

Floating Wind Plan Could Finally Crack California's Offshore Market

Falling prices, improving technology, and smart public policies are changing the calculations.

[James Temple](#)

Three tapered smokestacks tower above Morro Bay's otherwise idyllic harbor, offering what some residents see as a "three-fingered salute" to this pretty seaside town along California's Central Coast.

The six-decade-old Dynegy natural-gas plant, which shut down in early 2014, continues to loom over the city because it would cost tens of millions to disassemble. But this relic of midcentury technology might also offer the key to a very different energy future. A Seattle startup has proposed what could be the world's largest floating offshore wind farm on a site 33 miles northwest of Morro Bay, anchoring in place around 60 to 100 turbines capable of delivering as much as one gigawatt of electricity into California's grid. The site was selected specifically because the project could plug into the retired plant's high-capacity transmission line at an adjacent PG&E substation, powering homes and businesses up and down the state.

Until recently, offshore wind simply didn't make economic sense along the West Coast, because the steep continental shelf makes it prohibitively expensive to build the normal underwater foundations. But the ability to erect increasingly large wind turbines on floating platforms has presented new possibilities, particularly in California, where state renewable-energy mandates must be met even if the electricity prices aren't as cheap as fossil-fuel options.

A 2015 report from the Carbon Trust, an organization that promotes efficiency and emissions reduction, estimated that the average costs over the lifetime of a large commercial floating wind project would be around \$110 to \$123 per megawatt-hour. That's more expensive than natural gas, but already around the cost of fixed offshore wind (see "[Floating Wind Farms: Great Concept, Implausible Economics](#)"). Meanwhile, improving turbine technology and greater economies of scale are expected to drive down costs much further by the time a project like the one in Morro Bay would actually be built. Floating wind also allows developers to go further offshore, where it's possible to capture far more energy and minimize environmental impact, says Alla Weinstein, founder of Trident Winds, which proposed the project.

The confluence of greater energy potential, falling prices, and renewable-friendly public policies could finally open up a promising new segment of the wind industry, potentially offering a vast new supply of clean energy.

"Why would I not go and get it?" says Weinstein, a longtime Honeywell engineer, who has founded three renewable-energy startups. "This is the future of offshore wind."

Dividing allegiances

Whether or not this particular project ever gets built, by Trident Winds or another firm, the unsolicited proposal has already set in motion a bigger and more consequential undertaking: it prompted California's governor, Jerry Brown, to ask the Department of the Interior to establish a state task force in coordination with [Bureau of Ocean Energy Management](#), initiating the formal process of identifying promising areas for wind energy development off the state's coastline.

The task force hopes to produce the list of potential sites around the end of this year, says Joan Barminski, BOEM's regional director for the Pacific.

Following high-level environmental reviews of those locations, the government will hold lease sale auctions that will allow wind energy companies to bid on sites where they hope to build. Trident Winds could face competition for the Morro Bay site, as the Norwegian energy company Statoil has since expressed an interest in it as well.

The potential for new energy generation along the coast of California is huge. An [assessment](#) last year by the National Renewable Energy Laboratory estimated that offshore wind farms in the area could produce 112 gigawatts, most of it in waters 200 feet deep or greater, where floating wind is the most viable option.

To pinpoint potential sites, the BOEM task force is evaluating factors such as wind strength, water depth, proximity to power transmission lines, and impact on existing uses, including commercial fishing, marine sanctuaries, Department of Defense activities, and marine life populations, Barminski says.

Winning bidders for any of the sites will have to complete far more rigorous environmental assessments and secure assorted permits from state, local, and tribal agencies.

That won't be easy. Every proposed project is likely to spark criticism from fishing operations, wildlife organizations, or those simply concerned about marring the picture-perfect California seaside. Along the left-leaning West Coast, projects of this scale will also divide environmentalists, pitting those more concerned about the threat of climate change against those worried about the risk to migrating whales, birds, and other marine life.

Creating market demand

To date, only a handful of small floating wind projects have been built for

demonstration purposes, including Statoil's Hywind turbine off the southwest coast of Norway, Principle Power's similar-sized WindFloat project near Portugal, and a trio of government-sponsored turbines 12 miles off the shore of Fukushima, Japan. But energy developers have proposed or are moving forward with a growing number of larger floating wind projects, capable of producing anywhere from [24](#) to [400](#) megawatts, in Portugal, Scotland, France, and [Hawaii](#).

The challenge for floating wind to date has been its high price relative to fossil fuels.

Notably, Principle Power, a California company Weinstein previously cofounded, was forced to shelve a project in Oregon last year after utilities [balked](#) at paying far higher prices for its electricity.

Data is still limited at this point, but some studies have found that floating wind can offer slightly lower total electricity costs than fixed offshore wind. That's thanks to potential savings during major repairs, since the structures can be tugged back to shore and fixed at port, and the fact that floating turbines can take advantage of faster wind speeds in deeper ocean water, according to the [Carbon Trust study](#).

Every region and project is different, but fixed offshore wind is generally expected to reach price parity with fossil fuels in the next decade, and floating wind could certainly follow that trajectory, says Rhodri James, a coauthor of the report.

But for the time being, the electricity from floating wind is more expensive, which means that "places with the most supportive policies in place is where you'll see development start first," James says.

Indeed, that's one of the key reasons Weinstein decided to focus on

California. In late 2015, Governor Brown [signed a law](#) requiring the state to produce half its energy from renewable sources by 2030. That means utilities or municipal aggregators will have to purchase vast amounts of clean energy, even if it's not the cheapest source available.

Solar and onshore wind won't get to those numbers alone, especially with California planning to [retire its last nuclear plant](#), Weinstein says.

"So that's market demand," she says.

Industrializing the ocean

On a Tuesday evening earlier this month, Weinstein hosted a public meeting at the Veterans Memorial Building in Cambria, California, a quiet tourist town about 30 miles north up the scenic Highway 1 from Morro Bay. It's a few minutes' drive from the famed Hearst Castle, and popular lookout points for gray whales and elephant seals. The town is also around 10 miles closer to the proposed development site.

Weinstein, who speaks with a slight accent from her native Russia, walked through the particulars of the project for the two dozen residents and public officials who attended. The turbines would be around 400 feet tall, from the water to the hub of the rotor, and connected to the grid through a transmission line buried under the ocean floor. The floating platforms would be moored with thick cables and heavy anchors. Whether the final number of turbines is closer to 60 or 100 would ultimately depend on their generating capacity at the time of construction. The most powerful options on the market today produce 9.5 megawatts, but the technology is advancing fast, Weinstein noted.

As currently conceived, the project site would spread across 63,000 acres in waters roughly a half-mile deep. It would form a droopy L shape wedged

between competing uses like the Monterey Bay National Marine Sanctuary, shipping lanes, and trans-Pacific telecom cables.

Extending the bottom line of the L east would draw a straight path to Cambria, roughly 21 miles away. As the map that made that clear flashed on the screen, hands shot up. Attendees wanted to know why their area was chosen, and whether the project would be visible from their shores and tourist hot spots—the same concerns that accompany pretty much every offshore wind project.

“We work hard to keep our open spaces open,” said Mary Webb, a Cambria resident, in an interview as the meeting was wrapping up. “This is a place where people come from all over the world to see the seals and the whales. This would be the industrialization of our oceans.”

Morro Bay's roughly 10,000 residents are also divided over the project, and not just because of worries about eyesores on the shoreline. The local commercial-fishing trade group, representing the town's second-largest industry after tourism, has [expressed concerns](#) about losing its territory.

On the other hand, the project could be a way to replace [hundreds of thousands of dollars](#) in annual revenue the city lost when the [Dynegy](#) plant closed. Morro Bay had leased the plant an underwater conduit for cooling water, which the wind project would probably use to connect its transmission line to the grid.

‘Not in my back ocean’

During the Cambria meeting and in interviews, Weinstein came across as forthright about the project's impacts, and clear-eyed about the risks.

Unprompted, she mentioned the developer's worst-case scenario: the fate of [Cape Wind](#), a long-running effort to build 130 wind turbines in Nantucket

Sound that was scuttled by community opposition and legal challenges.

When it comes to a development of this size, she says, there's ultimately no way to avoid every impact or satisfy all parties, so it becomes a question of accepting appropriate compromises and trade-offs.

Notably, because of the curvature of the Earth, the turbines won't be visible along the shoreline to any average-size person. But Weinstein acknowledged it's possible that parts of the development, particularly the red navigation lights at night, could be spotted from higher elevations like Hearst Castle.

She stressed, however, that the bigger consideration to keep in mind is the impact of climate change. One way or another, California and other states have to build far more clean energy to lower greenhouse emissions, she said. Floating offshore wind is one of the most effective ways of doing it at a large scale, with limited environmental effects.

“We can be ostriches and put our head in the sand and say, ‘Not in my back ocean—go away,’” she says. “Or we can say, ‘Yes, there will be impacts, but let's find ways to create win-win situations.’”

“With a responsible development, I hope we can get to the correct answer.”