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California wades into offshore wind

Floating wind turbines are positioned off Norway in 2017. Plans are in the works for two large floating wind power installations off California's coast. Bloomberg News



By [Caitlin Devitt](#)

The challenges facing California as it strives to become home to the nation's first floating offshore wind farms range from turbines too large to fit under the Golden Gate Bridge to federal policy supporting oil and gas leases to a grid that can't handle the power coming from the sea.

But with last year's passage of legislation aimed at kickstarting development, California is working under an ambitious timeline to harness the wind from nearly 600 miles of federal waters located about 20 miles off the north and central coasts.

In August, the California Energy Commission, the state agency leading the project, released a [report](#) outlining goals of generating up to five gigawatts of floating wind energy by 2030, enough to power more than 3.5 million homes, and 25 gigawatts by 2045.

The CEC, as required under Assembly Bill 525, must also craft a fully developed strategic plan to present to the Legislature by July. By the end of this year, the CEC must also develop a roadmap for efficient and timely permitting.

Meanwhile, all eyes will be on the state in December, when the federal Bureau of Ocean Management, which oversees offshore wind activity, holds its first offshore wind sale in Pacific waters. The BOEM will auction off five leases in the two so-called Wind Energy Areas that will be developed first in California, off Morro Bay on the central coast and Humboldt on the north coast. The two areas together cover nearly 600 miles of federal waters and are projected to generate 4.6 GW of offshore wind energy.

The U.S. has sufficient offshore wind capacity to generate twice the amount of total energy that the country now produces, according to the U.S. Department of Energy. As states like California and the country wean themselves off of fossil fuels — and as demand for electricity rises with the shift to electric vehicles — advocates see offshore wind as key to reaching state and national clean energy targets.

In March 2021, Biden announced a goal of reaching 30 gigawatts of offshore wind by 2030 and 110 gigawatts by 2050. In September, the administration announced its [Floating Offshore Wind Shot initiative](#), which has a goal of reaching 15 GW of floating wind by 2035.

There are only two offshore wind farms in operation in the U.S., in Rhode Island and Virginia. But the pipeline of projects is growing fast — 13.5% this year compared to last — with the expansion driven by state-level offshore wind procurement activities and policies, according to the National Renewable Energy Laboratory's 2022 [offshore wind report](#).

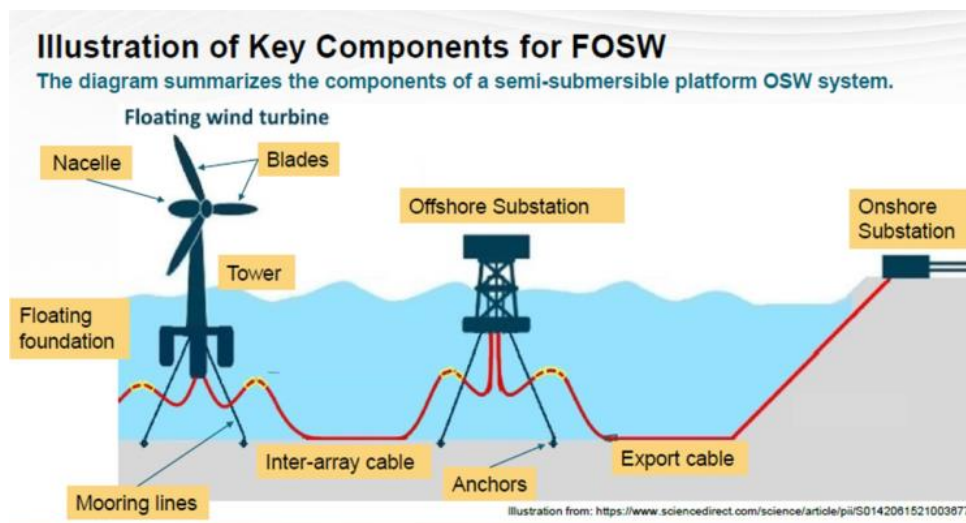
East Coast states have led the charge so far in part because they enjoy relatively shallow waters, of 60 meters or less, that allow for the conventional fixed-bottom wind farms.

It's a different story in California, where the steep outer continental shelf is too deep for fixed-bottom platforms. Two-thirds of U.S. offshore wind energy potential exists in waters too deep for conventional fixed-bottom wind platforms, according to the DOE. Floating platforms are tied to the sea floor with flexible cables and chains. The three-blade turbines create electricity from the wind and feed it to a nearby offshore substation, which feeds it to an onshore substation, which is connected to the local electric grid.

Compared to fixed-bottom wind, floating platforms may be less harmful to marine life, though it's largely untested, and may be easier to repair or maintain. The farms can also be placed far enough out at sea that they won't be visible from the shoreline, which has [been an issue](#) for some fixed wind farms on the East Coast.

Conventional fixed-bottom offshore wind turbines can't be used in waters deeper than 60 meters like those off the coast of California, Oregon and the Gulf of Maine. Sciencedirect.com

There are only handful of precommercial floating wind projects in operation around the world. "The industry has graduated to a pilot scale, where they're putting in multiple turbines, but it's still not full utility-scale projects, and it still doesn't have the economics," said Walter Musial, who leads the offshore wind project at the National Renewable Energy Laboratory.



The levelized cost of energy for fixed-bottom projects commissioned in 2021 was about \$91/megawatt hour on average, according to the NREL. In a 2020 [study](#), the NREL estimated the cost of floating offshore power in Humboldt would be around \$101/MWh and \$112/MWh in Morro Bay. The group also projected the cost would drop by nearly half, to between \$53 to \$64/MWh, by 2032.

"The first prototype of any industry, it doesn't matter if it's wind or solar, is the most expensive one, then as you build more of them, there's a learning curve and that takes the cost out of it," Musial said. There is no "inherent cost centers" that make offshore wind more expensive than onshore, he added. "It's just an immature technology and we have to learn how to make them more efficiently."

The White House's Wind Shot program has a goal of cutting the costs by at least 70% to bring the power price to around \$45 per megawatt/hour.

Beyond the cost of the power to ratepayers, the task of building out sufficient transmission and port infrastructure to support the floating farms will be significant. The expense will be covered by a mix of sources, including the state, said a spokesperson for the California Energy Commission.

Upgrading or building the transmission needed to service the two wind areas carries a price tag of around \$8.1 billion, according to a [20-year transmission outlook](#) from the California Independent System Operator.

The Morro Bay wind area is expected to need relatively little in transmission upgrades, in part because the nearby Diablo Canyon nuclear powerplant is [set to be decommissioned in 2030](#), which would open grid capacity at the same time the offshore wind is set to come online.

But the Humboldt area could require between \$5.8 billion to \$8 billion of transmission upgrades, CISO said. One option would undertake a massive upgrade of the north coast's power system, which can't currently handle the projected power coming from the sea.

Another scenario would run a subsea cable from the north coast down to the Bay Area and bring the power onto the grid there, according to Julia Zuckerman, head of external affairs for the West Region at Clearway Energy Group, a clean energy developer that plans to be one of the bidders on the California wind leases. Zuckerman spoke last Thursday during a webinar on developing California's offshore wind hosted by Orrick and Our Energy Policy.

"We know that the north coast is one of the most promising areas in terms of wind resources, so we are going to have to figure out the real answer to that question and start the work to build out that grid, whether it's under the ocean or on land," Zuckerman said. "California just has not done a very good job at building out the amount of transmission we need to keep up with our renewable energy sources."

Some manufacturing can be done onshore and in ports, which will also require extensive upgrades and new infrastructure, then hauled out to the platforms by boat. But some work will have to be done offshore. The turbines, for example, will be too large to fit under most bridges, including the Golden Gate Bridge, which eliminates the San Francisco-area ports.

The Inflation Reduction Act, signed by President Biden in August, provides tax incentives that will likely boost interest in floating offshore wind, said Wolfram Pohl, a tax partner at Orrick who was a panelist during the webinar.

The main tax incentive will be newly extended 10-year investment and production tax credits, Pohl said.

"Offshore wind was historically problematic because the credits expire, so planning projects was difficult because weren't sure if the credit would still be there," Pohl said. "What we're going to see as a result of the act is a lot more interest in developing these projects."

But the IRA includes what could be a poison pill for the industry as well, according to NREL's Musial.

Under a provision crafted by Sen. Joe Manchin, D-W.Va., the IRA restricts BOEM's authority to issue offshore wind leases by tying them to offshore oil and gas leasing. For the next decade, BOEM cannot issue an offshore wind lease unless it has offered — and executed — a lease of at least 60 million acres on the outer continental shelf for oil and gas. California's December auction will be the first to be affected.

So far, federal and state officials said the auction remains on schedule.

"I do not anticipate any delays," said Doug Boren, BOEM's Pacific regional director, at a Sept. 8 hearing of the House Natural Resources Subcommittee on Energy and Mineral Resources on the potential for offshore wind in California. "We have committed at BOEM that we are going to have the California lease sale by the end of the year. We are still committed to do that, in full compliance with the Inflation Reduction Act law."

To date the BOEM has held 10 competitive offshore wind lease sales and issued 25 active commercial leases. A February auction held for the New York Bight area, which features nearly 500,000 acres, yielded a record \$4.37 billion from six companies, the country's highest-grossing energy lease sale, including oil and gas.

"My guess is the bids are probably going to be lower [in California than New York] because it's floating wind, which is less proven, and the state mandate isn't a guarantee of an offtake," said Musial. "But we know there's a lot of interest so that means there's competition and more bidders willing to escalate."

BOEM is expected to release a final sale notice in the next several weeks outlining auction terms.

California needs to ensure it's engaging all stakeholders and minimizing environmental harm as it rolls out the technology so that it can offer a model for the rest of the country, Sarah Xu, a policy associate at the environmental justice group Brightline Defense, said during the Orrick webinar.

"These are really giant infrastructure projects. We're thinking about transmission and ports, and we're looking at 20, 30, 40 years of just building these offshore wind turbines, not counting the maintenance and operation," Xu said. "Offshore wind is incredibly exciting for California, but we want to make sure we set the gold standard."