Coral Bay stands at the gateway to the Ningaloo Reef World Heritage Area, 1,100 km north of Perth in Western Australia. The picturesque tourist town is home to approximately 140 permanent residents, although this number increases significantly during the summer months with the influx of tourists.

Providing Coral Bay with city-quality power is the priority for Verve Energy, Western Australia's leading electricity producer. There is no electricity network nearby, so the town generates its own electricity with a combination of diesel generators and wind turbines.

Wind generation is provided by three 225-kilowatt (kW) two-blade, tilt-up Vergnet wind turbines, which can be lowered in the event of a cyclone. The turbines could in theory provide nearly all the town's required power. Due to the spatial dispersion of the turbines and turbulent wind conditions, the integration and control of the high penetration volatile wind generation is the key to enable a reliable power supply to the Coral Bay grid.

Electricity is also supplied by seven 320-kW low-load diesel generators, which can be operated as low as 10 percent of rated power, enabling a high penetration of wind energy.

Although small diesel generators demonstrate fast response to power changes they cannot compensate the rapid fluctuations from the wind turbines. A stable system operation would not be possible with this high penetration of wind, without additional equipment. Volatile wind generation can easily upset balance between generation and consumption leading to system instability, possible equipment damage and outages.

The solution was ABB's 500 kW PowerStore™ grid stabilizing technology. Inverter-based PowerStore with flywheel energy storage capability can change its rated power from positive to negative in milliseconds. It stabilizes the grid by very rapidly absorbing power surges from wind turbines, or by supplying power to make up for short term lulls. Its high speed, bi-directional inverter uses the voltage and frequency of the grid to determine the power support needed, significantly improving power quality.

ABB's renewable microgrid controller (RMC 600) monitors all power flows and statuses within the Coral Bay power system. Real-time setpoints and dispatch signals are calculated based on current system statuses, and distributed to components accordingly. Generator schedules are managed by the controller, as well as wind turbine curtailment and many other features PowerStore and the RMC 600 enable Coral Bay’s wind turbines to supply up to 95 percent of its energy requirements, equal to a total annual energy contribution of 45 percent - all of it utility-quality power.

Project Information

Title: Coral Bay PowerStore Project
Region: Northwest Coast, Western Australia
Customer: Verve Energy
Commissioned: 2007
Power System Type: wind/diesel/PowerStore™
Voltage: 400/230 V
Frequency: 50 Hz
Installed Generation Capacity: 2840 kW
3 x 225 kilowatt (kW) Vergnet wind turbines
7x 320 kW Detroit Series 60 diesel generators
Grid stabilization:
1 x 500 kW (18MWs) PowerStore™ flywheel system
RMC 600 for automated operation of the power station
Peak Demand: 600 kW
Minimum Demand: 200 kW