

Duke Energy Business Services, LLC

Smart Grid Deployment**Abstract**

Duke Energy Business Services, LLC's (Duke) Smart Grid Program began in 2008 and includes the development and implementation of comprehensive end-to-end solutions that will transform its five-state electric system, and lead to products and services that increase the consumer's role in reducing energy use and carbon emissions. Duke's Smart Grid Deployment projects include advanced metering infrastructure (AMI) and distribution automation systems in five states. The projects involve 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 effort also includes pilot programs for electricity pricing including time-of-use rates, peak-time rebates, and critical-peak pricing. Customers in these pilot programs will test 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.

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 and home area networks.

Advanced metering infrastructure includes plans to install 1,119,050 smart meters in Ohio, North Carolina and South Carolina during the DOE grant period. The infrastructure 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 the capabilities of billing software and smart meters. In Ohio, Duke

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

- 398,800 Smart Meters in North/South Carolina
- 720,250 Smart Meters in Ohio
- AMI Communication Systems
 - Meter Communications Network
 - Backhaul Communications
- Meter Data Management System
- Home Area Networks
- 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 Pilots

- Time of Use
- Critical Peak Pricing

Key Targeted Benefits

- 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)

will conduct a 1-year pilot 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 programs including: flat with peak-time rebates, critical peak price and critical peak price "lite".

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	Q3 2009
AMI asset deployment begins	Q3 2009
Distribution automation asset deployment ends	Q1 2013
AMI asset deployment ends	Q1 2013

Contact Information

James Kevin Spainhour
Senior Strategic Planning Manager – Duke Energy Smart Grid Program
Duke Energy Business Services, LLC
James.Spainhour@duke-energy.com

Recipient Team Website: www.duke-energy.com