North Iowa Area Community College
Mason City, IA

Case Study
EDUCATION

AT A GLANCE

CUSTOMER
North Iowa Area Community College

LOCATION
Mason City, Iowa

CHALLENGE
Reduce utility costs and avoid peak-demand penalties by developing a microgrid that leverages an environmentally friendly power solution (solar) complemented by natural gas prime-power generator sets

SOLUTIONS
- Six KOHLER® 180REZXB generator sets with APM402 controllers
- One KOHLER KG80 generator set with APM402 controller
- One KOHLER KG100 generator set with APM402 controller
- Two KOHLER KCS-DMTA-0400S automatic transfer switches
- Two KOHLER KCS-DMTA-0200S automatic transfer switches
- One KOHLER KCS-DMTA-0104 automatic transfer switch
- One KOHLER KCS-ACTA-0400S automatic transfer switch
- One KOHLER KCS-AMTA-0104 automatic transfer switch
- One KOHLER KCS-DMTC-0400S automatic transfer switch
- One KOHLER KCS-DCTA-0400S automatic transfer switch

PRIMARY CHOICE FACTORS
Kohler reputation for product quality and reliability as well as suitability of its generator sets for energy-management applications

Two KOHLER 180REZXB prime-rated generator sets at the North Iowa Area Community College

BACKGROUND
Established in 1918, North Iowa Area Community College is located in Mason City, Iowa. It was the first public two-year community college in Iowa and currently has an enrollment of 3,000 students. The campus itself is large, spread out, and comprises of 30 buildings. Accordingly, it has significant electrical utility costs for lighting and HVAC. Moreover, it was incurring peak demand penalties regularly, forcing the administration to examine alternative power solutions.

CHALLENGE
Alleviate growing utility costs and peak-demand penalties by adopting an environmentally responsible energy alternative that would also make the school more energy self-sufficient.

IMPLEMENTATION
To address its energy challenge, the school management decided to investigate the possibility of adopting solar power. It also wished to explore the possibility of becoming more energy self-reliant. To this end, the school contracted Modus Engineering to develop the system design. Central Iowa's leading specialty contractor, ABC Electrical Services of Des Moines, was awarded the electrical contract. ABC bought its in-house design capabilities and expertise with multifaceted electrical infrastructure to the challenge.

KOHLER®

Kohler KCS-DMTA-0104, KCS-AMTA-0104 and KCS-DMTA-0400S transfer switches provide smooth transitions for the microgrid system

Moreover, ABC's reputation for forging relationships with customers, general contractors, engineers, and vendors to deliver large, complex projects was ideal.

ABC's project manager, Brandon North and field superintendent Adam Sperry were responsible for helping coordinate the efforts of several suppliers on the ground. Understanding that one of the first challenges would be to integrate the solar option with the local utility efficiently. ABC reached out to Russ Stokes, director of the Energy Solutions Group with Kohler-authorized distributor Electrical Engineering & Equipment Company (3E). 3E was founded in 1920 and is one of Iowa's largest electrical distributors. It has been an authorized Kohler distributor since 1981.

One of the first steps taken by 3E was to conduct a thorough review of the campus' energy usage. Next, it explored the incidence of peak demand charges, the potential for solar to offset utility needs, and the potential for the campus to develop its own energy microgrid.

While a compelling energy option, solar power has limitations in many climates, and customers cannot rely on it as a comprehensive energy solution. Inclement weather and/or cloudy days can limit its output. Accordingly, solar customers then must rely on battery storage (if practical) or revert back to the utility to compensate.

A popular alternative to traditional grid-supplied power that's growing with universities, data centers, and other large campus-based organizations is a microgrid. A microgrid is a localized energy grid with control capability. In effect, it can disconnect from the traditional grid and operate autonomously. A microgrid generally operates while connected to the grid, however, it can break off and operate on its own using local energy generation (e.g., solar and prime-power generators) in times of crisis like storms or power outages—or for other reasons. A microgrid can be powered by several sources, including distributed generators, batteries, and/or renewable resources like solar panels. Depending on how it is fueled and how its requirements are managed, a microgrid could run indefinitely. A microgrid not only provides backup for the grid in case of emergencies, but it can also be used to cut costs. A microgrid allows an organization to be more energy independent and, in some cases, in more environmentally friendly ways.

SOLUTION

The 3E team realized that the challenge at North Iowa Community College could be resolved with a microgrid system. The 3E team suggested adding the expertise of two more suppliers, Schneider Electric and its Square D™ business unit, which had significant experience with microgrid design and engineering. They would help build the "backbone" of the grid, allowing the ability to monitor and manage the energy requirements of selected campus buildings. The administration embraced the idea and ABC and 3E got to work.

The microgrid solution would consist of essential key power-generating sources: a solar array and a series of prime-rated generators from Kohler. The core of the generator set package included six natural gas model 180REZXB prime-rated generator sets. These particular generators meet EPA requirements for nonemergency generation, peak shaving, and microgrid energy management systems. The generator set's brushless, rotating-field alternator features Kohler's unique Fast-Response™ X excitation system, delivering excellent voltage response and short-circuit capability using a rare-earth, permanent magnet design.

A KOHLER® 180REZXB generator set and KCS-DMTA-0400S and KCS-DMTA-0200S transfer switches at North Iowa Community College

The APM402 controller offers one-source system integration and remote communication. It also provides metering, control, and diagnostics for the generator set and features a digital display and rotary push-button dial for easy access to data. An integrated voltage regulator maintains consistent voltage output and a built-in alternator overload protection circuit ensures safe generator operation.

The solution also includes a KOHLER KG80 and a KG100 standby generator set with corresponding APM402 controllers. The KG80 provides standby power for circulation pumps and control power for campus hot water systems. The KG100 provides backup for the on-site server and associated HVAC loads. All units included steel sound-attenuated enclosures to reduce noise and to protect the generator sets from the elements. The enclosures feature easily accessible doors and panels to facilitate service and local operation. They also feature fade-, scratch-, and corrosion-resistant KOHLER Power Armor™ automotive-grade textured finish. In addition, the units also included block heaters and battery chargers to ensure reliable operation during the winter months—which can be problematic in the Midwest.

Given each building had slightly different needs and was located in a different area on campus, the job required various KOHLER open transition automatic transfer switches. Some of these included two UL 1008-certified KCS-DMTA-0400S open transfer switches in NEMA 1 enclosures with front-accessible contacts for easy inspection. Similarly, the system included two KCS-DMTA-0200S open transfer switches with the same features and specifications. Other KOHLER automatic transfer switches in the generator solution package include KCS-DMTA-0104, KCS-DMTC-0400S, KCS-DCTA-0400S, KCS-ACTA-0400S, and KCS-AMTA-0104.

RESULTS

The North Iowa Community College microgrid is functioning and the school is already enjoying significant decreases in utility costs, which will be even more dramatic at the peak of each cooling season.

What started as a solar-only solution assignment for ABC Electrical Services turned into a more robust, environmentally friendly microgrid solution featuring some of the latest technologies from leading power experts like Kohler, Schneider Electric, and Square D. Leroy Clair, president of ABC Electrical Services noted, “This project was a classic team effort and fully demonstrates that the best solutions come from a collaboration of subject-matter experts. The team at 3E helped define a long-term, green solution that will help North Iowa Community College save money and be more self-reliant in terms of energy usage.”

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