



POWIN DELIVERS HIGH-UPTIME ENERGY STORAGE AS PART OF REPLACEMENT FOR SOCALGAS FACILITY IN ALISO CANYON

2 MW / 9 MWh System Installed in Six Months; Control Software Provides Frequency Regulation

In 2016 Southern California Gas Company employees discovered a massive natural gas leak at the company's Aliso Canyon storage facility in the Santa Susana Mountains northeast of Los Angeles. The biggest gas leak in US history impaired the fuel supply for gas-powered generating plants, creating severe constraints on the electric grid and threatening Southern California with major power outages.

Replacing this energy supply was critical and Southern California Edison (SCE) issued an RFP to vendors for 100 MW of storage – with an unprecedented six-month timeline from issue to commercial operation. Powin was one of five storage vendors selected for the project.

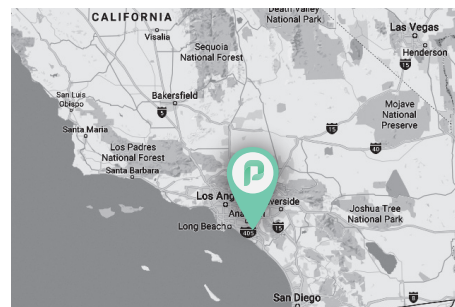
Powin Market Optimization Algorithms Facilitate Frequency Regulation and Real-time Energy Sales via California ISO

Powin energy storage systems are designed to absorb low-cost energy, typically from an oversupply of solar power in the middle

of the day, and feed it back into the grid as energy use spikes in the evening. Due to the design of the batteries and their control software, the lithium ion system can be used to provide an immediate burst of power on demand, or supply even power output over several hours, depending on the regional Independent System Operator's needs.

The Powin system participates in the California Independent System Operator (CAISO) market on a daily basis. In the first year of operation, it has provided eight thousand hours of frequency regulation services and exported 1.8 GWh of energy while maintaining a system uptime of 99.8 percent and total time online of 99.0 percent.

As a result of Powin's high system uptime and proprietary Market Optimization algorithms, merchant revenues have significantly exceeded the original project assumptions. The Powin algorithm determines the optimal combination of real-time energy, day-ahead energy and frequency regulation. This process, which uses numerical optimization and sophisticated machine learning and price forecasting software, can earn resource owners up to 50 percent more than companies without this market optimization ability.



MILLIKAN

Technology	Lithium ion battery energy storage
Capacity	2 MW / 9 MWh
Voltage	12 kV Interconnection Voltage
Location	Irvine, California, US
Status	Operational since January 2017
Ownership	100% esVolta LP
Customer	Southern California Edison
Partner	esVolta
System Usage	Frequency Regulation Energy Arbitrage Resource Adequacy Capacity
Key Fact	Powin developed the project, manufactured, installed, and commissioned the system in less than six months



“Participating in wholesale electricity markets creates compelling new revenue streams for project developers and underscores the important role storage plays on the electric grid. Our Market Optimization algorithm enables our partners to provide multiple grid services and maximize their investment in Powin storage systems.”

– GEOFFREY BROWN, POWIN ENERGY PRESIDENT

Additional Projects in the Region

Powin is also working with developer and project owner esVolta to develop a number of new projects in California, including five energy storage projects totaling 340 MWh in various locations around California. The projects, some of which are pending approval by the California Public Utilities Commission, are expected to go into service during 2020 and 2021.

“We at esVolta are delighted to work with Powin on these important energy storage projects in California,” said esVolta President Randolph Mann. “The Aliso Canyon project is a good example of how quickly Powin is able to deploy systems while also providing valuable services to the local grid.”

California-based esVolta has a portfolio of operational and/or contracted storage projects totaling more than 450 MWh.



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