PXiSE Energy Solutions

Partnered with

LG CNS

Jeju Island JHEDO Project Case Study

PXiSE Energy Solutions

LG CNS

Overview

Jeju Island, located off South Korea's southern coast, is known for its beautiful natural environment with white sand beaches and volcanic lava tubes, and its designation by UNESCO as a World Natural Heritage Site. Jeju Province is striving to make the island carbon-free by 2030 and established an agreement with LG CNS (a subsidiary of LG Corporation) to help it tap into local renewable energy sources to meet this goal . Despite Jeju Island currently receiving much of the electricity it needs from the South Korean mainland via underwater high-voltage DC power cables, the province wants to maximize renewable energy generated on the island.

The Challenge

In order to meet their renewable goals and save on electricity costs, LG CNS, plans to store wind and solar-generated power in batteries during the day, when power demand and prices are low, and use the electricity at night, when power demand and prices are high.

For the Jeju Haengwon Eco-Town DER Optimization (JHEDO) Project, a partnership between Jeju University, LG CNS and Jeju Haengwon Eco-Town, clean power generated by 500 kilowatts (kW) of solar panels and a 600 kW wind turbine will be stored in 1.2 megawatts (MW) of lithium-ion battery energy storage systems (BESS) and used between the peak demand hours of 6:00 pm and 9:00 pm local time.

The project scope also included ramp control services for the wind turbine, using the batteries as a power source to cushion the ebbs and flows of the wind power generation every time the wind picks up or dies down throughout the day.

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The Solution

LG CNS enlisted the PXiSE Power Plant Control technology to automatically operate two BESS installations: one 440 kW/224 kWh system and one 770 kW/776 kWh system). These store power generated from the solar panels and wind turbine in the morning and throughout the day, then discharge the power from the batteries after 6:00 pm, optimizing the electricity release when power prices are highest.

PXiSE's power plant controller dictates that either the renewable power is fed directly to the grid or it instructs the batteries to absorb excess electricity, depending on numerous conditions throughout the day. When the local utility signals that excess electricity -- between zero and 1.1 MW -- is being generated above demand, the batteries automatically start charging. These incremental bursts of excess electricity allow the batteries to recharge throughout the day. PXiSE's software-based technology tracks the batteries' state of charge and anticipates how much electricity is needed to recharge.

While PXiSE's power plant controller is determining the destination of the generated power, it simultaneously uses the batteries to provide ramp control for the wind turbine. Ramp control is like a shock absorber that smooths out the sudden stops and starts of wind power output due to fickle weather conditions. Every 16 milliseconds, PXiSE's controller monitors and responds to changes in wind power production. When the wind stops blowing, the system instantly discharges the batteries to provide power to the grid, decreasing by 30 kW every minute before reaching zero. When the wind starts blowing again, the batteries absorb a portion of the power being generated, gradually recharging.

PXiSE's control solution is scalable, replicable, and can be deployed rapidly. The PXiSE solution is programmed to expand control over and coordinate a high volume of power generating resources and batteries while reducing intermittency and performing a variety of customizable control services. The software for the JHEDO Project was installed, integrated with the multiple renewable power generating systems, and tested in four days – and has worked autonomously since then.

At a Glance

Location	Jeju Haengwon Eco-Town, Jeju Island, South Korea
Capacity	500 kW solar panel system 600 kW wind turbine 1.2 MW/1.0 MWh LG BESS
PXiSE Services	Power Plant control, energy shifting, ramp control

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