

# A Smart Grid for Smart Texans

An interactive, digitized, intelligent electric grid vision is becoming reality at Oncor, the largest distribution and transmission company in Texas, USA. Oncor's smart grid will connect power providers and customers to improve reliability in the deregulated ERCOT market and service across the Oncor system.

By Dana Desonie



Photo: Jared Moosy/Redux



The Oncor building in downtown Fort Worth.



The control room: Smart grid management means calm in the eye of the storm.

## “A smart grid ensures reliable, safe transmission and distribution.”

Keith Hull, Vice President, System Operations, Oncor

Dallas, Texas, USA: Alarms blare and power flickers. An operator’s attention bounces between six computer screens, three keyboards, four mice and another two or three computers nearby. From as many as ten disparate applications, the operator gathers information. Then, in the wake of his rapid-fire decisions, he radios his plan and priorities to workers in the field. “Extreme chaos,” says Keith Hull, Vice President, System Operations at Oncor, to describe an electrical control center during a raging storm. The Oncor service territory is larger than some European countries, with a seasonal challenging weather pattern. The ability to target storm recovery workforce based on real-time system information, including distribution analysis, improves system restoration time – hence improving reliability, workforce management and service reliability. So imagine the same storm, but with real-time integrated workforce management of the electrical grid. Multiple user interfaces are replaced by just

one keyboard and one mouse. Although the data stream is no less rapid, new information comes in systematically and intelligently, allowing operators to make decisions with even more confidence. With a smart grid, “operators have at their fingertips the control to manage and operate the grid,” says Hull. “They know who’s closest to trouble, and they can move resources to the appropriate places.” Real-time system information combined with detailed analysis enables the smart grid system to analyze and prioritize decisions. The ability to combine real time and huge data management is a key portion of an intelligent electrical system that, combined with experienced understanding of operations from Siemens, gains the most benefit from smart grids. They encompass the entire electricity production and distribution chain, streaming electricity in from various power generation sources, through multiple networks, and branching out to millions of consumers. A smart grid for

an electrical utility like Oncor, explains Hull, “is everything you could want for reliable, safe electrical transmission and distribution.”

### Get Smart

Leading the industry in adopting smart grid technology is Oncor, the sixth-largest distribution and transmission company in the United States. After installing its first smart grid components ten years ago, the company saw that to realize its full potential, it would require automated end-to-end information flows. Four years ago, Oncor began consulting with Siemens Energy – its real-time transmission management provider – who with Oncor created a solution that included the engineering and geospatial software provider, Intergraph, to determine how to integrate fully the grid’s outage, mobile workforce, and distribution management systems. This is the latest phase of a long-term relationship between Oncor and Siemens. “We see them as a real go-

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ahead utility,” says Dave Pacyna, Senior Vice President and General Manager of the NAFTA Transmission and Distribution Divisions of Siemens Energy, Inc. “Oncor takes very calculated, risk-managed advances that benefit its consumers.” Oncor, Siemens and Intergraph then formed a partnership to create an off-the-shelf, fully integrated distribution management system (DMS). The DMS includes Siemens’ advanced distribution network applications along with Siemens real-time D-SCADA system, replacing the current system – combined with Intergraph’s InService mobile workforce management (MWFM), deployed in December 2008, which each day facilitates automatic dispatch of about 15,000 service tickets (plus maps, visuals, and GPS tracking) to the more than 1,300 field crews via mobile devices. Intergraph’s InService outage management system (OMS) and Siemens SpectrumPower distribution supervisory control and data acquisition (D-SCADA) integrated solutions will be rolled out

this year. OMS provides operators with complex grid and outage data and also allows interaction with smart meters. D-SCADA informs operators of network conditions, even setting off alarms as needed. Siemens’ Spectrum Power DNA, also due out in 2010, converts the enormous amounts of data that are received – from more than 3 million smart meters, 1,200 distribution-controllable devices, and 3,100 controllable capacitors – into useful intelligence for operators. Once this rollout is complete, approximately 2,000 linemen and measurement personnel plus more than 50 dispatch operators will be on the integrated DMS.

### The Smart Grid’s IQ

With two-way communication, smart grids immediately alert operators to grid problems. More efficient handling of network interruptions means that the outage minutes are reduced. “The quicker we can deduce what is going on in the grid, either proactively or reactively, and respond with the right per-



Keith Hull in his office at the Oncor building in downtown Fort Worth.

sonnel and with the right equipment,” says Hull, “the more reliable power we’re ultimately going to provide.” To keep electricity flowing in an emergency, multiple autonomous control centers can be connected to the smart grid. Oncor has two control centers in different locations in Texas; either one can take over if the other goes down, as might happen in a severe storm such as a hurricane, tornado or winter weather event. With one center operating, the other, disabled center can connect back to the grid and become functional again quickly. This provides an invaluable safety net to utilities and their consumers. Mobile workforce management allows operators to handle complex scheduling and dispatch. MWFM is especially important in larger countries, where a distribution transformer may be over 200 miles from its consumers, leading to imbalances in the grid. In some parts of the United States, says Pacyna, distribution feeders “are larger than a country in Europe.”

Optimization of the customer’s connection to the grid, the shortest route to more efficient power consumption, allows for less waste in the system. Smart grids lessen the need for spinning reserve – extra capacity kept available just in case – that can be allocated for demand response. In addition, smart grids provide multiple ways of being more efficient in load management.

### Smarter Power

In 2005, the Texas Legislature mandated utilities to be greener at both ends of the supply chain, to develop transmission lines for wind power, and to adopt smart meters. On the production end, smart grids are essential for integrating renewable energy sources into the network. Two important resources, solar and wind, are variable: the sun may be out, it may be cloudy, or it may be nighttime; wind may be gale force or nonexistent. Renewables can be generated by large power sources, such as solar or wind

parks, or small ones, such as rooftop solar panels or microturbine generators. A smart grid affords the utility more control, “like a yin and yang between generation and consumption,” explains Pacyna. The smart grid will enable Oncor to assist in more than doubling wind power production in Texas. The state’s legislature designated the Texas plains region, with its near-constant gusts, a competitive renewable energy zone (CREZ). Wind power will be collected in the CREZ and then transmitted across the state to major load centers. To transport the power, Oncor is constructing 800 miles of transmission lines to help increase wind production to 18,000 MW by 2013 when 2,200 miles of new transmission construction will be complete. On the consumer end, smart meters provide two-way communication between a home or business and the utility. Operators will eventually know within minutes if the power goes out; no longer must they wait for a phone



Workers at Oncor train on the new Siemens software.

call from consumers. Like any electrical meter, smart meters measure power consumption, but in Texas they report it every 15 minutes. Studies show that consumers can reduce their electric bills by about 10 percent and can save expensive units from being energized. Fewer new power plants will be needed, if peaks in demand are flattened and consumption is more consistent throughout the day. By 2012, Oncor will complete installation of more than 3 million smart meters. The company has launched a consumer education program, so that users can get the greatest benefits from their metering technology.

### Encore Oncor

Meanwhile, the Obama Administration is calling for development of a smart grid nationwide. By conserving energy, smart grids reduce pollution and carbon footprints for the entire country. An increase in wind and other renewables could support expansion of low-

polluting technologies, such as plug-in electric vehicles. Using energy more efficiently will reduce the number of new power plants that will be needed in the future. Clearly, 21<sup>st</sup>-century goals require 21<sup>st</sup>-century technology, including intelligent, real-time operations of the electrical grid. “Oncor, Siemens and Intergraph are deeply committed as a team to providing this new technology to help Oncor and the others who want to become a part of it,” says Hull. “We will work well together to devise and develop these smart grids.”

*Dana Desonie sees great potential for renewable energy from her home in Phoenix, Arizona, USA, where the sun shines an average of 334 days a year. She is a freelance writer specializing in earth and environmental sciences for academic, educational and popular publications.*

### Glossary

- **Smart Grid:** Uses two-way digital technology to allow operators and users to keep track of power flowing into, through and out of their systems. They facilitate integration of renewables, reduce waste, increase efficiency and reduce costs.
- **Smart Meter:** An electrical meter that communicates customer power usage in near real time to the utility.

For further glossary terms see: [www.siemens.com/glossary](http://www.siemens.com/glossary)

### Further Information

[www.siemens.com/energy](http://www.siemens.com/energy)