Detroit Edison Company

***SmartCurrents*SM**

Abstract

Detroit Edison's (DTE) SmartCurrents project includes deployment of distribution automation assets, advanced metering infrastructure (AMI), and various customer systems. Distribution automation includes 55 circuits and 11 substations upgraded with automated switches and monitors a voltage ampere reactive (VAR) control. AMI includes 600,000 smart meters with customer systems including in-home displays, smart appliances, and programmable communicating thermostats (PCTs). A time-based rate program pilot will assess demand response and customer acceptance. Overall, the project improves distribution system reliability, operational efficiency, and power quality, and assists customers to make more informed decisions about electricity usage to control costs and bills.

Smart Grid Features

Communications infrastructure includes the deployment of a radio frequency mesh network for two-way communication and data transfer between the smart meters and collection points. The collection points are connected to the meter data management system via a wireless area network utilizing global systems mobile communication, code division multiple access, or Ethernet.

Advanced metering infrastructure includes the deployment of 600,000 smart meters for more than 25% of DTE's electric customers. The smart meters are equipped with wireless communication for data transfer with the communications infrastructure as well as support for home area networks and integration with back office systems.

Advanced electricity service options include home area networks, 1,050 in-home displays, 1,050 PCTs, and 300 smart appliances. These devices facilitate two-way information exchange between the customers and the utility while enabling the customers to better manage their electricity use and costs through appliance control. In addition, DTE offers a pre-pay pricing program to customers to help them better manage their electricity costs.

Time-based rate programs include time-of-use rates, and time-of-use rates with critical peak pricing.

At-A-Glance

Recipient: Detroit Edison Company

State: Michigan

NERC Region: ReliabilityFirst Corporation

Total Budget: $169,133,271

Federal Share: $83,828,878

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

Equipment

- 600,000 Smart Meters
- AMI Communication Systems
  - Meter Communications Network
  - Backhaul Communications
- Meter Data Management System
- Home Area Networks
- Customer Web Portal Access for 5,000 Customers
- 1,050 In-Home Displays
- 1,050 Programmable Communicating Thermostats
- 300 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
- Equipment Condition Monitors Substation Automation Equipment for 11 out of 716 Substations
  - SCADA Communications Network

Time-based Rate Programs Targeting up to 5,000 Customers

- Time of Use
- Critical Peak Pricing

Key Targeted Benefits

- Reduced Meter Reading Costs
- Reduced Operating and Maintenance Costs
- Reduced Electricity Costs for Customers
- Improved Electric Service Reliability and Power Quality
- Reduced Costs from Equipment Failures
- Reduced Greenhouse Gas and Criteria Pollutant Emissions
- Reduced Truck Fleet Fuel Usage

Detroit Edison Company *(continued)*

Distribution automation systems provide fault location, self-healing systems, switching, model-based load flow analysis, restoration management, condition-based maintenance, and integrated VAR control. This will be accomplished using supervisory control and data acquisition (SCADA)-enabled devices, substation instrumentation, circuit upgrades, and a central distribution management system. Circuit upgrades include remote controlled and monitored switches, automatic pole-top switches/reclosers, remote terminal units, and intelligent electronic devices. Expected improvements include power quality and reliability for residential, commercial, and industrial customers and real-time information for optimized asset utilization, operating efficiency, and resiliency to system disturbances and outages.

Distribution system energy efficiency improvements involve the integration of automated capacitors with SCADA's power quality monitoring capability. The capacitors improve voltage, VAR control, and power quality and increase distribution capacity by reducing energy losses on the distribution system.

Consumer Behavior Study

This effort involves two studies. The first, an experimental study, assesses how residential customers respond differentially to their existing inclining-block rate vs. time-of-use rate with a critical peak pricing overlay on an opt-in basis with differential access to alternative education material and/or use of information technology (in-home displays), control technology (PCTs), or both. The second, called an informational study, contains two key elements: (1) assess how residential customers accept and respond to a pre-pay option with one-half of the customers remaining on their existing inclining-block rate with the other half assigned to a time-of-use rate with a critical peak pricing overlay with control technology (PCTs); and (2) assess customer response to a time-of-use rate with a critical peak pricing overlay with smart appliances (refrigerators, dishwashers, and clothes washers and dryers).

Timeline

Key Milestones	Target Dates
AMI asset deployment begins	Q1 2009
Distribution automation asset deployment begins	Q2 2010
AMI asset deployment ends	Q2 2012
Distribution automation asset deployment ends	Q4 2012

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