

# Smart Grid, Texas-Style: Teamwork Prevails

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“TXU Electric Delivery made history on Wednesday, January 31 and, by design, nobody noticed.”

Those words begin a letter the Dallas-based utility sent out to local officials and others to commemorate a noteworthy first-time event. The utility’s broadband-over-power-line (BPL) network sensed a problem and alerted engineers to impending trouble well before the failing equipment could cause customers inconvenience.

This happened almost as soon as engineers flipped the switch to activate the BPL network in the affected area. When utility workers investigated the potential problem sensors detected, they found a loose split-bolt connector on a neutral wire. Line workers replaced the failing equipment before any customers called in with complaints about flickering lights.

It’s one thing to fix a problem once customers wind up in the dark. It’s another to prevent breakdowns from happening in the first place.

That’s a primary goal for staff at TXU Electric Delivery, Houston-based CenterPoint Energy and several other organizations focused on getting intelligent grid applications up and running in the Lone Star State.

Advanced metering is one of the first technologies that will be deployed to support the grid of the future. Still, metering alone won’t do the trick. Smart-grid applications cover multiple technologies, so various players must join together to develop them. That’s what’s happening in Texas, where utility professionals, university thinkers, product developers and others are banding together to make the smart grid real.

## **Putting Building Blocks in Place**

“There are three main components of the intelligent grid,” says Don Cortez, CenterPoint’s vice president of distribution support. “The first is the communication system. Second is the advanced metering infrastructure. The third component is the grid devices that help you manage the grid better.” Those devices can include equipment such as pole-top switches, which are now planned as an early grid enhancement for this utility.

But, first, there’s the metering.

Last year, Cortez reports utility managers tested CenterPoint’s BPL communication network, which serves as the backbone of the intelligent grid for both CenterPoint and TXU. “You really need a robust communication system to handle intelligent grid applications,” Cortez explains.

To test the reliability of the Corinex Communications network, utility managers read a few hundred advanced meters every 15 minutes for six months, and they double-checked the reads manually. The system performed flawlessly, Cortez says. The only errors recorded were human flubs, not technological glitches.

Now that the network has proven itself trustworthy, CenterPoint is gearing up to install 10,000 meters by the end of March 2007. This may not sound like much from the third-largest gas and electric delivery company in the United States, but Cortez explains that utility managers are moving slowly in planning stages so that they can quickly deploy their meters in the near future.

“When we talk about a five-year deployment, we’re talking about installing 50,000 meters a month,” he notes. That, in itself, requires an automated process, and the utility is carefully studying its smaller pilot to fine-tune procedures.

TXU Electric Delivery has more AMI devices already deployed. Systemwide, the utility has 300,000 advanced meters communicating over two technologies: BPL from Current Communications, and a power-line carrier system from Distribution Control Systems, Inc. (DCSI). By year-end, the company will have an additional 500,000 meters installed, and managers hope to complete change-out of all three million meters by 2011.

Not surprisingly, both TXU and CenterPoint are wrangling all the data from their meters and related systems into meter-data management systems. Both have selected e-Meter as the MDM system provider. “We felt that having one operating system was an appropriate approach,” CenterPoint’s Cortez says about his utility’s choice.

All of these details are the nuts and bolts realities of such ambitious projects. The real meat of these projects, however, is in the ultimate vision utility managers share.

### **Team Dream**

“An intelligent grid would provide us with on-demand data and information that would improve electric power-line grid planning, operations and maintenance.” Cortez says. “This would contribute to fewer and shorter outages, better customer service, improved operating costs and high productivity.”

These are lofty goals, and neither CenterPoint nor TXU is trying to reach such aspirations alone.

Bill Muston, research and development manager for TXU Electric Delivery can tell you about many team efforts in which his utility participates. For instance, the DCSI part of that utility’s metering network doesn’t have as much bandwidth as the BPL end, so TXU and DCSI are working together on what Muston calls distribution-automation functions. “We don’t have anything we can talk about yet.”

Another project is one supported by TXU, as well as 10 other utilities, the Electric Power Research Institute (EPRI) and scientists at Texas A&M University, which is the venture’s prime contractor. Called the distribution fault anticipator, this application looks at “noise on the distribution feeders, or signals that are not the regular 60 hertz signals” utility engineers expect, Muston says.

The goal of that project, he explains, is to see if those signals can be interpreted enough for diagnostic use. Researchers want to determine “if the signals are giving us any indication about equipment that could be degraded or failing, so we’ll know ahead of time and go out and replace equipment before there actually is an outage.”

Having diagnostic information is great. Even better: being able to automate part of the restoration process. To that end, TXU Electric Delivery has already started installing S&C’s IntelliTEAM switches, which have built-in communication capabilities, enabling them to essentially talk to each other.

“They’re set up to work autonomously, without an operator,” Muston explains. “They can determine if a fault occurred between two switches and, if it did, they can reconnect customers to power supply from another feeder.”

CenterPoint is working on deploying and testing pole-top switches on medium-voltage lines that could be controlled from a central location. Cortez explains that such technology would allow engineers to “isolate a problem area and switch around it.” He considers this part of an even

bigger aim: a self-healing grid.

Along with projects being pursued independently, CenterPoint and TXU are among founding members of the Center for the Commercialization of Electric Technologies, a non-profit organization aimed at developing smart grid technologies. The organization enjoys the brainpower of several Texas utilities, as well as universities and industry vendors such as Freescale Semiconductor and Itron.

Among the applications under development through CCET, you'll find:

**A sensor-development project:** "Part of making the system smart and automated is being able to monitor things like current and voltage disturbances," says Milton Holloway, CCET's chief operating officer. Referencing the number of feeders that traditionally leave substations, Holloway maintains that, "If you want to know what is happening out there, it means a lot of new devices." That, in turn, means the new devices must be "low-cost and efficient." Development efforts in this area are just now in discussion phases.

**Smart-meter enhancement:** As Holloway explains, the problem CCET members are trying to address is how to replace old technology with new, without having to reinstall meters or even go out to visit them physically. "If you get a smart meter today, and there's a smarter one tomorrow, it would be nice to avoid having to replace the whole thing," he says. "This project is about designing a chip or something that will allow utility managers to upgrade" via downloads from the metering network.

**A Demand-Response Pilot:** Holloway says his group hopes to have two locations covered in a demand-response pilot — Dallas and Houston. Mostly, it's a technology trial, he adds. CCET members hope to start the pilot this summer, although plans are not yet finalized.

### **Bringing the Smart Grid Home**

If demand response programs do rollout in Texas, it won't be CenterPoint or TXU Electric Delivery offering them. Both of these organizations are wires companies. That is, they exist in a restructure marketplace, where the utilities that operate the transmission and distribution systems don't also sell power to end-use customers. Retail Energy Providers (REPs) handle that job.

Still, that doesn't stop managers at these two wires companies from including business and residential customers in their intelligent-grid plans.

According to Muston, managers at TXU hope retail energy providers will take the data from the advanced metering system and offer customers options such as time-differentiated or critical-peak pricing designed to shave peak loads by lowering demand in high-use hours.

According to Cortez, similar goals exist at CenterPoint. "We, as a company, have a responsibility to be the enabling platform for things to occur that will make the market work better."

CenterPoint has been having workshops with REPs, partly to spread the demand-response gospel, and partly to get retailer input and support for technological advancements. "Since we have to build the metering network, we may as well build it from a collaborative standpoint," Cortez explains. "It's important that all stakeholders participate."

On the residential customer end, CenterPoint is using Itron's OpenWay meters, which will be able to communicate to household devices, such as pool pumps or air conditioners, through built-in communications capabilities that work via ZigBee protocols. That sets the stage for load-shedding programs, which could give customers rate breaks while energy providers catch some peak-load relief.

"A smart grid not only enables the utility to better manage the grid, it also enables customers to

participate in energy markets," says TXU's Muston. "If you have meters you can read hourly, you have data to show when customers use energy and you can bill them accordingly."