

Cuming County Public Power District

Smart Grid Initiative

Scope of Work

The Cuming County Public Power District's (CCPPD's) Smart Grid Initiative, with key partner Stanton County Public Power District (SCPPD), implemented a supervisory control and data acquisition (SCADA) system and distribution automation (DA) equipment on all 68 circuits. A wireless communication network has been deployed throughout both PPDs' service territories to support the new SCADA and DA software. These systems provide the foundation for future substation automation (SA) and down line automation of newly installed intelligent reclosers and voltage regulator controls.

Objectives

The project provides increased system visibility and operational control, enabling remote detection and restoration of customer outages and improved operational efficiency.

Deployed Smart Grid Technologies

- **Communications infrastructure:** A wireless network provides the backbone for integration of SA and DA equipment. The substations and downstream devices utilize a WiMax network, and the backhaul from communication towers to each PPD's operations center utilizes microwave communications. This scalable infrastructure provides opportunities to add future service offerings and further optimize electricity delivery, system reliability, and efficiency.
- **Distribution automation devices:** The project replaced hydraulic oil-filled reclosers on all substation feeders with intelligent reclosers and relays to provide each feeder with advanced protection, control, measurement, and supervision capability. The automated reclosers have a modular design that allows them to perform as reclosers, sectionalizers, or automated load break switches. Smart relays integrate the reclosers with SCADA through standard distributed network protocol communications and have advanced functionalities, such as peer-to-peer messaging and automatic loop restoration. The project also upgraded or replaced regulator controls at all substation and downstream circuit locations.
- **SCADA system:** This system integrates data from DA applications and equipment in a centralized control platform and provides grid operators with expanded visibility and management capabilities. The SCADA deployment improves system reliability, reduces outage duration, improves feeder monitoring, and assists with integration of future DA equipment. The platform is designed with each district's station as a backup to the other. The centralized SCADA system is managed through a grid automation controller gateway at each substation. The gateway can also function in de-centralized mode.

At-A-Glance

Recipient: Cuming County Public Power District

State: Nebraska

NERC Region: Midwest Reliability Organization

Total Project Cost: \$3,749,988

Total Federal Share: \$1,874,994

Key Partner: Stanton County Public Power District

Project Type: Electric Distribution Systems

Equipment

- **Distribution Automation Equipment for all 68 Circuits**
 - **Distribution Automation (WiMax and Microwave) Communications Network**
 - **SCADA Communications Network**
 - **Grid Automation Controller Gateways**
 - **Automated Reclosers and Relays**
 - **Automated Regulator Controls**

Key Benefits

- **Improved Electric Service Reliability**

Cuming County Public Power District *(continued)***Benefits Realized**

- **Improved electric service reliability:** All substation reclosers and regulators are remotely monitored, and numerous recloser functions can be controlled from the office, allowing each district to monitor system health in real time and to react more quickly when problems occur. Historical data are being tracked and will be used in engineering analyses and studies to identify and prioritize needed line and system improvements.

Lessons Learned

This project required a high level of technical and IT knowledge that will continue through the life cycles of the systems. All equipment is IP-based and requires extensive training for programming, integration, and application.

The communications network is foundational to the success of the SCADA system and any other plans for future automation. It must be reliable, serviceable, able to carry both existing and future data, and able to integrate with different vendors' equipment. The communications structure required the most planning and capital investment of all elements of the project.

Industry has traditionally been more geared to urban and high-voltage applications than to rural ones. The vendors chosen for this project were willing to collaborate and to be trailblazers. They developed and incorporated engineering and design changes in their products to meet the needs of not only this project but the entire rural market. Without these vendor efforts, the project would not have been successful.

Future Plans

The PPDs will install recloser devices and other intelligent equipment and will integrate the new devices, where practical, into the communications and SCADA networks. Additional communications functionality will be added to regulator controls to allow for remote programming and operation. All future equipment purchases will be considered in terms of potential integration into the network. The SCADA data will provide the foundation for engineering studies and system improvements.

“Without the grant dollars, this project would not have been economically feasible as implemented. At best, each district would have deployed these systems separately, over years, which would not have fostered the close vendor relationships that were pivotal for project success.” – Tisha Alfson, CCPPD SGIG Project Manager

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