

POWER PROFILE

Customer: Utah Municipal Power Association/Nephi City Electric Division

Location:

Nephi, Utah

Customer Business Issue:

Peak shaving, spinning reserve

Solution:

Cat® G3520H gas generator sets (2),
Cat Switchgear (12,470V – 1,200A)

Cat® Dealer:

Wheeler Power Systems



The Utah Municipal Power Association recognized that peak shaving would save money for their residents, and that without additional power they would risk blackouts. They worked with Cat® dealer Wheeler Power Systems to build a 4,732 sq. ft. power plant.

POWER NEED

Like a household circuit that trips when too many appliances are in use at the same time, Nephi City was in danger of experiencing a citywide outage if it exceeded the maximum energy load it imports from the grid.

Located in central Utah, Nephi (pop. 7,338) is a member of the Utah Municipal Power Association (UMPA). Nephi is one of six cities that comprise UMPA, a joint action agency and a Utah interlocal cooperative established in 1980. The other five cities are Levan, Manti, Provo, Spanish Fork, and Salem.

UMPA provides all power supply to its member cities by means of contracts or ownership of generating facilities and transmission management services. As an UMPA member, Nephi City imports power from a large, investor-owned utility for local distribution.

Since 1903, Nephi City has owned and operated its own electric utility. Over the years, Nephi has enjoyed the benefits of its two hydroelectric power plants in the canyon. By owning its own power utility, Nephi can better plan and develop the electrical system to meet the city's growth.

But as Nephi continues to grow, the amount of power it receives from those sources may not be enough during periods of peak demand, according to Tom Sorrells, a supervisor with UMPA, which identified the potential shortfall several years ago.

While negotiations continue to enhance the city's electrical infrastructure in order to increase the amount of power it receives from the grid, the potential for a citywide outage looms.

"Nephi has a couple of major industrial manufacturing facilities. There's a hospital, City Hall, schools, not to mention the residential population," Sorrells says. "We saw this problem coming years in advance with the growth of the city and surrounding area."

With an agreement to import more power not likely to happen until sometime in 2025, UMPA officials realized they needed to take action immediately, so they contacted Cat® dealer Wheeler Machinery to provide a proven distributed energy solution.

SOLUTION

Two years ago, UMPA entered into a contract with Wheeler Power Systems to build a 4,732 sq.-ft. facility and install two gas-fired Cat G3520H generator sets. Combined, the generators can produce up to 5 MW of power.

In Spring 2023, land clearing for the site began, while all the necessary equipment was procured in the following months. The project was completed on time and within the budget, according to Rust Finlinson, operations manager for Nephi's Electric Division.

The new power plant is located next to Nephi's existing substation and gas pipeline. The city worked with Wheeler Power Systems to connect it to the electrical grid.

"Having our own power plant is great for our community and the growing demands for power," Finlinson said in a Facebook post. "This new power plant will assist Nephi during those peak load periods keeping the power on during the hot summer. We are working to extend new power lines into the area to help meet the growth. This is a major undertaking with a new substation located at the north end of town. All of these investments in our electrical systems represent our commitment to being the most reliable utility, while still providing affordable power."

The new Cat power plant will help Nephi City provide lower, affordable rates to residents, said mayor Justin Seely, who serves as vice chair on the UMPA board.

"This project provides greater reliability at our fingertips for our growing community," Seely said at an open house event dedicating the new plant.

The new plant was commissioned in May ahead of the summer peak power season.

Nephi plans to add two more good-sized industrial customers, which is likely to increase the need for power next summer, Sorrells says. And the city's population is forecasted to grow 6.3 percent by 2030.

"Our interconnect arrangement with the big utility likely won't be complete until mid-summer 2025, so we'll have another summer of watching the load and running the power plant to help protect Nephi against a citywide outage," he says.

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“When the transmission constraints are lifted and that’s no longer an issue, then this plant will roll into our normal portfolio of peak shaving, providing transmission savings, as well as regulating voltage and serving as a non-spinning reserve—all the things that a distributed energy power plant usually takes care of,” Sorrells adds.

RESULTS

Peak shaving, also called load shedding, is a cost-saving technique used to reduce electricity expenses by minimizing peak electricity demand, thereby reducing utility charges. The maximum peak load consumed determines these capacity charges, which make up a substantial portion of a utility bill. The peak in Nephi typically occurs between 4 p.m. and 8 p.m.

“They haven’t reached the point of exceeding the amount of the power they can import,” Sorrells says. “But we’ve gotten close enough that we’ve run the generators more than a few times over the summer. This was dictated by the amount of power that Nephi is using, more so than the market price. We had a few really hot weeks this summer where we decided it was best to run the generators.

“Most of the time that we’ve run the plant, it’s been in the money for us to run for favorable pricing as well.”

Nephi’s new power plant is unmanned. Engine data is relayed to UMPA, where it is operated remotely from UMPA headquarters 35 miles away in Spanish Fork. Operators are able to view the same information that appears on the Cat Switchgear HMI screen at the Nephi power plant.

“We watch it remotely,” Sorrells says. “We have cameras and a whole lot of intelligence and automation in the building, so we can make informed decisions regarding operation of the plant. We look at the metering and have some parameters that we watch. When the city’s load reaches a certain point, then we’ll start the plant.”

Another feature of the Cat Switchgear provides the ability to schedule regular run times for the gensets, either for routine testing, or based on prevailing market conditions.

“They can set a weekly schedule as to when the units should come up, how long they should run, and when they should shut down,” says Shane Minor, a utility and government sales rep with Wheeler Power Systems. “It’s a really nice feature of the switchgear based on some custom programming implemented by Caterpillar.”

Another option that comes with the Cat Switchgear is providing additional capacity for non-spinning reserve. This is generation capacity that is held in reserve but ready to respond quickly if there is an imbalance on the energy grid and the system operator requires additional power. This helps maintain an uninterrupted supply of electricity to customers.

“So we can have a portion or the entirety of the plant dedicated to the reserves market, and any additional capacity that we have can then be used for allocating resources to Nephi’s energy needs,” Minor says.

The Nephi City power plant uses the most effective technology available to reduce air emissions. Wheeler installed Selective Catalyst Reduction (SCR) emission controls on the Cat generators, which significantly reduces nitrous oxide (NOx) emissions by 93 percent and contributes to better air quality.¹

UMPA dedicates one of its staff to maintain the generators at Nephi, and the plant as a whole.

“There are a few fairly minor items that we take care of here at the plant, but for all of the heavy lifting we contact Wheeler,” Sorrells says. “There’s a gentleman I deal with, and he knows exactly what we have down here, and also at our power plant in Provo. He’s well versed in knowing maintenance intervals, what we need and who we need to bring in at the right time.

“It’s just a well-oiled operation at this point. We work through things without delay, and it’s very much appreciated.”

¹ SCR aftertreatment solution is provided by Safety Power Inc. Testing was done by Safety Power, applying a selective catalytic reduction system to Cat generators, revealing a 93 to 96% reduction in nitrous oxide (NOx) emissions.



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