

Westar Energy, Inc. *SmartStar Lawrence Project*

Scope of Work

Westar Energy, Inc.'s (Westar's) SmartStar Lawrence project deployed an advanced metering infrastructure (AMI) system, integrated communications infrastructure, a meter data management system (MDMS), a customer web portal, and distribution automation (DA) equipment on 15 circuits in Lawrence, Kansas. A few neighborhoods in Wichita, Kansas, received smart meters and access to the online energy dashboard as well.

Objectives

The project's primary purpose was to confirm a smart grid business case on a small scale prior to deploying the selected technologies system-wide. The project aimed to gain insight into operational process and system requirements and the likely benefits that could be achieved through a full-scale investment. The project as a whole has enabled fact-based decision making for next steps in smart grid deployment.

Deployed Smart Grid Technologies

- **Communications infrastructure:** Westar deployed a radio frequency mesh (900 MHz) AMI network and utilized a dedicated wireless backhaul for data transfer to/from back office systems.
- **Advanced metering infrastructure:** 47,899 smart meters were deployed. The AMI system provides on-demand reads, remote connect and disconnect, and power outage and restoration notification. The meters are programmed to collect information at 15-minute intervals, and the MDMS integrates with the billing system to provide validated data for customer billing.
- **Distribution automation systems:** Westar has installed automated mid-circuit reclosers and centralized automation controls that perform autonomous fault location, isolation, and restoration activities. The DA information feeds into Westar's energy management system (EMS) and outage management system (OMS). The system also performs automated remote download of event records and oscillography and integrates with the MDMS, geographic information system (GIS), and other legacy systems. Westar's DA deployment included communicating capacitor controls that integrate into a centrally controlled volt/VAR optimization scheme. In addition, communicating fault indicators are integrated into the EMS and interfaced to the OMS. The automation equipment allows Westar to expand communications to other field equipment and supports future DA deployment across the entire Westar service territory.

At-a-Glance

Recipient: Westar Energy, Inc.

State: Kansas

NERC Region: Southwest Power Pool

Total Project Cost: \$39,290,749

Total Federal Share: \$19,041,565

Project Type: Advanced Metering Infrastructure
Customer Systems
Electric Distribution Systems

Equipment Installed

- 47,899 Smart Meters
 - AMI Communications Systems
 - Radio Mesh Wireless Meter Communications Network
 - Backhaul Communications
 - Meter Data Management System
 - Customer Web Portal
 - Distribution Automation Equipment for 15 out of 1,338 Circuits
 - Distribution Management System
 - SCADA Communications Network
 - Automated Distribution Circuit Switches
 - Automated Capacitors
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Key Benefits

- Reduced Meter Reading Costs
 - Reduced Operating and Maintenance Costs
 - Improved Electric Service Reliability and Power Quality
 - Reduced Costs from Equipment Failures, Distribution Line Losses, and Theft
 - Reduced Truck Fleet Fuel Usage
 - Reduced Greenhouse Gas and Criteria Pollutant Emissions
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- **Advanced electricity service options:** Customers with smart meters can view their electric usage information through a newly implemented web portal. The AMI system enabled Westar to offer a time-of-use rate for its customers, and meter connects and disconnects are now automated, greatly reducing response time for those service orders.

Benefits Realized

- **Reduced meter reading costs:** The automation of meter readings increases reading accuracy and reduces meter reading costs.
- **Reduced operating and maintenance costs:** The automation of customer service activities, such as remote connect and disconnect, requires the deployment of significantly fewer field crews.
- **Reduced truck fleet fuel usage:** Connect and disconnect service is done remotely for customers with smart meters, reducing the number of truck rolls and, hence, fuel usage and greenhouse gas emissions.
- **Improved electric service reliability and system efficiencies:** A centralized automation system is interfaced to an OMS. Coupled with communicating field equipment (i.e. reclosers, capacitor, controls, and fault indicators), this system reduces outage restoration times, improves operational efficiencies, and minimizes system losses. In addition, Westar can more efficiently review and analyze system faults and possibly identify field problems prior to their becoming more significant, sustained outage events.

Lessons Learned

Smart grid systems must be integrated with existing legacy systems, which is extremely labor-intensive and requires extensive testing. The impact of these systems on current business processes should be carefully evaluated and considered.

Advanced technology implementation changes the way many utility employees do their jobs. In some cases, these processes have not changed in decades. These changes may not be easily accepted or understood. Employee education is critical for significant changes to be successful.

Many customers do not understand energy systems, and resistance to misunderstood technology is inevitable. Utilities must work with their customers—using the layperson’s language—to help them understand the value of smart grid technologies.

New device connectivity and the subsequent data point mapping require significant manpower to achieve and may put a strain on resources, as well as on older legacy equipment not designed to handle the large amounts of “big data”. New technologies and processes will be required to continue expansion into an enterprise-wide system.

The lines between operational technology (OT) and the traditional information technology (IT) groups begin to blur with the introduction of smart grid technologies. It is imperative to maintain good communication and a working knowledge of the interfaces between the groups’ areas of responsibility.

Future Plans

Westar Energy currently plans to deploy 200,000 AMI meters over the next five years.

Westar Energy, Inc. (continued)

In addition, Westar will use the vast data collected through the new technologies to improve business processes and find further operational efficiencies. This will most likely be accomplished by implementation of an enterprise smart grid data analytics platform which will deliver an end-to-end solution across the entire company. All relevant grid data will be aggregated and analytics performed, allowing Westar to provide internal utility decision makers with rich insights into grid reliability and customers with enhanced satisfaction.

Other future plans include integrating and leveraging data from field devices with a new asset and work management system to aid in an optimized approach to asset maintenance.

Finally, Westar plans to expand communications to field devices and work towards the implementation of an active distribution management system (ADMS) in the near future.

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