

Permian Operator Takes Electric Power Supply Into Own Hands

Baseline plays major role in building reliable microgrid with stunningly low emissions profile using field gas in New Mexico

THE CHALLENGE

An independent oil and gas exploration and production company with operations in the Permian Basin located in southeastern New Mexico found themselves operationally constrained by the local electric utility, both in the amount of available power and reliability, that would severely impact production targets for the foreseeable future. The operator determined that building out heavy-duty permanent electrical infrastructure for the utility would guarantee only that power could be delivered, but would not reduce the likelihood of outages and would also require an excessive capital expenditure that could be better utilized on more revenue-producing projects.

Armed with the knowledge that many oil and gas operators are now using natural gas to electrify their operations, the operator sought out a purpose-built microgrid solution that would enable their growth and daily operations to continue unencumbered by electrical issues.

The key requirements of a microgrid system for the operator are that it be (1) able to generate and distribute 8 MW of power, (2) maintain 100% reliability, and (3) meet and exceed federal as well as the more restrictive New Mexico state air quality standards.

THE BASELINE SOLUTION

Baseline recommended setting up an in-field microgrid consisting of twenty-four NG 400 natural gas generators, fueled by a mix of nearby pipeline gas and the operator's own produced well gas ensuring both fuel quality and redundancy. This gas-fired generator microgrid would tie into the overhead power lines owned by the operator and distribute electricity throughout their field. Baseline generators would be networked together through a

“As our need for reliable electric power increased, it became obvious that the utility was not the best available option for our operations moving forward.”

proprietary hub-and-spoke paralleling system to ensure efficient load distribution and 100% power reliability in the event one or more generators go down. For the equivalent power output, multiple, smaller reciprocating gas engines are more fuel efficient, provide better redundancy, and have a significantly lower MOB and DEMOB cost than a single large turbine-driven generator, making them ideal for medium to long-term projects such as this.



Twenty-two of the twenty-four NG 400 Baseline generators outputting 8 MW (8,000 kW) of electric power. The remaining two generators currently located at a nearby frac pond and tied into the local grid from that location.

PROJECT IMPLEMENTATION

Throughout the Spring of 2020, the project scope and requirements took shape. The operator began site construction soon after with the installation of a six-inch pipeline fed from a large midstream pipeline. The operator then also routed a portion of their produced field gas to the fuel lines and set up a fuel rail system with a docking station for each of the Baseline generators. Multiple electrical engineering firms were contracted to perform the buildout and certification of the electrical system from the utility side and install additional overhead power lines. An arc flash study was also conducted to ensure the integrity of the system and safe working conditions.

During this time, Baseline prepared generator equipment for deployment. Baseline natural gas generators fall under rule JJJJ set by the EPA and are certified at their date of manufacture to perform within the rule as well as undergoing randomized testing throughout their useful lives. Additional rules apply depending on state requirements and New Mexico has specific limitations for the total amount of pollutants emitted at a single site.

To meet this rule and ensure the integrity of the project, Baseline upgraded twenty-four NG 400 generators with new catalyst systems and extended-height exhaust stacks. The result of the upgrades ensured that while operating on pipeline-quality or better gas, the system would have no permitting issues. Initial tests on a group of seven upgraded generators showed massive reductions from EPA standards in carbon monoxide (CO), nitrous oxide (NOx), and volatile organic compounds (VOC), of -87.55%, -79.2%, and -99.14%, respectively.

By January of 2021, construction on the site and additional power line buildout had been completed. The generators, distribution panels, and cabling were then brought in, connected, tested, and placed into operation.



Two of the twenty-four NG 400 Baseline generators were early startups at a nearby frac pond, powering (4) 475 hp water transfer pumps.



Baseline natural gas microgrid producing 8 MW (8,000 kW) of low-carbon electricity using in-field pipeline and produced gas.



SUCCESSFUL OUTCOME

Baseline's natural gas generator microgrid is providing continuous power for (2) 750 hp compressors, (4) 475 hp water transfer pumps for fracing operations, and artificial lift equipment on dozens of producing wells. Additionally, the twenty-four natural gas generator microgrid has exceeded New Mexico air quality requirements, even with having to account for two large compressors located on the same site. With a small infrastructure buildout, the operator now has a reliable power supply that is flexible to their needs today and into the future.