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Ocean wave power projects seek solid footing on West Coast

Story by **Mike Lee**

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The cancellation of three ocean wave-energy projects in Sonoma County leaves a proposal north of Oceanside as the only one of its kind off California's coast.

There's wide interest in harnessing the ceaseless power of the ocean because so-called hydrokinetic energy facilities could provide a steady source of energy without air pollution or toxic waste.

But there are so many barriers that the concept hasn't generated much momentum in California despite aggressive state mandates to ratchet up renewable power supplies. To reach commercial production, a wave-energy farm proposed near San Onofre would have to minimize interference with ocean ecosystems, the famous surf break at Trestles and Marine training at Camp Pendleton. Besides that, proponents must prove the technology will work in the corrosive waters of the ocean and navigate a grueling approval process.

"Wave energy is just not quite ready. It's probably a decade away from being commercially viable," said Cordel Stillman, deputy chief engineer at the Sonoma County Water Agency, which mothballed its wave projects this month. "But the motion of the waves is the most compact and dense energy available from a natural source, and it's only a matter of time before we figure out how to harvest that."

Officials at the U.S. Federal Energy Regulatory Commission said no ocean-wave energy facilities in domestic waters are connected to the power grid, though they have issued more than 30 preliminary permits for exploring tidal or wave projects. Also, the Department of Energy has helped fund a renewable marine energy research center shared by Oregon State University and the University of Washington.

Engineers have experimented with numerous methods for transferring ocean pulses into energy for everyday life. They include using devices that move up and down with the waves like pistons and others that look like giant snakes floating atop the waves and producing power as they flex. Some scientists also are exploring ways to capture energy

from steady ocean currents that could turn underwater turbines, much like wind does in the San Diego County backcountry.

Asfaw Beyene, a professor of mechanical engineering at San Diego State University, said the Channel Islands and the curvature of the Southern California coastline mean nearshore waves here don't pack as much power as they do to the north. In addition, there's intense competition for ocean resources in Southern California, making it a challenging place to install marine machinery.

Beyene said one prime opportunity is to repurpose existing oil platforms off the state's coastline as combined wave and wind energy centers.

He said the concept should be seen as part of a larger strategy to reduce dependence on fossil fuels. "It has to come as a package: solar here, or wind there, or the waves."

The proposed San Onofre Electricity Farm would sit in about 25 feet of water roughly 2,000 feet offshore at the northern edge of the county, where a small company aims to connect with existing transmission lines that serve the region's only nuclear power plant.

The concept was proposed last year by JD Products in Fountain Valley, which plans to use buckets that fill with water to turn a conveyor belt and transfer wave energy to a flywheel.

Company CEO Chong Kim envisions thousands of those energy-generating devices eventually tethered to the seafloor and poking several feet above the waves. The project would cover about 6 square nautical miles.

Kim said in an interview that he is a retired engineer from Korea who wants to repay the United States for helping his country during the Korean War. He has detailed mechanical plans but not the millions of dollars it would take to deploy his dream machines on a commercial scale. He's hoping for state and federal grants while he refines his concept under a preliminary federal permit that expires in 2013.

Even if Kim finds the money, it's not clear sailing for his wave farm. Officials at Camp Pendleton have warned that it could infringe on critical training areas for amphibious assaults and the National Marine Fisheries Service has raised concerns about potential damage to federally protected steelhead, marine mammals and turtles.

Startup stumbles are common in the world of wave energy. In early August, federal energy regulators canceled permits for the Sonoma County Water Agency's coastal development sites. Stillman, the engineer, said Sonoma lacked the $2 million or $3 million needed to proceed after it lost out on federal grants.

But he said the endeavor gave local leaders experience with the permitting process they can use if grants emerge and the technology advances.

"There are probably 50 companies out there looking to build … a device that not only would survive out there in the ocean but provide a good rate of return on the investment," he said.

In 2007, Pacific Gas & Electric announced a foray into wave energy exploration on the North Coast where company officials touted the "excellent wave power potential." PG&E pulled the plug on that project last year and in April it suspended work on a related endeavor near Vandenberg Air Force Base. A company spokeswoman said the costs ended up being much higher than expected.

A spokeswoman for San Diego Gas & Electric said it is not developing any wave-energy projects.

The future appears brighter in Washington, where the Snohomish County Public Utility District is pursuing a $25 million investigation into tidal wave power. District leaders are trying to position the Northwest as a leader in ocean energy much like it is for conventional hydropower by installing two turbines 200 feet deep in the Puget Sound by late 2013.

In Oregon, the university's marine energy center is developing an ocean test site where companies can bring devices for trial runs next year. Program manager Meleah Ashford said several technologies are moving ahead and some could be commercially viable in less than a decade if there's enough money to refine them.

But she said the big questions will be settled by factors outside the control of developers and scientists. "There are space-use issues that seem to be particularly challenging in the U.S." she said. "Who gets the right to use the ocean? … Society is going to have to decide."

Mike Lee: (619)293-2034; mike.lee@uniontrib.com. Follow on Twitter @sdutlee.