

Duke Energy Business Services, LLC

Smart Grid Deployment

Abstract

Duke Energy Business Services, LLC's (Duke) overall Smart Grid Program began in 2008 and includes the development and implementation of a comprehensive end-to-end solution that transforms its five-state electric system (Indiana, Kentucky, North Carolina, Ohio, and South Carolina) and leads to products and services that increase the consumer's role in reducing energy use and carbon emissions. Duke's Smart Grid Deployment project, a part of the Smart Grid Program, includes advanced metering infrastructure (AMI) and distribution automation systems in five states. The project involves large-scale deployments of AMI and distribution automation in Ohio and North Carolina, and smaller limited deployments of distribution automation in Indiana, Kentucky and South Carolina. The project includes pilot programs for electricity pricing including time-of-use rates, peak-time rebates, and critical-peak pricing. Customers in these pilot programs use home area networks, Web portals, and direct load control devices to reduce their electricity consumption and peak demand. In December 2008, Duke received a state regulatory order to proceed with Smart Grid deployment in Ohio and continues to work with the other states for similar approval.

Smart Grid Features

Communication infrastructure includes an open, interoperable two-way network that provides the backbone for AMI and distribution automation systems deployed as part of this project and allows for future integration with distribution automation, substation automation, smart appliances, and home area networks.

Advanced metering infrastructure includes 1.2 million smart meters to be installed. This system provides automated meter reading, enhanced outage notification and response, remote meter connect and disconnect capability and improved detection of theft. More detailed and timely data on peak electricity usage improves load forecasting and capital investment planning.

Time-based rate programs include a variety of options implemented in a series of pilot programs. The pilots measure customer load impacts, bill impacts, customer acceptance, and test

At-A-Glance

Recipient: Duke Energy Business Services, LLC
States: Indiana, Kentucky, North Carolina, Ohio, and South Carolina
NERC Region: ReliabilityFirst Corporation and SERC Reliability Corporation
Total Budget: \$555,706,307
Federal Share: \$200,000,000

Project Type: Advanced Metering Infrastructure and Customer Systems Electric Distribution Systems

Equipment

- 1.2 million Smart Meters
- AMI Communication Systems
 - Meter Communications Network
 - Backhaul Communications
- Meter Data Management System
- 100 Home Area Networks
- 100 In-Home Displays
- Remote Fault Indicators
- Customer Web Portals
- Distribution Automation Equipment
 - Distribution Automation Communications Network
 - SCADA Communications Network
 - Automated Distribution Circuit Switches
 - Automated Capacitors
 - Equipment Condition Monitors

Time-Based Rate Programs

- Time of Use
- Critical Peak Pricing

Key Targeted Benefits

- Reduced Electricity Costs for Customers
- Reduced Meter Reading Costs
- Reduced Operating and Maintenance Costs
- Deferred Investment in Distribution Capacity Expansion
- Improved Electric Service Reliability, Power Quality
- Reduced Costs from Distribution Line Losses, Theft
- Reduced Greenhouse Gas and Criteria Pollutants
- Reduced Truck Fleet Fuel Usage

Duke Energy Business Services, LLC (continued)

the capabilities of the billing software and smart meters. In Ohio, Duke is operating a 1-year pilot that began in June 2010 for time-of-use rates to selected residential customers that have a certified single-phase smart electric meter. Rates are divided into winter and summer months and vary based on the time of day energy is used. The pilot measures customer bill impacts, the customer’s experience, the daily/hourly kW and kWh impacts, and leverages enhancements to billing systems capabilities. In addition, Duke is considering a variety of pilot pricing program for the other states including: flat with peak-time rebates, critical peak price, and critical peak price “lite,” as well as additional programs as approved by the individual state regulatory commissions.

Distribution system automation includes automated switches, capacitors, and reclosers as well as sensors on the distribution system. This distribution system upgrade also includes integrating the supervisory control and data acquisition system (SCADA), geographical interface system, outage management system, and work management system. The integration of these systems provides more efficient system management through a single operator interface and enables the benefits of the distribution automation devices. These devices enable power quality monitoring, voltage regulation, and power flow reconfiguration to limit the spread of power interruptions. This enhanced functionality improves power quality and electric system reliability and lowers operating and maintenance costs.

Distribution system energy-efficiency improvements include automated switches and upgraded communications network capabilities for capacitor banks and distribution/transmission substation equipment. The automation of the capacitor banks improves power factor and voltage regulation, reducing distribution energy losses while improving service quality for customers. In addition, Duke is supporting plug-in electric vehicles with the distribution system improvements.

Timeline

Key Milestones	Target Dates
Distribution automation asset deployment begins	Q1 2009
AMI asset deployment begins	Q3 2009
Distribution automation asset deployment ends	Q1 2013
AMI asset deployment ends	Q1 2013

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