CLIMATE SOLUTIONS

This seaside town will power thousands of homes with waves

Wave energy has been untapped so far, but an experiment could unlock its potential in the United States.

The Washington Post)

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November 19, 2024 at 6:30 a.m. EST

NEWPORT, Ore. — At a moment when large offshore wind projects are encountering public resistance, a nascent ocean industry is showing promise: wave energy.

It's coming to life in Newport, a rainy coastal town of nearly 10,500 people located a couple of hours south of Portland. Home to fishing operators and researchers, Newport attracts tourists and retirees with its famous aquarium, sprawling beaches and noisy sea lions. If you ask anyone at the lively bayfront about a wave energy project, they probably won't know much about it.

And yet, right off the coast, a $100 million effort with funding from the Energy Department aims to convert the power of waves into energy, and help catch up to Europe in developing this new technology. The buoy-like contraptions, located several miles offshore, will deliver up to 20 megawatts of energy — enough to power thousands of homes and businesses.

As federal officials look to shift America's electricity grid away from fossil fuels, they are seeking alternatives to solar and wind, which can deliver energy only when the sun shines or the wind blows. Waves — constant and full of untapped energy — have emerged as a promising option. And because wave energy projects are relatively unobtrusive, they are far less controversial than offshore wind, which has generated fierce opposition on both U.S. coasts. In September, the Biden administration announced that up to $112.5 million would go toward the development of wave energy converters, the largest federal investment in marine energy.

There is enough energy in the waves off America's coasts to power one-third of all the nation's homes, said Matthew Grosso, the Energy Department's director of the water power technologies office.

Spanning 2.65 square miles and located seven miles out from shore, the PacWave test site is expected to be a "game changer for marine energy," he said.

Under the water, subsea connectors are waiting to be plugged in like extension cords to wave energy converters developed by teams around the world. With deep-sea offshore testing, companies will see how much power these energy converters can produce, whether they can hold up in rough ocean conditions, what environmental impacts they might have and how the devices will interact with one another.

PacWave, a project of Oregon State University (OSU), represents a necessary step for commercializing wave energy, experts said.

"The research that's been done in the past 15 years is reaching the point of what we can do just in labs or in theory," Grosso said. "We've got to start testing some of this stuff out and see what works and what doesn't

How wave energy works

Unlike with other forms of renewable energy, engineers have not yet settled on a single model of wave energy converters. While wind turbines have converged into the three-blade turbine shape, many types of wave energy converters are in development, turning the motion of the wave into electrical energy in different ways.

You can feel the energy in the waves, when it laps at the shore or when it rocks your boat. Created by wind over the sea, it's one part of the ecosystem of renewable energy that is available to us. But since waves don't move in a linear motion, they are harder to capture energy from than the flow of wind over a turbine, for example.

One wave energy converter may not work in all environments, either — models can vary based on the depth of water and the conditions in which the converter will operate. Some use rotating cylinders; some are buoys that move up and down with the waves; others look like snakes with joints that move when waves roll through.

But all of these devices use the oscillating or orbital motion of a wave to generate an electrical current, said PacWave Chief Scientist Burke Hales, in the same way that turbines use rotations to generate a current.

With four berths, the site can host devices by multiple developers at once. The cables carrying the electricity are buried under the seafloor, running 12 miles diagonal to the shoreline to avoid a rocky reef. On land, an operating site measures the energy output and sends the energy to the Central Lincoln power utility.

Because no wave energy converters are plugged in yet, there is still a clear view of the horizon from Newport's beaches. But even the larger devices are unlikely to be visible to the naked eye once they are there in the new year.

Coexisting with fisheries

The PacWave site sits where crabbers set out their pots to catch Dungeness crab, one of the West Coast's most important seafood species. And yet, unlike an offshore wind project a hundred miles down the coast that sparked strong opposition, most residents are either unaware of the wave energy project or support it. That the project is limited, and unlikely to spur commercial activity offshore that could damage the town's fishing economy, has helped its cause.

When deciding where to locate the project, Newport won out for its proximity to OSU's main campus in Corvallis and the local fishing fleet's openness to the idea. The town also hosts the National Oceanic and Atmospheric Administration's Marine Operations Center for the Pacific, which has its own research fleet.

PacWave also brought the promise of jobs, said Belinda Batten, who conducted outreach for PacWave when she directed the Energy Department's Northwest National Marine Renewable Energy Center. Many here remember how NOAA's move to Newport in 2011 created employment opportunities.

Perhaps most importantly, OSU already had a strong relationship with the community given the marine center in town, according to Charlie Plybon, who lives in Newport and is the Oregon senior policy manager for the nonprofit Surfrider Foundation.

It took years of outreach and many town hall meetings for Batten, who now serves as a senior adviser to the OSU provost, and Kaety Jacobson, Lincoln County commissioner and a fisherman's daughter, to cement their trust with the community. When they assembled

some fleet members to decide on the site, it took all of 10 minutes for the crabbers to draw a plot on a map of the ocean for a location that could work for everyone involved.

That area was important fishing grounds for the fleet, said crabber Bob Eder. In his button-down shirt and sneakers, Eder knows he doesn't look like a stereotypical fisherman, but he's one of the most respected crabbers in the fleet and still goes out in the waters every season at the age of 73. The PacWave site could represent a loss of hundreds of thousands of dollars for the fleet every crabbing season, he said. On the navigation system in his boat, he pointed to a map that showed he had previously crabbed in the area that was now off limits.

But the operators agreed to give it up for the sake of the experiment.

Eder, a representative of the fishing community during the process, said the agreement with OSU was a show of goodwill from the fishing community, whose members care about the environment and want to preserve their livelihood.

Climate change "definitely affects those of us whose work is directly involved with the environment," he said. "And so every fishery is at an environmental risk."

Where wave energy could thrive

In states like Oregon, where an abundance of renewable energy has lowered the price of electricity to around 3½ cents per kilowatt hour, wave energy isn't a competitive option. The first large-scale commercial wave energy project, by contrast, is expected to produce electricity costing 12 to 47 cents per kilowatt hour.

But in small, remote communities that depend on more expensive diesel fuel, wave power could ease energy woes.

"There's remote communities in Alaska where everyone is running on diesel generators, they're not on the grid, they have no electrical system," said PacWave Director Dan Hellin.

The wave industry first has to overcome several challenges. The consensus in the industry is that wave energy's development is 20 years behind that of wind. But Tim Ramsey, the Energy Department's marine energy program manager, pointed out that wind began to take off at that point, in the early 2000s.

In addition, putting something into offshore waters usually requires extensive federal permitting, which can take years. That's why this test site is important for developers — PacWave's operation offers a site that has already earned the necessary approvals.

For wave energy to be economically viable, developers need to lower its cost. Technological advancements can help, and just as solar and wind energy have received government subsidies, federal support could help get wave energy off the ground.

Members of the Newport fishing fleet — even those who aren't fans of the project — have hope that this renewable energy offers possibilities.

Crabber Bob Kemp, 75, said he isn't thrilled that he won't be able to fish for crab in that part of the ocean anymore, but he's counting on the researchers to make good use of the space they have taken.

"I want to make sure the project has some kind of pressure on it to keep going and not just [move on] like a contractor moves on to a new house," Kemp said. "I want them to stay on that."