SEVERN
GLOCON TECHNOLOGIES

Telemetry and Control System

INDUSTRY
Renewables Energy

LOCATION
UK—Cornwall

PROJECT
Telemetry & Control for Oceanus 2 Wave Power Device

THE CHALLENGE

With the development of renewable energy source technology in the UK, the Seatricity Oceanus 2 wave energy device was developed to identify the potential for harnessing wave power generation, a resource which is estimated at around 80,000TWh per year.

The Seatricity Oceanus 2 device is a full-scale prototype technology demonstrator. As the buoy moves up and down with the waves, it operates a pump which is anchored to the sea-bed. In a final installation, an array of devices would pump sea water to a central location and be used to power a turbine and generate electricity. The prototype device simply discharges water back into the sea, but measures the pressure and flow rates, calculating the power generated in different sea states. An actuated valve regulates pressure in the system, and simulates the turbine load under different conditions.

The brief for SGT was to produce an integrated telemetry and control system for the Oceanus 2 wave device that enables the researchers to correlate wave movement with power generated by feeding the data back to shore via a UHF radio modem link, and thus gain a better understanding of the optimum power generating conditions offshore.

There were some significant challenges with the development of the system as it has to:

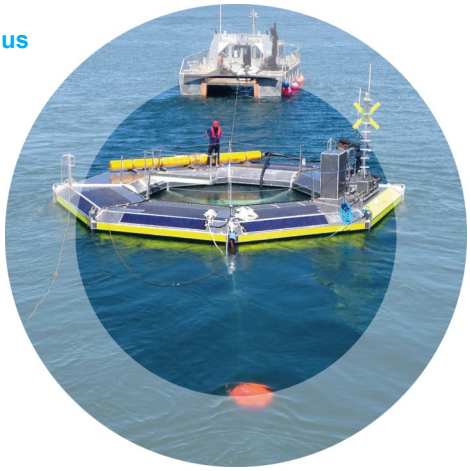
- Withstand exposure to Atlantic winter storms and high temperatures due to solar gain in the summer.
- Operate autonomously and continue to capture data in the event of loss of communications with the shore-based control.
- Function with a limited power budget, being supplied by solar panels and an optional wind turbine.
- Be developed to very aggressive timescales, in order to meet the weather dependent deployment schedule.

THE SOLUTION

Severn Glocon Technologies developed an integrated control and telemetry system with the following functions:

- Closed-loop PID control of the valve to regulate the pressure of the pumped water. Pressure and flow rate are monitored to calculate the power being generated and an algorithm, developed by SGT, constantly adjusts the pressure set-point to optimise power output as the sea-state changes.
- Estimation of sea-state using a marine GPS system to measure wave height in conjunction with digital filtering to remove long period drift due to GPS errors.
- Communication with a shore-based PLC over a UHF radio link. The link supports both real-time control and data monitoring and background downloading of data logs. A custom protocol was implemented to maximise data transfer over a slow (9600 baud) link.
- The shore-based PLC provides a web-based graphical interface to monitor and control the buoy and adjust operational parameters.
- The solar charging system and battery state is monitored and logged, along with electronics cabinet temperature and humidity.

Seatricity Oceanus 2 Wave Energy Device



THE OUTCOME

The Oceanus 2 telemetry and control system project demonstrates the advantages of taking an integrated approach to the mechanical systems, software development, communications, electrical power requirements and project management to meet a tight timescale.

The Oceanus 2 device was successfully deployed on the WaveHub, 10 miles off the north Cornish coast in the summer of 2014.

For more information on Severn Glocon Technologies call +44 (0)1209 312 000, email sales@severngt.com or visit www.severngt.com

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