Western Power Distribution

WPD is supporting the Isles of Scilly Council in their drive to conserve energy, be more self-sufficient and include renewables in their supply.

Feed-in energy can present headaches for network operators, such as unplanned surges of power in the grid, which can cause bottlenecks. How to incorporate renewables into the grid is a challenge facing all UK utilities as the country strives to reduce its carbon footprint.

Growing your own energy

The introduction of feed in tariffs in the UK has driven an increase of micro generation connected to the low voltage distribution network. This is already a common situation in Germany, and PPC was able to support WPD with their experience in this area.

In the literally isolated community of the Scilly Isles, WPD saw the opportunity to measure and monitor the efficiency of a medium to high voltage grid, to make a detailed study of energy flow, loading and network losses. WPD intend to use the islands as a test bed for Smart Grid and smart metering in the UK.

Project Summary	
Goals	Grid management in an 11 kV network
Solution	IP connection to all substations System management with SNMPv3 Data delivered via BPL network to WPD'S ENMAC system
Product	Rugged BPL modems and 12CC Couplers
Results	Broadband data transmission with up to 20 Mbps net data rate on 1 to 36kV 64 substations enabled for network monitoring and control in real-time Significant savings on maintenance costs in a hard-to-reach location Configuration and software updates can be managed remotely

Rugged Modem carries data to the coupler above

As the islands transition from their current energy set up (a single 33 kV undersea cable from the mainland supplemented by an island-based diesel generating station, for use in emergencies) to using renewables, an effective communications infrastructure (Smart Grid) will provide detailed, real-time data about how energy is being used, and whether it is being transmitted efficiently.

To achieve this PPC installed a communications platform based on Broadband Powerline (BPL) that uses the power grid itself to collect and transfer the data to WPD's SCADA system.

WPD will use the detailed data to assess the current state of the grid, and later understand how a local network is affected when renewable energy feeds into the grid. They will also be able to communicate with the meters and power generators on the islands, to make adjustments and updates from the mainland. Given the islands' location, this is a big advantage.

First installation BPL in an 11 kV network in the UK

The Isles of Scilly project was a first for WPD, and has delivered valuable insights to support other Low Carbon Network Fund projects as the UK moves towards meeting its renewable energy goals.

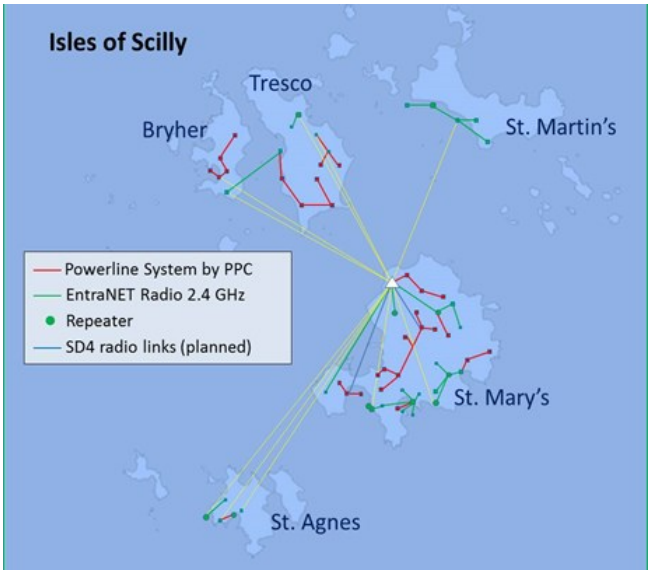
WPD especially wanted to monitor the profile of substations or individual feeders in areas where solar panels will be installed, to deliver valuable insights into:

- How to measure power data in suburban and rural areas
- What type of equipment is needed for real–time measurement
- How to install equipment safely without disrupting supply
- How often network characteristics need to be monitored
- What volumes of data are generated

The system relies on a hybrid installation of Broadband Powerline (BPL) communications – using the power grid itself to carry the energy data – supplemented with radio communications to connect the islands. Modems installed in substations transmit data around the medium to high voltage network, to and from WPD's SCADA system.

> *"We were very impressed with the ease and speed of installation of PPC's equipment both at ground level and on the overhead lines,"*
>
> Ben Godfrey, Innovation and Low Carbon Networks Engineer, WPD

WPD now have a reliable flow of data with which to monitor the 11 kV network, and the possibility to update the system software and configurations remotely. The grid comprises 64 overhead and underground substations on five islands. PPC typically install couplers in or near cable boxes within substations, however in this installation joints outside the substations, underground and overhead, were also installed.



The communications network on the Isles of Scilly

Where substations have space constraints this approach offers a viable alternative. Backhaul is achieved via radio transmissions provided by GE. The system was connected to the existing cable network with as little disruption as possible to the domestic network.

"The islands provide us with a self–contained microcosm of an 11 kV and low voltage electricity distribution system that can be monitored, controlled and measured to show us the impact of low carbon initiatives," said Ben Godfrey, Innovation and Low Carbon Networks Engineer for Western Power Distribution

WPD needed a system that would be easy to install, without requiring specialised equipment, and reliable enough to be managed remotely with little or no maintenance. "We were very impressed with the ease and speed of installation of PPC's equipment both at ground level and on the overhead lines," said Godfrey.

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