Industry Segment: Utility

POWER PROFILE

Customer: Heber Light & Power

Location:
Heber City, Utah

Customer Business Issue:
Peak shaving, grid firming

Solution:
Fast response gas gensets: G3516, G3520

Gas gensets: G3516C (2), G3516H, G3520C (3), G3520H

Battery Energy Storage System (BESS): Energy Time Shift (ETS) and Energy Capacity Expansion (ECE) modules, 4160V Switchgear

Cat® Dealer:
Wheeler Power Systems

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POWER NEED

Located 45 minutes from downtown Salt Lake City at an elevation of 5,600 feet, Heber Light & Power (HL&P) is a community-owned municipal utility providing service to about 15,000 customers in Utah's Heber Valley. Formed in 1901 by the communities of Heber City, Midway City, and Charleston Town, the utility operates a transmission and distribution system that spans 100 square miles in Wasatch County.

HL&P's power portfolio includes a diverse mix of wind, solar, geothermal, hydro, natural gas, and coal. The company owns 18 MW of generating capacity, including three hydro plants and three natural gas-fueled power plants that can produce up to 15 MW of electricity.

As a forward-looking utility, HL&P has owned distributed generation assets since 1984. In 2002, HL&P became one of the first public utilities in the world to install Caterpillar's line of advanced gas-fueled engine generator sets. The utility continues to partner with Caterpillar as it tests new power generation equipment before it moves into widespread use.

Today, Heber Light & Power keeps the electricity flowing through a peak load shaving initiative that includes nine Cat® gas generator sets. Peak shaving is a cost-saving technique used to reduce electricity expenses by minimizing peak electricity demand on the grid, thereby lowering high demand charges. In-house generation minimizes exposure to market price spikes when the cost of utility power rises.

The advanced units, designed to carry the top 25 percent of the daily load demand, provide great flexibility in delivering reliable, low-cost power. This assures HL&P of a reliable peak-time power supply at a predictable price.

The Cat gensets run for short periods during the hottest and coldest days of the year—which are normally the times of peak grid demand. HL&P's winter demand currently peaks at 47 MW, and summer demand peaks at 52 MW, while average daily demand ranges from 18 to 20 MW.

Annual operating time for the gensets ranges from 1,500 to 5,000 hours per year, depending on the market price. With pre-purchased gas contracts and known gas cost, as well as planned maintenance costs, Heber knows their strike price and will bring on generation when the market price exceeds its generator strike price. This enables HL&P to find savings when the market price is higher than the cost of running its own generation assets.

"Most of our scheduling is usually in the eight- to 12-hour per day range to run the units," says HL&P general manager Jason Norlen. "These Cat units just come up as they're needed to support additional load. So when there's a load jump of two megawatts on our system, we generally have a unit scheduled to fill that void."

The Cat gensets are increasingly called upon to backfill when renewable energy wanes, such as when the sun isn't shining or the wind isn't blowing.

"Ten years ago, we didn't have this higher level of renewable energy in our portfolio," Norlen observes. "So we're doing more than just shaving peak loads. We're reacting to whether or not we're utilizing energy from these renewables."

As the cost of power rises, HL&P seeks innovative ways to stabilize the cost of energy for its customers.

"Power markets are definitely more volatile here in the West, and the cost of capital is a lot higher now," Norlen says. "And COVID didn't do us any favors. Our loads increased dramatically during COVID because people stayed at home to work, and we're a bedroom community. But just having the ability to control our own destiny by peak shaving and filling in behind the renewables is definitely something that gives us the ability to keep rates lower than they otherwise would be."

SOLUTION

About 15 months ago, HL&P began field testing a Cat G3516 fast-response natural gas generator set, which has since become an integral part of the utility's power generation fleet. HL&P is working with a local joint action agency to potentially implement a plan for using the G3516 as well as several other Cat gensets in a fast-start pool that can come online quickly and supply power to the grid when it's needed.

"They can go from sitting idle to full load in five minutes, and that's something that's needed with all the renewables that are coming online," Norlen says. "If you want to be a player in the capacity markets—the spinning and non-spinning reserve markets—there's value in having that fast-start capability."

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Customer: Heber Light & Power

In October 2023, Heber Light & Power and Cat dealer Wheeler Power Systems held a ribbon cutting ceremony for a battery storage facility that will be used to support the operation of HL&P's Lake Creek Hydro power plant and the corresponding distribution circuit.

The Cat Energy Time Shift (ETS) module is a scalable, rapidly deployable energy storage system using lithium ion batteries and the Cat BDP1000 inverter. The Battery Energy Storage System (BESS) consists of an ETS module that houses the inverter and a Cat Energy Capacity Expansion (ECE) module that adds energy capacity expansion with additional battery strings. Altogether, the battery storage system can be scaled up to 9,000 kWh.

The lithium ion battery is one of the first installations of its kind to be used by a public power utility in the state of Utah. At the end of testing, Heber Light & Power has the option to purchase the battery units.

"This project has been at least five years in the making," Norlen said. "We had a battery study done on that distribution circuit by an engineering firm, and the study was huge to get buy-in from my team and the HL&P board of directors. It's never easy being the tip of the spear, and it's taken some patience because this battery technology is new. But my sales rep, Shane Minor, and the team at Wheeler Power Systems have provided excellent support throughout this process."

RESULTS

HL&P has operated the battery storage system since mid-November 2023, typically recharging it from its hydro energy resources and then discharging the battery during times of peak demand. When Lake Creek Hydro goes offline, the energy stored in the battery helps regulate voltage.

"This enables us to shift the peak on this circuit and bolster the circuit's strength," Norlen said. "We just pick the right times during low-load demand to charge back up, and then we release the energy to the distribution circuit again during the next day's peak demand period."

The ETS energy storage system integrates with the utility, generator sets, and renewable sources to store energy for use at a later time. The system may also provide temporary backup power in the event of a power outage.

Factory pre-packaged and tested, the pre-engineered containers are shipped as a single unit with batteries, inverter, isolation transformer, and other equipment installed.

The ETS module is designed to work with an array of renewable systems, including solar and wind. Integration with the Cat Microgrid Master Controller (MMC) enables time-shifting of renewable energy, and full asset control allows smoothing of intermittent renewables.

The grid forming Cat Bi-Directional Power (BDP) inverter enables generator sets to be switched off, further reducing fuel consumption and operating costs.

When used with a generator set, the energy storage system provides reserve power capacity to:

- Decrease the transient voltage and frequency dips resulting from the application of large loads.
- Enable highly-efficient, lean-burn gas gensets to operate in island mode.
- Shut down one or more gensets for fuel savings.

"We have power purchase agreements with large solar producers in the west desert, and energy storage is just a nice fit with those renewable projects," Norlen says. "By having the battery, it extends our capacity by a few more hours when the solar day ends. Natural gas generators can work in similar fashion, providing power that can be stored by the battery units.

"Energy storage technology is brand new to us," he adds. "But seeing what these batteries can do compared to a bank of voltage regulators, or a capacitor bank—they can do a lot more than some of the technology we've been using forever."

During his 27 years at Heber Light & Power, Norlen has established a solid partnership with Wheeler Power Systems that's built on trust.

"We've always worked with Wheeler; it's not even like a customer-vendor relationship—we work together to solve problems," he says. "They're very familiar with the challenges we face. It's way more than just buying generators. It's literally like 'let's sit down and resolve this problem.' They have so many resources to help a utility like HL&P to solve those problems.

"And their service department is just huge for us; they're definitely our warehouse for parts inventory," Norlen adds. "And if I need one of my technicians just for power plant operations, a Wheeler technician will provide the scheduled maintenance or do anything else we need that requires attention. We work with Wheeler side-by-side—it's a great relationship."

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