

Advanced Batteries and California's Clean Energy Future

Demonstrations of Grid-Scale Sodium-Sulfur Energy Storage

May 2014

Fact Sheet

The Issue

Energy storage technologies are an increasingly important part of broad efforts to improve the flexibility, reliability, and sustainability of California's energy supply. While renewable energy from sources like wind and solar is clean, the variable nature of renewable energy demands special attention when connecting to the grid. Energy storage can address these system challenges and balance the development of newer, distributed energy technologies with grid improvements. Energy storage technologies have great potential, but to reach this potential they must be tested and demonstrated in a variety of real-world scenarios. These demonstrations, partially funded by the California Energy Commission, will provide the data and experience industry and investors require to move storage forward.

The Demonstrations

Tests at Two Scales: The sodium-sulfur battery energy storage system is one of the most advanced battery storage technologies on the market, with more than six hours of energy storage, a high efficiency of about 80 percent, and a life span of 15 years. Pacific Gas and Electric (PG&E) installed a 2-megawatt (MW), 14 megawatt-hour (MWh) system at its Vaca-Dixon substation and a 4 MW, 28 MWh system at the end of a distribution line connected to the Hitachi Global Storage Technologies (HGST) facility in San Jose.



2 MW / 14 MWh sodium-sulfur battery installation at PG&E's Vaca-Dixon substation.
Source: PG&E

Storage Works— Services Provided by the

Project: The installation at the HGST facility will enhance power reliability for customers on the distribution line by reducing fluctuations. Multiple hours of backup power provided by the system will reduce emissions from the diesel backup generator of the facility normally used during power outages. The system also has the capacity to disconnect from the grid – known as “islanding” – and fully power the HGST facility in the event of an outage. Along with these functions, additional battery capacity is allocated to provide grid reliability services such as peak load shaving to reduce the need for energy in times of high demand and voltage regulation that maintains electricity delivered at a constant voltage, helping to support grid stability. The

system will also be used to supply energy in times of high demand and store energy in times of oversupply.

Adding California Sunshine to the Grid: PG&E's Vaca-Dixon substation is close to, and on the same distribution feeder as, the Vaca-Dixon solar plant. The solar plant is capable of generating nearly 2 MW of peak power. Installation of a 2 MW energy storage battery will test energy storage use at the substation level to manage this intermittent resource and will provide grid services depending on customer demand.

Anticipated Benefits for California

Advancing these battery technologies could provide many benefits to California's electric ratepayers. These systems could:

- Stabilize the grid and improve service reliability.
- Reduce economic losses and public safety concerns associated with power outages.
- Offset the need to purchase and construct new power plants.
- Reduce the use of expensive "peaker" power plants during short periods of high demand.
- Aid the integration of large amounts of variable renewable energy.

This project provides critical real-world data on the technical and financial performance of battery energy storage and helps determine how market products can be designed to make energy storage economical. This project is driven by the mutual vision of the Energy Commission and PG&E to better understand how emerging energy storage technologies can help meet California's future energy needs, and to share this knowledge with the public.

Project Specifics

Contract Number: 500-09-027

Contractor: Pacific Gas and Electric

City/County: San Jose, San Jose County; and Vacaville, Solano County

Application: Regional

Amount: \$2,800,000

Co-funding: \$8,000,000 from Pacific Gas and Electric

Term: June 2010 to June 2014

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