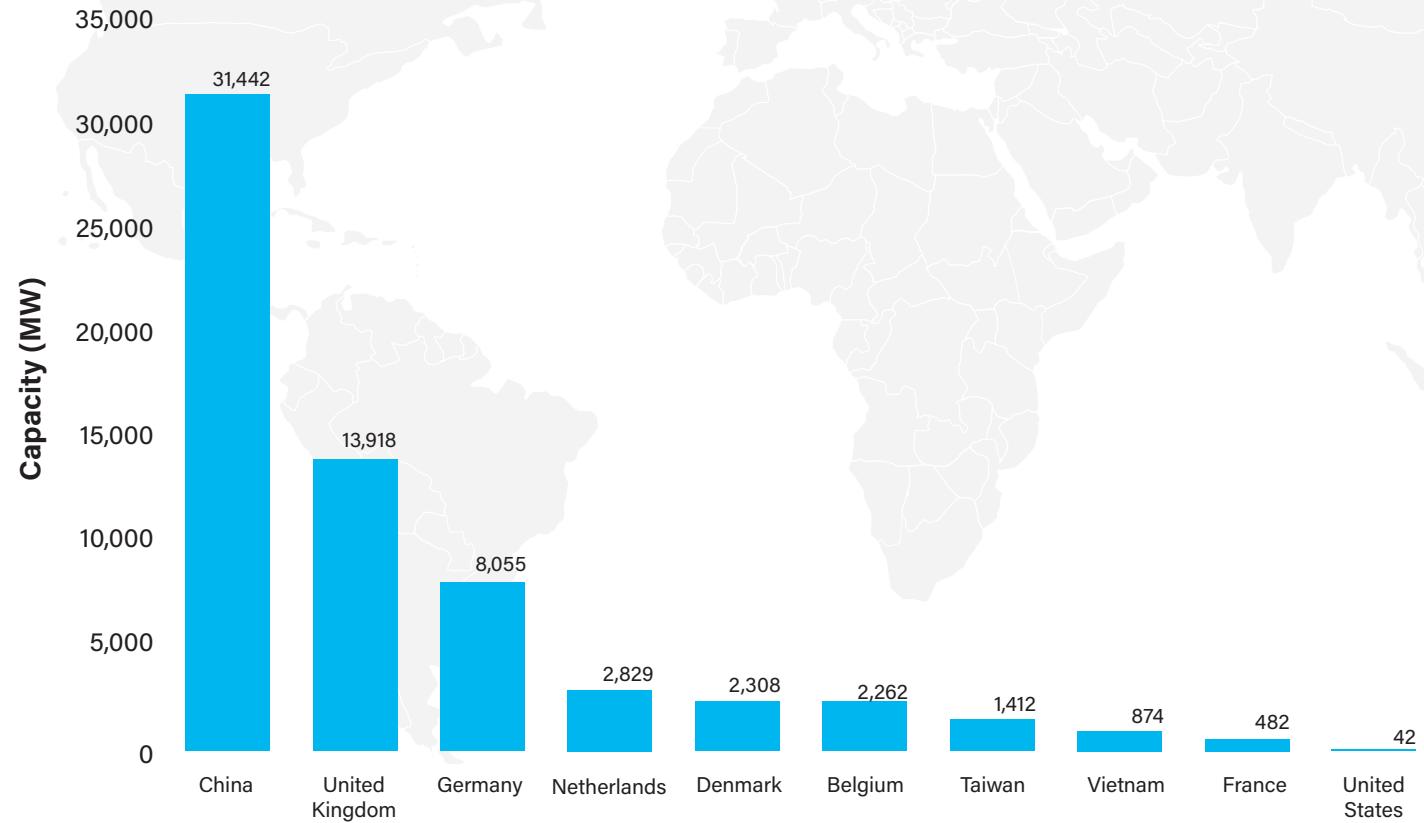
## 42 MW of Offshore Wind Online in the U.S.

There are currently two offshore wind projects online in the United States – Ørsted’s 30 MW Block Island Wind Farm off Rhode Island and Dominion Energy’s 12 MW Coastal Virginia Offshore Wind Pilot Project.

China leads the world with over 31 GW of cumulative offshore wind capacity installed.

The United Kingdom and Germany follow, with 13,918 MW and 8,055 MW, respectively. The Netherlands, Denmark, Belgium, and Taiwan are the only other countries with at least 1 GW of offshore wind capacity installed.

### U.S. and Global Installed Offshore Wind Capacity, 2022



Source: GWEC Global Wind Report 2023

## Nearly 53 GW of Offshore Wind Capacity in Development

There are currently two projects under construction in federal waters – Avangrid and Copenhagen Infrastructure Partners’ 816 MW Vineyard Wind 1 and Ørsted and Eversource’s 132 MW South Fork Wind Farm. Vineyard Wind broke ground with onshore construction in late 2021 and began offshore work laying cable in November 2022. South Fork Wind Farm began onshore construction in February 2022. Offshore construction on the project began in March 2023 with cable laying activities. Three Massachusetts’ utilities, via Power Purchase Agreements (PPA), are buying the power from the Vineyard Wind project, while South Fork Wind Farm has a PPA with the Long Island Power Authority in New York.



Photo credit: Dominion

There are 32 active federal leases in development. Within these leases, there are 18 projects in early development and 18 projects in advanced development. Projects in early development have been awarded a lease by BOEM but have yet to secure offtake via a PPA, Offshore Wind Renewable Energy Certificate (OREC) contract, or other offtake mechanism. Projects in advanced development have been awarded a lease and secured offtake or have a firm equipment order in place. ACP considers projects under construction when offshore construction such as cable laying, pile driving, or other offshore work has commenced.

Early development projects make up the majority of the pipeline, representing 33,875 MW. There are 16,564 MW of projects in advanced development, and 938 MW under construction. In total, there are 51,377 MW of offshore wind in the U.S. pipeline, 84% of which, or 43,115 MW is on the East Coast with the remaining 8,262 MW spread across five projects on the West Coast.

Construction start dates and commercial operations year in the following table are estimates based on published information and may shift as permitting timelines change.

Note: Some leases host multiple projects.

## Leases in Development

Label	Lease Number	Project Name	State	Capacity (MW) <sup>1</sup>	Developer(s)	Status	Offtake	Construction Start	Operation Year
1	OCS-A 0482	TBD	TBD	<i>1,249</i>	Ørsted, PSEG	Early Development	TBD	TBD	TBD
2	OCS-A 0483	Coastal Virginia Offshore Wind	VA	<i>2,587</i>	Dominion Energy	Advanced Development	Direct use	TBD	2026
3	OCS-A 0486	Revolution Wind	CT, RI	704	Ørsted, Eversource	Advanced Development	PPAs (National Grid, Eversource Energy, Unitil)	TBD	2025
4	OCS-A 0487	Sunrise Wind	NY	924	Ørsted, Eversource	Advanced Development	NY OREC	TBD	2025
5	OCS-A 0490	Marwin; Momentum Wind	MD	<i>270; 808.5</i>	U.S. Wind	Advanced Development; Advanced Development	MD OREC	TBD	2026
6	OCS-A 0497	Coastal Virginia Offshore Wind Pilot	VA	12	Dominion Energy	Online	Direct use	2019	2020
7	OCS-A 0498	Ocean Wind 1	NJ	1,100	Ørsted	Advanced Development	NJ OREC	2023	2024
8	OCS-A 0499	Atlantic Shores Offshore Wind	NJ	1,510	EDF, Shell	Advanced Development	NJ OREC	2024	2027
9	OCS-A 0500	TBD	TBD	<i>2,579</i>	Ørsted, Eversource	Early Development	TBD	TBD	TBD
10	OCS-A 0501	Vineyard Wind	MA	806	Avangrid, Copenhagen Infrastructure Partners	Under Construction	PPAs (Eversource, National Grid, Unitil)	2022	2023
11	OCS-A 0506 <sup>2</sup>	Block Island Wind Farm	RI	30	Ørsted	Online	PPA (National Grid)	2015	2016
12	OCS-A 0508	Kitty Hawk Offshore	NC, VA	3,500	Avangrid	Early Development	TBD	TBD	TBD
13	OCS-A 0512	Empire Wind 1; Empire Wind 2	NY	816; 1,260	bp, Equinor	Advanced Development; Advanced Development	NY OREC	TBD	2026; 2027

<sup>1</sup> Where a proposed capacity has not been stated publicly, ACP estimates potential capacity using a factor of 4.4 MW per square kilometer. This assumes that lease areas will be completely developed. Estimates are denoted in italics.

<sup>2</sup> Lease number references right-of-way grant. Block Island Wind Farm is located in RI state waters.



## Leases in Development *(continued)*

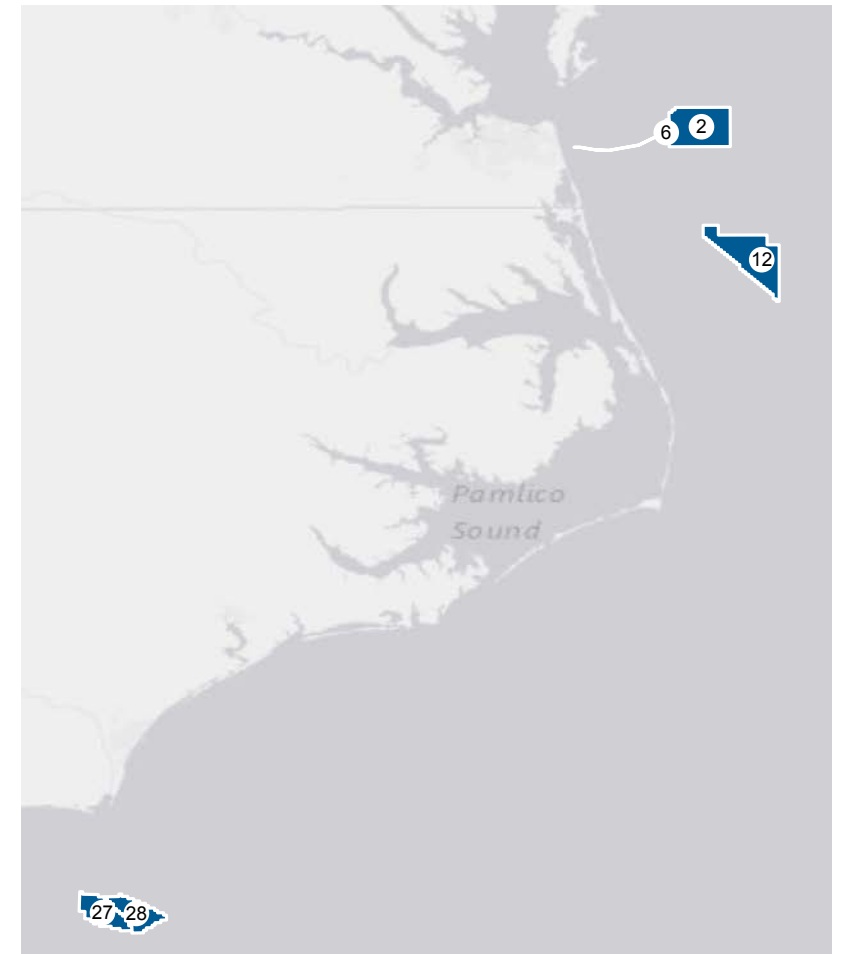
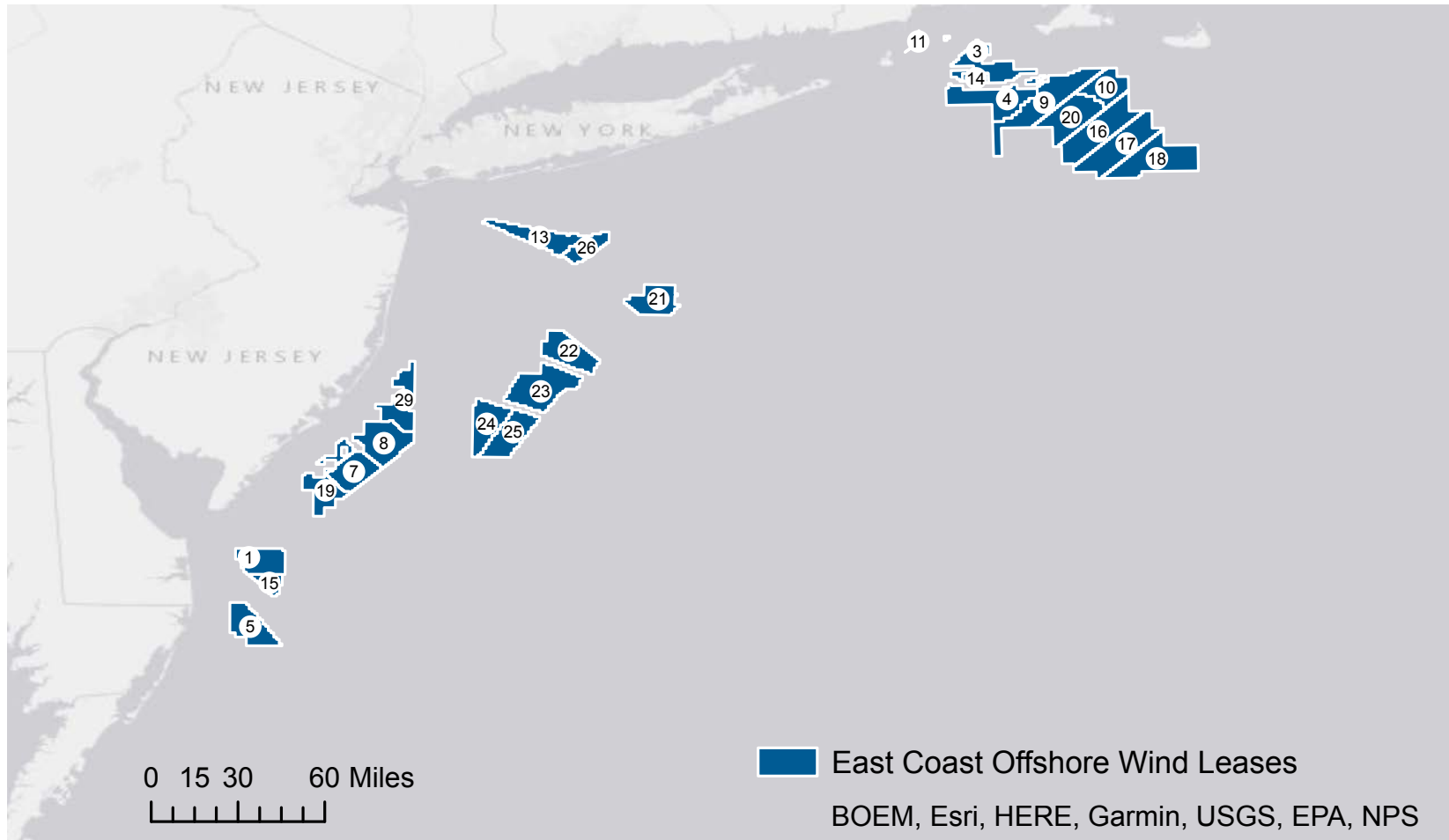
Label	Lease Number	Project Name	State	Capacity (MW) <sup>1</sup>	Developer(s)	Status	Offtake	Construction Start	Operation Year
14	OCS-A 0517	South Fork Wind Farm	NY	132	Ørsted, Eversource	Under Construction	NY OREC	TBD	2023
15	OCS-A 0519	Skipjack Wind 1; Skipjack Wind 2	MD	120; 846	Ørsted	Advanced Development; Advanced Development	MD OREC	TBD	2026
16	OCS-A 0520	Beacon Wind	NY	1,230	bp, Equinor	Advanced Development	NY OREC	TBD	2028
17	OCS-A 0521	SouthCoast Wind	MA	1,204	EDP, ENGIE, Shell	Advanced Development	PPAs (Eversource, National Grid, Unitil)	TBD	2028
18	OCS-A 0522	TBD	TBD	2,358	Copenhagen Infrastructure Partners	Early Development	TBD	TBD	TBD
19	OCS-A 0532	Ocean Wind 2	NJ	1,148	Ørsted	Advanced Development	NJ OREC	TBD	2029
20	OCS-A 0534	Park City Wind; Commonwealth Wind	CT; MA	804; 1,232	Avangrid	Advanced Development; Advanced Development	PPAs (Eversource, Unitil); PPAs (Eversource, National Grid, Unitil)	TBD	2027; 2028
21	OCS-A 0537	Bluepoint Wind	TBD	1,700	EDP, ENGIE, Global Infrastructure Partners	Early Development	TBD	TBD	TBD
22	OCS-A 0538	Attentive Energy	TBD	3,000	TotalEnergies	Early Development	TBD	TBD	TBD
23	OCS-A 0539	Community Offshore Wind	TBD	3,000	RWE Renewables, National Grid	Early Development	TBD	TBD	TBD
24	OCS-A 0541	Atlantic Shores Offshore Wind Bight	TBD	1,414	EDF, Shell	Early Development	TBD	TBD	TBD
25	OCS-A 0542	Leading Light Wind	TBD	2,000	Invenergy, energyRE	Early Development	TBD	TBD	TBD
26	OCS-A 0544	Mid-Atlantic Offshore Wind (TBD)	TBD	767	Copenhagen Infrastructure Partners	Early Development	TBD	TBD	TBD

## Leases in Development *(continued)*

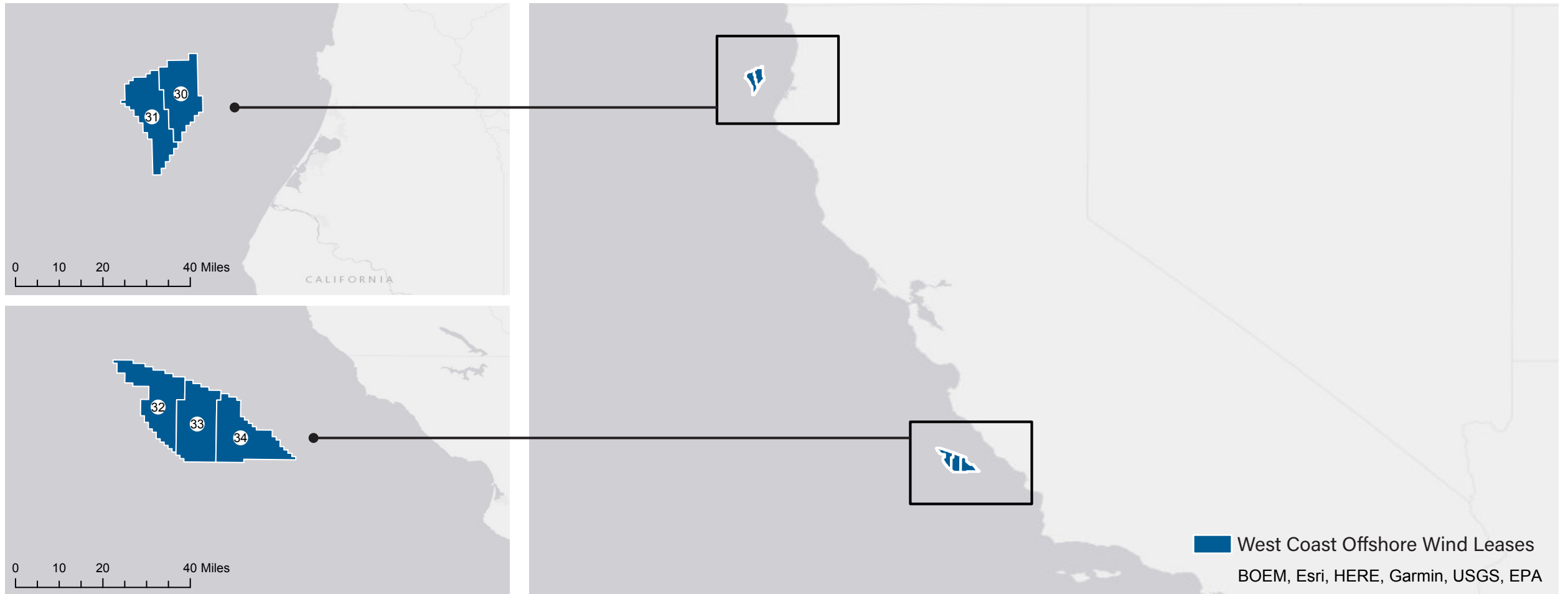
Label	Lease Number	Project Name	State	Capacity (MW) <sup>1</sup>	Developer(s)	Status	Offtake	Construction Start	Operation Year
27	OCS-A 0545	TBD	TBD	1,000	TotalEnergies	Early Development	TBD	TBD	TBD
28	OCS-A 0546	TBD	TBD	1,600	Duke Energy	Early Development	TBD	TBD	TBD
29	OCS-A 0549	Atlantic Shores North	TBD	1,446	EDF, Shell	Early Development	TBD	TBD	TBD
30	OCS-P 0561	TBD	TBD	1,600	RWE	Early Development	TBD	TBD	TBD
31	OCS-P 0562	TBD	TBD	1,229	Copenhagen Infrastructure Partners	Early Development	TBD	TBD	TBD
32	OCS-P 0563	TBD	TBD	2,000	Equinor	Early Development	TBD	TBD	TBD
33	OCS-P 0564	Golden State Wind	TBD	2,000	EDP, ENGIE, Canadian Pension Plan Investment Board	Early Development	TBD	TBD	TBD
34	OCS-P 0565	TBD	TBD	1,433	Invenergy	Early Development	TBD	TBD	TBD

## East Coast Project Map

The following maps highlight the East Coast and West Coast projects, respectively. Labels refer to the lease numbers in the previous table.



## West Coast Project Map



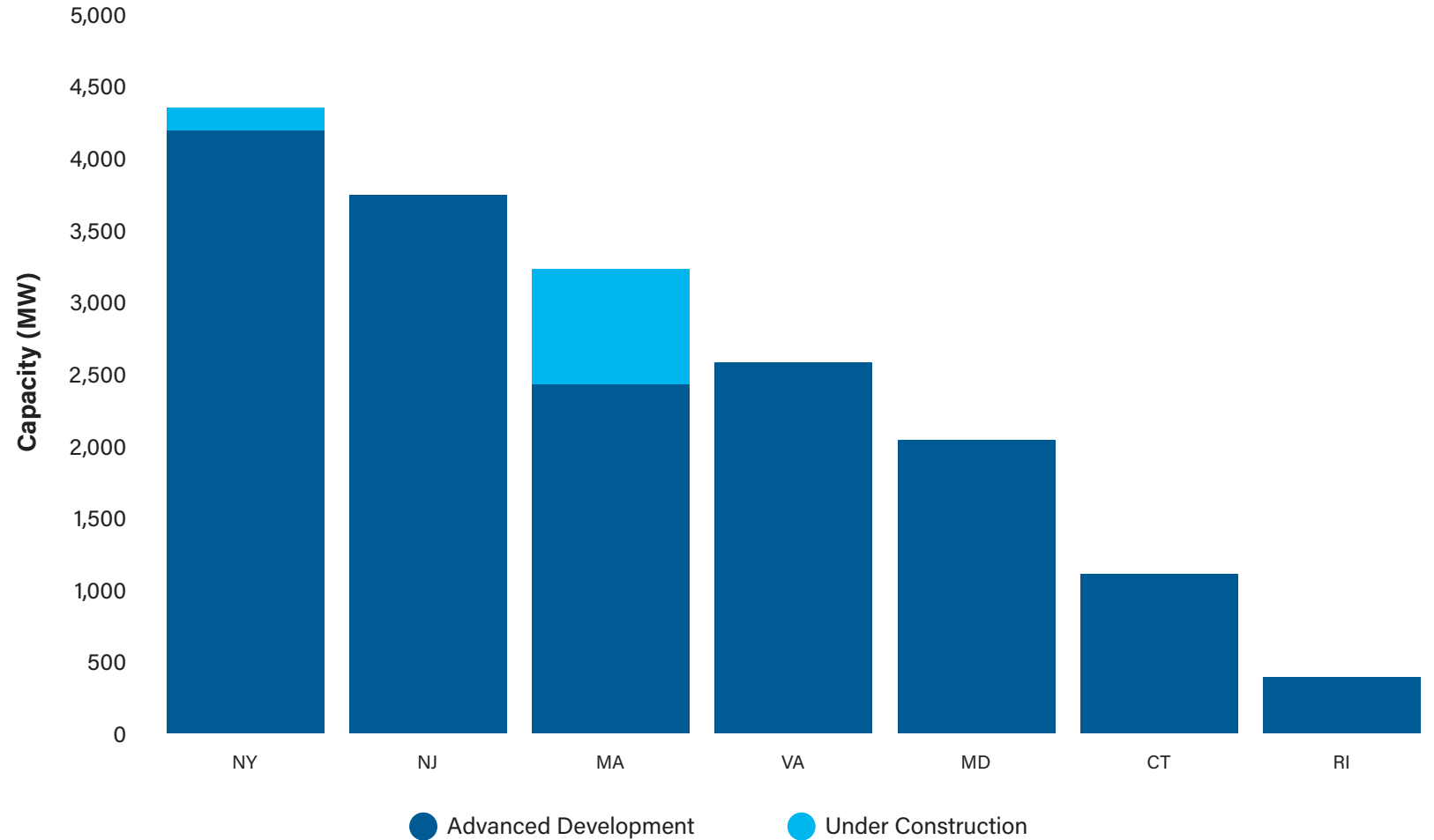
## Pipeline by State

Projects that have reached the advanced development phase have secured offtake, identifying the state where the electricity generated by the offshore wind project is to be provided. Although projects in early development may be targeting specific state procurements, we can not say with certainty where these projects will ultimately provide electricity.

New York leads all states with a total of 4,362 MW of offshore capacity in the pipeline, with 132 MW under construction via the South Fork Wind Farm. New Jersey follows with 3,758 MW of capacity in the pipeline, all of which is in advanced development.

Massachusetts is the only other state with offshore wind capacity under construction, with Vineyard Wind's 806 MW capacity representing roughly 25% of the state's 3,242 MW of capacity in the pipeline.

U.S. Offshore Wind Pipeline by State

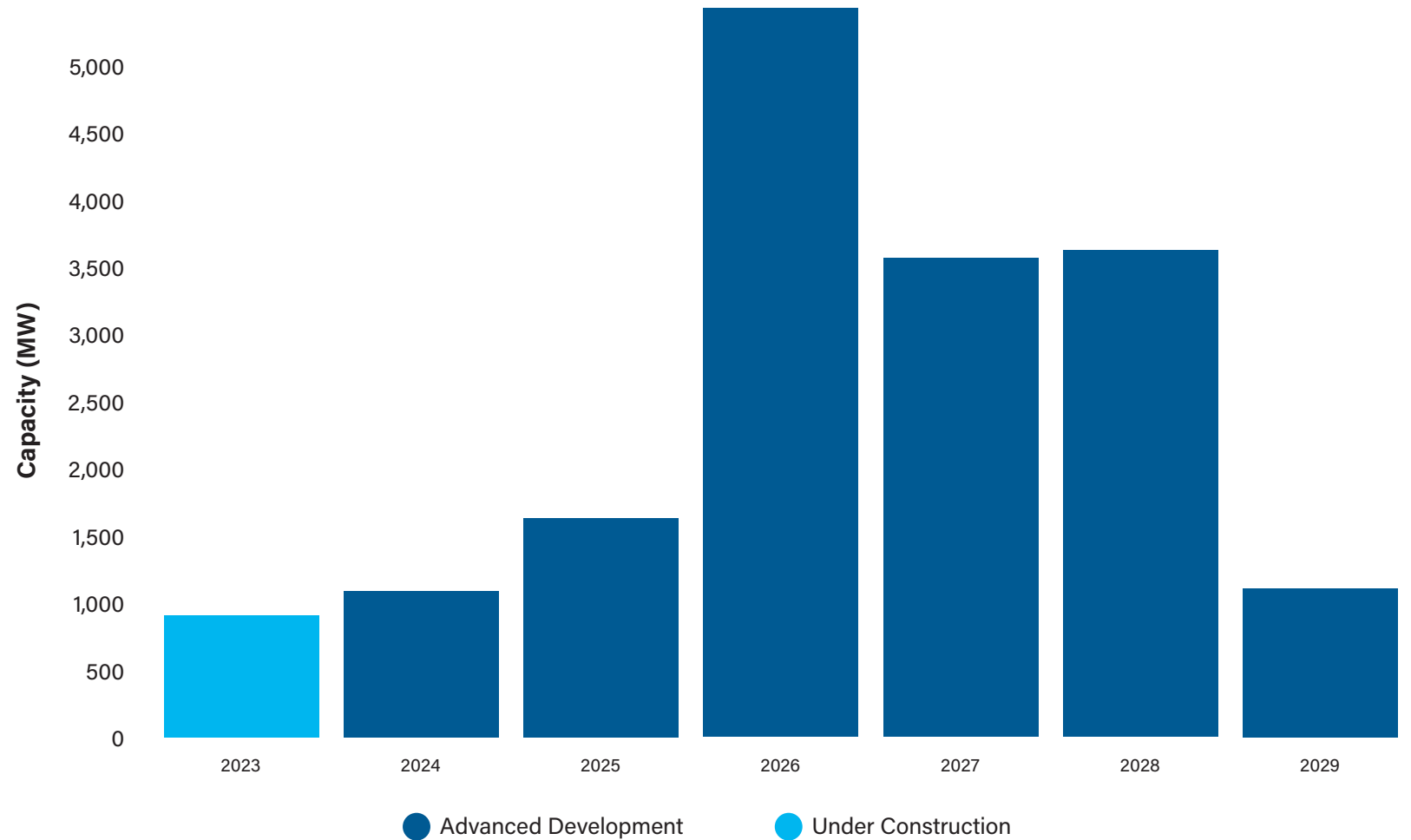


## Pipeline by Expected COD Year

Among projects currently under construction or in advanced development, capacity installations will reach their peak in 2026, with 5,448 MW currently planned to come online in that year. 2028 follows with 3,666 MW.

Expected capacity installations fall after 2028, as many of these projects are still in early development and have not secured offtake. As states release additional offshore wind solicitations (the main procurement method to date) and award offtake contracts to bidders, it stands to reason that additional capacity with commercial operation dates in 2029, 2030, and beyond will be added to the pipeline.

U.S. Offshore Wind Pipeline by Commercial Operations Date



# Federal Activity

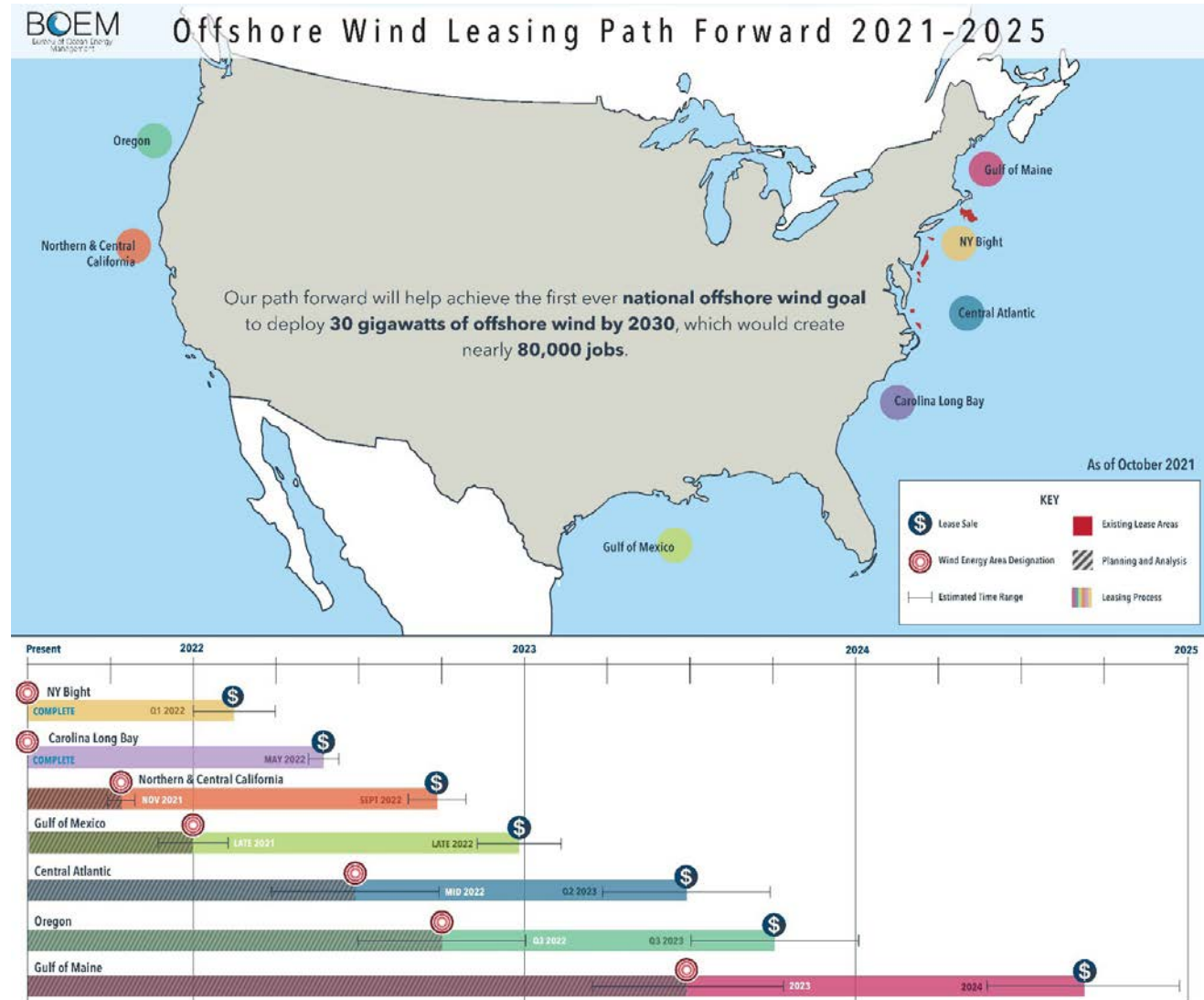


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# BOEM Path Forward

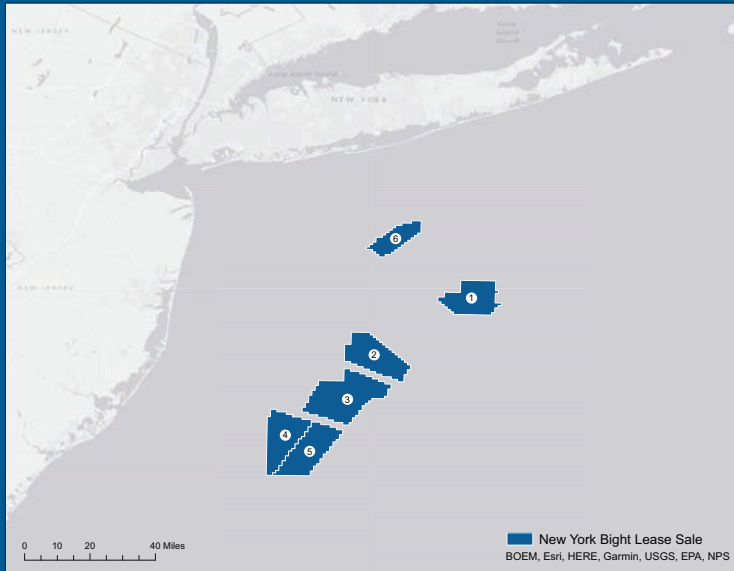
At ACP’s Offshore WINDPOWER conference in October 2021, Secretary of the Department of the Interior Deb Haaland announced BOEM’s Offshore Wind Leasing Path Forward 2021- 2025. As planned in the *Path Forward*, BOEM held an offshore wind lease auction in the NY Bight in February 2022. Following that, the agency held an auction in the Carolina Long Bay region in May 2022 and finished the year with a lease auction for two areas off California in December 2022.

BOEM plans to hold lease auctions in the Gulf of Mexico (2023), Central Atlantic (2023), Oregon (2023), and the Gulf of Maine (2024) to round out the *Path Forward*, but these dates are likely to change given delays.





## 2022 Lease Sales



- |   |            |   |
|---|------------|---|
| 1 | OCS-A 0537 | <b>OW Ocean Winds East, LLC</b>                 |
| 2 | OCS-A 0538 | <b>Attentive Energy LLC</b>                     |
| 3 | OCS-A 0539 | <b>Community Offshore Wind, LLC<sup>3</sup></b> |
| 4 | OCS-A 0541 | <b>Atlantic Shores Offshore Wind Bight, LLC</b> |
| 5 | OCS-A 0542 | <b>Invenergy Wind Offshore LLC</b>              |
| 6 | OCS-A 0544 | <b>Vineyard Mid-Atlantic LLC<sup>4</sup></b>    |

## New York Bight

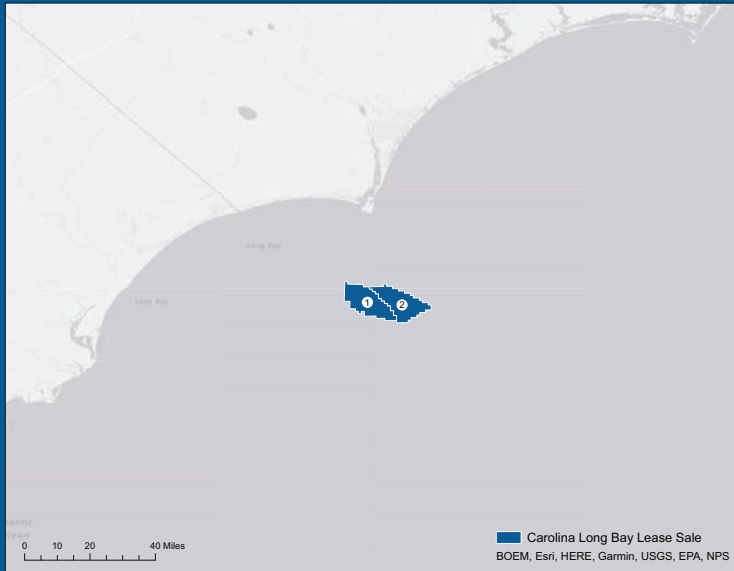
In its first lease sale as part of the Path Forward, BOEM held an offshore wind auction for six lease areas in the New York Bight on February 23rd, 2022. The New York Bight refers to a stretch of ocean between New York and New Jersey. The auction, which concluded on February 25th, lasted three days and 64 rounds, drawing winning bids from six companies totaling roughly \$4.37 billion. This record-breaking offshore wind lease auction highlights the strong opportunities for developers in the region. New York and New Jersey both have ambitious offshore wind goals and detailed procurement schedules.

- 1 **OCS-A 0537, a 71,522-acre lease, was awarded to OW Ocean Winds East, LLC**, a partnership between Ocean Winds (itself a joint venture of EDP Renewables and ENGIE) and Global Infrastructure Partners, for the winning bid of \$765 million. The project is now known as Bluepoint Wind.
- 2 **OCS-A 0538, an 84,332-acre lease, was awarded to Attentive Energy LLC** for the winning bid of \$795 million. Attentive Energy LLC was jointly owned by TotalEnergies and EnBW. Days later, EnBW announced that they had decided to exit the U.S. offshore wind market. The company's U.S. assets will be acquired by TotalEnergies.
- 3 **OCS-A 0539, the largest lease in the auction at 125,964 acres, was awarded to Bight Wind Holdings, LLC** for the winning bid of \$1.1 billion. Bight Wind Holdings, LLC is a joint venture between RWE and National Grid. The project is now known as Community Offshore Wind. As such, the name Bight Wind Holdings, LLC was changed to Community Offshore Wind, LLC after lease issuance.
- 4 **OCS-A 0541, a 79,351-acre lease, was awarded to Atlantic Shores Offshore Wind Bight, LLC** a subsidiary of Atlantic Shores Offshore Wind (itself a joint venture of Shell and EDF) for the winning bid of \$780 million.
- 5 **OCS-A 0542, an 83,976-acre lease, was awarded to Invenergy Wind Offshore, LLC for the winning bid of \$645 million.** Invenergy Wind Offshore, LLC is sponsored by Invenergy and EnergyRE. Blackstone Infrastructure Partners, CDPQ, FirstLight Power, and Ullico Infrastructure Fund will also provide funding for the project. The project is now known as Leading Light Wind.
- 6 **OCS-A 0544, the smallest lease at just 43,056 acres, was awarded to Mid-Atlantic Offshore Wind LLC**, for the bid of \$285 million. The name Mid-Atlantic Offshore Wind LLC was changed to Vineyard Mid-Atlantic LLC after lease issuance. Vineyard Mid-Atlantic LLC is owned by Copenhagen Infrastructure Partners.

3 Name changed after lease issuance from Bight Wind Holdings, LLC

4 Name changed after lease issuance from Mid-Atlantic Offshore Wind LLC

## 2022 Lease Sales



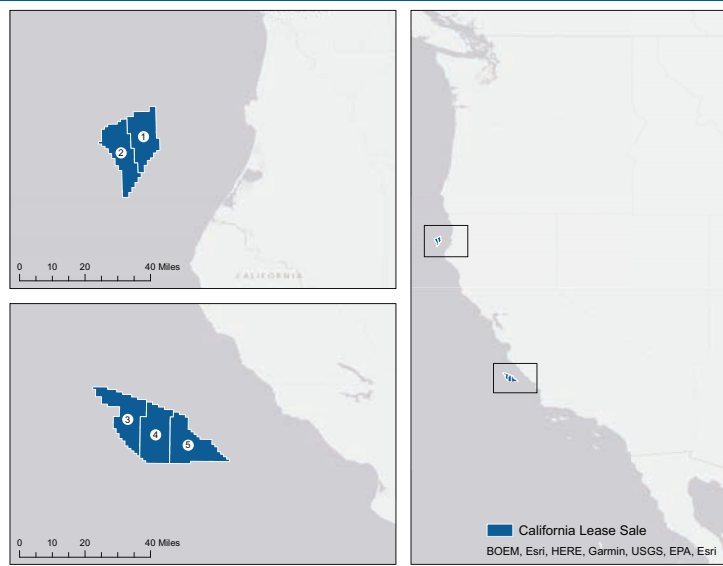
- 1 OCS-A 0545 **TotalEnergies Renewables USA, LLC**
- 2 OCS-A 0546 **Duke Energy Renewables Wind, LLC**

## Carolina Long Bay Lease Sale

In its second lease sale of the year, BOEM held an offshore wind auction for two lease areas in the Carolina Long Bay on May 11th, 2022. The auction lasted one day (18 rounds) and resulted in winning bids totaling \$315 million. Combined, the leases total 110,091 acres.

- 1 **Lease OCS-A 0545**, in the western part of the Carolina Long Bay lease area, was awarded to TotalEnergies Renewables USA, LLC for the final bid of \$160 million. TotalEnergies Renewables USA, LLC is wholly owned by TotalEnergies. This lease represents a total of 54,937 acres.
- 2 **Lease OCS-A 0546**, to the east, was awarded to Duke Energy Renewables Wind, LLC for a final bid of \$155 million. Duke Energy Renewables Wind LLC is wholly owned by Duke Energy. This lease represents a total of 55,154 acres.

## 2022 Lease Sales



- |   |            |   |
|---|------------|---|
| 1 | OCS-P 0561 | <b>RWE Offshore Wind Holding, LLC</b>       |
| 2 | OCS-P 0562 | <b>California North Floating LLC</b>        |
| 3 | OCS-P 0563 | <b>Equinor Wind US LLC</b>                  |
| 4 | OCS-P 0564 | <b>Central California Offshore Wind LLC</b> |
| 5 | OCS-P 0565 | <b>Invenergy California Offshore LLC</b>    |

## California Lease Sale

In its third and final lease sale of the year, BOEM held an offshore wind auction for five lease areas off California on December 6th, 2022. The auction included two leases off the coast of Northern California (near Humboldt Bay) and three leases off the Central Coast (near Morro Bay). The auction lasted two days and resulted in winning bids totaling \$757 million. The leases total 373,268 acres. Deep waters in these lease areas necessitate the use of floating offshore wind technology.

- 1 **OCS-P 0561, a 63,338-acre lease off Humboldt, was awarded to RWE Offshore Wind Holding, LLC** for a final bid of \$157.7 million. RWE Offshore Wind Holding, LLC is wholly owned by RWE.
- 2 **OCS-P 0562, a 69,031-acre lease also off Humboldt, was awarded to California North Floating LLC** for a final bid of \$173.8 million. California North Floating LLC is wholly owned by Copenhagen Infrastructure Partners.
- 3 **OCS-P 0563, an 80,062-acre lease off Morro Bay was awarded to Equinor Wind US LLC** for a final bid of \$130 million. Equinor Wind US LLC is wholly owned by Equinor.
- 4 **OCS-P 0564, an 80,418-acre lease off Morro Bay was awarded to Central California Offshore Wind LLC** for a final bid of \$150.3 million. Central California Offshore Wind LLC is owned by a joint venture of Ocean Winds (itself a joint venture of EDP Renewables and ENGIE) and the Canadian Pension Plan Investment Board.
- 5 **OCS-P 0565, an 80,418-acre lease off Morro Bay was awarded to Invenergy California Offshore LLC** for a final bid of \$145.3 million. Invenergy California Offshore LLC is wholly owned by Invenergy.

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