



1 MWH GRID-CONNECTED SOLAR + STORAGE + DIESEL MICROGRID AT PSE&G SITE



PSE&G Wastewater Treatment Plant Solar + Storage Microgrid

PROJECT HIGHLIGHTS

PSE&G installs Eos Aurora® 250 | 1000 to anchor solar + storage + diesel gen microgrid at wastewater treatment plant in N.J.

On October 29, 2012, Superstorm Sandy struck the New Jersey coast and left over two million households without power. In 2013, the New Jersey Board of Public Utilities approved an extension to an existing program called Solar 4 All that allowed Public Service Electric and Gas Company (PSE&G) to invest in additional solar capacity and solar pilot programs for storm hardening and grid resiliency.

The solar pilot program targeted the development of projects that integrate solar with other technologies to reduce the impact solar has on the grid or increase reliability and grid resiliency for critical facilities during prolonged power outages. Under this program, PSE&G targeted a critical wastewater treatment plant in the Borough of Caldwell, N.J. as a potential site for a solar + storage project to keep the facility running during extended power outages resulting from severe weather.

A safe, 4-hour discharge battery for the utility market

The Caldwell solar storage project is the first grid-connected deployment of an Eos Aurora DC battery system manufactured by Eos Energy Storage, based in Edison, N.J. The energy storage system integrates Eos' Znyth technology and takes advantage of an inherently safe and stable

chemistry that is optimized specifically for multi-hour discharge applications, making it ideal for the utility industry.

The Eos Aurora battery system features 4 hours of continuous discharge capability, immediate response time, and modular construction. The system is designed to cycle daily to 100% depth of discharge, or 100% of the useable energy, with minimal maintenance requirements.

The Znyth battery offers important benefits, including a simple, low-cost bill of materials, 100% non-toxic end of life recycling after 10 to 15 years, and a thermally stable operating range from -4° to 122° F that eliminates the need for the fire suppression measures and HVAC equipment associated with more volatile lithium-ion systems. In contrast to other technologies, the Eos Aurora allows for a simple balance of plant with no pumps, electrolyte tanks, pipes, and minimal battery management.

Solar storage microgrid provides reliability and resiliency

Advanced Solar Power of Flemington, N.J., was the engineering, procurement and construction contractor for the Caldwell solar storage system, which combines a 2,682 panel, 896 kilowatt-DC solar system with a 1 megawatt-hour Eos Aurora battery system. During normal operation, the

- First-ever grid installation of 250 kW | 1 MWh Eos Aurora DC battery system, integrating 576 zinc hybrid cathode (Znyth®) batteries

- 896 kW-DC solar system using 2,682 panels

- Solar + storage + diesel backup = 10 days off-grid operation

- Supports 165 homes with solar generation, avoiding one million pounds of CO₂ annually

- The Eos Aurora system enhances power reliability in microgrid mode and generates revenues by providing frequency regulation services when connected to the grid

solar system provides electricity directly to the grid and can power about 165 homes annually.

In the event of an extended power outage, the combined solar and battery system works in conjunction with the treatment plant's existing diesel back-up generators to create a microgrid. A microgrid is a local energy grid with control capability, which means it can disconnect from the primary grid and operate autonomously using on-site, distributed generation in times of crisis like storms or power outages. A microgrid can be powered by diesel generators, batteries, and/or renewable resources like solar panels, switching between available generation sources as conditions warrant.

During an outage, the solar panels recharge the batteries and help power the wastewater treatment plant during the day so that the batteries can keep the facility running at night. The solar and battery system reduces the load and fuel consumption of the diesel generator allowing the Caldwell plant to operate for as long as 10 days without grid power, which will help keep wastewater from the facility out of local waterways in the event of prolonged outages.



[Customer testimonial quote from PSEG]

"PSEG has taken a number of major steps during the past several years to both harden our electric grid in the face of major storms and also make it more resilient," said Courtney McCormick, vice president renewables and energy solutions, PSEG. "The Caldwell wastewater treatment plant and our other solar storage projects around the state are an important part of that work because they all demonstrate how well-suited solar storage is for ensuring the reliability and resiliency of critical pieces of infrastructure."

Value-added benefits and safety checks complete the package

The Caldwell solar storage project provides PSEG with value-added grid services including peak shaving and eligibility for fast response frequency regulation in the PJM wholesale market, enabling the utility to act as a direct participant in a customer resiliency project.

The project employs sophisticated control systems and algorithms that can configure different electrical orientations with the grid and the real-time market. When connected directly to PSEG's 13kV distribution line, the battery system can participate in the PJM wholesale market for frequency regulation. If there's an outage on the grid, the system activates an automatic transfer switch (ATS) which disconnects the solar storage system from the grid and isolates the circuit to prevent feedback on the grid, mitigating safety hazards for utility linemen.

Positive impact on the community and the industry

The project is having a positive impact on the community it serves and New Jersey generally in several ways:

- Provides valuable back-up power to a critical piece of municipal infrastructure that will allow the wastewater treatment plant to run for an extended period of time during a power outage;
- Solar panels provide enough electricity daily to power about 165 homes a year, which avoids putting more than one million pounds of CO₂ into the air, equivalent to removing more than 200,000 cars from the road for one year;
- Construction provided jobs for the local construction industry and also continued PSEG's support of New Jersey's solar development sector;
- Serves as a demonstration that solar can be successfully combined with battery storage to increase grid resiliency and harden a piece of critical infrastructure from extended power outages, which will hopefully spur the construction of similar projects in New Jersey and beyond.



FOR MORE INFORMATION

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