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## What offshore wind power could mean for California (when turbines eventually start spinning)

A floating offshore wind farm in Scotland, operated by Equinor, an international energy company. The company's U.S.-based LLC recently secured a lease to develop a wind farm off the coast of Morro Bay. (Michal Wachucik / Equinor)



By **RYAN FONSECA** Staff Writer

Good morning, and welcome to the Essential California [newsletter](#). It's Thursday, Jan. 12. I'm Ryan Fonseca.

The Pacific Ocean contains a potential windfall of clean, renewable energy. Last month, the federal government took a major step to harness that power.

The Bureau of Ocean Energy Management [auctioned off five lease areas](#) covering more than 373,000 acres in Central and Northern California. The Northern California area includes two parcels off Eureka in Humboldt County and three in the waters west of Morro Bay in San Luis Obispo County. Both areas are about 20 miles offshore.

The five winning companies — one American and [four European](#) — bid more than \$757 million in total for the rights to build wind farms in the Pacific parcels.

The state and local governments are banking on offshore wind to help reach their renewable energy goals in the coming decades. California aims to generate 2,000 to 5,000 megawatts of offshore wind by 2030 and 25,000 by 2045. That would be “enough electricity to power 3.75 million initially and 25 million homes by mid-century,” according to [the California Energy Commission](#).

According to the Bureau of Ocean Energy Management, the newly auctioned parcels have “the potential to produce over 4.6 gigawatts of offshore wind energy, enough to power over 1.5 million homes.”

If you're like me and [Marty McFly](#), you're probably wondering: What the hell is a gigawatt?

Arne Jacobson helped me out: One gigawatt is a billion watts.

He's the director of the [Schatz Energy Research Center](#) at Cal Poly Humboldt, which promotes and studies clean, renewable energy technologies. I spoke with him this week to better understand what these wind turbines would do and when they might start spinning.

For Jacobson, the push for offshore wind “is really thinking about mitigation of climate change and how do we decarbonize our energy system.” As for how many turbines these farms would have, Jacobson said that depends on the region and the power generation capacity of each turbine.

The parcels off Humboldt County could end up with around 100 to 150 turbines if fully built out, he said. The area off Morro Bay could be about double that.

Here are four other key takeaways from our conversation.

### 1. Harnessing wind power in the Pacific has some unique challenges

There's a lot of wind out at sea to spin turbines and generate power, but the windiest areas are above deep water — too deep for fixed-bottom turbines, which attach to the ocean floor. These West Coast wind farms [will need to float](#), secured with a series of anchors and mooring lines.

The vast majority of offshore turbines in operation are fixed to the ocean floor, Jacobson said, so floating turbines are in an earlier stage of technological development.

“California is certainly not as far along as some parts of the East Coast when it comes to offshore wind,” he said. “But I think we're in some ways ahead of the game when it comes to thinking about floating offshore wind.”

Offshore turbines are also much larger than their land-based relatives. Jacobson said the expectation is that offshore turbines would be about 600 feet up to the main hub and around 900 feet tall when adding the blades.

A bigger turbine means more power generation. Offshore turbine capacity is expected to hit 12 to 15 megawatts, while land-based turbines typically generate three or four megawatts.



A rendering of the different types of offshore floating wind turbines that could be used off the coast of California. (National Renewable Energy Laboratory)

## 2. We'll need a whole lot more infrastructure (and money)

The biggest challenges facing offshore wind in California, according to Jacobson:

- “A fairly significant investment in transmission infrastructure” to be able to handle all the power the wind farms would generate.
- Large-scale construction of new port infrastructure to handle the assembly and transportation of turbines from land to the open ocean.

California’s power system is not prepared to absorb and transmit the billions of watts floating turbines would generate. That’s especially true in northwest California, which has a “weak” grid, Jacobson said. Getting the state’s power infrastructure up to speed will take some time, he explained:

*“Large transmission projects take a decade or sometimes longer. ... To build out at scale, I think it’ll be into the early 2030s, or maybe as [long] as 2035, probably before the transmission infrastructure is ready to be able to absorb that power.”*

The other issue is building and shipping the turbines out to sea. That requires unique port conditions. For example, ports in San Francisco Bay won’t work because the turbines would be too tall to fit under the Golden Gate Bridge.

## 3. The environmental effects remain largely unknown

Relatively new technology is at play and the effect floating wind farms could have on marine ecosystems is unclear.

Like land-based turbines, bird strikes remain a concern. Jacobson noted that some marine birds that rely on ocean wind for “dynamic soaring,” such as albatrosses, could be at risk.

But “it’s hard to know how some of these seabirds will interact with wind farms when there aren’t wind farms,” he said. “Having an initial project in water will really help to be able to understand what the issues are.”

Researchers like Jacobson are also mindful of how wind farms might affect deep-sea fisheries, as well as “upwelling,” a process that brings colder water and plankton to the surface. That creates ocean grazing grounds that support a vast ecosystem of marine life. Wind plays a big role in that process, and Jacobson explained that “early modeling” indicates wind farms could potentially affect upwelling.

“If you have a very large wind farm, you’re essentially slowing down the wind downstream,” he said. “There’s definitely additional analysis needed there and it’s important to pay attention to that because obviously we can’t disrupt the food chain in any significant way.”

## 4. The timeline is very much TBD

Jacobson said the areas off Morro Bay, which has a stronger power grid than the Humboldt County area, will probably start getting turbines out first. But realistically, they won’t produce significant power until “the end of this decade.”

“We have to do a lot and we have to do a lot pretty quickly in order to meet those goals,” Jacobson said.

Another complication — but an important one: taking the time to ensure that smaller, marginalized communities are included in the process. “People don’t want to just feel like big projects are being built to serve the needs of more populated parts of the state without significant benefits flowing through this region as well,” Jacobson said. “People know how to oppose things, and we have to figure out how do we get to yes on these things — and fast.”

I asked Jacobson if he’s optimistic that California can achieve its renewable energy goals as state and federal leaders look to mitigate the climate crisis.

“The technologies that are needed to do all of this exist, so that makes me optimistic,” he said, adding:

*“It’s really about making sure that we have the economic resources and the political will to deploy them and to deploy them in a way that makes people trust that the power is going to stay on.”*