

Houston Brings Its Grid Into the Digital Age

CenterPoint Energy's advanced metering system will benefit consumers, retail electric providers and the utility.

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CREATING AN ADVANCED METERING SYSTEM IS THE FIRST STEP IN DEPLOYING A SMART GRID.

CenterPoint Energy Inc.'s (Houston, Texas, U.S.) electric transmission and distribution subsidiary, CenterPoint Energy Houston Electric, LLC, has embarked on an effort to create an advanced metering system (AMS) of more than 2 million electric meters across its 5000-sq mile (12,950-sq km) electric service territory.

CenterPoint Energy and its predecessor companies have been delivering electric service to the Houston area for more than 130 years. To keep up with the region's growing power demands, meet the needs of its technically savvy and conserva-

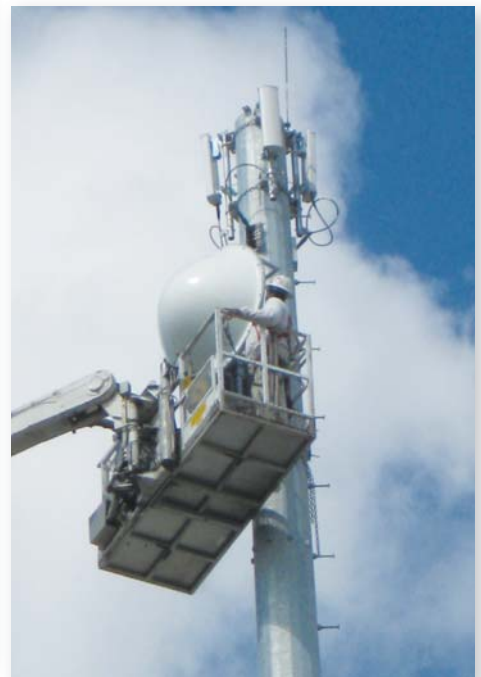
tion-minded consumers, and address its aging infrastructure, CenterPoint Energy is undertaking an innovative, long-term strategy that will employ several integrated technologies to bring its electrical grid into the digital age.

LINKING ELECTRICITY AND COMMUNICATIONS

In early 2009, CenterPoint Energy announced Energy InSight, a program designed to highlight the utility's smart grid initiatives, including AMS, and to integrate the technologies necessary to transform the way energy is bought, delivered and used by consumers, retail electric providers (REPs) and the electric utility. For Houston-area consumers, AMS



Construction of the takeout point tower (metal pole) at the Dunlavy substation. Before its construction, CenterPoint Energy performed radio signal tests and checked signal strengths to select the remote sites associated with this takeout point.



This takeout point tower closeup shows three WiMAX antennae at the pole top.



This pole-mounted cell relay and radio in a Houston neighborhood includes (from bottom to top) the weatherproof enclosure for the MDS Mercury 3650 radio, the Itron cell relay weatherproof enclosure and the bottom of the WiMAX antenna.

would provide user-friendly access to detailed consumption information so they could make informed choices, enable and promote energy conservation, and in the future, facilitate faster transactions.

For REPs, AMS would expand their ability to develop new service offerings, including time-of-use rates and critical peak pricing, and to establish a platform to offer future home appliance monitoring and control. An environmentally friendly solution, AMS also would enable demand-side management, facilitate the integration of solar and wind generation into the grid, and promote energy efficiency through greater awareness of energy consumption by consumers.

For the electric utility, the future smart grid would enable more effective loading of utility assets, increase proactive monitoring and diagnostics to enhance the life of utility assets, such as lines and transformers, and improve line fault detection and diagnostics.

CenterPoint Energy's first step was to obtain approval for a strategy to deploy an AMS using OpenWay smart meters from Itron (Spokane, Washington, U.S.). In December 2008, CenterPoint Energy received approval from the Public Utility Commission of Texas for the AMS deployment plan and a request for surcharge on more than 2 million meters across its service territory over five years. The capital expenditure for this project is approximately US\$640 million and includes the installation and complete integration of the OpenWay meters, communications technologies and back-office systems, including a meter data management system. The utility will recover the cost of the AMS system through a monthly surcharge to REPs for 12 years. In February 2009, a monthly surcharge of



A closeup view of the MDS Mercury 3650 radio in the weatherproof enclosure (with the door open) on the utility pole.

\$3.24 per month for each residential meter was implemented. After 24 months, the surcharge will be lowered to \$3.05 per month.

CenterPoint Energy selected a number of technologies to create its AMS solution. These include, among others, the Itron OpenWay meter and meter data collection system, the eMeter (San Mateo, California, U.S.) Meter Data Management System, IBM's (Armonk, New York, U.S.) Tivoli for system monitoring and GE Digital Energy's (Markham, Ontario, Canada) MDS Mercury 3650 radio system for communications. In addition, IBM was chosen as the system integrator for the AMS program.

▲ COMMUNICATIONS INFRASTRUCTURE

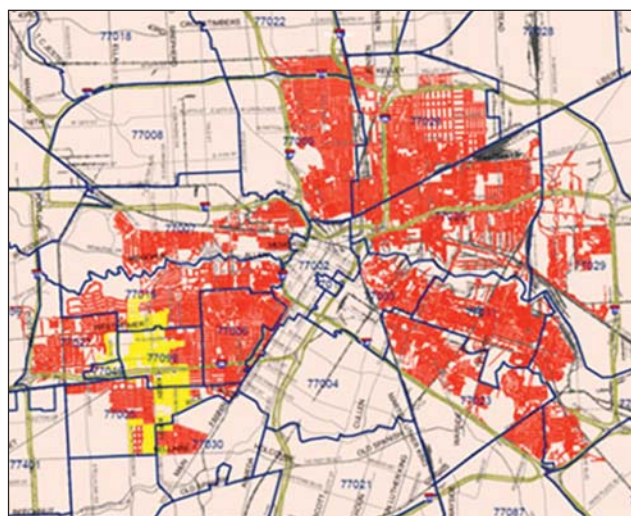
Key to any AMS is the retrieval and collection of meter data. In that regard, the challenge for CenterPoint Energy was how to connect the 7000 OpenWay meter data collection devices planned to be located throughout the service territory and communicate with the meters being deployed in its private network. CenterPoint Energy considered a number of different communications technologies. Critical to the selection of a technology and vendor were the following minimum requirements:

- Support for cyber-security standards
- Support of open networking standards and protocols
- Ability to provide high reliability and system availability
- Ability to provide the bandwidth for network loading and future network capacity
- Robust network management tools and processes
- Proven track record satisfying the needs of utility communication systems.

The system had to be scalable to support the build-out over a five-year period, and it had to be rugged enough to withstand Houston's harsh weather conditions, including heat, humidity and hurricanes. CenterPoint Energy chose GE Digital Energy's MDS Mercury 3650 radios for the AMS communications network to provide network connectivity from the meter data



The first smart meter installation at a home in Houston took place in February 2009.



As shown in CenterPoint Energy's 2009 Smart Meter Deployment Map, 145,000 meters are expected to be installed by the end of 2009. The installation of smart meters began in central Houston and has moved outward based on meter-reading routes.

thermostat, which will allow consumers to make informed decisions for energy conservation.

THE DEPLOYMENT

The AMS deployment started in January 2009, with the first meter installed by March 1. On August 1, CenterPoint Energy had a functioning AMS and had deployed more than 45,000 meters, more than 300 data collection devices and the associated communications, along with the Itron and eMeter systems needed to manage the meter information. By the end of 2009, the CenterPoint Energy AMS deployment will have expanded to include more than 145,000 meters and 745 meter data collection devices. All of this is made possible through the use of a rigorous project management methodology that centers around a plan–design–deploy–operate framework.

The overall health of the program implementation is

collection devices to CenterPoint's existing private network. In addition, GE Digital Energy is providing the engineering, program management and support services to build out the WiMAX network and make it a reality.

HOW THE AMS WORKS

The AMS network collects data from the OpenWay meters and passes it to the meter data collection devices over a wireless mesh network. When installed, each of the 7000 meter data collection devices will connect to an MDS Mercury 3650 WiMAX radio, which will transmit the meter information to one of approximately 100 radio access points. The meter information will then be transmitted to CenterPoint Energy's data center, where it will be stored and processed.

The OpenWay meters have the ability for storing energy-use data in 15-minute intervals. An application will poll each meter three times daily to upload the consumer's energy-use data. The meters also have embedded communications enabling a home area network to connect to smart energy management devices throughout the home, such as a smart

Electric Reliability Council of Texas

The Electric Reliability Council of Texas (ERCOT; Austin, Texas, U.S.), the independent system operator for the region, is responsible for managing the flow of electric power to 22 million Texas customers. The ERCOT region represents 85% of Texas' electric load and 75% of the Texas land area. ERCOT schedules power on an electric grid that connects 40,000 miles (64,374 km) of transmission lines and more than 550 generation units. ERCOT also manages financial settlement for the competitive wholesale bulk-power market and administers customer switching for 6.5 million Texans in competitive-choice areas.

ERCOT's members include consumers, cooperatives, independent generators, independent power marketers, retail electric providers, investor-owned electric utilities (transmission and distribution providers) and municipal-owned electric utilities.

In the Texas competitive electric market, there are three main entities: the electricity producers, the wires companies and the retail electric providers (REPs). The producers generate the electricity transmitted by the wires companies, such as CenterPoint Energy, which own and maintain the poles, wires and meters, and perform the meter reading. The wires companies then transmit the usage data to ERCOT, which is responsible for settlement and billing with the entities that schedule electricity on the grid.

Based on the usage data and the rate charged, REPs bill the customers. Different REPs have different prices for electricity. They may have point-to-point contracts — where they pay a fixed price for electricity — or they may also buy the spot market — where the price fluctuates hour by hour. Before deregulation, these functions were all part of a vertically integrated electric utility. In the restructured competitive market, generation, transmission and distribution, and retail have been "unbundled," allowing competition among generation and retail providers while T&D remains regulated under the Public Utility Commission of Texas. As the grid operator and manager of the wholesale market, ERCOT ties all three entities together.

tracked weekly and includes an assessment of stakeholders, financials, schedule, scope, staffing, risks and issues, deliverables and technology. GE, Itron and IBM are supporting the AMS program not only through project management, design and field support services, but also by contributing to CenterPoint Energy's AMS operations planning efforts.

CenterPoint Energy's AMS, through the Energy InSight program, will help transform the purchase, delivery and use of energy. On-demand transactions and near-real-time services — such as automated outage notification, remote meter reading and remote connect/disconnect — will require new business processes. CenterPoint Energy's AMS is the first step in delivering the integrated set of Energy InSight technologies envisioned as part of the utility's corporate smart grid strategy.

TDW

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