

ELECTRIC UTILITY

CASE STUDY

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

Life can change when the power goes out. The heat or air conditioning often stops. Electrical appliances stop. Lighting stops. In 2018, Generac recorded 633,692,764 total power outage hours across the United States. Power outages have become more prevalent and more problematic in recent years, especially in an increasingly connected world.

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.”

A U.S. city in the Midwest sees an increasing risk of more frequent blackouts and brownouts. During peak energy demand, the grid powering the city cannot supply enough electricity and in turn, rolling brownouts could happen. The utility providing power to the city is challenged to find a cost effective solution to maintain consistent power reserve with the stressed and aging power grid.

Seeing the need for a solution, the utility provider turned to Sterling & Wilson Power Solutions (SWPS). SWPS engineers, builds and installs customized, end-to-end gas-based combined heat and power (CHP), demand response (DR) and microgrid solutions in North America. SWPS proposed a plan to add support to the grid, as well as providing some measure of power resiliency to the local city. When the grid is stressed or in need of emergency support, this



supplementary site will provide the additional power needed by the local grid.

“This is the first DR and resiliency project for the main stakeholders,” said Ashish Mall, Director of Operations, SWPS. “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.” Mall said when considering options for a solution, one of his must-haves for the project included specifying gaseous generators. “Rich burn gen-sets have quick start advantages, which is important for grid response and resiliency,” he said. “Included three-way catalyst fulfills the environment norms, provides an EPA factory-certified solution, and can be used for multiple starts and stops, which is important for DR applications. This gen-set solution also provides a lower capex than other competitive solutions on the market.”

When developing a plan for the utility, SWPS contacted Generac for help in designing 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 other applications both in front of and behind the meter. Besides providing

resiliency to the local community, the solution SWPS was after would also provide grid support. Generac natural gas units offer the flexibility to participate in ancillary programs to assist frequency regulation, black-start and under frequency situations. 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 than battery storage.

SWPS was also after a solution that would defer or eliminate the need for costly upgrades. By selectively targeting problem areas within the electric distribution system, Generac generation assets can relieve the overburdened infrastructure for years, and in some cases indefinitely. Generac units can be brought online during times of localized oversubscription to correct the situation. “The flexible approach of the Modular Paralleling System being deployed also allows for room to grow if additional megawatts would need to be added in the future”, Honl said.

“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,” said Honl. With these considerations in mind, the experts at Generac specified a total power solution consisting of 16 Generac MG750 gaseous units to SWPS 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 Modular Power System (MPS) software to group

APPLICATION:
Electric Utility

SYSTEM CONFIGURATION:
10 MW MPS

MODELS:
16 x MG750 Natural Gas

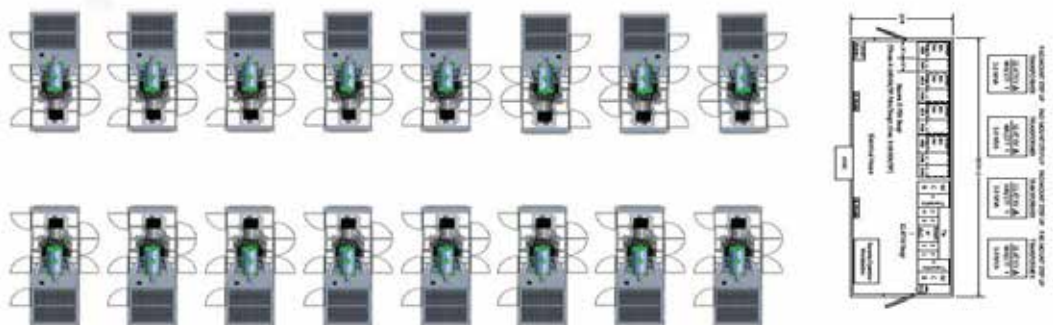


Figure 1. System Configuration

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.”

SWPS specified natural gas for several reasons; however, the main consideration was resiliency. “Solar cannot meet the continuous resiliency requirement and diesel gen-set approval for non-emergency application was improbable and honestly just expensive,” said Mall. “Natural gas availability was not a risk considering Columbia Gas and TransCanada 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.” Lincoln added that, “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 gen-set 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.”

SWPS added one extra feature to the standard controller for the utility. “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,” DeWall said. He continued to say the customer would be able to access the information in real time, as well as command the units to start, synchronize, parallel to utility, and base load to the customer’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 control detect.

DeWall said there were several reasons the utility wanted this option. “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 on site 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.

This was SWPS’s first time specifying Generac, but they said it won’t be their last time. “Generac was very responsive,” said Mall. “They offered the sales support we wanted and flexibility all at a lower cost.” Mall said there were many advantages to partnering with Generac. “DR projects like these have a very limited construction period because they are mostly utilized for emergency applications,” said Mall. “Procuring everything locally allowed us to control the value chain and limited the logistical risks. With Generac being able to provide and package the complete gen-set solution locally, it helped eliminate unnecessary risk while providing the extra benefit of supporting local businesses who make products here in the U.S.” Mall also said the advantages to Generac’s rich burn gen-sets over the competition was another factor of why Generac was selected for this project, and why SWPS would specify Generac again in the future.

When this project is complete, the residents of the city will be the true beneficiaries from this innovative solution. Thousands of people can have the peace of mind knowing that the power will stay on no matter the situation.