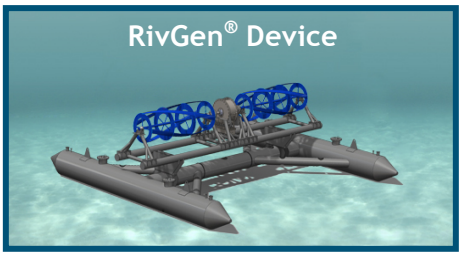
RivGen® Power System

Clean, Predictable Power Generation for River and Coastal Communities

Ocean Renewable Power Company (ORPC) develops and builds proprietary power generation systems and eco-conscious projects that convert river, tidal and deep water ocean currents into clean, reliable sources of renewable electricity. ORPC power systems have no visual impacts, use no fossil fuels and produce no emissions of any kind, including greenhouse gases.

RivGen® Power System Overview



ORPC designed the RivGen® Power System to generate electricity from river and tidal currents, either with direct power grid connection or in remote communities with isolated power grids. Many remote communities rely on local power distribution grids connected to diesel generators, which leave a huge carbon footprint and are growing increasingly expensive to fuel and operate. The RivGen® Power System is designed to connect directly into existing diesel-electric grids, operating either in parallel with diesel generators to offset diesel power generation and fuel use, or in "grid-forming" mode, which allows diesel generators to be shut off entirely when RivGen® power output meets or exceeds local demand. An important and unique feature of the RivGen® Power System is that it is self-deploying, requiring only small- to medium-size vessels that are commonly available, even in remote river or coastal communities.

All RivGen® Power System components are shipped in intermodal shipping containers to staging areas near a project site, and arrive ready for final assembly. When assembled, the RivGen® device is towed to the project site where the anchor is deployed. The device is held in the river or tidal current by the anchor lines and then submerged (ballasted) into position on the river bed. An underwater power and data cable follows the anchor line to the anchor, where it then runs along the river bottom to an on-shore interconnection point. Any number of RivGen® devices, each with a rated capacity of 25 kilowatts, can be installed at a site in this manner, depending on community needs and site characteristics.

RivGen® Power System Key Features

- An ideal power supply solution for remote river and coastal communities and industrial facilities
- Self-deploying device that is quickly installed using commonly available vessels
- Easily retrieved and maintained or removed for seasonal applications
- Microgrid-compatible and easily integrated into existing electrical distribution networks
- Uses a sustainable resource (water currents) to generate emission-free electricity
- Designed to be shipped in intermodal shipping containers
- RivGen® Power Systems components include the turbine generator unit (TGU) consisting of two turbines connected through a single driveline to an underwater generator in the center (34 ft x 4.9 ft x 4.9 ft); pontoon support structure which supports the TGU (42 ft x 38 ft x 5.5 ft); power electronics and control system; underwater power and data cabling; and debris protection system (if needed).
- Power electronics convert the output to meet grid- or customer-compatible requirements
- Power output of a single RivGen® device varies with water current speed, but in a 6.75 foot-per-second river current (approximately 4 knots or 2 meters per second), it will generate 25 kilowatts

Technical Advantages

The core component of the RivGen® Power System is ORPC's proprietary and well proven turbine generator unit. The RivGen® device has a low vertical profile allowing it to be more easily installed in shallower rivers and tidal estuaries than most competing systems. RivGen® Power System components are shop-fabricated (less expensive), easier to ship (in intermodal containers) to remote sites, simpler to assemble, easier to install (self-deploying) and retrieve, and more robust in the underwater environment than competing technologies. All power system components are located on shore or below the water surface so there is no impact on natural water landscapes, and the system is not affected by floating debris or boat traffic. These technical advantages make the RivGen® Power System extremely attractive for applications in river and coastal communities, particularly those in remote regions.

Advancing to Commercialization

In the fall of 2011, a prototype pontoon support structure was built and successfully tested in Nikiski, Alaska. In 2012, a full-scale prototype of the RivGen® TGU, with associated power electronics, was built and successfully operated at ORPC's marine center in Eastport-Lubec, Maine. In 2014, ORPC built and is testing and demonstrating the commercial viability of the RivGen® Power System in partnership with the Village of Igiugig, Alaska.

About ORPC

Established in 2004 and headquartered in Portland, Maine, ORPC is a privately-held developer of tidal, river and deep-water ocean current power generation systems and eco-conscious projects that has become an international industry leader. ORPC has developed three unique hydrokinetic power systems and is also developing commercial-scale tidal energy projects in the two most robust tidal energy resources in North America: the Bay of Fundy (in Maine and Nova Scotia) and Cook Inlet, Alaska.

ORPC built and commenced operation of the first phase of the Cobscook Bay Tidal Energy Project in 2012, the first grid-connected tidal energy system in the U.S. to be built under a Federal Energy Regulatory Commission license. This project is the first ocean energy project of any kind (other than a tidal barrage) to be connected to the grid anywhere in the Americas. The Cobscook Bay Project is part of the larger Maine Tidal Energy Project, for which ORPC signed a 20-year power purchase agreement, approved by the Maine Public Utilities Commission, allowing expansion of the project to up to 5 MW of production.