

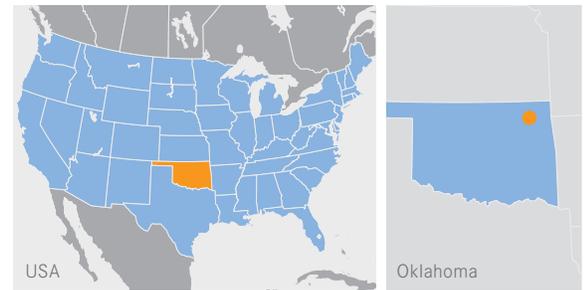
STANDBY POWER

THREE 500 KW GENERATOR SETS ASSURE WATER SUPPLY IN “TORNADO ALLEY”

DIGITAL CONTROLLERS ELIMINATE NEED FOR TRADITIONAL SWITCHGEAR



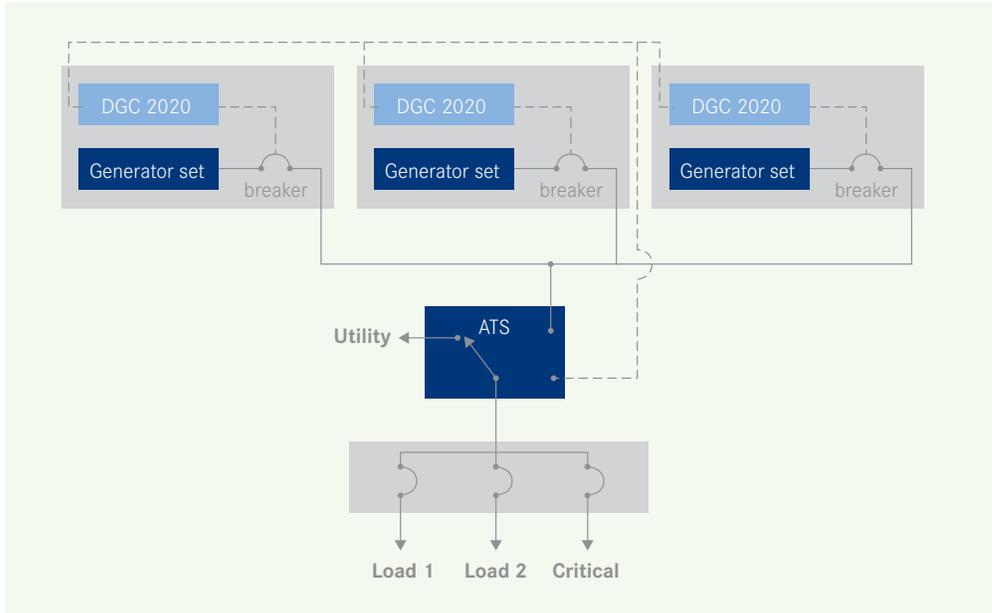
- // **Who:** Washington County Rural Water District #3
- // **What:** Three MTU Onsite Energy 500 kW units with DGC 2020 digital controllers
- // **Where:** Washington County, Oklahoma, USA



Washington County Rural Water District #3 is more than keeping pace with the increasing population of greater Tulsa. The district's water treatment plant – expanded from a capacity of 4 million gallons a day to 12 million gallons a day – is now designed to serve the area's current population of 40,000, plus additional growth for the next 25 years. But tripling the plant's capacity meant tripling the capacity of the emergency standby generators designed to keep the plant running during utility outages – from an existing single 600 kW generator set to a system with 1,500 kW output.

Typically, this power system expansion would mean buying two additional 500 kW units, plus expensive paralleling switchgear needed so that all three could work together. However, the cost of the paralleling switchgear put the project over budget. Instead, with the help of MTU Onsite Energy and its local distributor United Engines, LLC, plant officials chose an innovative solution: United Engines installed three 500 kW generator sets from MTU Onsite Energy equipped with digital controllers that allow the generator sets to run in parallel without traditional free-standing switchgear and controls. The unique approach saved the water district approximately \$300,000 and created a standby power system that was faster, simpler and more compact.

Rural Water District #3 serves urban and rural areas outside Owasso, Collinsville and Skiatook north of Tulsa, located in an area known as tornado alley. The plant treats water from Lake Oologah and distributes it to residents from six water towers through miles of distribution lines. Without standby power, the plant would not be able to supply water to the residents in the event of an extended outage. Even the most reliable utility cannot always withstand the ice storms, lightning strikes and other severe weather common to the region. The emergency standby generator sets supply backup power for the treatment plant's raw water and recirculation pumps, process and filter controls and valves, and sludge transfer pumps, as well as power for laboratories, offices, and safety and security systems.



MTU Onsite Energy generator sets at RWD #3 run in parallel without traditional free-standing switchgear and controls, saving the water district approximately \$300,000 and creating a standby power system that was faster, simpler and more compact.

“We absolutely require backup power at the treatment plant,” said Jerry Gammill, manager of Rural Water District #3. “A few years ago, an ice storm knocked out power to the community for seven days, but we were able to provide running water the whole time. It’s critical that the treatment plant functions despite a power outage. We fully expect the new system to provide the same reliability.”

Digital controls provide synchronization function

The purpose of paralleling switchgear is to provide synchronization, load sharing and load management for a system with multiple generator sets. “Using traditional switchgear and controls would have added \$300,000 to the project’s cost and taken up valuable floor space in the newly expanded plant,” said Greg Esau, sales engineer with United Engines, LLC. “To save cost and footprint, we designed a system without traditional switchgear, using the digital

controllers on the MTU Onsite Energy generator sets (enhanced DGC 2020 with auto-sync) and motorized breakers mounted onboard each generator set to provide the paralleling function.” Esau was one of the first MTU Onsite Energy distributors to apply the DGC 2020’s paralleling function on a mission-critical application in the field.

The original plan was to parallel the existing 600 kW generator set with one new 1,000 kW generator set, but that soon became unfeasible. “The dilemma was how to synchronize the older generator with a newer generator set without having to make extensive modifications to the older unit,” said Joseph Baran, professional engineer with Innovative Engineering Group, LLC, Tulsa, designers of the expanded treatment plant. “Bypassing the original generator set made the project feasible, while saving money and adding redundancy.”

The DGC 2020 digital generator controller provides I²/t protection on the generator, which covers over-current due to shorts or other malfunctions. If a fault occurs on the system, the motorized breakers will take the units offline. In essence, the DGC 2020 is capable of typical generator set control protocols as well as functionality found in paralleling switchgear, providing an integrated, cost effective solution to paralleling applications.

Esau explained, “After the signal for the generators to start, the paralleling process works like this: The first unit to attain voltage and frequency within the nominal operational bandwidth will communicate to other units on the system and request dead-bus closure while inhibiting other units from closing on the bus. This ‘dead bus arbitration’ optimizes load acceptance and emergency power availability.”

“It’s critical that the treatment plant functions despite a power outage.”

/ / / Jerry Gammill, manager, RWD #3



All three generators sit on top of a single 7,500-gallon fuel tank that provides a 72-hour runtime and reduces hassles during refueling.

Single fuel tank simplifies operation

Omitting switchgear significantly reduced the footprint of the entire system – good news for plant officials, because space was already allocated to pumps, controls and filters. Another plus is that three generator sets offer redundancy and higher reliability than one single generator set, but because of the absence of paralleling switchgear, the new system doesn't add complexity. To further save valuable floor space, all three generators sit on top of a single 7,500-gallon fuel tank that provides a 72-hour runtime and reduces hassles during refueling.

With its expanded water treatment capacity, Rural Water District #3 will be able to deliver water to residents well into the future, no matter what the weather does to utility power. And relying on digital controllers instead of paralleling switchgear for its power system allows the district to minimize capital spending and simplify its operation today.

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MTU Onsite Energy is a brand of Rolls-Royce Power Systems AG. It provides diesel and gas-based power system solutions: from mission-critical to standby power to continuous power, heating and cooling. MTU Onsite Energy power systems are based on diesel engines with up to 3,400 kilowatts (kW) power output, gas engines up to 2,150 kW and gas turbines up to 50,000 kW.

