

# update

## Ocean Power Catches a Wave

Europe and New Zealand to install commercial generators; U.S. lags

**T**HE FIRST commercial ocean energy project is scheduled to launch this summer off the coast of Portugal.

Three snakelike wave-power generators built by Edinburgh's Pelamis Wave Power will deliver 2.25 megawatts through an undersea cable to the Portuguese coastal town of Aguçadoura. Within a year, another 28 generators should come online there, boosting the capacity to 22.5 MW. That may be a trickle of power, but the project represents a new push into wave and tidal power as governments eye the oceans as a way to meet their renewable energy targets.

Engineers have come up with a variety of schemes to harness the power of waves, the flow of currents, and the motion of the tides. The Pelamis generators, part of a class of wave-energy converters called linear absorbers, each comprise three long canisters that look like giant oxygen tanks. Hinged joints link the canisters; when the waves change the segments' positions relative to one another, the joints push hydraulic rams, which pump high-pressure oil through turbines inside the canisters.

Though Portugal may be the site of the first commercial installation, the UK—Scotland in particular—leads in the research and development of ocean energy and is expected to end up with the most installed capacity in the coming years, say experts. Pelamis's generator was first tested at the European Marine Energy Center (EMEC), which is located amid the Orkney Islands



**SEA MONSTER:** A Portuguese utility plans to install wave-power generators like these.

off Scotland's northeastern coast.

The UK created EMEC with an eye toward making renewables 20 percent of its energy mix by 2020. The government-financed Carbon Trust estimates that Britain could someday meet as much as one-fifth of its electricity demand using ocean energy alone. For its part, the Scottish government is awarding the annual US \$20 million Saltire Prize to the creator of the most innovative marine renewable-energy technology deployed there. "Scotland has a huge renewable-energy potential—enough to meet its demand for power almost 10 times over," says its energy minister, Jim Mather. Scotland is estimated to be home to 25 percent of Europe's tidal power potential and 10 percent of its wave-power potential.

On the other side of the globe, New Zealand already gets 60 percent of its electric power from renewables but wants to raise that figure to an amazing 90 percent by 2025. Among the ocean-power projects under consideration is an array of 200 tidal turbines that would be anchored to the seafloor across the mouth of the 900-square-kilometer Kaipara Harbor near Auckland. Crest Energy, the project's Auckland-based backer, estimates that the turbines would yield 200 MW, or 3 percent of the country's energy demand. Getting

ocean-power projects going in New Zealand was made easier thanks to an initiative introduced in October 2007, says Anthony J. Hopkins, codirector of Crest Energy. It places a 10-year moratorium on the construction of new fossil fuel power plants by state-owned utilities and creates an emissions-trading scheme. "This levels the playing field quite a bit," says Hopkins.

Despite growing momentum for ocean power elsewhere, the tide hasn't turned in the United States, where environmental regulatory tangles and a preference for wind and solar energy have left most ocean-energy schemes at the research stage. Though ocean energy could offset as much as 10 percent of national electricity demand, "it will be around 2020 before any [U.S.-based] commercial projects come online," predicts Roger Bedard, the lead ocean-energy researcher at the Electric Power Research Institute in Palo Alto, Calif. The Energy Department has requested only \$3 million for ocean energy for the 2009 fiscal year, compared with \$156 million for solar energy. And, says Bedard, unlike the UK, where a single agency has jurisdiction over all ocean-energy projects, the United States has as many as 20 agencies from which developers have to gain approval—even for a pilot project. —WILLIE D. JONES