

Surging ahead

Wind power's not the only game in town. Portland's ORPC is making waves with its tidal energy technology.

By Jackie Farwell, Mainebiz staff reporter, can be reached at jfarwell@mainebiz.biz.

The surging tides that crash along the shores of Eastport are regarded as among the strongest and highest in the country. Rising upwards of 20 feet two times a day, the swells have for decades attracted the attention of those keen to harness their power.

The community has a long memory of these failed ambitions. Chris Sauer experienced that firsthand about three years ago when he checked into Motel East in the small Washington County town of Eastport. It was Sauer's first visit; he would later introduce his plan to install cutting-edge turbines there beneath the water's surface to generate emission-free electricity. Sauer briefly explained the plan to a curious motel clerk, who in turn asked if Sauer had heard about the Quoddy Dam project. No, he hadn't, Sauer replied, exasperated that a competitor had beat him to the storied waters of Cobscook Bay and the Western Passage, he recalls.

Sauer soon realized that the Quoddy Dam project dates back more than 70 years, to the grand but ultimately abandoned plans of Franklin D. Roosevelt and his friend and engineer, Dexter Cooper, to dam up the surges of the Cobscook and Passamaquoddy bays.

Since checking in to that motel, Sauer and his enterprising startup, Ocean Renewable Power Co. of Portland, have developed one of the country's most promising tidal power projects, using technology that's unique, in part, because it's dam-free. A prototype — full of high-tech components but resembling an old-fashioned push lawnmower — was launched in late 2007 and has proven technically feasible. Now, with the help of a joint venture with a major renewable power producer, the company is making modifications and improvements to prepare the design for commercial use. "We still don't know if we can do this," a bushy-haired Sauer says from his office on the Portland fish pier. "But I've got to tell you, if anyone can do this, we can do this."



Photo/David A. Rodgers

Chris Sauer, president and CEO of Ocean Renewable Power Co. in Portland

Testing an idea

Sauer was semi-retired in June 2004, living in Florida and indulging his woodworking hobby, when a cruise ship industry executive approached a friend of his at a conference with an idea that would form the genesis of ORPC. The executive, Paul Wells, thought there must be a way to generate electricity from ocean currents like the Gulf Stream.

Over the next two years, with input from the Navy, ORPC devised a design for the 46-foot-long horizontal cross flow turbines that it will anchor 65 feet below the water's surface off Eastport. The unit's foils, similar to windmill blades, turn with the tides and can move in the same direction regardless of whether the tide is flowing or ebbing. Two turbines are attached to opposite ends of an axle that runs through a central generator. As the foils rotate, they produce mechanical power that the generator converts to electricity and then sends to the grid via an underwater power cable. On shore, the electricity is converted from alternating current to direct current, then back to an alternating current with a constant voltage, allowing it to be plugged directly into the grid.

That technology is coupled with a generator that uses a high-powered, extremely durable magnet, eliminating the need for a gear box. So, the unit uses no lubricants (or gases, for that matter) that could leak into the surrounding water. The dreaded gear box has proven the Achilles heel of many a wind power project, with its numerous moving parts that struggle to convert the blades' slow rotational speed into the faster speeds the generator requires to produce electricity. Putting one underwater invites even more trouble, Sauer says.

In peak conditions, the tides off Eastport climb to six knots, or about 7 miles per hour. At that speed, one unit can generate 100 to 125 kilowatts of power. But the idea is to stack the units in a modular design for a commercial model that ORPC hopes will produce up to one megawatt of power — enough to power 300 Maine homes — at a rate of 10 cents per kilowatt hour, competitive with wind and solar. In the future, the units could be comprised in arrays of tens to hundreds of modules.

On Dec. 8, 2007, ORPC plunked the first prototype of its unit into Cobscook Bay. By April, the company had collected enough data to prove the unit would work technically. Now a relic of ORPC's early days, the prototype sits in a parking lot at Husson University's Boat School in Eastport. "We look at it now and it looks like a Model T Ford," Sauer says, shaking his head.

ORPC is on to bigger and better, with plans to test a larger prototype in early November to find out if the modular unit is cost-competitive and compatible with the grid. Along with generating power at its own sites, ORPC plans to license its technology to other permit holders and oversee project development for new market players. Sauer hopes to have 200 megawatts of capacity installed by 2015.



Bob Lewis (left), ORPC's general manager, and contractor Steve Cox of Woodland Machine Works in Baileyville work on development of ORPC's prototype off Eastport in December 2007.

The company's future is promising, given its adaptive, consistent approach and sensitivity to the local community and environment, according to Bob Judd, a Lubec resident and retired power executive from California who advised a landmark study three years ago that identified Eastport as Maine's prime potential tidal energy site. "While others talk, ORPC works," Judd says.

Diving in

That conference held five years ago, where cruise ship exec Paul Wells floated his back-of-the-envelope plan, was called EnergyOcean, and is an annual event attended by internationally recognized leaders in the field. This year, the conference was held in Rockport, and ORPC came full circle, walking away with two awards. The startup received the Company Pioneer Award for its leadership in ocean energy, and its director of systems engineering, Patrick McGinnis, was named a technology pioneer.

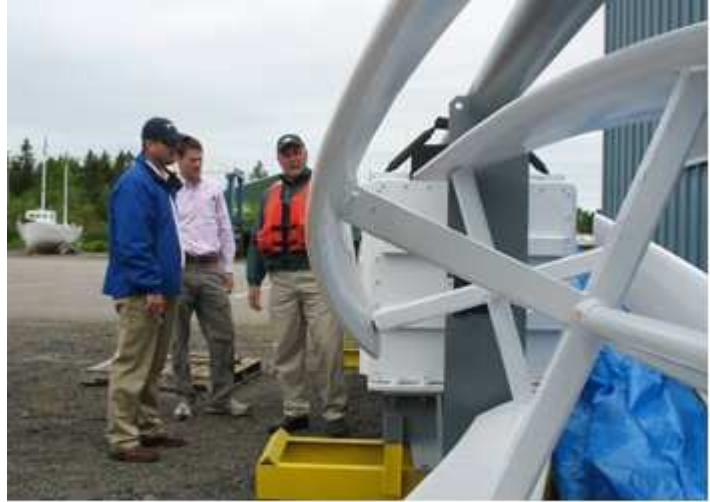
ORPC, which employs 13 full time in Portland, has won the partnership of New York-based Caithness Development, a low-profile but influential private alternative energy producer. ORPC in mid-June entered into a joint venture agreement with Caithness that offers an influx of money, greater breadth in project development and relief from many back-office functions, according to Sauer. “We’ve been like shot out of a cannon,” he says. “It’s a new life.”

ORPC also has received a total \$1.5 million in funding from the Maine Technology Institute. The largest chunk was announced in June, when ORPC was awarded \$806,000 from MTI’s Maine Technology Asset Fund to build and test the commercial design of its unit. “We would not be here today if it wasn’t for MTI,” Sauer says.

The company has also teamed up with several Maine composite companies — including US Windblade, Custom Composite Technologies and Harbor Technologies to make the turbines — as well as the University of Maine, Maine Maritime Academy, the Gulf of Maine Research Institute and the Eastport Port Authority to create a tidal energy cluster in Maine. ORPC funds two graduate students at UMaine, which has a 100-foot-long water tank that was used to test the turbines. ORPC is also working with the Coast Guard on a plan to power the Eastport station with tidal energy.

Such partnerships with the local community have characterized ORPC’s approach. “They asked for people’s help rather than coming in and trying to sell a pre-planned project,” says Will Hopkins, executive director of the Cobscook Bay Resource Center, an organization serving nine area municipalities that promotes sustainable economic development. The company appreciates the expertise of area marine fabricators and locals’ knowledge of the waters, and has held numerous meetings with stakeholders, he says. “ORPC’s been successful not only because of their technical design prowess, but also because they know how to work with local people.”

Since 2007, ORPC has created or retained up to 60 jobs in seven Maine counties and spent about \$3 million on goods and services, according to the company. “It’s a coastal resource, but it does have impacts away from the coast as well,” says John Ferland, vice president for project development for



Bob Lewis (right), ORPC's general manager, shows the turbine to a Department of Energy staffer (center) and a professor from Florida Atlantic University this summer in Eastport



The economic impact of ORPC's tidal power work in Maine stretches far beyond the coast, says John Ferland, ORPC Maine's vice president for product development

ORPC Maine, a subsidiary of ORPC. The company expects to directly employ up to 500 people and invest about \$1 billion in the state over the next five to seven years.

Despite its progress, and another project under way at Cook Inlet in Alaska, ORPC is still a small startup. It's also the last startup for Chris Sauer — whose career history includes ventures in energy-efficient lighting and mercury removal methods — thanks to a pledge he made to his wife. Further testing is needed to assess the turbines' potential impacts on fish and the environment. Meanwhile, ORPC's competitors are busy with projects in Puget Sound, under the Golden Gate Bridge and in New York's East River.

Sauer sees his company's successes and failures as part of the wider effort to channel much of the world's energy from the depths of the ocean. ORPC's environmental impact studies and experience with the regulatory and commercial environments will apply to the broader ocean energy industry, he says. While excitement and anticipation continue to build around the nascent offshore wind industry, Sauer's little company has harnessed the ocean's power in a promising, if early, model. "We're learning all the lessons that they're going to need to know," he says.

Ocean Renewable Power Co.

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Founded: 2004 President and CEO: Chris Sauer Services: Development of ocean energy technologies and projects	Employees: 13 full time in Portland Revenue (projected): Cash-flow positive by 2012-13 Contact: 207-772-7707 www.oceanrenewablepower.com
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Clearing a path

Last month, Gov. John Baldacci and the head of the Federal Energy Regulatory Commission signed an agreement that will align state and federal reviews of tidal energy projects off the coast of Maine. Now, when companies like ORPC apply for preliminary permits, pilot project licenses or full operating licenses, regulators in Maine and at FERC will coordinate procedures and schedules for a more streamlined review process, according to a press release from the governor's office.

"Our state has been aggressive in its pursuit of clean energy to help end our country's dependence on fossil fuels, and this agreement will help establish a coordinated and responsible partnership between Maine and FERC," Baldacci said in the statement.

FERC has signed similar agreements in Washington and Oregon, and the memorandum of understanding with Maine marks the commission's first on the East Coast. Included in the agreement are stipulations that the agencies will notify each other about potential applicants and identify information gaps earlier in the process. FERC has agreed to consider whether proposed tidal projects are consistent with Maine's river management plans, and the state will take action on water quality certifications within two months of accepting applications for processing, the release states.

ORPC has received preliminary permits from FERC for its project in Eastport and is seeking approval for further development in 2010. The "new permitting path" sends a strong message to the tidal energy industry that the two levels of government are willing to work together, according to John Ferland, vice president for project development for ORPC Maine. The most immediate impacts for a company like ORPC are improved predictability, timeliness, manageability and equality in the regulatory process, he says. Adds President and CEO Chris Sauer, the agreement also tells potential tidal energy investors that Maine is open for business.