



POWIN DELIVERS HIGH-UPTIME ENERGY STORAGE CLOSE TO THE LOAD IN THE INDUSTRIAL HEARTLAND OF SOUTHERN CALIFORNIA

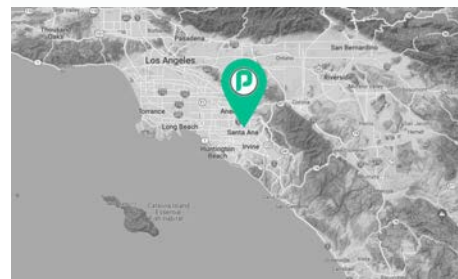
*20 MW / 80 MWh System
Installed in a working paper mill
parking lot;
Control Software Provides
Frequency Regulation.*

Powin was selected by Hecate Grid, an energy storage company formed by Hecate Energy and InfraRed Capital Partners Ltd., for the Johanna Energy Storage System (ESS) project. Powin supplied the full design and installation services for two identical, co-located, battery energy storage systems (BESS) totaling 20 MW / 80 MWh at Johanna 1 and Johanna 2 in Santa Ana, Calif., and will service the project under a 20-year long-term service agreement.

As more and more intermittent renewable power is added to the California grid, energy storage becomes increasingly important. The Johanna ESS project will be a stand-alone source of near-term energy storage that can relieve grid congestion. This allows utilities such as Southern California Edison, the Clean Power Alliance, and community-selected aggregators to save up to four hours of surplus electricity from renewables, cheap and carbon-free during peak hours after solar decline.

The Johanna ESS is a part of a critical project integrating renewable energy into the California Independent System Operator grid to validate distributed energy resource (DER) capacity assumptions, study grid requirements and develop technology expertise for broad scale DER implementation. The multi-year study will determine whether clean distributed energy can offset the increasing demand for electricity in central Orange County.

"ISO is at the forefront of the energy storage revolution," said Elliott Mainzer, president and CEO of California ISO. "Starting with a 4-hour lithium-ion battery and eventually expanding to longer periods and chemistry, energy storage plays an important role in maintaining reliability and providing essential grid services. We are excited to work with our industry partners to further evolve market rules and unleash the full value of energy storage technology."



JOHANNA

Technology	LFP battery energy storage
Capacity	20 MW / 80 MWh
Voltage	12 kV Interconnection Voltage
Location	Santa Ana, California, US
Status	Operational since January
Customer	Hecate Grid
Partner	Mitsubishi Power Americas
System Usage	Frequency Regulation Energy Arbitrage Resource Adequacy

Located close to the load, used to relieve grid congestion

Key Fact	Received UL1973 as well as UL9540 field certification
	Combined equipment for each interconnect, co-locating the systems within enclosures based on site size constraints

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Powin's approach

Powin's turnkey solution consists of their StackOS Platform, a fully integrated EMS, BMS, and TMS (Thermal Management System) which monitors and controls 380 Stack230E's that are tied to the grid through 20 inverters. The stacks are housed in nineteen (19) of Powin's 53' BESS Enclosures which are also fully integrated to their control platform for constant thermal monitoring and safety management. Powin's StackOS also integrated seamlessly with Trimarks SCADA management system and the CAISO Rig for dispatch purposes. Together, the closely integrated system made Powin's offering a fully functional, turn-key, solution at the utility point of connection.

The Johanna project will provide many automated services to the SCE Grid, including: Voltage and Frequency Deviation Ride Through, Dynamic Volt/Var Operations, and Fixed Power Factor Support. These ancillary services are critical given the urban industrial location of the BESS where high loads can easily affect grid stability. In addition to serving the SCE utility's needs, the system will be participating in the California ISO market where it will provide additional flexible resource capacity.

In addition to providing the grid integration services, there were several design considerations which Powin had to satisfy to comply with the Orange County Fire Authority's (OCFA) requirements. Given the high population density of the area, OCFA had heightened concern around the safety of the project. As a part of this project, Powin's system achieved UL1973 certification for the Stack230E product, as well as a field certification to UL9540. Additionally, extensive hazard analysis associated with NFPA 68 and NFPA 69 was conducted in accordance with NFPA855, the generally accepted standard for fire safety. On site, OCFA performed extensive inspections of every component of the fire system including heat and smoke detectors, fire suppression canisters, and pre-configured fire panels, all of which come integrated with Powin's enclosure-based solution.

Finally, Powin completed UL9540A testing at the cell, module, and unit level through independent 3rd party testing laboratories. Throughout this testing, Powin's selection of the Lithium Iron Phosphate (LFP) chemistry proved to be beneficial as it shows a heightened resistance to moving into thermal runaway, the primary danger that OCFA was concerned about. Powin was one of the first major market players to adopt the LFP chemistry for an earlier 8MWh project located in Irvine, California commissioned in 2016, but the industry has seen widespread adoption of it in 2021. The extensive safety and compliance testing that Powin undertook resulted in OCFA approving the project and removing requirements for a fire barrier wall which would have been needed for technologies with higher thermal risk. These types of challenges from local authorities are common in the energy storage industry at this stage and Powin's in-house team of experts often support the permitting process with our customers to ensure smooth transition and facilitate education of all parties involved.

One additional challenge presented by the urban location of the project is that it was significantly space constrained. To meet the energy density requirements of the project site, the SCE installed switch gear for both interconnects, PCS's, Transformers, Control systems, and BESS all needed to be co-located on a rather small project site. Powin was able to combine equipment for each interconnect, co-locating the systems within enclosures, to make the tight tolerances work. Additionally, a capacity maintenance plan was included as a part of their LTSA.

Powin's full integration at the HW level affords them diverse options for future augmentation, potentially even including their current generation Centipede product which can flexibly fit into site locations, inaccessible to larger containerized systems.



“ Powin is a great partner. Working on development, working on operations, working on construction. The mindset, the approach, the teamwork, the collaboration has been wonderful. The Johanna project helps to facilitate the energy transition to renewable, green electricity. And it is not just the storage systems that does that, it is the partnerships like Hecate Grid and Powin that make this all possible. ”

— Chris Bullinger, Hecate President & CEO

Additional Projects in the Region

Southern Power has awarded Mitsubishi Power Americas, Inc. and Powin an order for two utility-scale battery energy storage system (BESS) projects totaling 640 megawatt hours (MWh). These projects will enhance California's grid reliability with additional flexible resource capacity for integrating intermittent renewable energy into the grid.

The BESS projects are among the first collocated solar and storage projects in California and represent some of the largest retrofits of solar and storage in North America to date. They are designed for a 20-year life cycle and four hours of energy storage duration. Southern Power's two solar facilities in the area will add 88 MW/352 MWh of energy storage and 72 MW/288 MWh's respectively. Both projects are scheduled to come online by 2022.

