EnCurrent

Ruby
(Alaska)

Electricity from a 5 kW EnCurrent Power Generation System started to flow into the micro-grid in Ruby Alaska on August 6, 2008. This represents the first hydrokinetic implementation in Alaska, an area that has been highlighted as having large hydrokinetic potential due to the high energy costs and abundant river and tidal resources. The client for this installation was the Yukon River Inter-Tribal Watershed Council (YRITWC) with the intent of demonstrating hydrokinetic solutions for communities in the Yukon River Watershed. ABS Alaskan Inc., as a reseller of EnCurrent Power Generation Systems, sold the system and worked with personnel from YRITWC to install and commission the system in Ruby.

Ruby is a community of approximately 200 residents located on the Yukon River in central Alaska. The retail cost of electricity is currently $0.98/kWh and rising. Electricity generation for the community is currently provided by diesel generators with a full year's supply of diesel stored in a local tank farm.

Project Background

Jim Norman, owner of ABS Alaskan, has been researching hydrokinetic turbines periodically for a number of years and with the recent steep climbs in energy costs resumed the search in earnest last winter. After researching all of the hydrokinetic units being promoted, Jim commented that "The New Energy turbine was the only turbine that had been developed as a complete *water-to-wire* unit and brought to the point that functioning units could be purchased and installed. Other turbines were still in either design or prototype stages." YRITWC approached ABS Alaskan regarding the potential project at Ruby due to its location and high electricity cost.

Project Overview

ABS Alaskan and YRITWC undertook all aspects of the commissioning of the system including the fabrication of a pontoon boat to house the EnCurrent Power Generation System. The pontoon boat utilized aluminum pontoons held together with an aluminum frame and handrails. The turbine itself was supported by a cradle supplied by New Energy which transfers the torques generated by the turbine onto the pontoon boat and allows for the pivoting

of the turbine in and out of the water for installation and removal. A deflector boom was constructed of 8-by-8 timbers to be placed in from of the pontoon boat to deflect floating debris past the turbine.

Project Commissioning

Prior to placement of the pontoon boat two anchor points were installed: one on a rock face on the bank of the river and the second was a Danforth anchor on the river bottom directly in front of where the pontoon boat was to be situated. Chains ran from each of the anchor points to a buoy located in the center of the boom.

The grid-tie inverter was installed on-shore and interconnected to the local micro-grid. A TECK cable was connected from the inverter to an electrical disconnect at the anchor point on the rock face to support the connection from the generator on the pontoon boat. On the pontoon boat, the output from the generator was tied into a junction box to support connection to shore.

The installation of the pontoon boat was carried out by first installing the boom deflector. Then the pontoon boat was moved into position by tying if off to a second boat which then maneuvered it to a position downstream of the boom deflector. Once in position downstream, it was motored into position directly behind the boom deflector and attached to the buoy using two synthetic lifting cables.

The electrical cable, which ran underwater from the electrical disconnect on shore, was then attached into the junction box on the pontoon boat. With the pontoon boat in place and the electrical connections completed, the turbine was rotated into the water and allowed to spin. With that, the system was generating electricity and supplying it into the micro-grid in Ruby. Further fine-tuning of the Maximum Power Point Tracking values in the inverter were then undertaken to optimize the power output from the system.

The system at Ruby has validated the concept of installing hydrokinetic turbines and producing power to micro-grids in Alaska. The system is now being monitored for performance, grid integration, fisheries and navigation issues. These findings will then be used for further improvement and perfection in order to provide a sound village hydrokinetic system.