Offshore Wind Market Report: 2024 Edition

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Data and Methodology

Multiple Data Sources Ensure Accuracy and Alignment With Global Research Organizations

- The scope of the *Offshore Wind Market Report: 2024 Edition* covers the global fleet of projects in the pipeline through Dec. 31, 2023, and U.S. developments and events through May 31, 2024.
- Primary source: U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory's (NREL's) internal offshore wind database, which is built on internal research and a wide variety of data sources, including peer-reviewed literature, press releases, industry news reports, manufacturer specification sheets, and global offshore wind energy project announcements.

NREL has verified and sourced data from the following publications:

- The 4C Offshore Wind Database (4C Offshore 2024)
- Bloomberg New Energy Finance (BNEF) Renewable Energy Project Database (BNEF 2023)
- 4C Offshore Vessel Database (4C Offshore 2024)
- Wood Mackenzie Wind Turbine Trends (Wood Mackenzie 2023b).

Note: All dollar amounts are reported in 2023 U.S. dollars, unless indicated otherwise.

U.S. Offshore Wind Energy Data

Offshore Wind Energy Project Pipeline Classification Criteria

Step	Phase Name	Start Criteria	End Criteria
1	Planning	Starts when a developer or regulatory agency initiates the formal site control process (e.g., designation of a lease area under a proposed sale notice [PSN])	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	Starts 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 [COP] or is selected for offtake agreement negotiations for electricity sales)
3	Permitting = COP or Offtake Pathway	Starts when the developer files major permit applications (e.g., a COP) or is selected for offtake agreement negotiations for electricity sales	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	Ends when the sponsor announces a “financial investment decision” and has signed contracts for construction work packages
5	Financial Close	Starts when the 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 major construction work is initiated	Ends when all wind turbines have been installed and the project is connected and generating power to an electrical grid
7	Operating	Starts when all wind turbines are installed and transmitting power to the grid; commercial operation date 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

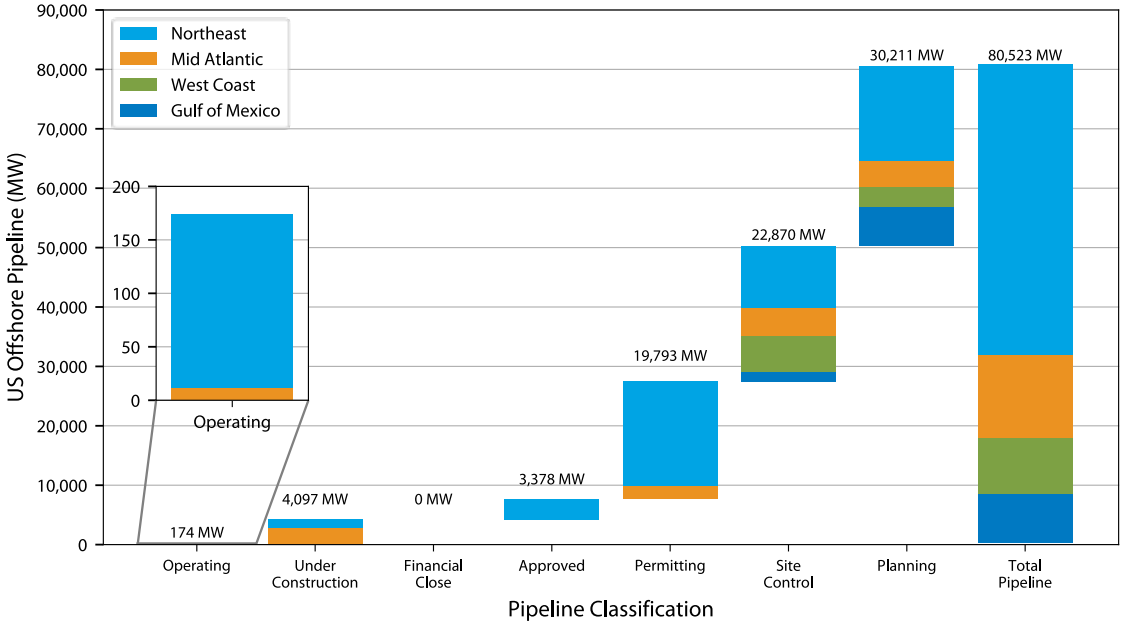
The U.S. Offshore Wind Energy Pipeline Grew by 53% and Is Estimated To Have 80,523 MW of Capacity

Status	2023 Total (As of May 31)	Change From Last Year	2024 Total	Notes
Operating	42 MW	132 MW	174 MW	South Fork Wind Farm became operational.
Under Construction	932 MW	3,165 MW	4,097 MW	Revolution Wind (704 MW), and Coastal Virginia Offshore Wind (2,587 MW) began construction. Vineyard Wind 1 (806 MW) remains in construction.
Financial Close	0 MW	No Change	0 MW	
Approved	1,100 MW	2,278 MW	3,378 MW	Empire Wind 1, Sunrise Wind,[a] and New England Wind 1 and 2 all had Records of Decision and were approved by Bureau of Ocean Energy Management (BOEM).
Permitting	20,978 MW	-1,184 MW	19,793 MW	New Jersey Board of Public Utilities awarded two new offtakes to Attentive Offshore Wind Energy 2 and Leading Light Wind. Several projects that lost offtake were moved back to site control.
Site Control	24,596 MW	-1,725 MW	22,870MW	Ocean Wind 1 New Jersey Offshore Wind Renewable Energy Certificate (OREC) award and Record of Decision suspended, now in site control category. Skipjack 1 and 2 canceled their Maryland OREC agreement and did not submit COP. RWE Offshore US Gulf won the Gulf of Mexico Auction 1 lease.
Planning	5,039 MW	25,172 MW	30,211 MW	New lease area designations occurred in the Gulf of Maine, Central Atlantic, and Oregon.
Total	**52,687 MW**		**80,523 MW**	

[a] Sunrise Wind and Empire Wind 1 have both entered construction since the report cutoff date of May 31, 2024. There are approximately 6 GW of capacity currently under construction. For the purpose of the report, their capacity is attributed to the “approved” stage of the pipeline.

The U.S. Project Pipeline Has More Than 27 GW of Projects at or Beyond the Permitting Stage as of May 31, 2024

- Three operating projects have an estimated capacity of 174 MW.
- Three projects are under construction (4,097 MW).
- Two projects have their permits approved and an offtake agreement, and two projects have their permits approved and are attempting to secure offtake agreements (3,378 MW).
- Eighteen projects (19,793 MW) are currently in the permitting phase.

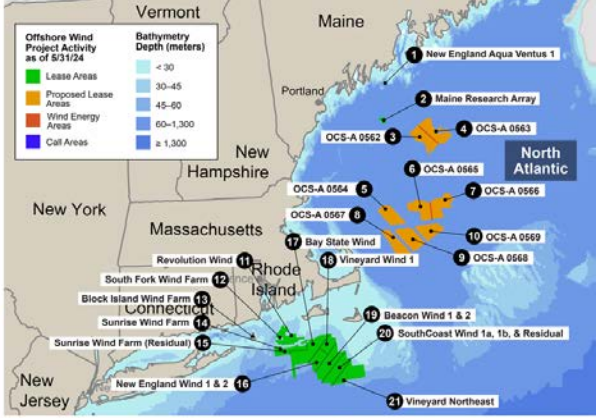


U.S. project pipeline classification by status

Economic Indicators Suggest Long-Term U.S. Market Growth While Inflationary Cost Increases May Hinder Near-Term Growth

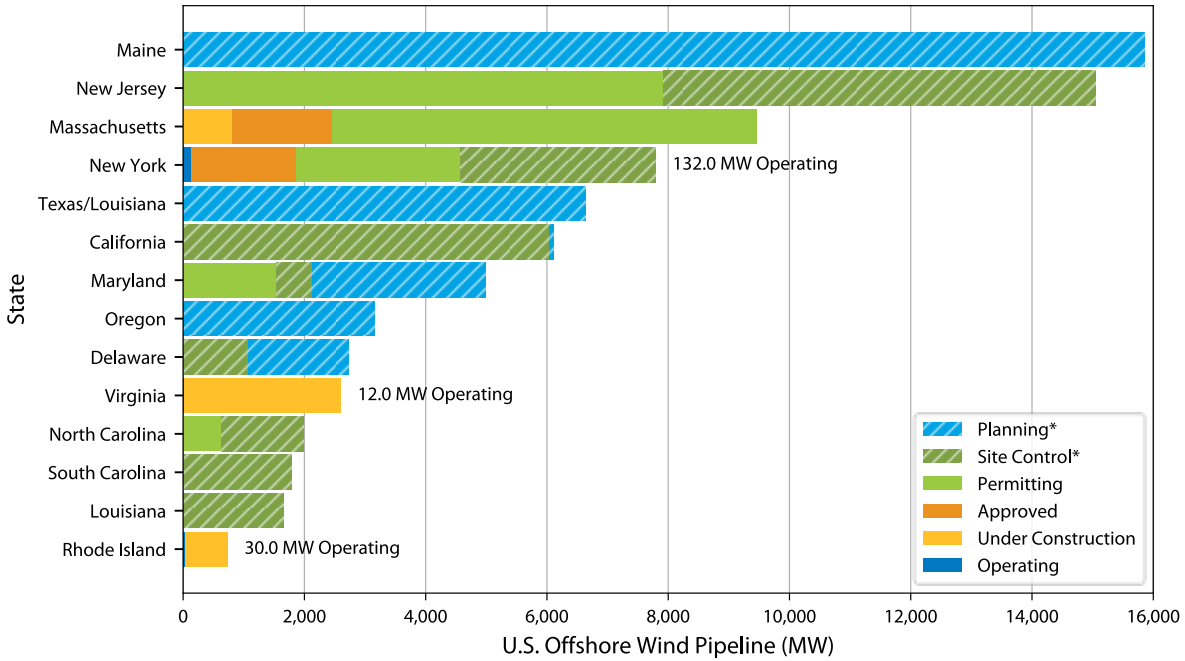
- In the United States, key offshore wind energy market indicators point toward sustained, long-term market growth.
- Economic headwinds may delay near-term development.
- Challenges with the deployment of first projects lead to some uncertainty.

Locations of U.S. offshore wind energy pipeline activity and Call Areas as of May 31, 2024. Maps by John Frenzl, NREL



Massachusetts, New York, and New Jersey Account for More Than 40% of the Capacity in the U.S. Project Pipeline

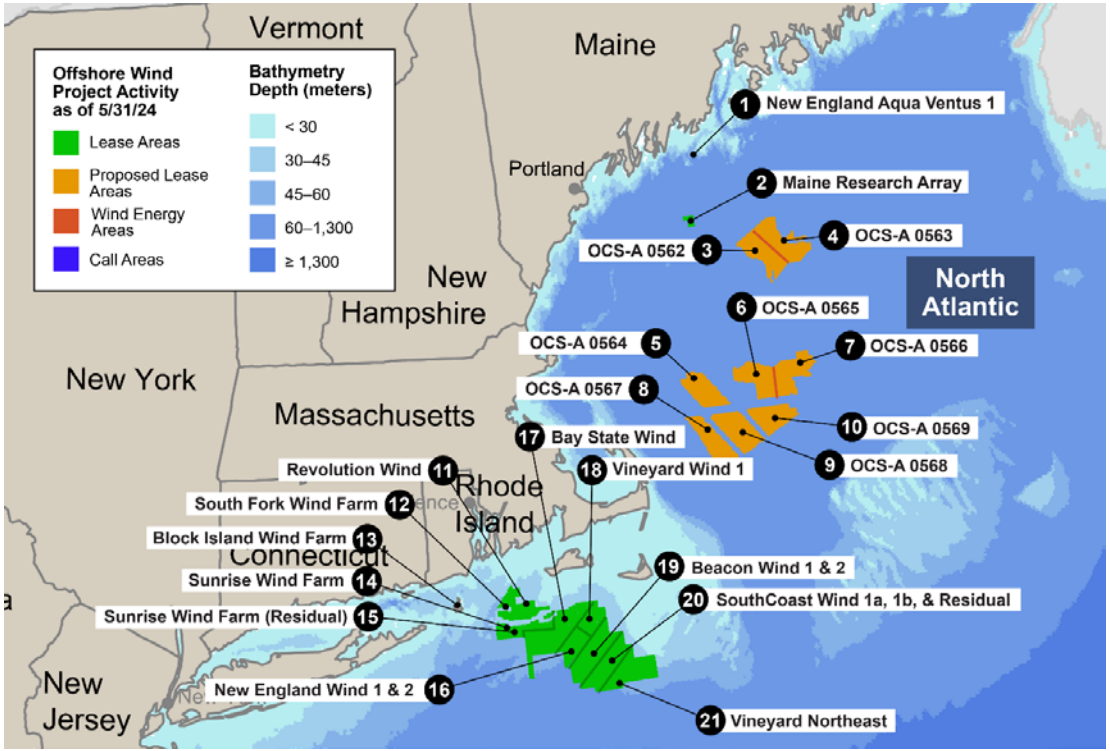
- Although in "planning," Maine potentially has the most capacity.
- State capacity for "site control" and "planning" (hashed colored bars) are assigned to the state where the wind energy area is located.
- State capacity for "permitting" and more advanced classification categories (solid colors) are based on where the energy will be delivered under a contracted offtake agreement.



Allocation of U.S. pipeline capacity by state. The asterisks (*) indicate that planning and site control pipeline capacity will be reallocated and assigned to the state where the offtake agreements are negotiated.

Offshore Wind Energy Pipeline Projects in the North Atlantic Are the Most Advanced in the United States

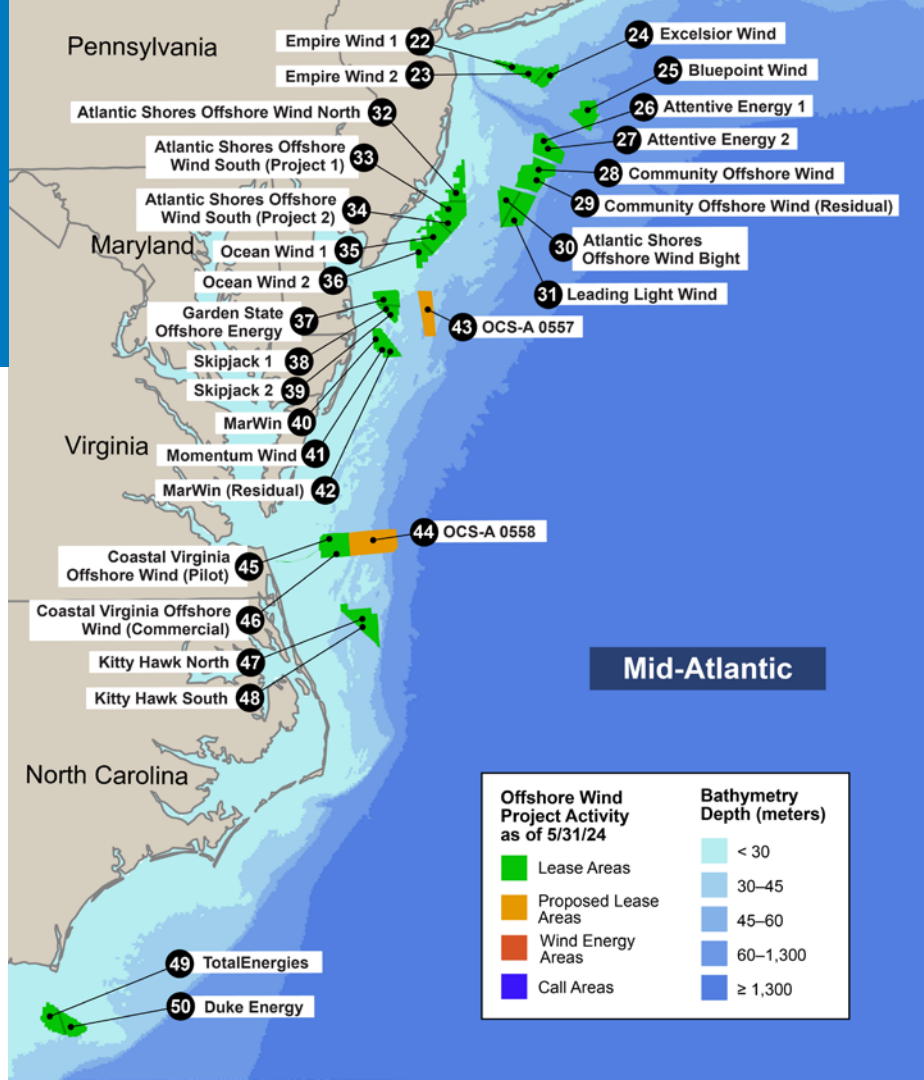
- The 132-MW South Fork wind farm became the first commercial operating offshore wind project in the United States.
- The Vineyard Wind 1 (806 MW) and Revolution Wind (704 MW) projects are under construction.
- On May 1, 2024, BOEM issued a Proposed Sale Notice for eight lease areas in the Gulf Of Maine, which have the potential to generate approximately 15 GW.
- Sunrise Wind has entered the construction phase since the May 31, 2024, report cutoff date.



U.S. offshore wind energy pipeline in the North Atlantic, including the Gulf of Maine. Map by John Frenzl, NREL

U.S. Offshore Wind Energy Pipeline Projects in the Middle and South Atlantic, Including the Central Atlantic Final Lease Areas

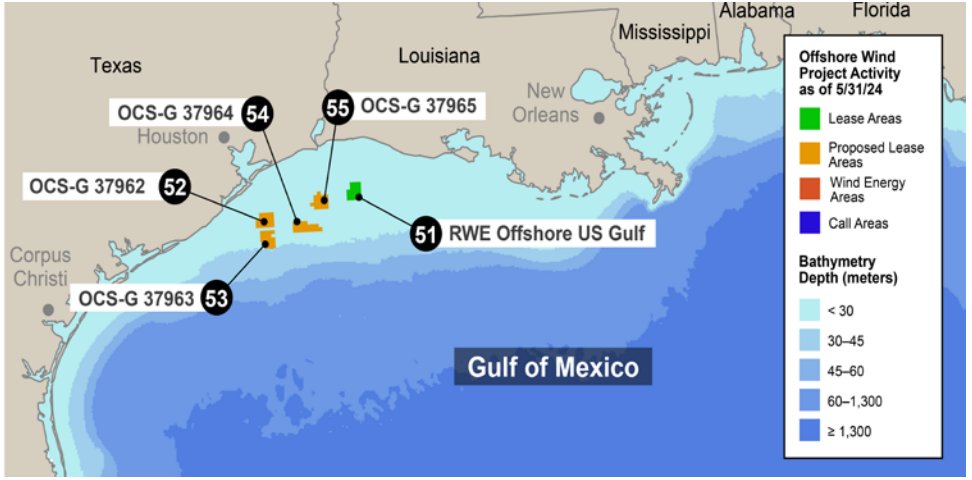
- The Coastal Virginia Offshore Wind Project (2,587 MW) is under construction.
- Empire Wind 1 (810 MW) has entered the construction phase since the May 31, 2024, report cutoff.
- On Aug. 14, 2024, BOEM held an offshore wind lease sale in the U.S. Central Atlantic. There were two provisional awards for lease areas OCS-A 0557 and OCS-A 0558.



U.S. offshore wind energy pipeline for mid-Atlantic and South Atlantic.
Map by John Frenzl, NREL

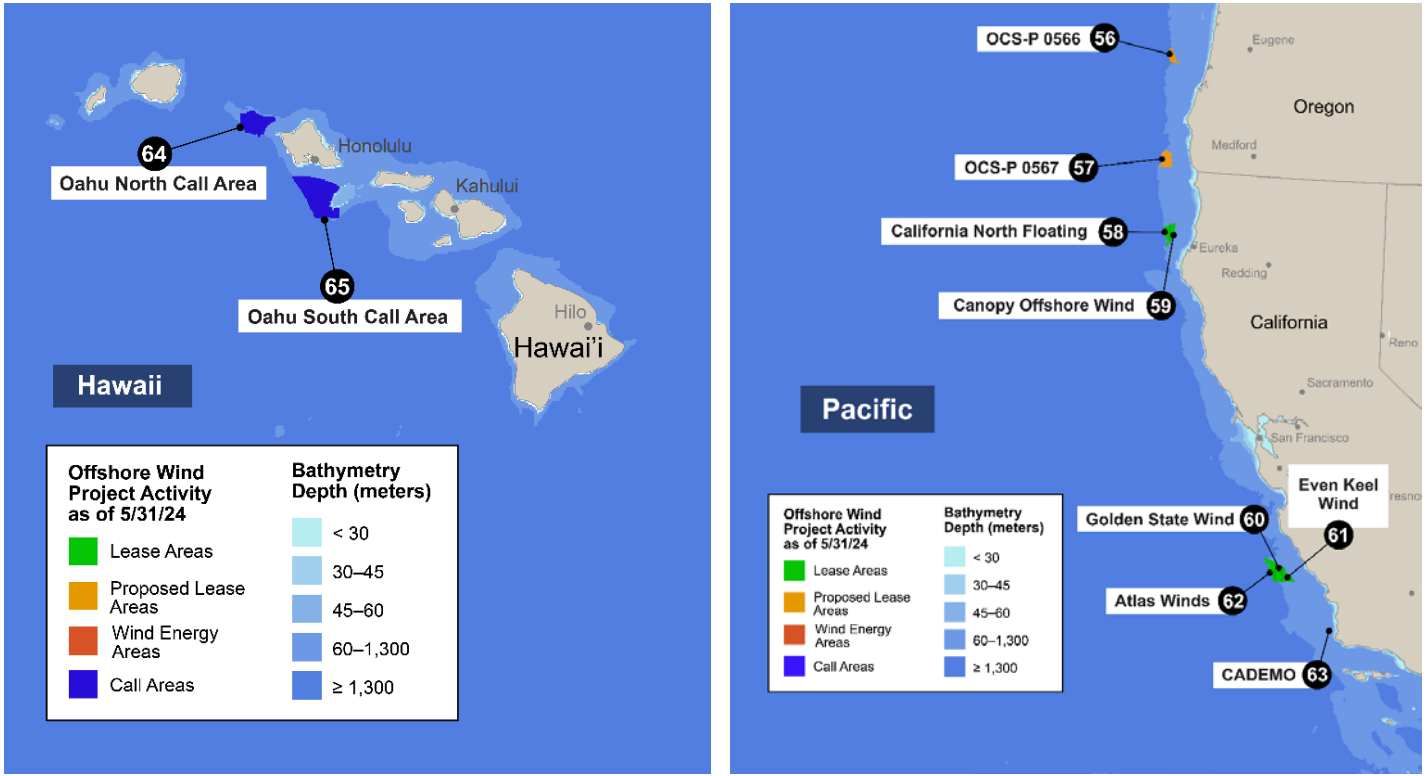
U.S. Offshore Wind Energy Pipeline Projects in the Gulf of Mexico

- On Aug. 29, 2023, BOEM held its first Gulf of Mexico lease sale, and one lease was awarded to RWE Offshore US Gulf LLC.
- On March 21, 2024, BOEM issued a proposed sale notice for a second Gulf of Mexico offshore wind lease sale; however, the sale was canceled due to a lack of competitive interest.
- Vestas' Steelhead Americas and Mitsubishi-owned Diamond Offshore Wind signed agreements with the state of Louisiana to explore development in state waters.



U.S. offshore wind energy pipeline for the Gulf of Mexico. Map by John Frenzl, NREL

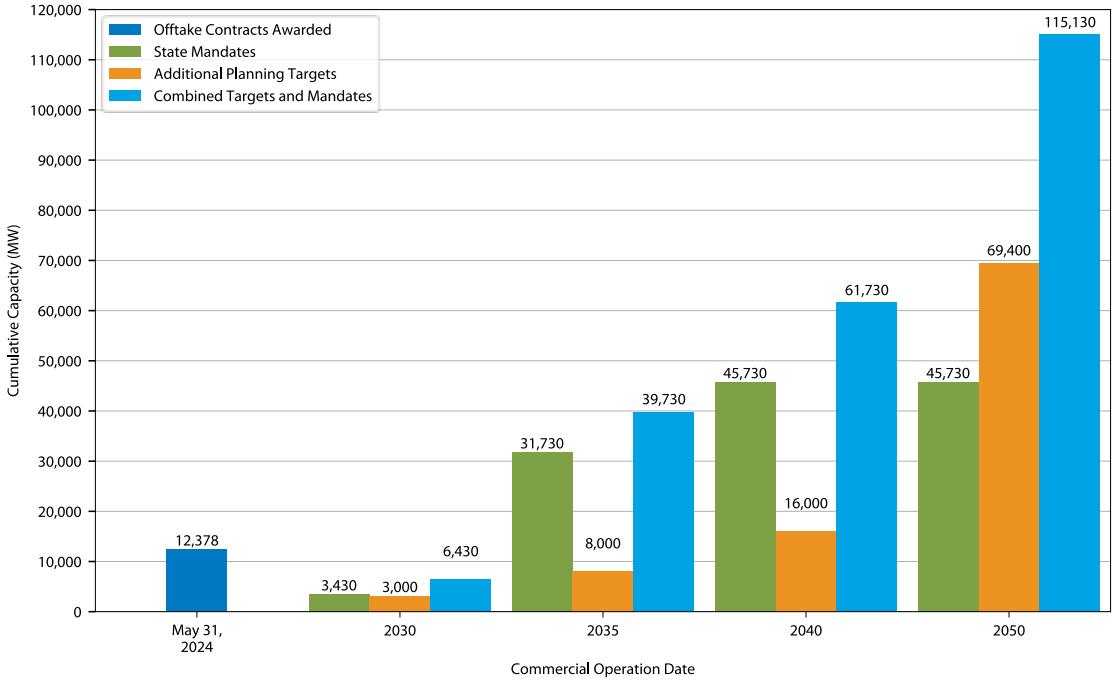
U.S. Offshore Wind Energy Pipeline Projects in the Pacific



U.S. offshore wind energy pipeline for Hawaii (left) and the Pacific (right).
Maps by John Frenzl, NREL

State Planning Goals, Mandated State Procurements, and Offtake Contracts Awarded

12 states have set planning targets or procurement mandates.



U.S. offshore wind energy state planning goals, procurement mandates, and offtake agreements awarded

- The planning targets total 115,130 MW of offshore wind capacity by 2050. The mandated procurement totals 45,730 MW of offshore wind capacity by 2040.
- As of May 31, 2024, 15 offtake agreements have been signed, which are associated with 12,378 MW of contracted capacity.

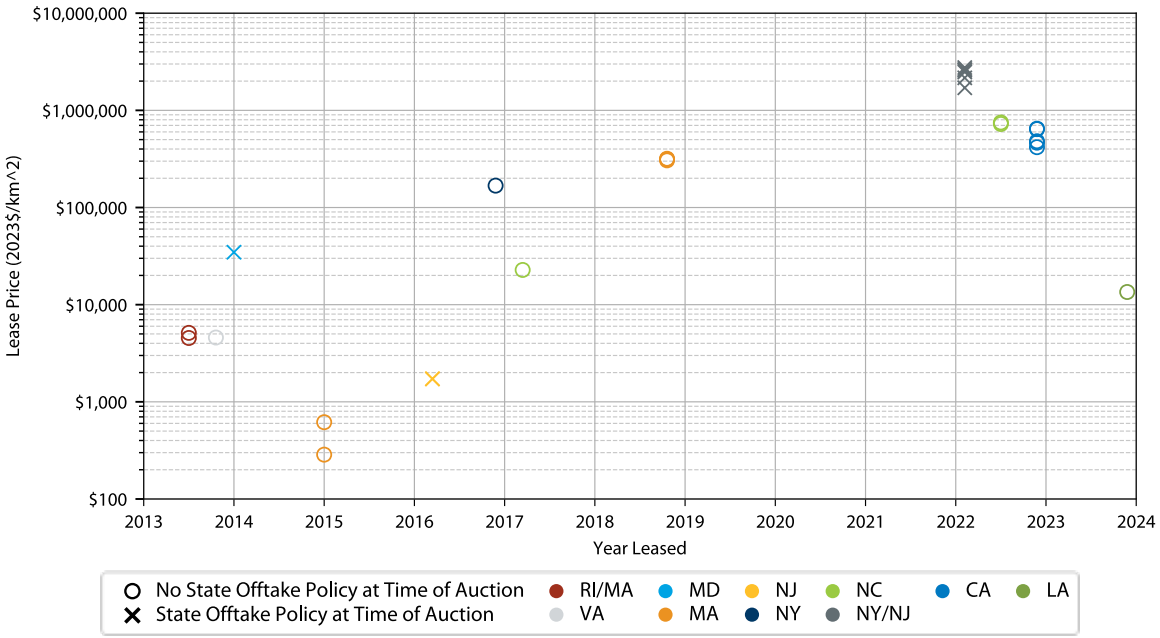
State Planning Goals, Mandated State Procurements, and Offtake Contracts Awarded by Year

State	Planning Targets		Mandated Procurement		Offtake Contracts Awarded (MW)	Awarded Projects (MW)	Supporting Policies and Documents
	Capacity (MW)	Year	Capacity (MW)	Year			
ME	3,000	2040	3,000	2040	12	Aqua Ventus (12)	An Act Regarding the Procurement of Energy from Offshore Wind Resources (2023)
MA	23,000	2050	5,600	2035	806	Vineyard Wind 1 (806)	An Act Driving Clean Energy and Offshore Wind (2022)
RI	1,430	2030	1,430	2030	430	Block Island Wind Farm (30) Revolution Wind (400)	Request for Proposals for Long-Term Contracts for Offshore Wind Energy (2022)
CT	2,000	2030	2,000	2030	304	Revolution Wind (304)	An Act Concerning the Procurement of Energy Derived From Offshore Wind (2019)
NY	20,000	2050	9,000	2035	1,866	South Fork Wind (132) Empire Wind 1 (810) Sunrise Wind 1 (924)	Climate Leadership and Community Protection Act (2019)
NJ	11,000	2040	11,000	2040	5,252	Atlantic Shores Offshore Wind South (Project 1) (1,510) Attentive Energy Two (1,342) Leading Light Wind (2,400)	New Jersey Executive Order 307 (2022)

State Planning Goals, Mandated State Procurements, and Offtake Contracts Awarded by Year

State	Planning Targets		Mandated Procurement		Offtake Contracts Awarded (MW)	Awarded Projects (MW)	Supporting Policies and Documents
	Capacity (MW)	Year	Capacity (MW)	Year			
MD	8,500	2031	8,500	2031	1,109	MarWin (300) Momentum Wind (809)	Promoting Offshore Wind Energy Resource Act (2023)
VA	5,200	2034	5,200	2034	2,599	Coastal Virginia Offshore Wind (Pilot) (12) Coastal Virginia Offshore Wind (Commercial) (2,587)	Virginia Clean Economy Act (2021)
NC	8,000	2040	-	-	-		North Carolina Executive Order 218 (2021)
CA	25,000	2045	-	-	-		Offshore Wind Energy Development off the California Coast: Maximum Feasible Capacity and Megawatt Planning Goals for 2030 and 2045 (2022)
LA	5,000	2035	-	-	-		Louisiana Climate Action Plan (2022)
OR	3,000	2030	-	-	-		Relating to Floating Offshore Wind Energy; and Prescribing an Effective Date (2021)
Total	**115,130**	**2050**	**45,730**	**2040**	**12,378**		

U.S. Offshore Wind Energy Lease Prices From 2013 Through 2023

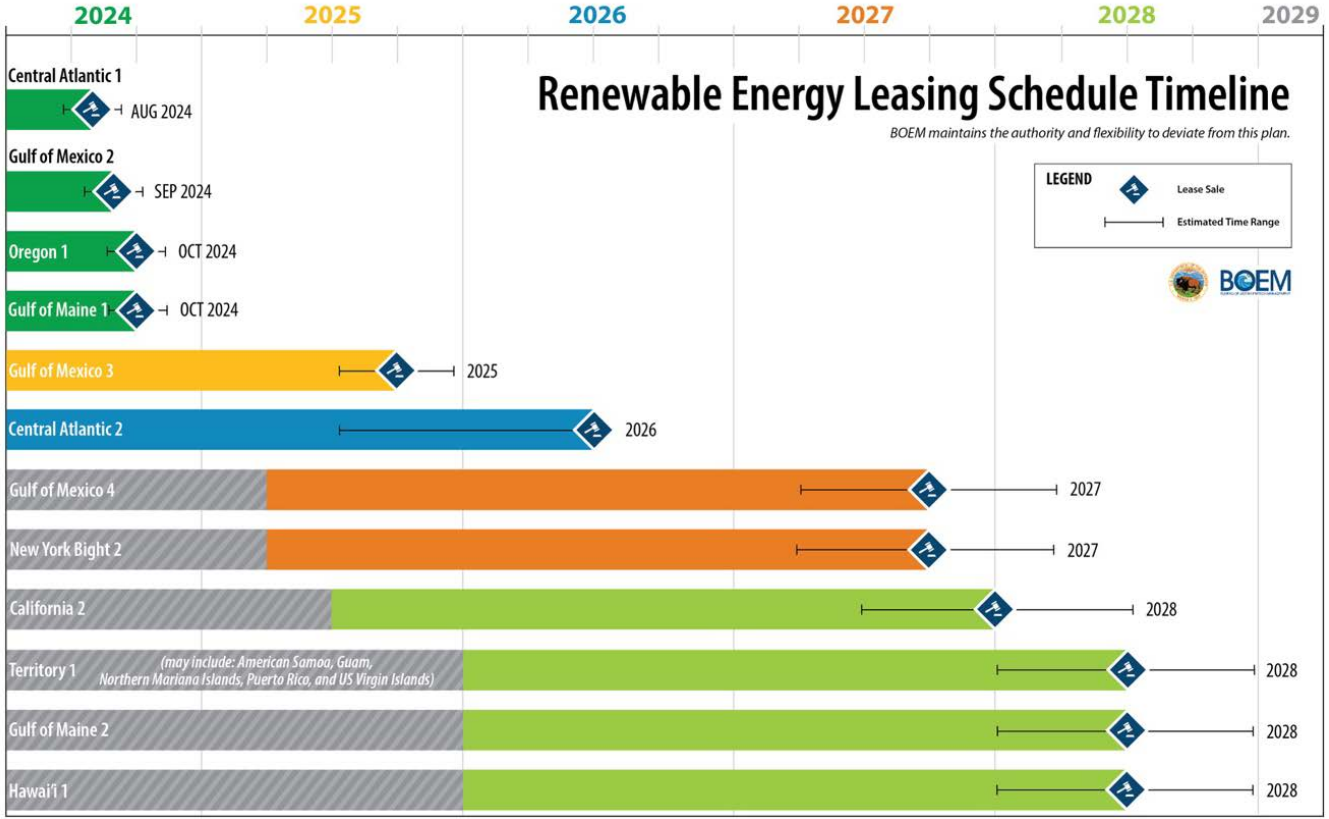


U.S. offshore wind energy lease prices

Since May 31, 2023, there were three lease areas available for auction in the Gulf of Mexico, but only one was sold, receiving a bid of $5.6 million.

On April 24, 2024, the U.S. Department of the Interior Announced a New 5-Year Offshore Wind Leasing Schedule

- The schedule includes up to 12 offshore wind lease sales across the Atlantic, Gulf of Mexico, Pacific, and U.S. territories.
- BOEM held Central Atlantic lease sale on Aug. 14, 2024.
- Lease sales are planned for the Gulf of Maine and offshore Oregon in 2024 with a total of 12 proposed lease areas. (The planned September 2024 lease sale in the Gulf of Mexico was canceled.)



Offshore wind leasing schedule. Figure from BOEM

Offshore wind ports, vessels, and manufacturing supply chain facilities emerging near project development sites indicate regional economic development and domestic supply chain growth.

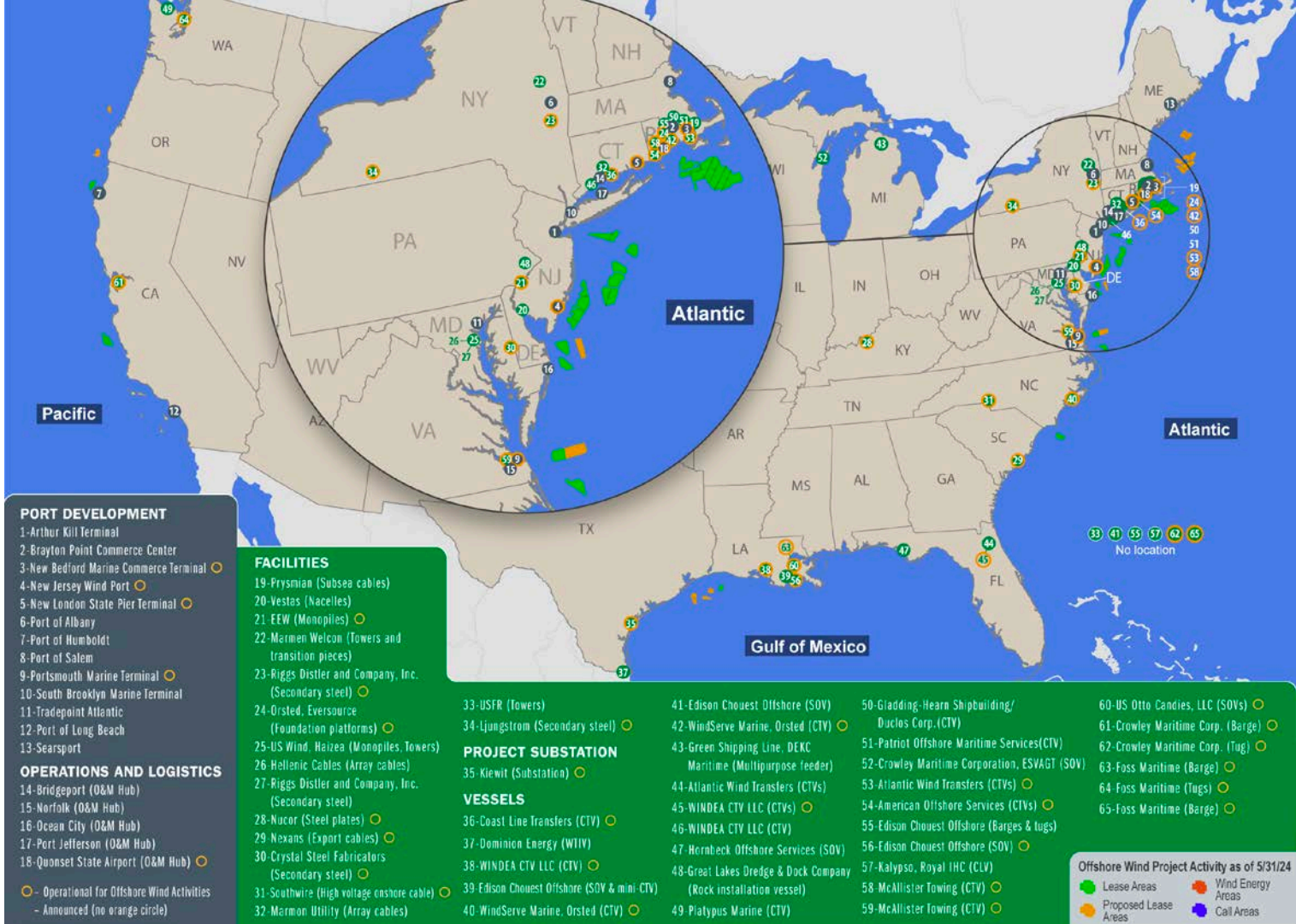


Image by Al Hicks and John Frenzl, NREL

The U.S. Offshore Wind Vessel Fleet Has 22 Vessels in Operation and 30 Vessels Announced as of May 31, 2024

The following table lists operational and announced U.S.-flagged vessels to serve the offshore wind energy industry:

Vessel Category	Operational	Announced	Total
Crew transfer vessel (CTV)	13	18	31
Service operation vessel (SOV)	3	4	7
Barge	3	2	5
Tug	3	2	5

- In April 2024, the only Jones Act compliant wind turbine installation vessel, Charybdis, was successfully launched to water in Brownsville, Texas; its estimated time of arrival after sea trials is expected to be late 2024 or early 2025 (Dominion Energy n.d., 2024).
- An SOV constructed in Edison Chouest shipyard in Louisiana was delivered in May 2024 and is expected to be in operation for the operations and maintenance support of the Ørsted Northeast portfolio (Ferry 2023; Ørsted 2024).
- In May 2024, the keel for Acadia, which will become the first U.S.-built subsea rock installation vessel for the offshore wind industry, was laid at the Philly Shipyard in Philadelphia, Pennsylvania (Buljan 2024).

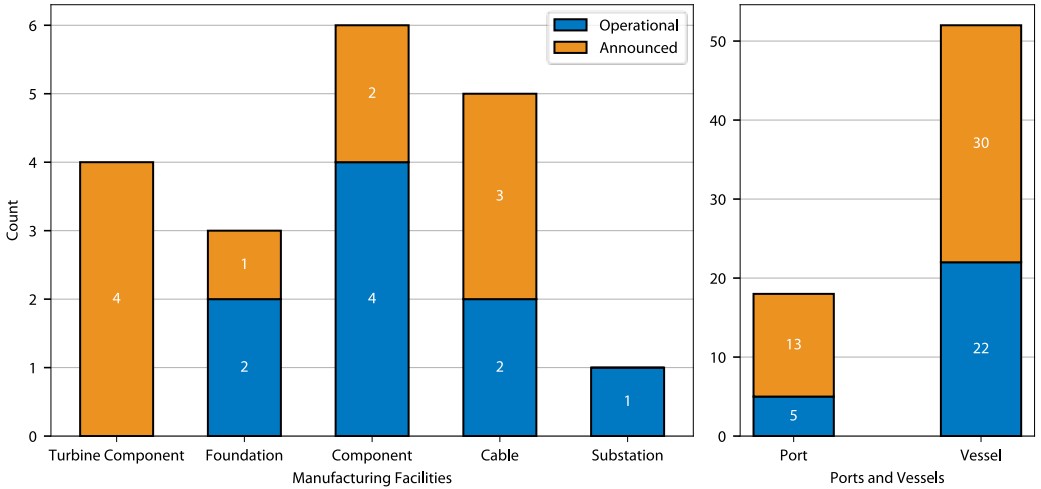
More Than $2 Billion in Announced Port and Supply Chain Investments Since the Start of 2023

Type of Investment	State	Port (If Applicable)	Announced Investment	Funding Source
Secondary steel manufacturing	MD	Tradepoint Atlantic	$14,000,000	Ørsted, Riggs Distler
Tower manufacturing	-	-	$700,000,000	US Forged Rings
Port development	CA	Port of Humboldt	$8,670,000	DOT Maritime Administration – Port Infrastructure Development Program
Port development	CA	Port of Humboldt	$426,700,000	DOT INFRA program
Monopile manufacturing	NJ	Paulsboro Marine Terminal	$58,850,000	Attentive Wind/TotalEnergies
Monopile manufacturing	NJ	Paulsboro Marine Terminal	$105,250,000	Leading Light Wind/Invenergy
Port development	NY	South Brooklyn Marine Terminal	$861,000,000	Skanska
Total announced investment (Jan. 1, 2023–May 31, 2024):			**$2,174,470,000**	**-**

Data sourced from DOE's Clean Energy tracking efforts (DOE n.d.)

From January 2023 to May 31, 2024, the U.S. Offshore Wind Industry Has Made Significant Port and Supply Chain Developments and Announced Investments

- In January 2024, the Humboldt Bay Harbor District secured a $426.7 million grant from the U.S. Department of Transportation's Nationally Significant Multimodal Freight & Highway Projects to support the construction and maintenance of offshore wind infrastructure (Huffman 2024).
- Also in January 2024, Attentive Energy committed $58.85 million, and Invenergy committed $105.25 million toward the completion of the EEW Foundation Manufacturing Facility in New Jersey (State of New Jersey 2024a, 2024b).
- In February 2024, US Forged Rings Inc. announced a $700 million investment in a tower and rolled ring fabrication facility (US Forged Rings Inc. 2024).
- In April 2024, Skanska announced an $861 million contract award to transform the 73-acre South Brooklyn Marine Terminal into a dedicated offshore wind port (Skanska 2024).



Announced and operational manufacturing facilities, ports, and vessels as of May 31, 2024

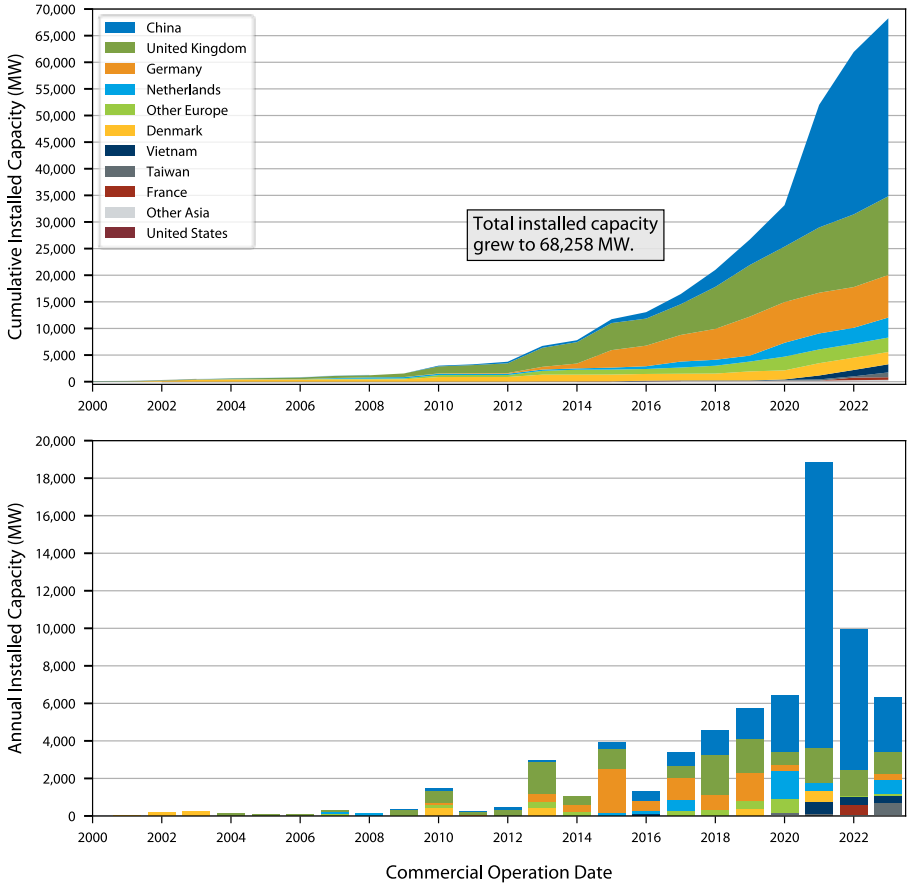
Grid Progress To Support Offshore Wind Development Is Evident Nationwide

- In February 2023, the New York Public Service Commission (NY PSC) approved 62 Phase 2 transmission projects in New York, representing a $4.4 billion investment aimed at integrating clean energy into upstate renewable generation areas (NY PSC 2023a).
- In June 2023, the New York Independent System Operator (NYISO) selected the $3.26 billion T051 Alternate Solution 5 project to meet Long Island's Offshore Wind Export Public Policy Transmission Need (NYISO 2023).
- The *Northern California and Southern Oregon Offshore Wind Transmission Study*, published in October 2023, estimates that developing offshore wind resources on the northern California and southern Oregon coasts will require $35–$40 billion in new transmission infrastructure (Zoellick et al. 2023).
- The *Atlantic Offshore Wind Transmission Study*, published by DOE and NREL in March 2024, addresses gaps in offshore transmission planning along the Atlantic seaboard (Brinkman et al. 2024).
- In April 2024, the California Independent System Operator (CAISO) released their draft 2023–2024 Transmission Plan, with $4.59 billion devoted to infrastructure to carry offshore wind power from the northern coast to the San Francisco Bay Area. The plan received approval from CAISO's Board on May 23 (CAISO 2024).

Global Offshore Wind Energy Development

Global Cumulative Offshore Wind Energy Installed Capacity Reaches 68,258 MW

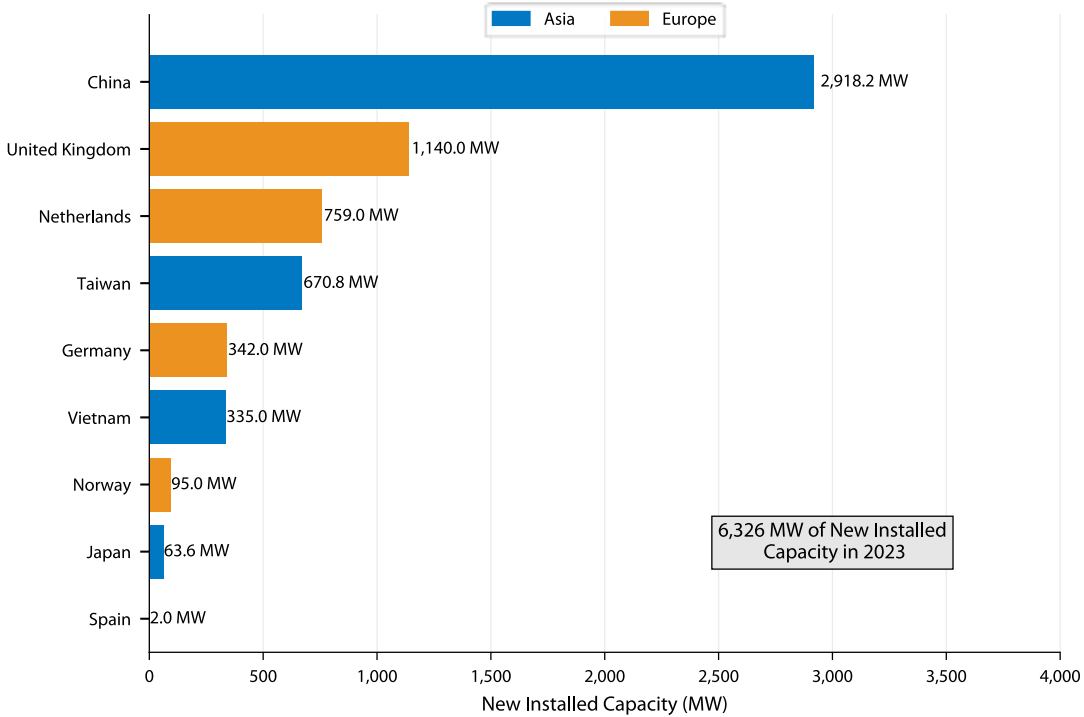
- Total installed capacity reached 68,258 MW across 319 operating projects and more than 13,096 operating offshore wind turbines.
- This growth in cumulative operating capacity represents an increase of 10.2% compared to the end of 2022.



Global cumulative offshore wind energy installed capacity (top) and annual capacity additions (bottom) through Dec. 31, 2023

China Continues To Lead in Global Offshore Wind Deployment, Followed by the United Kingdom

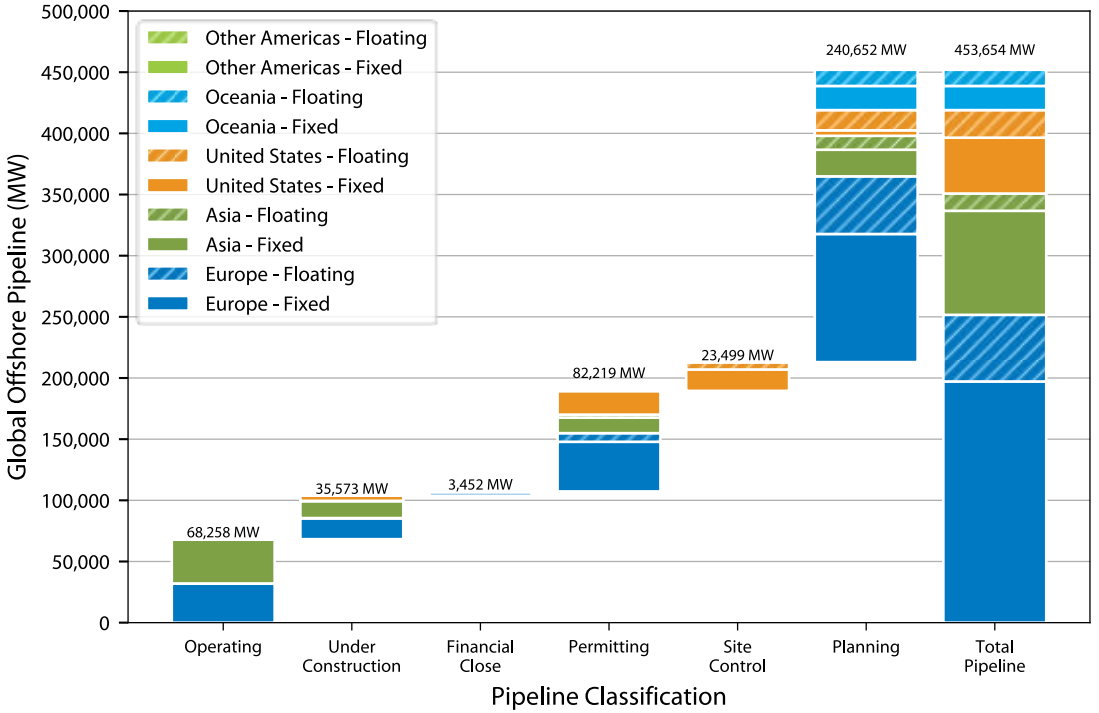
- In 2023, 6,326 MW of offshore wind energy were deployed globally.
- Installed capacity in 2023 is the fourth largest annual installed capacity ever.
- Nearly half of the new capacity (46.1%) was commissioned in China, totaling 2,918.2 MW.



Global offshore wind energy installations in 2023

As of Dec. 31, 2023, the Global Offshore Wind Energy Pipeline Total Capacity Was Assessed To Be More Than 453 GW

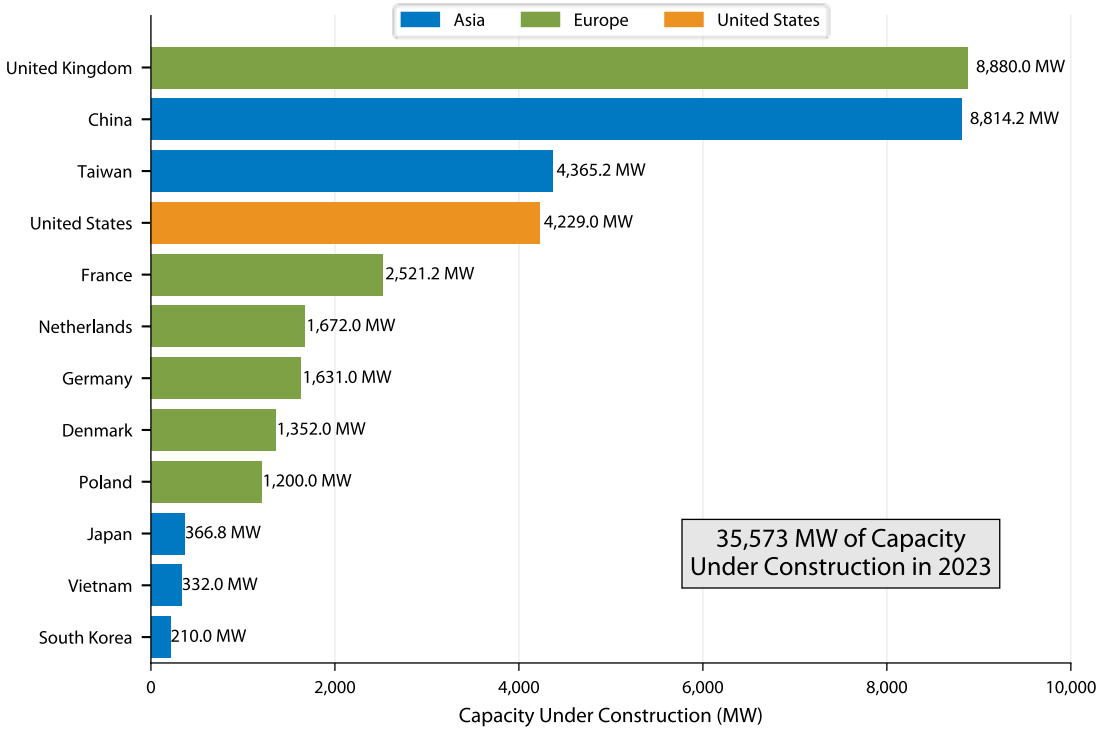
- The assessed total capacity of more than 453 GW is an increase of 27 GW (6.3%) compared to the approximately 426 GW reported in the in the *Offshore Wind Market Report: 2023 Edition* (Musial et al. 2023).
- Globally, there are 68.3 GW of operational offshore wind energy projects.



Total global offshore wind energy pipeline by regulatory status

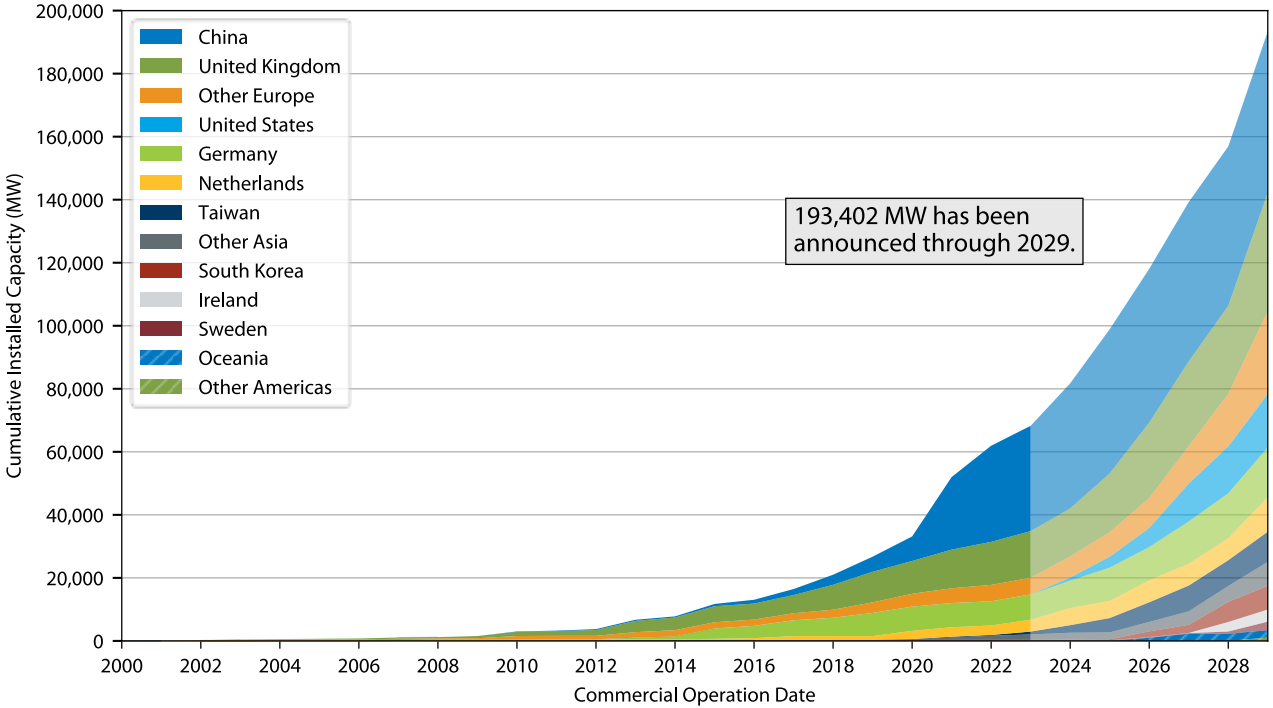
There Were 35,573 MW of Offshore Wind Capacity Under Construction as of Dec. 31, 2023

- There was approximately 64% more offshore wind energy capacity under construction in 2023 compared with 21,717 MW in 2022.
- 5,745 MW were originally estimated to be completed in 2023 but is now estimated for completion in 2024.
- 19,889 MW of projects entered the construction phase in 2023.



Offshore wind energy capacity under construction by country as of Dec. 31, 2023

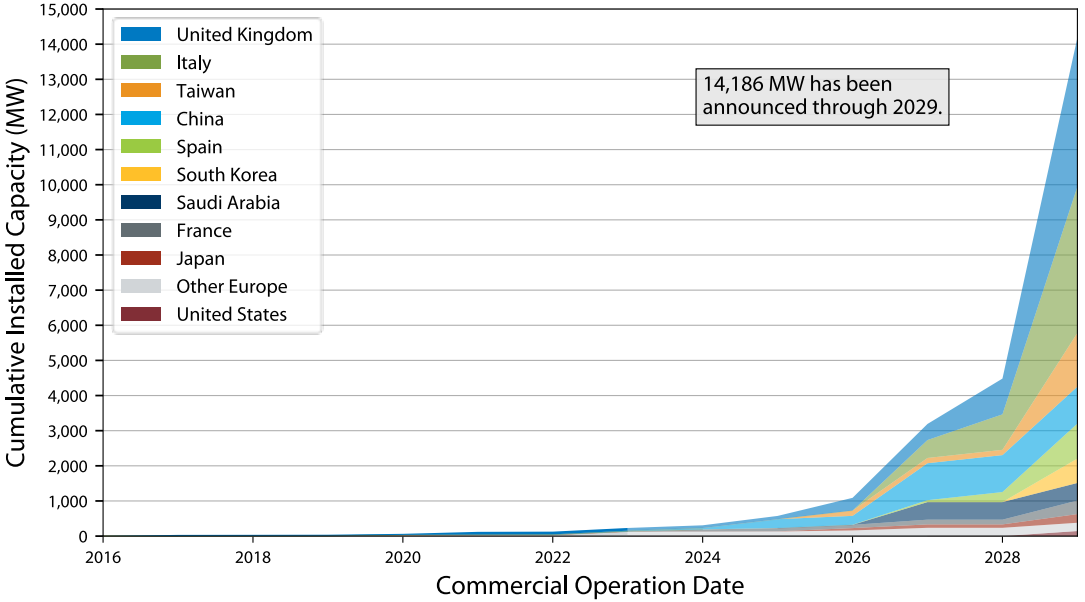
Global Installed Capacity Could Reach 193 GW by 2029 Based on Developer-Announced Commercial Operation Dates



Estimated cumulative fixed-bottom and floating offshore wind capacity by country based on developer-announced commercial operation dates.

Based on Developer-Announced CODs, 14,186 MW of Floating Offshore Wind Capacity May Be Installed Globally by 2029

- Because most projects are still in the planning phase, there is a high degree of uncertainty about their timing and likelihood of completion.
- The potential surge after 2028 indicates the transition from pilot-scale to commercial-scale projects.
- Most of the developer-announced deployment through 2029 is in the United Kingdom (4,242 MW), Italy (4,160 MW), Taiwan (1,530 MW), China (1,052 MW), and Spain (995 MW).



Estimated cumulative floating offshore wind capacity by country based on announced CODs through 2029

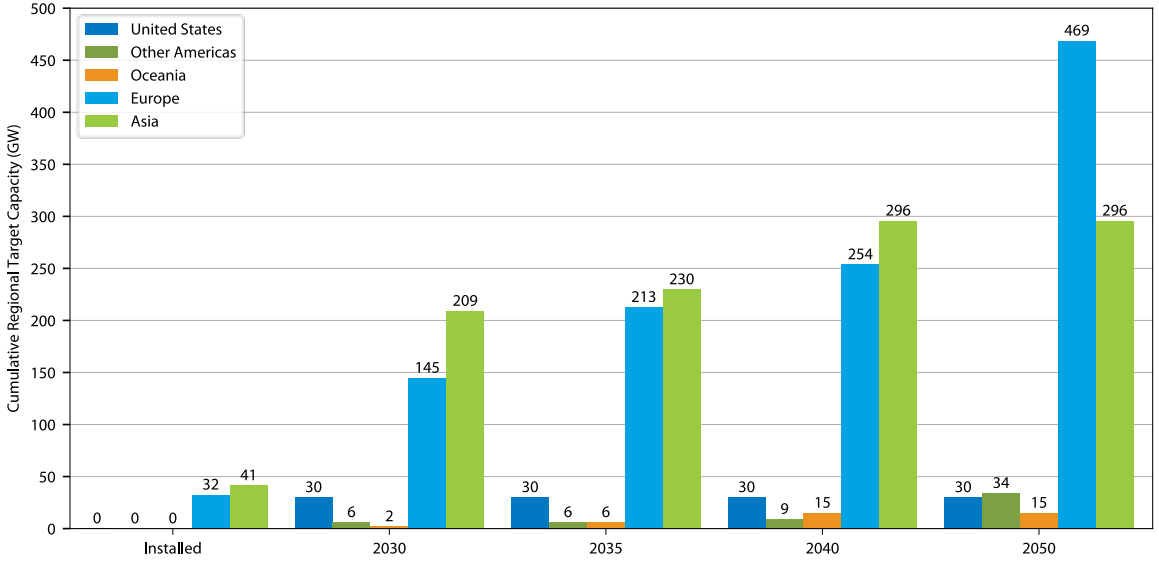
Operating Floating Offshore Wind Capacity Grew 91% to 234 MW in 2023 From Successful Commissioning of Pilot Projects

The following floating offshore wind energy projects larger than 1 MW achieved significant installation milestones in 2023:

- The 88-MW Hywind Tampen project in Norway was fully commissioned in August 2023, making it the largest operational floating offshore wind plant in the world (Equinor 2023). There are 11 SG 8.0-167 direct-drive turbines operating at the project (Siemens Gamesa Renewable Energy [SGRE] 2019).
- The 25-MW Provence Grand Large pilot project installed three turbines (8.4-MW Siemens Gamesa turbines) on tension-leg floating platforms near Marseille, France (SBM Offshore 2023).
- The 3.6-MW Guoneng Sharing pilot project installed a single turbine on a semisubmersible platform near Longyuan Nanri Island in China (Shanghai Electric 2023; M. Lewis 2023).
- The 2-MW DemoSATH demonstration project in Spain achieved first power in September 2023 (RWE 2023).
- The China National Offshore Oil Corporation Limited connected a Mingyang Smart Energy MySE 7.25-MW wind turbine on a semisubmersible platform to the grid of the Wenchang oilfield in May 2023 (Buljan 2023; China National Offshore Oil Corporation 2023).

Government Renewable Energy Objectives Play a Key Role in Driving the Worldwide Expansion of Offshore Wind Energy

- Targets have the potential to catalyze investment, reduce costs, and provide guidance for energy planners, aiming to ensure lasting market stability.
- Some targets are legally binding like those in Greece, and others are not presently legally binding, such as the U.S. target.
- Tables A-1, A-2, and A-3 (Appendix A) present national deployment objectives and procurement targets for the United States, and countries in North and South America, Oceania, Europe, and Asia.

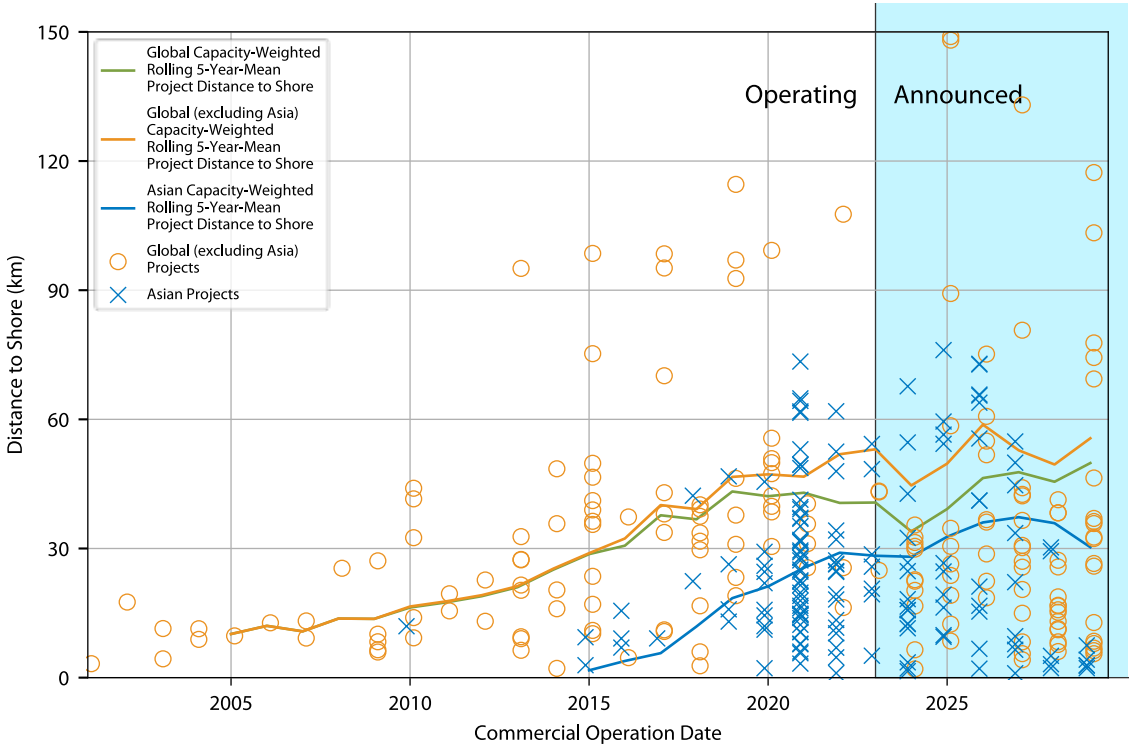


Total regional offshore wind energy targets

Offshore Wind Energy Technology Trends

Global Projects Installed Increasingly Far From Shore

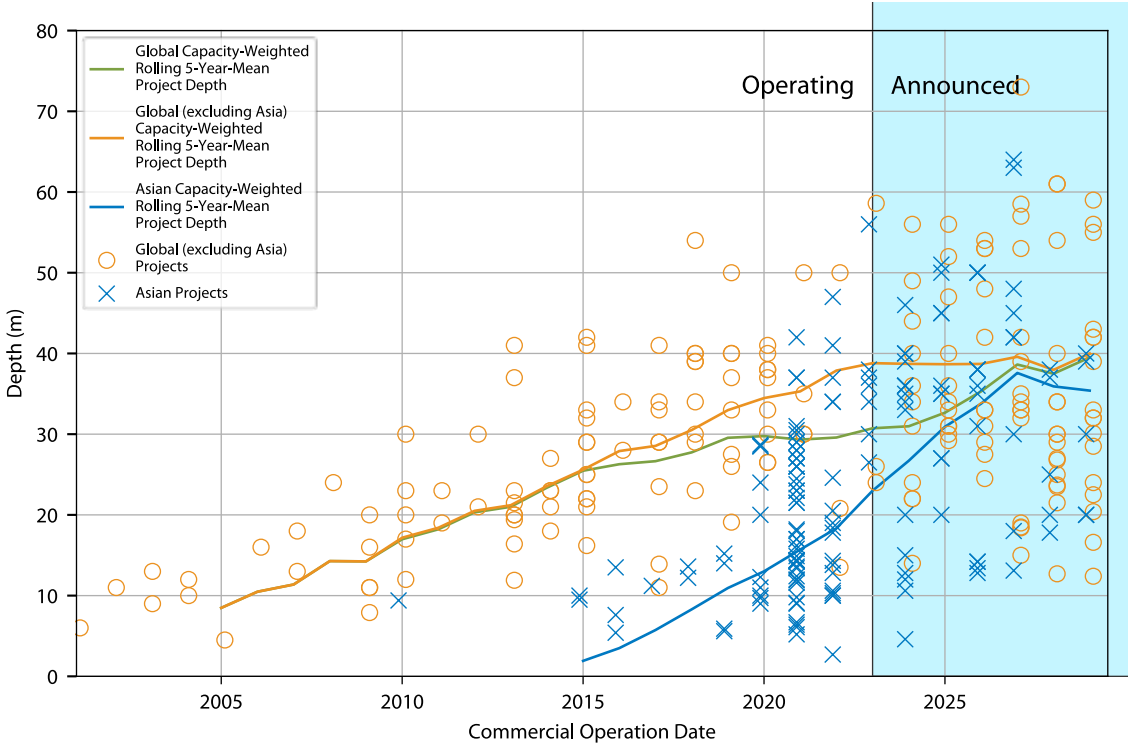
- The operational project with the greatest distance to shore in the NREL database is the Hornsea I Project in the United Kingdom at nearly 115 kilometers (km).
- For announced projects through 2028, the data indicate that projects in Asia are approaching, but not yet converging, with the global average distances from shore in other regions.
- For the rest of the world, projects coming online in the Netherlands, Denmark, France, Germany, and the United States are all less than 40 km from shore—leading to the drop in global average distance from shore through 2028.



Distance to shore for global offshore wind energy projects (excludes floating)

Fixed-Bottom Projects Could Become Commercially Viable Beyond the Conventional Limit of 60 Meters

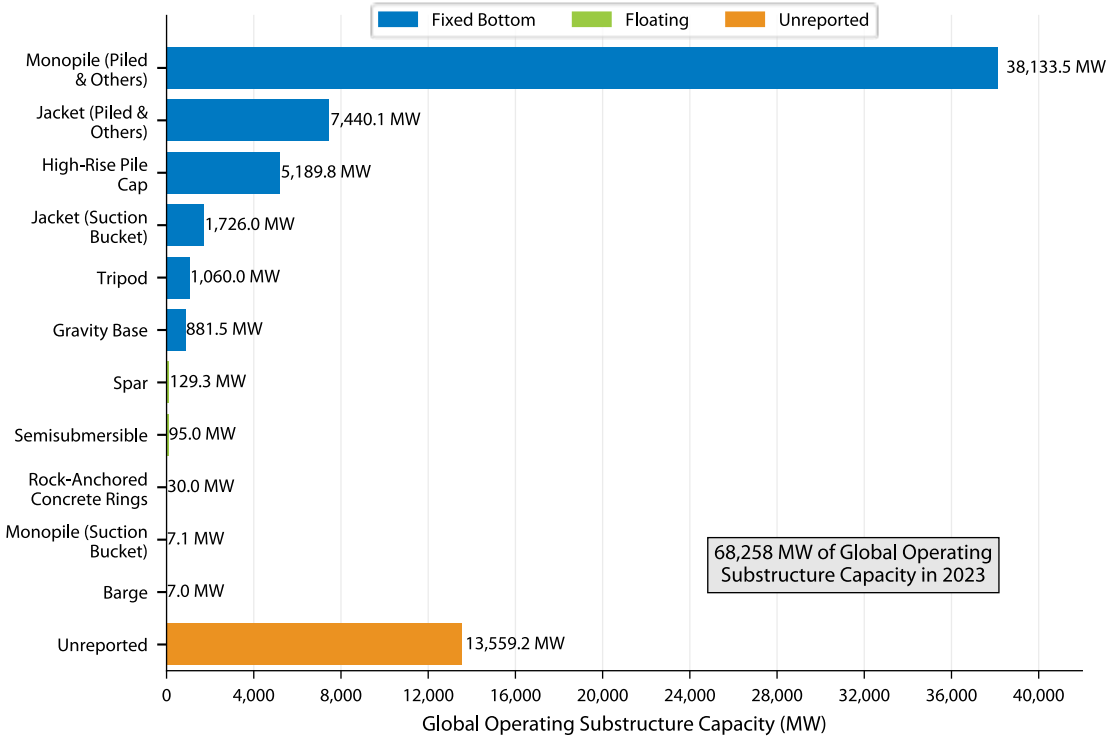
- The deepest operational fixed-bottom offshore wind turbine is installed on a jacket substructure in water that is 58.6 meters (m) deep at the Seagreen project in Scotland (Seagreen Wind Energy Limited 2023).
- The data from announced projects suggest that fixed-bottom projects could be installed in maximum water depths of up to 65 m in the coming years.



Maximum water depths for global fixed-bottom offshore wind energy projects (excludes floating)

Floating Substructure Technologies Are Rapidly Maturing, With Operating Demonstration-Scale Floating Projects

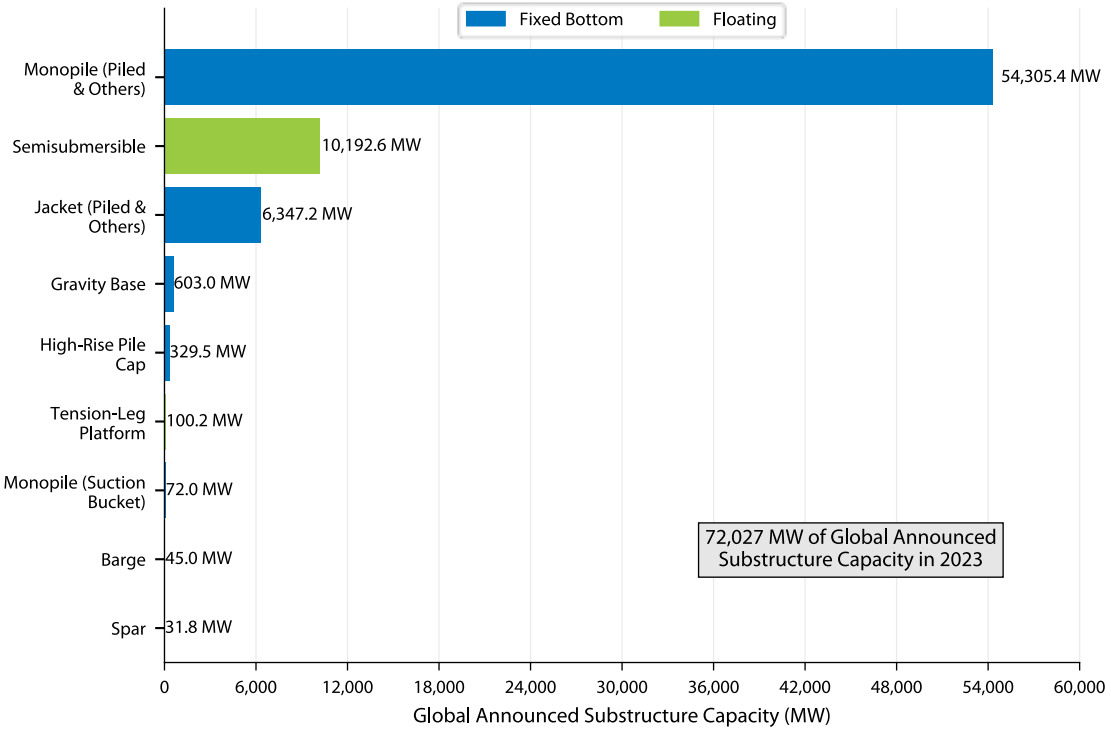
- Of the 68,258 MW of operational projects, monopiles represent more than half (55,6%), followed by jackets (13.4%), pile caps (7.6%), gravity-base (1.3%), and tripod (1.6%) designs; about 19.9% are unreported in the database as of Dec. 31, 2023.
- Pile cap substructures are more common in Asia than Europe and include multiple piles driven into the seabed, joined by a cap to which the wind turbine tower is mounted (Wang et al. 2018).



Offshore wind substructure technology types used in operating projects

For the 72,027 MW of Future Projects (16% of Pipeline Capacity), Monopiles Are Expected To Remain the Dominant Choice

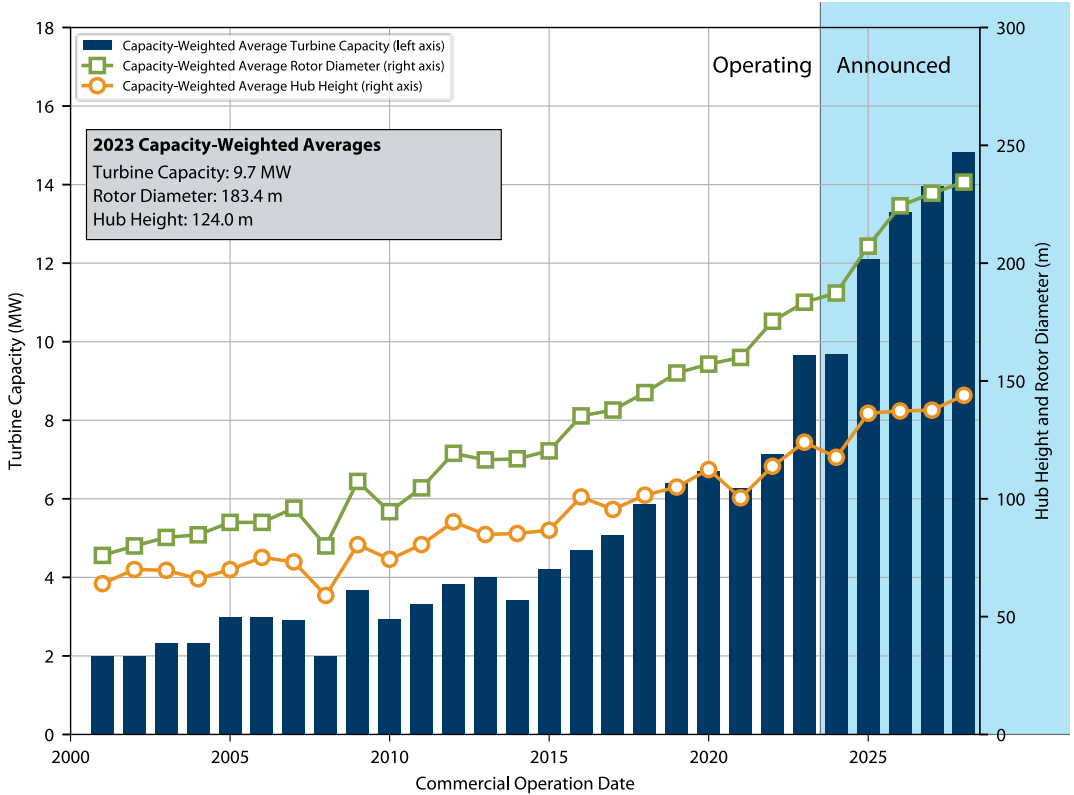
- Monopiles make up 75.4% share of announced capacity—even as floating technologies are commercialized.
- Jacket substructures are expected to make up 8.8% of the announced market.
- Semisubmersibles are expected to represent a 14.2% share of the announced market for all substructure types.



Announced offshore wind substructure technology for future projects

Capacity-Weighted Average Turbine Rating, Rotor Diameter, and Hub Height Increased Year Over Year for Global Installations

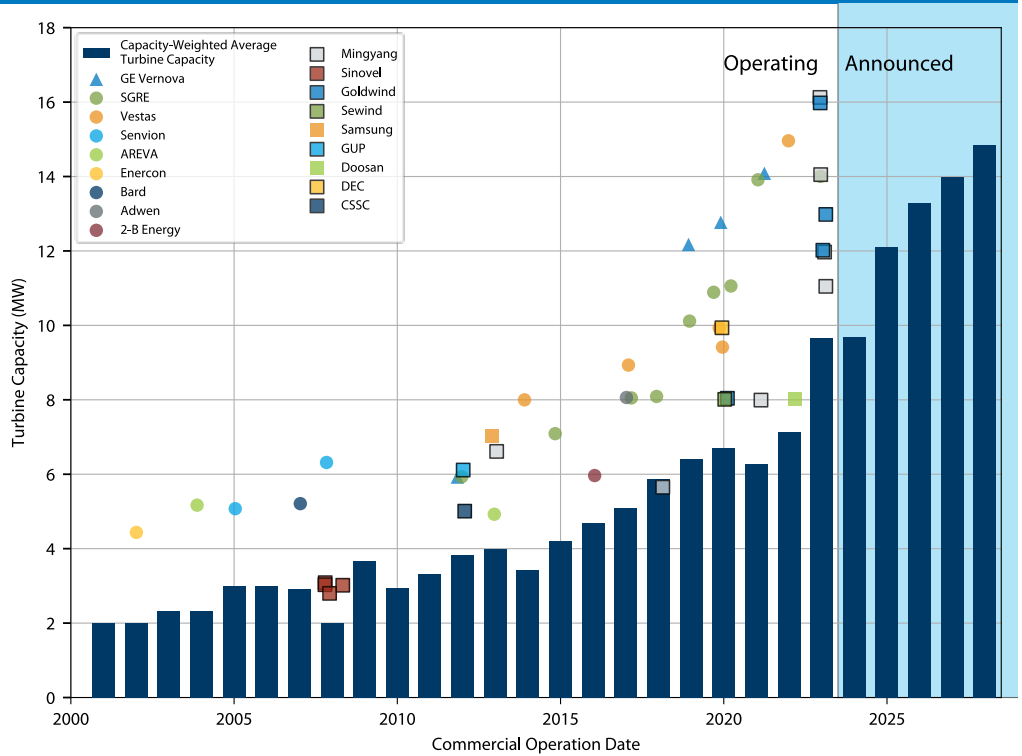
- Global installations in 2023 had a capacity-weighted-average turbine rating of 9.7 MW (26% year-over-year increase), rotor diameter of 183.4 m (5% year-over-year increase), and hub height of 124.0 m (6% year-over-year increase).
- The global capacity-weighted average turbine rating made a large jump to nearly 10 MW this year as the market has begun adopting the 12–15-MW turbine platform.
- Wind turbines of up to 13 MW were operating at commercial-scale projects in Europe and North America in 2023 and early 2024 (Memija 2023a; NYSERDA 2023a; General Electric 2023; Copenhagen Offshore Partners 2024).



Global average offshore wind turbine capacities, hub heights, and rotor diameters

Offshore Wind Turbines Show an Upscaling Trend

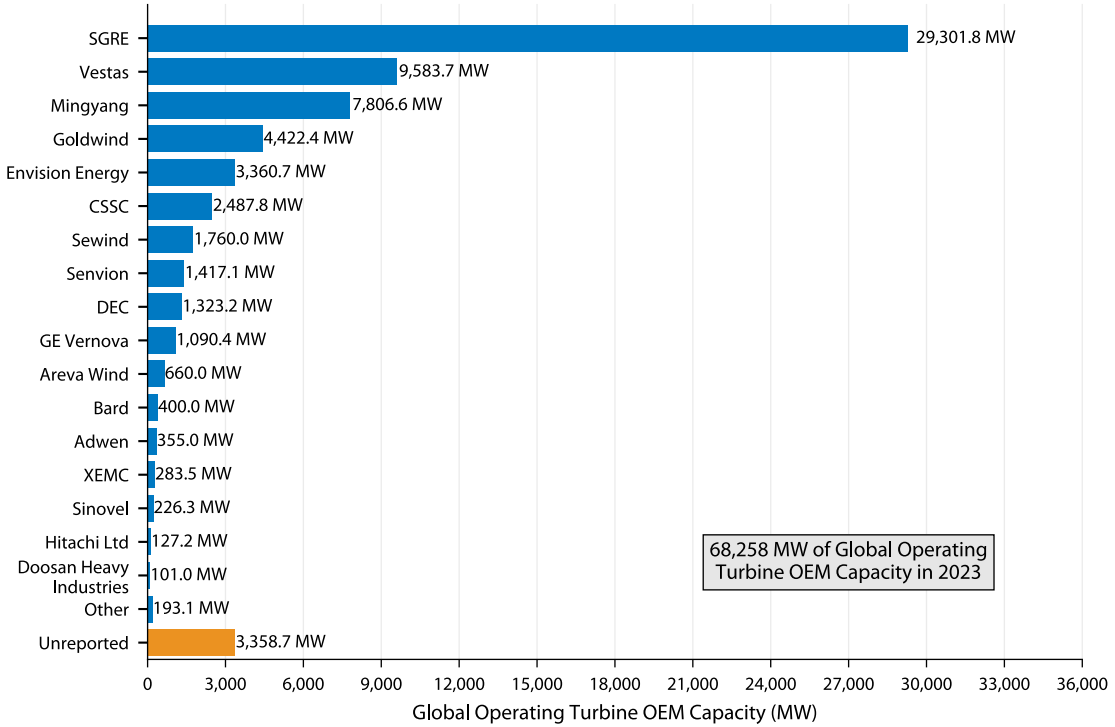
- The 11-MW Siemens Gamesa (SGRE) and 13-MW GE turbine models, which produced power in 2020 as prototypes, produced power in large-scale projects in in Europe and North America in 2023 and early 2024.
- The Vestas 15-MW model, which produced its first power near the end of 2022 as a prototype, was type-certified by the end of 2023 and is expecting its first deliveries in 2025 (Memija 2023b; Vestas 2024).
- In April 2024, the first of 60 14-MW Siemens Gamesa turbines was installed in Scotland (Durakovic 2024). This model produced power for the first time as a prototype in 2021.
- Timelines demonstrate that Western turbine OEMs typically require approximately 3 years from the initial power generation of a prototype model to the first power generation at a commercial-scale project.



Comparison of offshore wind turbine prototypes with commercial offshore wind turbine capacity growth

At Least 49.2% of All Operational Offshore Wind Capacity Is From SGRE Wind Turbines

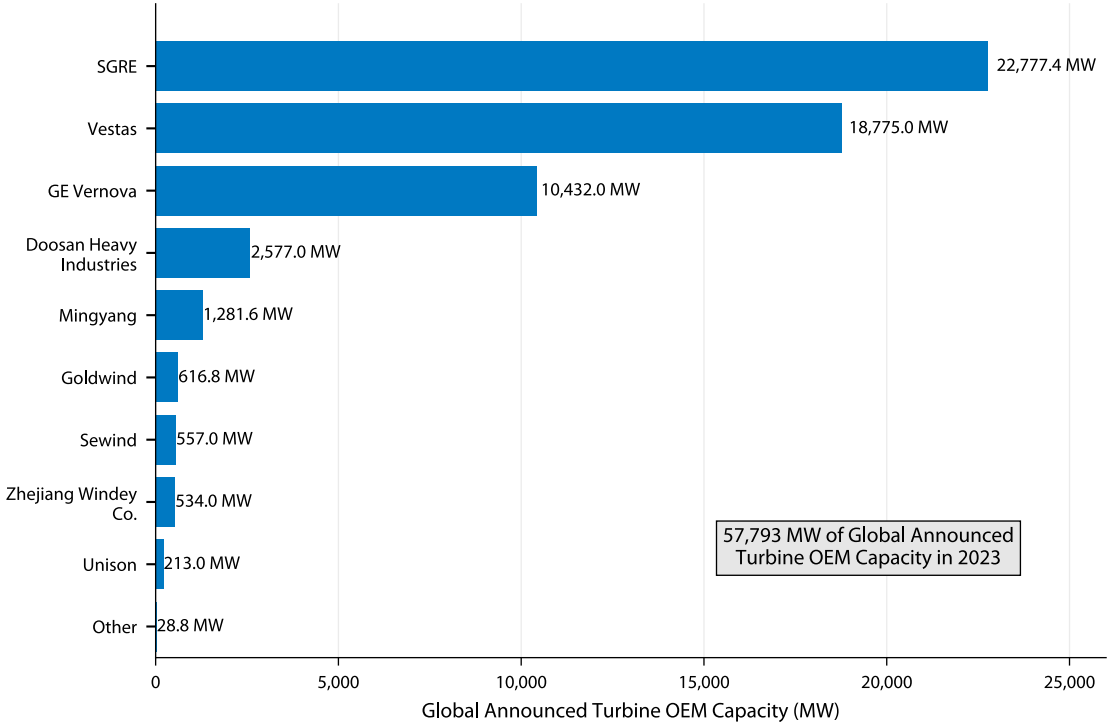
Vestas wind turbines are the next-largest share of the operational market at 14%, followed by Mingyang (11.4%), Goldwind (6.5%), and Envision Energy (4.9%).



Offshore wind turbine manufacturer market share for operating projects

SGRE Is Expected To Hold a 39.4% Share of Wind Turbine Manufacturing for Future Project Announced Capacity

- Vestas is expected to hold a 32.5% share, followed by GE Vernova (18.1%), Doosan Heavy Industries (4.5%), and Mingyang (2.2%).
- While Chinese manufacturers have focused on the domestic market to date, Mingyang, Envision Energy, Dongfang, Goldwind, Windey, and Harbin Electric have all secured contracts for projects outside China representing a potential for greater competition in global offshore wind turbine markets (Barla 2023).



Global offshore wind turbine manufacturer market share for announced projects

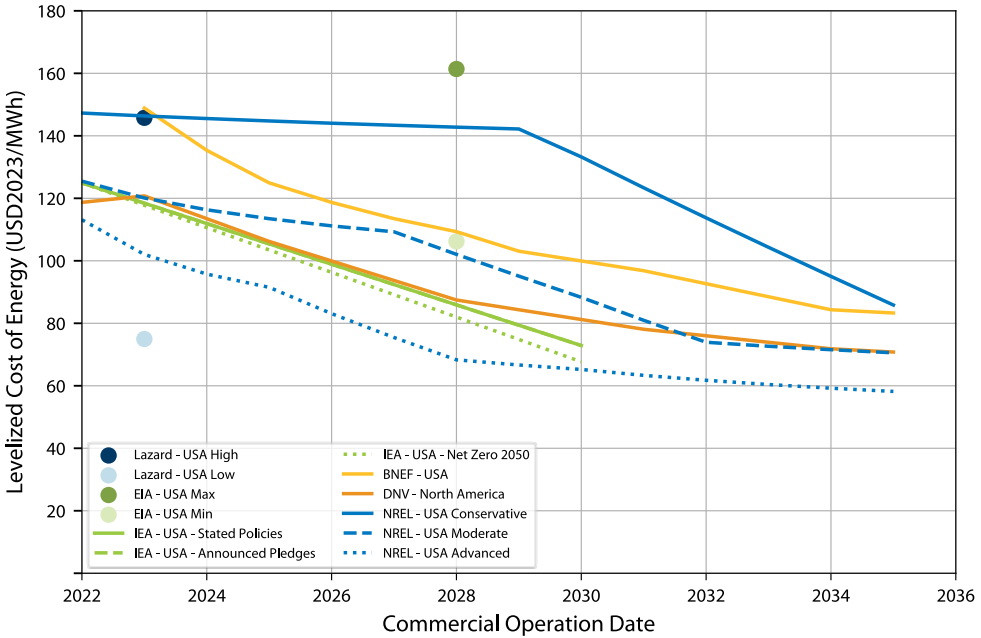
Cost and Price Trends

Cost and Price Overview

- Rising interest rates, supply chain constraints, and higher commodity prices during 2021–2023 have led to higher offshore wind energy costs globally and in the United States.
- Rising costs primarily affect projects planned for commercial operation between 2023 and 2026 because of a 1–3-year lag between the placement of supply chain orders and the start of commercial operations.
- Projects planned for later commercial operation might be less affected because of the actions taken at the state and federal levels and may have time to wait for macroeconomic conditions to return to prior levels.
- The cost reporting and figures in this section focus on projects that have attained commercial operation date in 2023.

Unsubsidized Average Levelized Cost of Energy Estimated at $125/MWh in 2023 for Hypothetical U.S. Offshore Wind Project

- The unsubsidized average levelized cost of energy (LCOE) in 2023 of $125 per megawatt-hour (MWh) is estimated by data providers using mid-case estimates for a hypothetical commercial-scale fixed-bottom U.S. offshore wind project.
- Sources report a wide range of $75/MWh to $149/MWh across scenarios.
- Cost differences can often be explained by the represented siting conditions, such as higher wind speeds, closer proximity to port and grid infrastructure, varying financing assumptions, forecast error from a small cost record, and others.
- These costs represent an average increase of more than 45% when compared to the 2023 edition of this report (Musial et al. 2023).
- Global offshore wind costs have declined by more than 50% since 2013, even though LCOE has increased since 2022 (Moné et al. 2015).



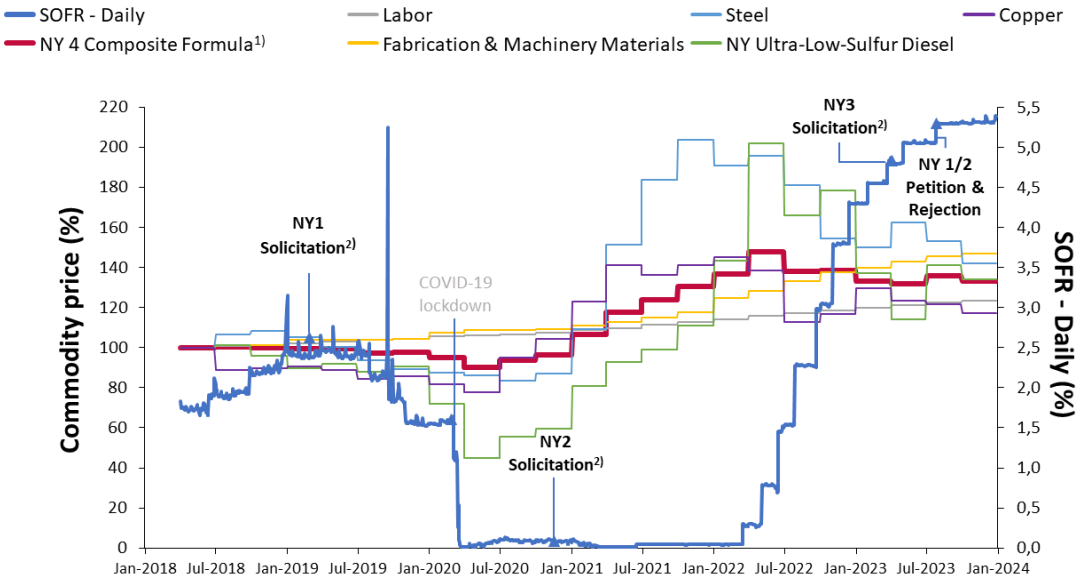
Unsubsidized LCOE estimates for fixed-bottom offshore wind energy in the United States. Source: Lazard (Bilicic and Scroggins 2023); EIA (U.S. Energy Information Administration 2023); BNEF (BNEF 2024b); IEA (International Energy Agency 2023); DNV (DNV 2023), NREL (NREL 2024).

Short-Term Cost Trends

- Compared to earlier contract prices established for the Empire Wind 1 and Sunrise Wind projects in 2018 (New York ORECRPF18-1), recent awards from 2024 (New York ORECRFP23-1) for the same projects suggest an increase of the levelized OREC contract price of 36% and 27%, respectively.
- OREC prices released for offshore wind power projects in New Jersey have also shown significant increases.
- The OREC first-year (nominal) price for the Attentive Energy Two project was $131/MWh, and the Leading Light Wind project was priced at $112.50/MWh (New Jersey Board of Public Utilities 2024a, 2024b; TotalEnergies 2024). These prices, both awarded in 2024, represent a substantial jump from previous OREC prices in New Jersey.
- Ørsted's New Jersey Ocean Wind 2 project was awarded an OREC first-year (nominal) price of $83.40/MWh in 2021.

After Mid-2020, Several Key Commodities Experienced Considerable Price Increases

- Between 2020 and 2024, the Secured Overnight Financing Rate (SOFR, blue line) surged from close to 0% to nearly 5%, mirrored by other debt cost indicators (e.g., 20-year treasuries).
- During the same period, key offshore wind commodities increased by approximately 34% and 38% for New York's first and second round of offshore wind solicitations (NY1 and NY2).



Offshore wind commodity price index (left axis) and SOFR (right axis), 2018–2024. Notes: (1) NY 4 composite index was calculated based on the NY4 price formula (NYSERDA 2024); (2) represents the time of offer proposal submission. Quarterly data. Source: Federal Reserve Bank of St. Louis (2024a, 2024b); NYSERDA (2023b); U.S. Bureau of Labor Statistics (2024a, 2024b, 2024c); U.S. Energy Information Administration (2023)

The Price of Key Offshore Wind Commodities Changed Between Bid Submission and the Fourth Quarter of 2023

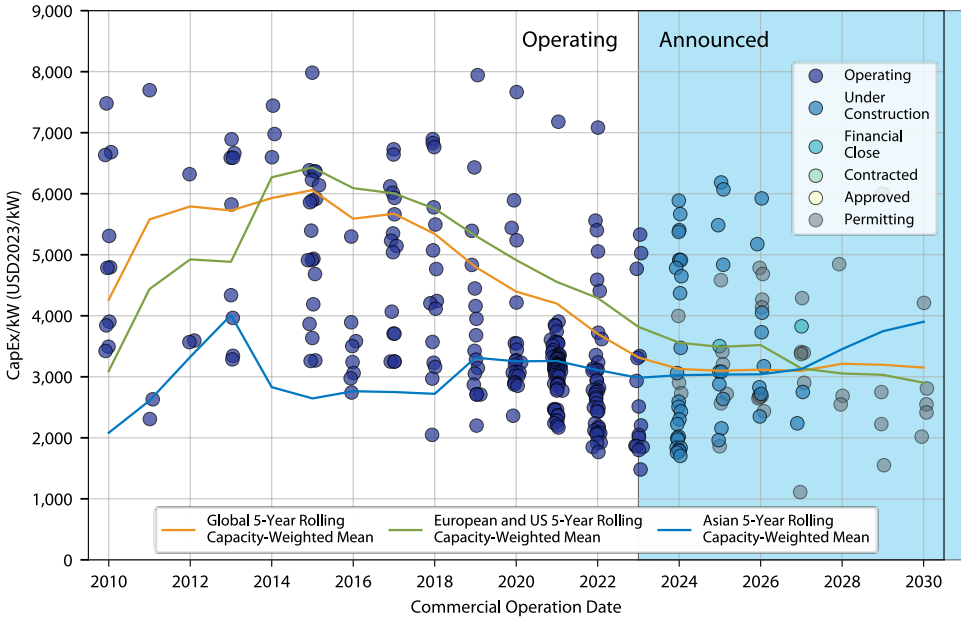
Commodity	NY1 Bid Submission[a] Through Q4 2023	NY2 Bid Submission[b] Through Q4 2023
Labor	+21%	+15%
Fabrication and Machinery Material	+42%	+34%
Steel	+35%	+63%
NY Ultra-Low-Sulfur Diesel	+49%	+125%
Copper	+30%	+12%
Index	+34%	+38%

[a] NY1 refers to New York's first offshore wind solicitation published in 2018 (ORECRFP18-1).
[b] NY2 refers to New York's second offshore wind solicitation published in 2020 (ORECRFP20-1).

Source: Calculated using the inflation index formulas from NYSERDA (2024).

The Capacity-Weighted Average Capital Expenditure for Global Offshore Wind Projects Has Decreased Since 2015

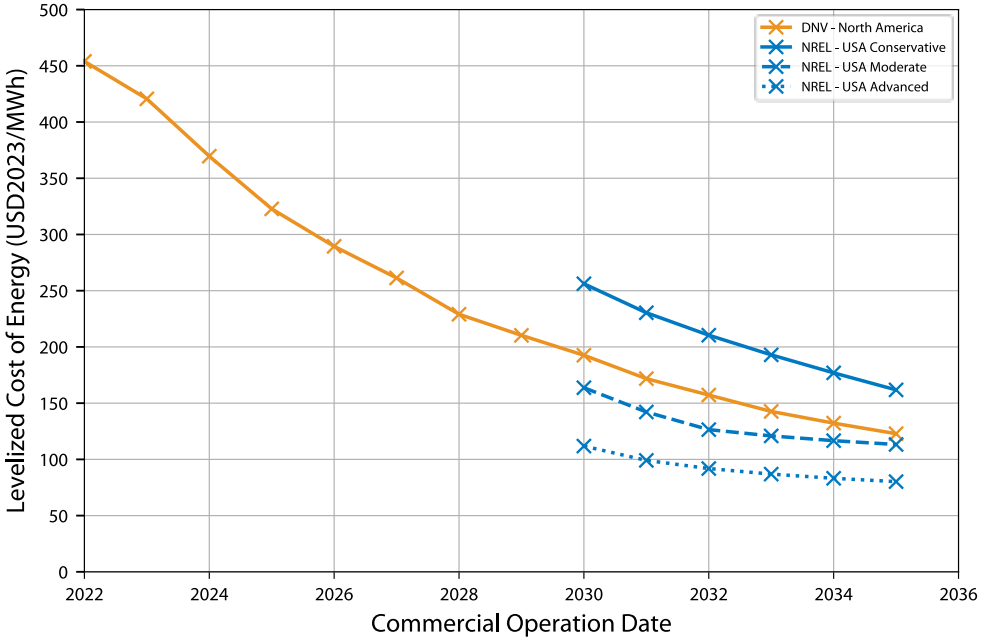
- Globally, the 5-year rolling average (2019–2023) cost decreased to approximately $3,400 per kilowatt (kW) for projects with a 2023 commercial operation date.
- The 5-year rolling average capital expenditure (CapEx) for projects in Europe and the United States is reported to be higher at $3,900/kW. The 5-year rolling average CapEx for projects in Asia is approximately $3,000/kW. Despite the difference, the two markets have been converging since 2014.
- Reported global project data suggest 5-year rolling capacity-weighted average CapEx globally will remain roughly flat or slightly decline from $3,400/kW in 2023 to between $3,000 and $3,500/kW by the late 2020s.



Capital expenditures for global offshore wind energy projects

The Unsubsidized LCOE for U.S. Floating Offshore Wind Energy Projects Is Estimated To Decline From 2030 to 2035

- The unsubsidized LCOE for U.S. floating offshore wind energy projects is estimated to decline from approximately $123–$278/MWh in 2030 to $92–$180/MWh in 2035.
- Generally, floating offshore wind costs are predicted to decrease through 2050 as the industry matures (Wiser et al. 2021).
  - Early-stage technologies usually experience cost reductions as their market expands.
  - Technological and commercial developments from fixed-bottom offshore wind systems might translate to floating offshore wind systems.



Unsubsidized LCOE estimates for floating offshore wind technologies in the United States.
Source: NREL (2024); DNV (2023)

Offshore Wind Tax Credits

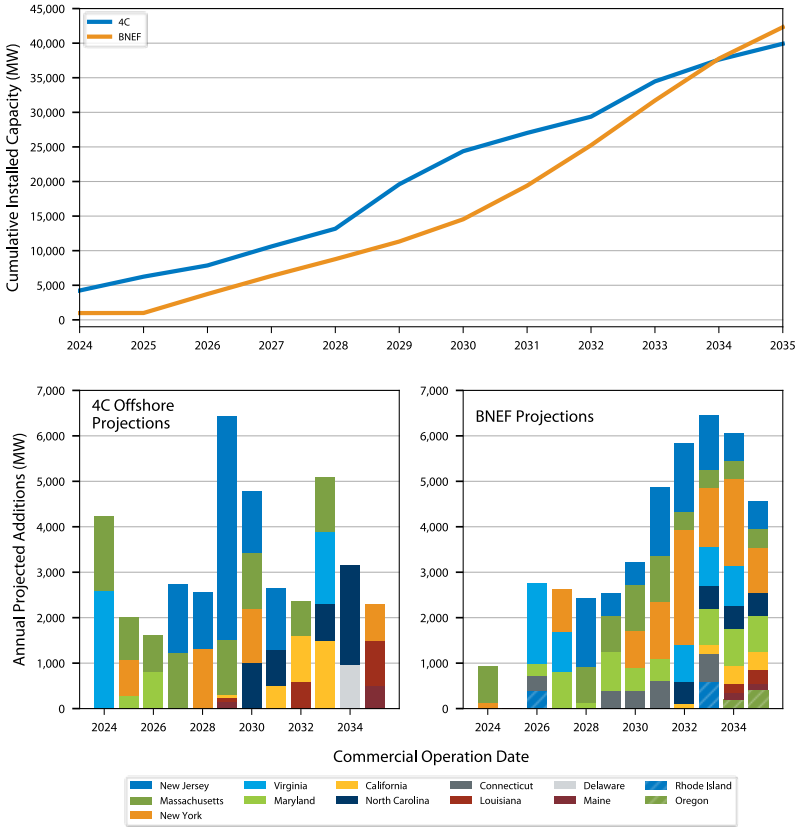
New guidance related to the implementation of clean energy tax credits passed under the IRA was issued by the Internal Revenue Service (IRS) during 2023 and early 2024.

- On March 22, 2024, IRS issued guidance that updated the eligibility criteria for offshore wind projects seeking the Energy Communities Bonus Credit passed under IRA (IRS 2024; Kearns and Daray 2024).
  - Offshore wind projects with multiple points of interconnection may benefit from credits if they locate any power conditioning and transfer equipment at one of their points of interconnection within an energy community.
  - Projects now may qualify for the bonus credit benefits if their supervisory control and data acquisition system is situated at an “eligible project port”—one with which the project has a long-term relationship and at which the project employs staff that perform essential project functions such as operations and maintenance—within an energy community.
- IRS guidance released on Nov. 22, 2023, clarifies that offshore power conditioning and transfer equipment such as export cables and onshore substations are integral to the energy property (IRS 2023) and therefore eligible for the ITC.
- The IRA also provides projects the ability to transfer tax credits to one or more other parties (Lonczak and Jones 2023).

Future Trends

4C Offshore and BNEF Estimate Cumulative U.S. Offshore Wind Energy Deployment of 40 and 42 GW (Respectively) by End of 2035

- The size and speed of U.S. offshore wind build-out will depend on continued regulatory efficiency, the availability of installation vessels and port infrastructure, proactive onshore and offshore grid planning and upgrades, the successful commercialization of 15-MW-class wind turbines and associated infrastructure, and sustained market demand.
- These forecasts predict that most near-term (pre-2030) offshore wind energy deployment will occur on the East Coast in states with existing offshore wind energy procurement goals.
- Both forecasts predict project development in the Gulf of Mexico and floating offshore wind deployment in Maine and California starting around 2030.

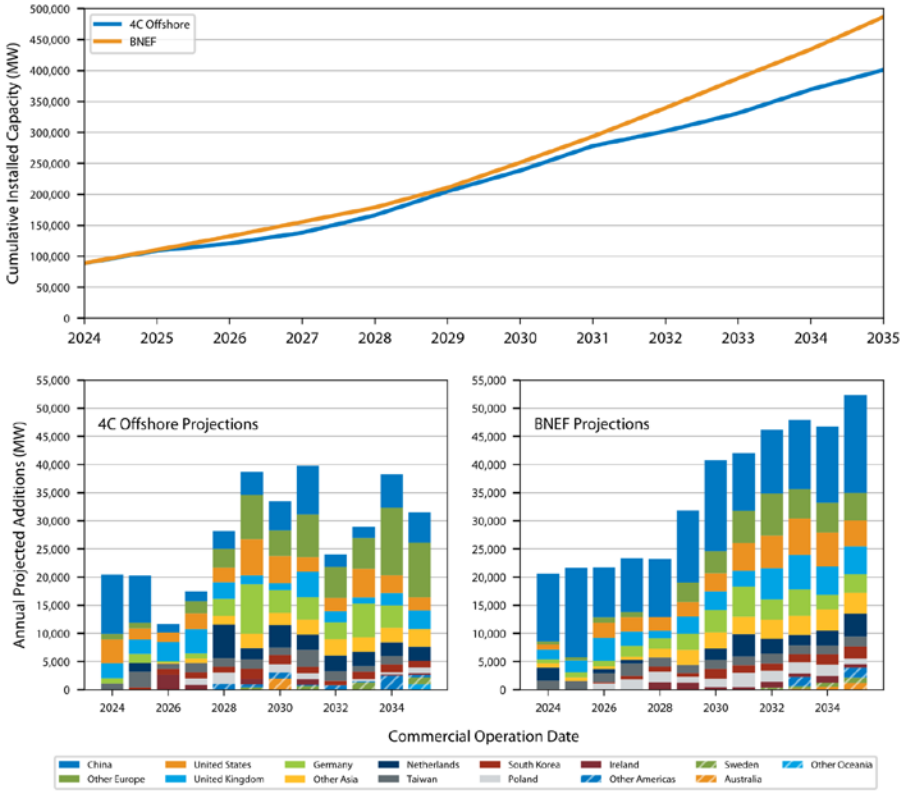


Industry projections of U.S. offshore wind energy development through 2035.

Source: BNEF (2023); 4C Offshore (2024)

BNEF and 4C Offshore Forecast Cumulative Global Offshore Wind Energy Capacity of 486 GW and 421 GW by 2035, Respectively

- The BNEF (2023) and 4C Offshore (2024) forecasts show variability in longer-range deployment estimates, but both indicate strong global market growth with more than a fivefold increase in offshore wind energy deployment projected over the next decade.
- The most prominent trend in the offshore wind energy market in the 2035 forecasts is the estimated growth of the Chinese market. 4C and BNEF differ in their expectations, with 4C projecting approximately 100 GW and BNEF 150 GW of new offshore wind capacity in China by 2035, representing 24%–38% of total 2035 installed capacity.
- Per the forecasts, other countries in Asia (Taiwan, Korea, Japan, and Vietnam) will account for an additional 13%–14% of installed capacity.
- European developers will build projects at an increasing rate relative to today, with Europe holding 39%–51% of the total installed global offshore wind capacity by 2035.
- The forecasts project the U.S. portion of installed capacity to be about 9% of the global total by 2035.

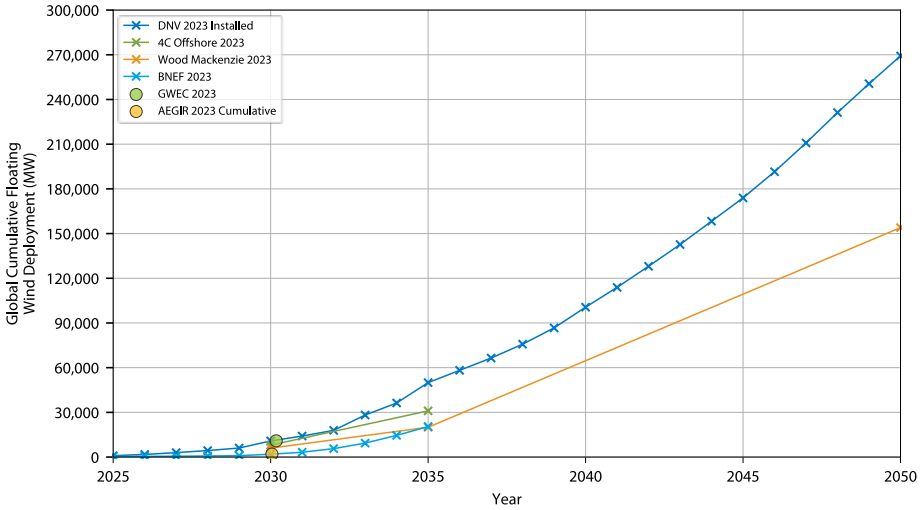


Industry forecasts for global offshore wind energy deployment to 2035.

Source: BNEF (2023); 4C Offshore (2024)

Most Independent Research Groups Have Revised Deployment Estimates Downward Since the 2023 Offshore Wind Market Report

- The latest projections of floating offshore wind now include a range of estimates, predominantly falling between 6 and 10 GW by 2030 (4C Offshore 2024; Global Wind Energy Council 2023; DNV 2023; Wood Mackenzie 2023b).
- Other independent entities adopt an even more conservative approach, forecasting 2 GW of floating offshore wind capacity by 2030 (AEGIR Insights 2023; BNEF 2024a).
- The 2030–2035 period is expected to welcome new entrants like developers, OEMs, and other offshore wind development players into the sector, positioned to capitalize on the insights gained from early experiences and newly constructed infrastructure (AEGIR Insights 2023).



Long-term cumulative floating offshore wind energy deployment projections. Note: GWEC stands for Global Wind Energy Council.

Summary of Key Findings and Future Trends

- The U.S. Offshore wind energy pipeline grew by 53% to nearly 81 GW, in large part due to 12 new BOEM proposed lease areas in the Gulf of Maine, Central Atlantic, Gulf of Mexico, and Oregon.
- Many projects are advancing through the U.S offshore wind energy pipeline. The first fully operational commercial offshore wind farm, South Fork Wind Farm, was installed in the United States. Three projects totaling more than 4 GW of capacity are under construction, with an additional 3 GW of capacity approved awaiting to begin construction.[a]
- Forecasted global projections for offshore wind energy indicate strong market growth over the next decade, with more than a fivefold increase with upward of 490 GW deployed by 2035.

[a] Sunrise Wind and Empire Wind 1 have both entered construction since the report cutoff date of May 31, 2024. There are approximately 6 GW of capacity currently under construction. For the purpose of the report, their capacity is attributed to the "approved" stage of the pipeline.

Summary of Key Findings and Future Trends

- Rising interest rates, supply chain constraints, and higher commodity prices during 2021–2023 have led to higher offshore wind energy costs globally and in the United States, with costs in the United States increasing by more than 45% from the previous edition of this report, however global offshore wind costs have declined by more than 50% since 2013.
- States have quickly responded to economic headwinds and power contract cancellations. Most states have reaffirmed their original offshore wind commitments and timelines. Multiple states have restructured their procurement strategies and opened new solicitation rounds to enable canceled projects to re-bid with updated offtake prices, such as by introducing inflation indexing.
- The U.S. offshore wind energy market continues to be driven by state-level offshore wind procurement, planning activities, and energy policies. As of May 31, 2024, state mandates totaled over 45 GW from eight states.

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Appendix A

Global Offshore Wind Energy Targets

Table A-1. National Offshore Wind Energy Targets for Countries in Europe

Country	Installed Capacity in 2023 (GW)	Planning Targets		Key Developments or Procurements	Source
		Capacity (GW)	Year		
Belgium	2.26	5.4–5.8	2030	The objective is to realize an additional production of 3.15–3.5 GW in the Princess Elisabeth Zone. The Minister of Energy has stated a desire for a future potential target of 8 GW by 2030.	Government of Belgium (2023); Wind Europe (2022a)
Denmark	2.65	10 35	2030 2050	The Danish government signed a joint declaration to make the North Sea a green powerhouse in Europe.	ESG today (2022)
Finland	0.04	-	-	The national climate and energy strategy to become carbon neutral by 2035 intends to have the first large-scale offshore wind energy projects operational by 2030, and several more in production by 2035.	Ministry of Economic Affairs and Employment of Finland (2022)
France	0.98	18 40	2035 2050	The French government signed an offshore sector deal with the wind energy industry to organize auctions for a minimum of 2 GW of new offshore wind capacity each year starting in 2025 and build more than 50 offshore wind plants by 2050.	Wind Europe (2022b)
Germany	8.28	30 50 70	2030 2035 2045	The current statutory targets in Germany are for offshore wind to reach a cumulative installed capacity of 30 GW in 2030, 40 GW in 2035 and 70 GW in 2045 as per the reformed Wind Energy at Sea Act 2022.	Reuters (2023a); Ivanova (2022)

Table A-1. National Offshore Wind Energy Targets for Countries in Europe

Country	Installed Capacity in 2023 (GW)	Planning Targets		Key Developments or Procurements	Source
		Capacity (GW)	Year		
Greece	0.00	2	2030	The parliament approved Greece's first offshore wind law.	Tisheva (2023)
Ireland	0.03	7	2030	The Irish government increased the 2030 offshore wind target from 5 to 7 GW.	renews.biz (2022)
Italy	0.03	2.1	2030	Italy sent its revised energy and climate plan to the European Union setting a target of 2.1 GW of offshore wind capacity by 2030.	Reuters (2023b)
Lithuania	0.00	1.4	2030	The Lithuanian government approved legislation amendments by the Ministry of Energy to expedite renewable energy development. By 2030, Lithuania aims for a total green energy capacity of 7 GW, including 1.4 GW from offshore wind.	Baltic Wind (2022)
Norway	0.09	30	2040	Norway's prime minister announced the country's goal of 30 GW of offshore wind capacity by 2040.	Wind Europe (2022c)
Poland	0.00	5.9 11	2030 2040	The EU Commission endorsed Poland's offshore wind farm support system, allowing installation of 5.9 GW capacity by 2030 in the initial phase and facilitating up to 11 GW capacity by 2040. There are discussions of increasing the 2030 target to 12 GW.	Ministry of Climate and Environment Republic of Poland (2021)

Table A-1. National Offshore Wind Energy Targets for Countries in Europe

Country	Installed Capacity in 2023 (GW)	Planning Targets		Key Developments or Procurements	Source
		Capacity (GW)	Year		
Portugal	0.03	2	2030	The Portuguese government has ambitions for 2 GW in operation and 10 GW of leased projects by 2030.	Norwegian Offshore Wind (2024)
Spain	0.01	3	2030	The Spanish government has approved an offshore wind roadmap that aims to install up to 3 GW of floating offshore wind energy in Spanish waters by 2030.	Wind Europe (2021)
Sweden	0.19	-	-	The Swedish government has launched a search for areas to support the plan to generate 120 terawatt-hours annually.	Durakovic (2022)
The Netherlands	3.12	4.5 21 70	2023 2030 2050	The Climate Agreement (2019) and the coalition agreement (2021) include a commitment to maintain the offshore wind energy policy. The government has presented its offshore wind energy roadmap.	Government of the Netherlands (n.d.); Buljan (2022)
United Kingdom	14.75	50	2030	The UK Energy Strategy aims to dedicate 5 GW to floating offshore wind.	Wind Europe (2022d)

Table A-2. National Offshore Wind Energy Targets for Countries in Asia

Country	Installed Capacity in 2023 (GW)	Planning Targets		Key Developments or Procurements	Source
		Capacity (GW)	Year		
China	38.62	60 90	2025 2030	Mainland China has provincial 5-year targets, for a cumulative 60 GW by 2025, and the regional cumulative targets by 2030 increased to 90 GW.	Wood Mackenzie (2023a); BNEF (2024a)
India	0.00	30	2030	The Union Ministry of New and Renewable Energy has set a target of installing 30 GW by 2030.	Infrastructure Investor (2018)
Japan	0.27	10 30–45	2030 2040	The Japanese government aims to deploy 45 GW by 2040 as part of its 2050 decarbonization target.	Muto (2022)
South Korea	0.14	12	2030	South Korea's president reaffirms goal of 12 GW of offshore wind energy by 2030. The Framework Act on Low Carbon, Green Growth sets an optimistic scenario of 18–20 GW by 2030.	InfoLink Consulting (2021); Skopljak (2020)
Philippines	0.00	21	2040	The Department of Energy of the Philippines published its Offshore Wind Roadmap to aim for 21 GW by 2040.	Pinsent Masons (2022)
Taiwan	1.21	15	Between 2026 and 2035	The Ministry of Economic Affairs said that 1.5 GW of offshore wind capacity would be added each year from 2026 until 2035, instead of the previously planned 1 GW.	Upstream (2021); BNEF (2024a)
Vietnam	1.18	7	2030	The Ministry of Industry and Trade of Vietnam published a new Power Development Plan VIII draft with new capacity targets.	Global Wind Energy Council (2022)

Table A-3. National Offshore Wind Energy Targets for Countries in Other World Regions

Country	Installed Capacity in 2023 (GW)	Planning Targets		Key Developments or Procurements	Source
		Capacity (GW)	Year		
United States	0.04	30	2030	The current midterm national target is 30 GW by 2030. Achieving this target could unlock a pathway to 110 GW by 2050.	The White House (2021)
Canada	0.00	5	2030	Nova Scotia has set a target to offer leases for 5 GW of offshore wind energy by 2030.	Nova Scotia (2022)
Australia	0.00	2 4 9	2032 2035 2040	The Victorian Offshore Wind Policy Directions Paper sets nation-leading policy targets.	The Victorian Government (2022)
Brazil	0.00	16	2050	Brazil's government long-term energy expansion plan sees the potential to deploy 16 GW by 2050.	Radowitz (2020)
Colombia	0.00	0.2–1 0.5–3 1.5–9	2030 2040 2050	The Colombian Ministry for Mines and Energy launched the Roadmap for the Deployment of Offshore Wind Energy in Colombia. The roadmap shows the offshore wind potential from a low-case to a high-case scenario.	Argus (2022)

Appendix B

Global Pipeline Database Updates

Table B-1. Global Floating Offshore Wind Energy Pipeline by Country and Project Phase

Country	Operating (MW)	Under Construction (MW)	Permitting (MW)	Site Control (MW)	Planning (MW)	Total (MW)
Australia					11,250.0	11,250.0
Bulgaria					5.0	5.0
China	23.0	216.6	12.0		800.0	1,051.6
France	2.0	90.2			2,063.0	2,155.2
Ireland					5410.0	5,410.0
Italy					11,186.0	11,186.0
Japan	5.0	16.8			225.0	246.8
New Zealand					2,000.0	2,000.0
Norway	100.9				95.0	195.9
Philippines					6,420.0	6,420.0
Portugal	25.0					25.0
Saudi Arabia					500.0	500.0
South Korea			2,445.0		1,570.0	4,015.0
Spain	2.0				1,543.5	1,545.5
Sweden			12,200.0		6,450.0	18,650.0
Taiwan					1,890.0	1,890.0
United Kingdom	77.5		950.4		11,270.0	12,297.9
United States				6,042.0	19,074.0	25,116.0
Total	235.4	323.6	15,607.4	6,042.0	81,751.5	103,959.9

Appendix C

Commissioned U.S.-Flagged Vessels

Table C-1. Commissioned U.S.-Flagged Vessels To Serve the Offshore Wind Energy Industry

Vessel Category	Companies Backing	Commissioning
CTV - Gripper	American Offshore Services, Blount Boats	Not listed
CTV - Atlantic Pioneer	Atlantic Wind Transfers, Blount Boats Inc., Chartwell Marine Ltd.	2016
CTV - Atlantic Endeavor	Atlantic Wind Transfers, Blount Boats Inc., Chartwell Marine Ltd.	Not listed
CTV	Coast Line Transfers	2023
CTV - Gaspee	McAllister Towing	Not listed
CTV - Roger Williams	McAllister Towing	Not listed
CTV - Courageous	WINDEA CTV LLC	2023
CTV - Intrepid	WINDEA CTV LLC	2023
CTV - Enterprise	WINDEA CTV LLC	2023
CTV - Journey	WindServe Marine	Not listed
CTV - Explorer	WindServe Marine	2024
CTV - Odyssey	WindServe Marine, Ørsted	2020
CTV - Genesis	WindServe Marine, Ørsted, Senesco	Not listed
SOV - ECO Edison	Edison Chouest Offshore, Ørsted	2024
SOV - Paul Candies	Siemens Gamesa, US Otto Candies, LLC	2018 (retrofit)
SOV - Cade Candies	US Otto Candies, LLC	2010 (retrofit)
Barge - 455-8	Crowley Maritime Corporation	2010
Barge - Marmac 400	Foss Maritime	2001
Barge - Prevailing Winds	Foss Maritime	Not listed
Tug - Ocean Sky	Crowley Maritime Corporation	2013
Tug - Michele Foss	Foss Maritime	2015
Tug - Nicole Foss	Foss Maritime	2017

Appendix D

Detailed Status of U.S. Offshore Wind Energy Projects in the North Atlantic

No.	Location	Name	Developer	Lease Area	Offtake Agreement	Status	Capacity
1	ME	New England Aqua Ventus 1	UMaine, Diamond Offshore	State Lease	Power Purchase Agreement (PPA) – ME	Permitting	12 MW
2	ME	Maine Research Array	State of Maine	TBD	TBD	Planning	144 MW
3	ME	Proposed Lease Area	TBD	OCS-A 0562	TBD	Planning	1,964 MW
4	ME	Proposed Lease Area	TBD	OCS-A 0563	TBD	Planning	2,143 MW
5	ME	Proposed Lease Area	TBD	OCS-A 0564	TBD	Planning	1,786 MW
6	ME	Proposed Lease Area	TBD	OCS-A 0565	TBD	Planning	1,866 MW
7	ME	Proposed Lease Area	TBD	OCS-A 0566	TBD	Planning	2,062 MW
8	ME	Proposed Lease Area	TBD	OCS-A 0567	TBD	Planning	1,993 MW
9	ME	Proposed Lease Area	TBD	OCS-A 0568	TBD	Planning	2,172 MW
10	ME	Proposed Lease Area	TBD	OCS-A 0569	TBD	Planning	1,716 MW
11	RI/MA/CT	Revolution Wind	Ørsted/GIP	OCS-A 0486	PPA – RI (400 MW) PPA – CT (304 MW)	Under Construction	704 MW
12	RI/MA/CT	South Fork Wind	Ørsted/GIP	OCS-A 0517	OREC – NY	Operational	132 MW
13	RI	Block Island Wind	Ørsted	State Lease	PPA – RI	Operational	30 MW
14	RI/MA/CT	Sunrise Wind [a]	Ørsted	OCS-A 0487	OREC – NY	Permitting	924 MW
15	RI	Sunrise Wind (Residual)	Ørsted	OCS-A 0487	TBD	Planning	TBD
16	RI/MA/CT	New England Wind 1 and 2	Avangrid	OCS-A 0534	TBD	Approved	1,644 MW
17	RI/MA/CT	Bay State Wind	Ørsted	OCS-A 0500	TBD	Site Control	2,334 MW
18	RI/MA/CT	Vineyard Wind 1	Vineyard Offshore	OCS-A 501	PPA – MA	Under Construction	806 MW
19	RI/MA/CT	Beacon Wind 1 and 2	BP	OCS-A 0520	TBD	Permitting	2,085 MW
20	RI/MA/CT	SouthCoast Wind 1a,1b, and Residual	Ocean Winds	OCS-A 0521	TBD	Permitting	2,062 MW
21	RI/MA/CT	Vineyard Northeast	Vineyard Offshore	OCS-A 0522	TBD	Site Control	2,600 MW

[a] Sunrise Wind has entered the construction phase since the May 31, 2024, report cutoff.

Detailed Status of U.S. Offshore Wind Energy Projects in the Mid and South Atlantic

No.	Location	Name	Developer	Lease Area	Offtake Agreement	Status	Capacity
22	NY	Empire Wind 1[a]	Equinor	OCS-A 0512	OREC– NY	Approved	810 MW
23	NY	Empire Wind 2	Equinor	OCS-A 0512	TBD	Site Control	621 MW
24	NY	Excelsior Wind	Vineyard Offshore	OCS-A 0544	TBD	Site Control	697 MW
25	NY	Bluepoint Wind	OW Ocean Winds East, LLC	OCS-A 0537	TBD	Site Control	1,158 MW
26	NJ	Attentive Energy One	TotalEnergies, Rise Light & Power, and Corio Generation	OCS-A 0538	TBD	Site Control	1,365 MW
27	NJ	Attentive Energy Two	Total Energies, Rise Light & Power, and Corio Generation	OCS-A 0538	OREC – NJ	Site Control	1,342 MW
28	NJ	Community Offshore Wind	RWE Offshore, National Grid	OCS-A 0539	TBD NY	Site Control	1,314 MW
29	NJ	Community Offshore Wind (Residual)	RWE Offshore, National Grid	OCS-A 0539	TBD	Site Control	725 MW
30	NJ	Atlantic Shores Offshore Wind Bight	EDF/Shell	OCS-A 0541	TBD	Site Control	2,500 MW
31	NJ	Leading Light Wind	Invenergy	OCS-A 0542	OREC – NJ	Permitting	2,400 MW
32	NJ	Atlantic Shores Offshore Wind North	EDF/Shell	OCS-A 0549	TBD	Site Control	1,313 MW
33	NJ	Atlantic Shores Offshore Wind South 1	EDF/Shell	OCS-A 0499	OREC – NJ	Permitting	1,510 MW
34	NJ	Atlantic Shores Offshore Wind South 2	EDF/Shell	OCS-A 0499	TBD	Permitting	1,350 MW

[a] Empire Wind 1 has entered the construction phase since the May 31, 2024, report cutoff.

Detailed Status of U.S. Offshore Wind Energy Projects in the Mid and South Atlantic

No.	Location	Name	Developer	Lease Area	Offtake Agreement	Status	Capacity
35	NJ	Ocean Wind 1	Ørsted	OCS-A 0498	TBD	Site Control	1,223 MW
36	NJ	Ocean Wind 2	Ørsted	OCS-A 0532	TBD	Site Control	1,375 MW
37	DE	Garden State Offshore Energy	Ørsted	OCS-A 0482	TBD	Site Control	1,080 MW
38	DE	Skipjack 1	Ørsted	OCS-A 0519	TBD	Site Control	426 MW
39	DE	Skipjack 2	Ørsted	OCS-A 0519	TBD	Site Control	
40	MD	MarWin	US Wind	OCS-A 0490	OREC – MD	Permitting	300 MW
41	MD	Momentum Wind	US Wind	OCS-A 0490	OREC – MD	Permitting	809 MW
42	MD	MarWin Residual	US Wind	OCS-A 0490	OREC – MD	Site Control	600 MW
43	DE	Proposed Lease Area[a]	TBD	OCS-A 0557	TBD	Planning	1,642 MW
44	VA	Proposed Lease Area[b]	TBD	OCS-A 0558	TBD	Planning	2,857 MW
45	VA	Coastal Virginia Offshore Wind Pilot	Dominion Energy	OCS-A 0497	Utility Owned	Operational	12 MW
46	VA	Coastal Virginia Offshore Wind Commercial	Dominion Energy	OCS-A 0483	Utility Owned	Under Construction	2,587 MW
47	NC	Kitty Hawk North	Avangrid	OCS-A 0559	TBD	Permitting	631 MW
48	NC	Kitty Hawk South	Avangrid	OCS-A 0508	TBD	Site Control	1,351 MW
49	NC/SC	TotalEnergies	TotalEnergies	OCS-A 0545	TBD	Site Control	889 MW
50	NC/SC	Duke Energy	Duke	OCS-A 0546	TBD	Site Control	893 MW

[a,b] These lease areas have entered the site control phase since the May 31, 2024, report cutoff.

Detailed Status of U.S. Offshore Wind Energy Projects in the Gulf of Mexico

No.	Location	Name	Developer	Lease Area	Offtake Agreement	Status	Capacity
51	LA	RWE Offshore US Gulf, LLC	RWE	OCS-G 37334	TBD	Site Control	1,659 MW
52	TX	Proposed Lease Area	TBD	OCS-G 37962	TBD	Planning	1,659 MW
53	TX	Proposed Lease Area	TBD	OCS-G 37963	TBD	Planning	1,567MW
54	TX	Proposed Lease Area	TBD	OCS-G 37964	TBD	Planning	1,752 MW
55	LA/TX	Proposed Lease Area	TBD	OCS-G 37965	TBD	Planning	1,660 MW

Detailed Status of U.S. Offshore Wind Energy Projects in the Pacific and Hawaii

No.	Location	Name	Developer	Lease Area	Offtake Agreement	Status	Capacity
56	OR	Proposed Lease Area	TBD	OCS-P 0566	TBD	Planning	991 MW
57	OR	Proposed Lease Area	TBD	OCS-P 0567	TBD	Planning	2,166 MW
58	CA	California North Floating	Copenhagen Infrastructure Partners (CIP)	OCS-P 0562	TBD	Site Control	1,117 MW
59	CA	Canopy Offshore Wind	RWE	OCS-A 0561	TBD	Site Control	1,025 MW
60	CA	Golden State Wind	EDPR/ENGIE	OCS-P 0564	TBD	Site Control	1,302 MW
61	CA	Even Keel Wind	Invenergy	OCS-P 0565	TBD	Site Control	1,302 MW
62	CA	Atlas Winds	Equinor	OCS-P 0563	TBD	Site Control	1,296 MW
63	CA	CADEMO	Floventis, Cierco, SBM	State Lease	TBD	Permitting	60 MW
64	HI	Oahu North Call Area	N/A	N/A	N/A	N/A	N/A
65	HI	Oahu South Call Area	N/A	N/A	N/A	N/A	N/A

On April 30, 2024, BOEM announced a proposed lease sale in Oregon for two lease areas totaling 194,995 acres.

The *Offshore Wind Market Report: 2024 Edition* is available at: https://www.nrel.gov/docs/fy24osti/90525.pdf.
The report data file is available at: https://www.nrel.gov/docs/fy24osti/90525data.xlsx.

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