

CASE STUDY

Electric Utility

CHALLENGE:

Create a distribution-level solution to provide utility-scale power for demand response, as well as provide emergency backup power for a portion of a local city.

SOLUTION:

Generac 10 MW MPS solution consisting of 16 paralleled MG750 gaseous generators, uniquely installed as four groups of four generators to help provide more flexibility.

RESULT:

An innovative solution utilizing Generac natural gas generators to increase energy management, maximize redundancy and provide state-of-the-art monitoring systems.



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Total Solution Partnership Supports the Grid & Powers Midwest City

Power outages happen for several reasons. Mother Nature can be blamed for many power failures. According to the Edison Electric Institute, 70-percent of power outages in the U.S. are weather related, but other causes include vehicle crashes, equipment failure, animals and an overworked power grid. Peak energy demand is when electrical power is expected to be provided for a sustained period at a significantly higher than average supply level. When maximum supply levels are surpassed, power outages can happen. Grid power supply is also becoming more irregular with the retirement of historical coal and nuclear assets, as well as incremental adds of less dependable wind and solar sources.

“Regionally, the potential for brownouts or outages are driving creative solutions to close the gap between the dramatic increase in demand and not enough supply,” said Corey Honl, P.E., Senior Director of Global Industrial Solutions, Generac Power Systems. “Long and expensive permitting processes around environmental constraints and land purchases/rezoning makes power grid upgrades costly, but those costs can be lessened by grid support solutions becoming more distributed and less centralized. Utilities and consultants have been talking about the potential benefits of a more distributed grid for decades.”

An energy project developer and midwestern U.S. city needed a solution that would add support to the grid, as well as provide

some measure of power resiliency. When the grid is stressed or in need of emergency support, this supplementary site would provide the additional power needed by the local grid.

“This is the first demand response (DR) and resiliency project for the main stakeholders,” said Honl. “The city was in need for a resilient solution for customers, including businesses needing power to retain its manufacturing jobs as well as in-process production in the risk of an outage.”

The initial plan from the city was to install 10 MWs of natural gas generators. That would be enough capacity to backup the city’s typical load, minus its three transmission customers. The city also wanted the generators to be used to peak shave, thereby reducing the city’s transmission and capacity expenses. Those savings then would be used to offset the cost of construction, operation and maintenance of the project. The project’s main goal was to provide a 100% reliable source of power for residents, retail/commercial businesses, and small industries.

One of the main considerations while designing the solution was the inclusion of gaseous generators.

“Rich-burn generators have quick start advantages, which is important for grid response and resiliency,” said Honl. “Included three-way catalyst fulfills the environmental norms, provides an EPA factory-certified solution, and can be used for multiple starts and stops, which is important for DR applications.”



APPLICATION:

Electric Utility

SYSTEM CONFIGURATION:

10 MW MPS

MODELS:

16 x MG750 Natural Gas



With that in mind, the city need a partner that could deliver the best possible solution. Generac Industrial Power was in turn selected to help design the system.

“Generac saw this project as a perfect fit for our flagship gas generator, the MG750,” said Honl. “Reduced scale utility generator plants are being built at a level for distributed power. Distributed plants can be more efficient, as the centralized approach has more line losses between power plant and consumer, and typically drops off in efficiency at lower power outputs. This type of smaller scale generator plant is built at the distribution level, while being less expensive due to smaller equipment, less costly construction and permitting.”

Early in the planning stage, Generac said they could offer a flexible energy management solution. Generac Industrial Power solutions can help with demand response, peak shaving, grid support and behind and in front of the meter power generation applications. Besides providing resiliency to the local community, the solution for the city would also provide grid support. Leveraging Generac gaseous units, utilities can also balance renewable generation assets on their systems. Generac units can be dispatched and online in a matter of seconds for rapid grid support, and have extended runtimes that make it a more robust and cost-effective solution set.

“The flexible approach of the Modular Paralleling System (MPS) being deployed also allows for room to grow if additional megawatts would need to be added in the future,” said Honl. “The main considerations for the project were the size of the footprint, power output and generator fuel consumption, as well as the ability to grid synchronize or do standby.”

With these considerations in mind, the experts at Generac specified a total power solution consisting of 16 Generac MG750 gaseous units for the utility company. When paralleled together, the entire system can support 10 MW, but the system is designed in four groups of four generators to help provide more flexibility as they can be deployed in groups instead of all at once.

“The site layout utilizes Generac’s MPS software to group these units in packs of four units,” said Honl. “The units are paralleled to the utility grid in order to provide support to the utility when there is concern that supply does not meet demand. This is a unique solution compared to our typical solution where the grid is not available due to regional outages.”

The city specified natural gas for several reasons; however, the main consideration was resiliency. Natural gas availability was not a risk considering natural gas utility presence near the site.

“Reliability should not be a concern for this project as the natural gas utility is historically very dependable with very few outages,” said Rick Lincoln, Senior Director, Global Product Management, Generac Power Systems. “Several recent studies conclude that reliability of the utility natural gas supply will continue to increase due to unconventional gas supply, pipeline expansion and improvements in operations, and the data clearly shows it is more reliable than the electric grid itself. Many people do not realize that the natural gas pipeline network itself is backed up by natural gas generators, so it has self-sufficiency and reliability designed in from the beginning.”

Another unique aspect to this solution is the use of Generac’s Power Zone Pro sync controllers.

“The controllers are located on each of the generators and do all the functionality of our typical generator controller,” said Joel DeWall, Senior Director of Engineering, Generac Power Systems. “They control voltage, speed, air fuel ratio, synchronizing, paralleling and load control – a full authority system to optimize the complete genset performance. There are multiple sensors for monitoring pressures, temperatures, etc. and the Power Zone Pro Sync also provides all the protections and user interface for the engine and generator.”

The site design also adds one extra feature to the standard controller for the site operator. They installed a remote monitoring device that will communicate to each one of the Power Zone Pro Sync controllers to gather all the available parameters. Through

the local cellular network it will send the information to the cloud. The site operator can access the information in real time, as well as command the units to start, synchronize, parallel to utility, and base load to the grid's specific power requirements. The remote monitoring system will also send alerts and notifications for any warnings or alarms the Power Zone Pro Sync or other site controls detect.

"The location is unmanned and remote monitoring gives the customer access to this site for monitoring and control," he said. "Since this site is not only used for energy management, but it is also used for emergency backup to the city, 24/7 monitoring of their equipment ensures that the site is ready at any given moment to serve."

Without connectivity, the utility would need to have someone visit the site daily or weekly to ensure the condition of the site, as well as have someone onsite during operation to ensure the site is operating properly.

"Real time information and being able to monitor and control the site without having a single person onsite can provide the city and the utility the peace of mind that in the time of need, this system will work," said DeWall.

Design and installation are only parts of the process. Another important part of owning a generator system is the maintenance. With the primary cause of generator failure being lack of maintenance, it is important to get on a scheduled maintenance program directly following installation. With Generac's vast network of dealers with trained technicians, it was easy for the utility to partner with the local dealer to not only help with the startup of the units, but to help service the generators for the next 20 years. Basic maintenance includes checking the lubrication system, cooling system and fuel system. More advanced preventative maintenance includes taking oil and coolant samples to get them tested to see if there is any metal or debris in the sample. A good maintenance program requires much more than simply changing the oil and filters.

The residents of the city are the true beneficiaries of this innovative solution. Thousands of people can have the peace of mind knowing that the power will stay on no matter the situation.

