

OCEAN RENEWABLE POWER COMPANY

The remote village of Iguigig, Alaska (pop. 50 – US Census, 2010) has very high energy costs and electricity is not a readily available commodity. With a diesel-powered microgrid providing the only opportunity to generate electricity, residents can pay up to 15 times the cost of normal grid-powered electricity and are restricted on how much power they can use. Iguigig is just one example of the 700 million people worldwide that derive their power from diesel-powered microgrids. This population presented the perfect opportunity for Ocean Renewable Power Company to demonstrate its solution – a RivGen® Power System that harvests energy from both river and tidal currents to generate electricity.

AGENCIES

DOE, DOD (NAVY), USDA

SNAPSHOT

The RivGen® Power System harvests energy from river and tidal currents, generating electricity either with direct power grid connection or in remote communities with isolated power grids. Funding provided by Navy CRADA, DOE STTR, and additional SBIR grants by USDA has proved to be an invaluable component to the company's success and longevity.

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RivGen® Power System's core component, the turbine generator unit (TGU), is at the forefront of marine hydrokinetic technology, and utilizes innovative control systems to drive two advanced design cross-flow turbines that efficiently provide reliable energy even within highly turbulent flow environments. The TGU started as a Navy Cooperative Research and Development Agreement (CRADA) project years ago, and has become the secret sauce in all of ORPC's systems to date.

"One of the really unique things about the RivGen® Power System is that it self-deploys and self-retrieves," explains Chris Sauer, President and Chief Executive Officer of Ocean Renewable Power Company. "All that was used in our Alaska demo was a local fishing vessel. The system integrates electronically with the diesel unit – the RivGen® Power System puts electricity into the grid and the diesel makes up any difference. It significantly reduces economic and environmental costs."

The RivGen® Power System comes on the heels of ORPC's first success – the TidGen® Power System, which also utilizes a TGU. With the help of a DOE Small Business Technology Transfer (STTR) grant, ORPC built and operated the first revenue-generating, grid-connected tidal energy project in North America in 2012, which was the first non-barrage ocean energy project to deliver power to a utility grid anywhere in the Americas. This first TidGen® device had a rated capacity of 150 kilowatts and generated enough electricity annually to power 25 to 30 homes in the Cobscook Bay, Maine area where it was installed. ORPC plans to install additional power systems starting in 2017 to increase the project's output to up to 5 megawatts – enough electricity to power 1,200 Maine homes and businesses with clean tidal energy.

The funding provided by federal agencies such as the Navy CRADA, DOE STTR, and additional SBIR grants by USDA has proved to be an invaluable component to the company's success and longevity.

"If you're a struggling start-up company as we were, it is nearly impossible to raise private capital," explained Sauer. "The general view across the private sector is that renewable energy technologies are not worth pursuing because gas is going to be cheap forever so why bother. SBIR and STTR were the only way to achieve our research and development goals, so it was a lifesaver for our company."

With operations in Maine and Alaska, ORPC is contributing to both local economies on a large scale. In Alaska, the company is actively working with local groups to make tidal and river energy a reality. They have invested over \$2.8 million since they began their work in Alaska in 2009, and they have over 60 partners and contractors throughout the state, including the Alaska Energy Authority.

ORPC's Maine Tidal Energy Project has brought in more than \$25 million into the state economy, and has created or helped retain more than 100 jobs in 14 Maine counties.

The company has a continued commitment to collaborate with local communities, universities, state and federal agencies, fishing industry groups, and other major stakeholders in every project it undertakes.

ORPC's business model for its Alaska operations entails training local businesses how to deploy, retrieve and ultimately how to maintain its RivGen® Power Systems to generate affordable electricity. The company successfully deployed a similar project in July 2015 that contains significant improvements from the first test pilot, increasing the flow and efficiency of the turbine. Work is also ongoing with University of Washington through another DOE grant to improve the control system and test a new control scheme.

"It's a challenging market because many of the remote communities we are targeting don't have infrastructure – they don't have equipment or cranes; they just have fishing vessels," added Sauer. "So we are continually improving our products to meet this need. With very high food and energy costs, these people really need to get to a sustainable state and energy is a big part of that. We definitively see ourselves as part of that sustainability formula."



ORPC's TidGen® turbine generator unit



ORPC's RivGen® Power System ready for installation: Kvichak River, Igiugig, Alaska