Success Story:
Kansas City Power & Light Company

Market Served
Privately Owned Utility

Kansas City Power & Light calls on Eaton to modernize capacitor bank controls

Location:
Missouri and Kansas

Segment:
Privately Owned Utility

Challenge:
Develop an upgraded capacitor bank control solution to help the utility continue maintaining exceptional power factor, voltage regulation and monitoring while reducing installation and maintenance labor expenses.

Solution:
Eaton's highly configurable CBC-8000 Capacitor Bank Controls with custom modifications for simplified operations and improved communications while maintaining compatibility with KCP&L legacy field applications.

Results:
On-schedule capacitor bank control modernization with no known failed controls to date and continual collaboration to help KCP&L maintain an automated, secure, and cost-effective capacitor automation system.

"Eaton's engineering team not only met the technical requirements of compatibility with our existing equipment, but also developed an exchangeable faceplate for the controls that would help our linemen operate more efficiently in the field."
Bill Menge, director of technology, KCP&L

Background

Kansas City Power & Light (KCP&L) is an investor-owned, regulated electric utility serving more than 800,000 customers in 47 northwest Missouri and eastern Kansas counties.

With a service area of about 18,000 square miles, KCP&L delivers power to its customers over a vast infrastructure of more than 3,000 miles of transmission lines, 24,000 miles of distribution lines and 400 substations.

Challenge

From the early 1990s through the last decade, KCP&L has completed many capacitor automation projects designed to improve capacitor bank control and monitoring for Volt/VAr support and control. A significant portion of the utility's legacy capacitor automation solution included nearly 800 aging controls and an antiquated communication solution.

In 2014, KCP&L began to explore ways to modernize its capacitor bank controls to simplify operations and improve communications while maintaining compatibility with legacy field applications.

KCP&L also wanted to reduce communication fees while minimizing the complexity of deploying and configuring capacitor controls.

To identify a vendor capable of meeting its needs, KCP&L began a pilot testing process and ultimately landed on Eaton due to the team's ability to manufacture capacitor controls to meet KCP&L's specific needs in a timeline that would maintain an aggressive project schedule.

"Over twenty-five years ago, KCP&L played a major role in the development of some of the first commercially available automated capacitor controls. This experience helped us recognize that when our legacy devices reached end of life, we needed a proven product supplier with a dedicated team of engineers capable of meeting our unique requirements," said Carl R. Goeckeler, distribution automation engineer at KCP&L.

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KCP&L lineman installing and field testing automated capacitor control on distribution capacitor bank

Distribution automation engineer reviews settings within capacitor control prior to field deployment using Eaton ProView NXG software™

Solution

Eaton provided KCP&L with its highly configurable CBC-8000 Capacitor Bank Controls with modifications required by the utility for backwards compatibility and simplified field operation.

Each control is a remote controlled unit that can be readily deployed in advanced automation schemes. The CBC-8000 control strategy is based on field-proven algorithms and uses Eaton's Cooper Power series standard front panel and ProView™ NXG application software.

Each CBC-8000 control can act as a stand-alone, one-way, or two-way communicating device with advanced distribution automation features, and provides robust offering of "failsafe" modes that enable a utility to maintain grid stability during unexpected periods of communication network downtime.

To ensure seamless integration into KCP&L's existing control systems, Eaton configured the CBC-8000 units to match the system currently used by KCP&L. These configurations also included support for KCP&L's engineering standards and existing line post current sensors as well as faceplate labeling required by the utility to match the specific naming conventions linemen were trained on.

"Eaton's engineering team not only met the technical requirements of compatibility with our existing equipment, but also developed an exchangeable faceplate for the controls that would help our linemen operate more efficiently in the field," explained Bill Menge, director of technology at KCP&L. "This was a convincing indicator of Eaton's willingness to listen to our needs and respond with collaborative, creative solutions."

Each unit provides linemen with light-indicated buttons for Local, Manual and Remote settings, as well as Trip and Close verification. The user-friendly display also allows the user to easily locate live measurement values for temperature, current, and voltage statistics, and gives them the ability to verify and modify capacitor bank settings.

As a result of the collaboration with KCP&L, Eaton standardized features to support legacy control operations such a remotely configurable time delay for Trip and Close. Eaton also enhanced the CBC-8000's remote SCADA override capabilities that can be used to keep the capacitor bank closed or open for testing, maintenance and operational purposes.

Results

Utilities require intelligent solutions to improve distribution system voltages and power factor to reduce generation demand, achieve significant energy savings, and improve customer power quality.

With the backwards-compatible versions of its CBC-8000 controls, Eaton was able to help KCP&L complete the modernization of its system on schedule with full compatibility and no known failed controls to date.

The Eaton CBC-8000 controls are enabling KCP&L to monitor every aspect of site health, current, VAR and harmonic monitoring as well as provide capacitor bank neutral current monitoring via analog inputs for greater accuracy. The controls are also providing KCP&L with refined power quality event monitoring in the event of problems or grid anomalies that may need detailed analysis.

The integrated communications capabilities and robust library of DNP3 Analog Outputs helped KCP&L significantly reduce the number of steps needed to commission devices, while enabling technicians to remotely manage control settings through centralized SCADA software. This feature mitigates the need for KCP&L to deploy field technicians to change control settings, as the controls can be easily updated from an engineer's desk.

Additionally, remote firmware and settings updates are allowing KCP&L to cost effectively manage firmware upgrades in support of improved product features. This further reduces costly site visits to the field by line crews and technicians.

Throughout the testing, commissioning and initial deployment phases of the new capacitor bank controls, Eaton's engineers worked closely with KCP&L to understand and accommodate suggestions for improvement. The Eaton team is continually collaborating to help KCP&L maintain a fully automated, secure and cost-effective grid.

"The lessons learned while collaborating with KCP&L will prove beneficial to utilities of all sizes facing similar modernization challenges," said Troy Hedland, product manager at Eaton. "For some manufacturers, the project is completed once the installation is complete. However, at Eaton we're committed to going the extra mile to ensure success for our customers. This is yet another powerful example of how challenges faced in the field can spark our most innovative thinking and provide a platform for us to engineer the right products to energize our ever-changing world."

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