

# CenterPoint Energy breaks new ground in grid reliability through the power of automation

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## Overview

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### ■ **Business Challenge**

*Like the rest of the electric transmission and distribution industry, CenterPoint Energy needs to deliver power more efficiently and reliably in the face of growing consumer expectations, environmental concerns and increasing costs. The company also saw the opportunity to break new ground in grid management practices.*

### ■ **Solution**

*Subject to approval by its regulators, CenterPoint Energy plans to leverage a mix of leading edge communication technologies, smart meters and first-of-a-kind process innovations to create one of the industry's first intelligent utility networks. This mix of advanced technologies, which utilizes a service-oriented architecture (SOA) foundation, will enable near real-time data access and automated processes for a new level of grid reliability, fewer outages and faster response.*



*CenterPoint Energy's electric operations unit delivers electricity to 2 million customers in a 5,000-square-mile area that includes Houston, the nation's fourth largest city. CenterPoint Energy (NYSE: CNP) owns and maintains 3,766 miles of transmission lines and 46,376 miles of distribution lines—enough to go around the world twice—and delivers over 76 million Megawatt hours of electricity annually.*

### ■ **Key Benefits**

- *Reduction in the frequency and duration of power outages through proactive management and automated response*
- *Overall increase in meter reading and grid management efficiency*
- *Near real-time electric use data provided by smart meters to the utility and to the consumer*
- *Extended asset life for distribution and substation equipment through remote monitoring and diagnostics*

When it comes to the electricity that powers homes, schools, businesses and hospitals, most people have little more than a fuzzy idea of what's involved to get it there. This ambiguity disappears when it comes to their expectations, however. They expect the power to be there when they need it, and if it's not, they want the problem fixed as fast as possible—period. In the greater Houston area, it's the responsibility of CenterPoint Energy's ([www.CenterPointEnergy.com](http://www.CenterPointEnergy.com)) electric transmission and distribution business unit to meet this expectation for 2 million customers. The company

## Setting the foundation for a more efficient, reliable power grid through automation

### Potential Market Benefits

- Greater electric reliability—reduction in the frequency and duration of power outages through proactive management and automated response
- Potential for retail energy providers to increase new time-of-use rate structures and additional services
- Increase in customers' ability to manage their own demand for power, which may encourage greater energy conservation

owns and maintains the grid of power lines that connect electric generators to users. One of the outcomes of electric restructuring in Texas in 2002 was the creation of a new layer in the market, comprised of competitive retail electric providers that sell power and services directly to customers and, in effect, pay CenterPoint Energy (CNP) for the use of its power lines.

While a new electricity market in Texas was perhaps the most visible outcome, a changing regulatory environment—both at the state and federal level—also intensified the challenges that CNP faced as a business. Like other transmission and distribution providers around the country following the Northeast blackout in 2003 and the severe hurricane seasons in 2004 and 2005, CNP was looking for ways to “harden” the grid by making it better able to resist outages and fluctuations in power quality.

As envisioned in the U.S. Department of Energy’s “Grid 2030” plan, the goal was to bring many of the defining attributes of the information superhighway—such as resiliency and intelligence—to the nation’s electrical grid. Regulators were also encouraging changes on the demand side, most notably giving electricity consumers the means to change their consumption patterns based on near real-time usage data, transparency and time-of-day pricing—all of which will allow the consumer to be an interactive participant in the electric market. While the future vision was clear, the best way to implement it was anything but.

### CenterPoint Energy’s business challenges

CNP faced a series of operational challenges. For one, material costs—driven by the growing demand for transformers, cables and conductors, as well as increases in the costs of the copper, aluminum and steel they are made of—continue to rise, along with franchising fees and taxes.

CenterPoint Energy also realized that only a fundamental change in its business and operational structure would provide a viable, long-term answer. What makes this story stand apart, however, is that CNP opted for revolution over evolution by resolving to comprehensively change the way it operates. Looking beyond short-term strategies, the company saw its challenge as an opportunity to provide much-needed leadership for an industry in flux, and saw IBM as the ideal organization to help it articulate and realize its vision of a next generation power grid.

Drawing upon expertise and technology from nearly every part of IBM, CenterPoint Energy established a roadmap for building an Intelligent Utility Network, or IUN. Traditional grid management systems provide only the most basic information on operational status and have no way to gather information from—or deliver information to—the homes and businesses they serve. As such, they enable only a limited

*“We expect that the Intelligent Grid will improve electric power line grid planning, operations, and maintenance, enabling us to deliver power more efficiently. We also expect the technology to contribute to fewer and shorter outages.”*

– Tom Standish, Group President,  
Regulated Operations,  
CenterPoint Energy

“top-down” view, with essentially no rapid view from the “bottom up.” Today, field crews must be on site to identify the location and cause of power outages. In the future, technology will pinpoint the outage location. The core premise of IUN is that by improving the transparency of the entire grid—to the meter and beyond—energy delivery companies like CenterPoint Energy will have a more granular, real-time view of conditions on the grid. This will vastly improve the ability to leverage information, make the grid more reliable and operations more efficient.

While the broad goals embodied by IUN are not new, their realization has been held back by technological barriers, the most fundamental being the lack of a viable communications infrastructure that spans the distance from a utility’s backend systems to its customers’ meters. While utilities may be able to detect a problem using their current systems, they are often unable to ascertain the nature of the problem until crews arrive on-site. It is because of this gap that utilities like CenterPoint Energy are forced to rely on physical visits by field staff to diagnose and fix problems, as well as to activate/deactivate service and read meters.

#### The solution

Designed in collaboration with IBM, CenterPoint Energy’s proposed IUN solution will address these issues through the innovative application of leading-edge technologies—including broadband over power line (BPL)—and its work with IBM Research to develop first-of-the-kind failure detection capabilities that go beyond what was previously thought possible. The fact that BPL, which sends a broadband signal over distribution wires (utilizing solutions from IBM Business Partners Corinex and Artech), leverages CNP’s existing assets is just one benefit. The bigger story is how the company’s future BPL infrastructure, when deployed by IBM Global Technology Services, will provide a single conduit for a wide range of grid-related activities, with advanced meter services, the use of the meter as a sensor on the grid (with its own address), and the deployment of home area network monitoring and control representing prime examples.

Using meters from IBM Business Partner Itron that have two-way communications capability, CNP has successfully tested automated meter reading as well as more advanced capabilities such as remote connection and disconnection of service, both of which promise to reduce the incidence of costly “truck rolls” to the customer’s premises. Meter data management software from IBM Business Partner eMeter (running on IBM BladeCenter® servers and managed by IBM Global Services Strategic Outsourcing) will control the flow of meter data to and from CNP’s backend systems. The fact that these meters have the built-in capability to wirelessly send and receive data with everything from individual appliances to thermostats within customers’ homes and businesses opens up a range of new service opportunities down the road.

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### Solution Components

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#### Software

- IBM WebSphere® Message Broker

#### Servers

- IBM BladeCenter

#### Services

- IBM Global Business Services
- IBM Global Services Strategic Outsourcing
- IBM Global Technology Services
- IBM Research

#### IBM Business Partners

- Itron, Inc., eMeter, Corinex, Artech
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*“While we see this initiative as helping to transform us as a company, many of the results and innovations that come out of it will help to transform the energy transmission and distribution industry as a whole.”*

– Don Cortez, Division VP,  
Operations Technology,  
CenterPoint Energy

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### Smarter power

As part of its pioneering deployment of an intelligent utility network, CenterPoint Energy will be putting in place an SOA framework that will better enable a wave of innovations, including a first-of-a-kind outage detection capability that features self-healing within the grid and fully automated dispatching.



One of the key insights in the project was that simply having a communication infrastructure wasn't enough when it came to supporting its future service requirements. Instead, CenterPoint Energy needed an architecture with the inherent flexibility to support a growing number of services and thus fully leverage its communication backbone. To that end, IBM Global Business Services will be designing a service-oriented architecture (SOA)-based service delivery framework that employs IBM WebSphere Message Broker as an enterprise service bus to enable different services to share grid data in real time. Using this framework as a foundation, the IBM-CNP team will be able to redesign and automate many of the core processes used to manage the grid. The most revolutionary improvement will be in the area of fault detection. Using data gathered from first-of-a kind analytical techniques developed by IBM Global Business Services and IBM Research, CNP will be able to not only detect problems, but also to diagnose faults and their precise location so it can send the right crew with the right equipment to fix the problem.

Complementing this quantum increase in grid transparency are process automation efforts designed to drastically cut the duration of outages and to mitigate their effects on customers. Automation will not only let the company operate more efficiently, but will also provide the basis for a self-healing capability within the grid. The proposed solution, when approved by the company's regulators, will detect outages the moment they happen—enabling the system to reroute grid traffic around the problem automatically to minimize its impact.

As a storm-prone city situated on the Gulf Coast—and the home to a large base of energy-hungry businesses—Houston is the ideal testing ground for one of the world's first true IUN solutions. Don Cortez, Division VP, Operations Technology, and a driving force behind the IUN project, sees CenterPoint Energy's work with IBM as strengthening the foundations of its business and providing leadership for other transmission and distribution service providers around the world. "We're working to implement all those things that people dream about in a newly deregulated energy market—all very new ideas," says Cortez. "With its unparalleled track record in translating technology innovation to sustainable market success, we saw IBM as the right kind of partner to help us succeed."

#### **For more information**

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