Detroit Edison Company

SmartCurrents[SM]

Scope of Work

Detroit Edison's (DTE's) SmartCurrents[SM] project involved deployment of distribution automation (DA) assets on 55 circuits, an advanced metering infrastructure (AMI) system to support 725,000 meters, a meter data management system (MDMS), a distribution management system (DMS), and various customer systems, including a new web portal, in-home displays, and programmable communicating thermostats. The DA component included implementation of automated switches and monitors for improved volt/VAR control at 11 substations. DTE also piloted a time-based rate program to assess demand response potential and customer acceptance.

Objectives

The project improved distribution system reliability, operational efficiency, and power quality. DTE also enabled customers to make more informed decisions about electricity usage to control costs.

Deployed Smart Grid Technologies

- **Advanced metering infrastructure:** Deployed smart meters have two-way wireless communication capabilities that enable near-real-time interval and event data transfer across the network, as well as support home area networks. A new MDMS validates and processes the meter data for billing and integration with other back office systems.
- **Communications infrastructure:** A radio frequency mesh network supports two-way communication and data transfer between the smart meters and collection points. The collection points utilize a wireless area network to backhaul system data to the utility.
- **Distribution automation system:** The DA system comprises supervisory control and data acquisition (SCADA)-enabled devices, substation instrumentation, circuit upgrades, and a central DMS. Circuit upgrades include remote-controlled and monitored switches, automatic pole-top switches/reclosers, remote terminal units, and other intelligent electronic devices that help decrease the frequency and duration of outages and allow for more efficient deployment of field forces. Integration of automated capacitors with SCADA's power-quality monitoring provides the ability to evaluate system conditions and perform remote capacitor switching.

At-A-Glance

Recipient: Detroit Edison Company

State: Michigan

NERC Region: ReliabilityFirst Corporation

Total Project Cost: $174,503,542

Total Federal Share: $83,828,878

Project Type: Advanced Metering Infrastructure
Customer Systems
Electric Distribution Systems

Equipment Installed

- 725,000 Smart Meters
- AMI Communication Systems
  - Meter Communications Network – Radio Mesh System
  - Backhaul Communications – Wireless Area Network
- Meter Data Management System
- Home Area Networks
- Customer Web Portal Access for 5,000 Customers
- 750 In-Home Displays
- 750 Programmable Communicating Thermostats
- 61 Smart Appliances
- Distribution Automation Equipment for 55 out of 3,271 Circuits
  - Distribution Management System
  - Distribution Automation Communications Network
  - Automated Distribution Circuit Switches
  - Automated Capacitors
- Substation Condition Monitors and Automation Equipment for 11 out of 716 Substations
  - SCADA Communications Network

Time-Based Rate Programs, 2,471 customers enrolled

- Time of Use
- Critical Peak Pricing

Key Benefits

- Reduced Operating and Maintenance Costs
- Improved Electric Service Reliability and Power Quality
- Reduced Truck Fleet Fuel Usage
- Reduced Greenhouse Gas and Pollutant Emission

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- **Customer system devices:** Home area networks, in-home displays, programmable communicating thermostats, and smart appliances facilitate two-way information exchange between DTE and customers, allowing customers to manage their electricity use through appliance control. DTE also offers a pre-pay pricing program to help customers manage their electricity costs.

Benefits Realized

- **Reduced operating and maintenance costs:** AMI meters, supporting communications infrastructure, and meter data integrated systems reduce the number of meter readers needed. Furthermore, grid condition monitors and automated switches and reclosers help to better optimize asset utilization and improve service reliability, resulting in reduced operation and maintenance costs.
- **Improved electric service reliability and power quality:** The combination of grid condition monitors and automated/remote switches reroutes power for better service reliability (lower number of sustained outages) and enables quick system configuration options to improve power quality.
- **Reduced truck fleet fuel usage:** Truck fleet fuel usage is reduced in two ways: fewer meter readers are needed and fault location is improved. The latter reduces the time and distance crews have to search to locate and repair faulted lines.

Lessons Learned

- The ease and accuracy of automation of disconnects/reconnects with AMI meters has led to much higher use of these functions than originally anticipated.
- DTE piloted volt/VAR optimization technologies on a limited number of circuits, gleaned lessons learned specific to the DTE system, and used that experience to evaluate next steps for expansion into other parts of the system.
- A robust communication network is required to support the automatic operation of DA devices by advanced distribution applications.

Future Plans

- DTE will continue deployment of AMI electric meters beyond the completion of SGIG scope (725,000 meters), with 1.68 million expected by the end of 2014 and 2.59 million by the end of the overall project.
- DTE is leveraging experience gained and technologies implemented during the SGIG project to develop strategies for upgrading the electrical system in other areas.

Contact Information

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