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Marine Energy Projects Pick Up Momentum

By BETH GARDINER

LONDON — Hopes of harnessing the churn and flow of the seas to generate power are pushing forward work in the small but growing tidal and wave energy industry. Despite a tough investment climate, proponents expect the technologies to begin contributing significant amounts of clean energy to power grids around the world within a decade.

Tidal energy technology harvests power from the rise and fall of the sea caused by the gravitational forces of the Moon and the Sun and the rotation of the Earth. Wave power systems harness the energy of surface waves.

The immense force of the tides has long tantalized those hoping to harvest energy from them, but although a few small projects are operational, the technical barriers are high. Two distinct technologies exist — traditional dam-based plants and more recent “tidal stream” generators, built like underwater windmills. But tidal dams can be ecologically harmful while in places suitable for tidal stream plants, currents can sometimes be so strong that they risk destroying the generating turbines.

Capturing energy from waves may be even trickier. But proponents say that if wave projects are successful, the energy available for harvest would be even greater than with tidal stream power, which requires particular physical conditions, like a narrows where water runs quickly. While not as predictable as the tides, waves can be anticipated several days in advance as they move across the sea, and they tend to be strong in winter, when demand for electricity is high.

Most tidal stream power projects are still in the testing phase — the first to deliver energy to the U.S. grid went on line last month — and wave energy is even further behind. Costs are far higher than for more-established renewable sources like wind and solar, largely because equipment must be strong enough to withstand the force of the seas, and maintenance workers have to brave tough marine conditions.

But “there is a huge prize, and therefore it is worth going for,” said Tim Yeo, a Conservative lawmaker in the British Parliament who heads the Commons’ Energy and Climate Change Committee.

The predictability and power of tides makes them a potentially valuable complement to the uncertainty of wind and solar generation, and the amount of energy available is enormous, said Mr. Yeo. His committee reported in February that wave and tidal energy could eventually meet 20 percent of Britain’s current electricity demand.

For the industry, the biggest obstacle is cost. Small projects already in existence are generating energy at five to six times the price of onshore wind power, and seven times the price of natural gas power plants, said Joe Salvatore, a renewable-power analyst at Bloomberg New Energy Finance. And the cost of installing devices has gone up, not down, as companies have learned from experience how tough their devices must be, he said.

“I’m optimistic in the medium term, I’m not necessarily optimistic in the short term,” said Angus McCrone, chief editor at Bloomberg New Energy Finance. “There will be a shakeout and there will be casualties, and because of that, there will be negative publicity before there’s positive publicity.”

Still, costs should come down as technologies improve and equipment is manufactured on a larger scale, he said.

Some big players, particularly engineering groups, are jumping into the sector. Rolls Royce bought the British company Tidal Generation in 2009 and Siemens bought Marine Current Turbines of Britain this year. The French firm DCNS has grabbed a stake in OpenHydro of Ireland.

“Investment is certainly harder than it was, but against that we’re also seeing an increase in confidence that the technology works,” said Neil Kermode, head of the European Marine Energy Center, a test site for wave and tidal devices in the Orkney Islands of Scotland.

In Maine, Ocean Renewable Power last month became the first company in the United States to deliver tidal stream power into the electricity grid, from a four-turbine unit in Cobscook Bay. The turbines can deliver enough power for 25 homes, and John Ferland, the company’s vice president of project development, said that with more units in place, it hoped to provide electricity for 1,500 homes within two years.

The U.S. Department of Energy has given $10 million to support the project, and says it

believes that wave and tidal power could meet 15 percent of U.S. electricity needs by 2030.

Ocean Renewable Power plans eventually to sell turbines for deep water, shallow water and rivers around the world. It is talking to potential customers in Asia, Europe and South America.

Mr. Ferland said tidal stream turbines should be able to produce power at a competitive price by 2018 or 2020.

Those working on wave power are experimenting with a wider range of devices than the tidal generators, which tend to be based on a turbine model. Pelamis Wave Power has built a huge “sea snake” that rides on the surface, and Aquamarine Power is working on the Oyster, a pump with a hinged flap that moves with the waves to drive an electricity-generating hydraulic piston.

Pelamis ran into trouble in 2008 when a combination of technical problems and the collapse of a major investor brought to an abrupt end a Portuguese project that had been billed as the world’s first wave farm. Pelamis has since modified its machine and has moved forward on deals with two utility companies in Scotland.

It now calls the Aguçaduora project in Portugal a valuable learning experience. It has successfully delivered power to the grid in Scotland, and it is a finalist in a £10 million, or $16 million, Scottish government competition for the project that delivers the most renewable energy from the seas for two years running.

“No time is easy to be a new technology developer, but we’re quite happy with the customers that are on board with Pelamis at the moment,” said Deborah Smith, a company spokeswoman.

Scotland, with its rough waters, powerful tides and offshore islands, has become an important center for the development of both tidal and wave power.

Australia, Japan, Portugal, Scandinavian countries and South Korea are also actively pursuing wave and tidal energy, said Mr. McCrone of Bloomberg New Energy Finance.

Tidal stream turbines are generating power in Strangford Lough, an inlet in Northern Ireland. Verdant Power is working on a project in the East River in New York, between Roosevelt Island and the borough of Queens.

Britain has been looking for years at harnessing the powerful tides of the Severn Estuary

between England and Wales, but there are big practical and environmental concerns about proposals for a dam-like structure there.

In 2010, the government rejected plans for a barrier running 16 kilometers, or 10 miles, across the estuary, citing cost and environmental objections.

Officials are now looking at an alternative, privately funded barrier proposal from the consortium Corlan Hafren. Some environmentalists, meanwhile, say that a more limited project, generating power from a set of artificially built "tidal lagoons," rather than a full-scale dam, could be less damaging.

That controversy aside, Britain hopes to become a leader in tidal and wave power, the way many in the country say it has failed to do with wind energy.

British officials increasingly support research: Mr. Yeo, the Conservative lawmaker, noted that because marine energy was still in its early stages, the sums needed now to push it forward are much smaller than the amounts that would be required to install a fully developed technology on a commercial scale.

In the Orkney Islands, Mr. Kermode, of the European testing center, said things were moving quickly.

"I see these machines going past my window here, three machines went past in a week," he said. "This is a long-haul job, but we've started making significant progress."