Quarterbacking the Grid

By Lisa V. Wood, executive director of IEE and vice president of The Edison Foundation.

The electric power sector's recent investments in new and innovative grid technologies are often described in broad terms such as smart grid and big data. But these terms do not adequately describe the actual advancements made to the grid or the resulting value to the customer. The reality is that today's grid is far more resilient and reliable than ever before, and customers have a multitude of energy management options.

With over 45 million smart meters installed in the United States, dozens of utilities are now providing customers with an unprecedented view into their energy usage (often at 15-minute time intervals), enabling them to understand their usage relative to their neighbors, develop budget or energy savings goals, and receive alerts regarding their monthly usage. But, by networking smart meters with thousands of sensors at key points in the grid—substations, transformers, local distribution lines, and high-voltage transmission lines—utilities are enhancing the flexibility and resilience of the grid, improving the distribution system, and realizing even greater value from these combined investments.

IEE's Partner Roundtable brings together technology and utility executives to discuss innovations delivering value across the grid.

Investing in the Grid

For example, Florida Power & Light (FPL) has installed 4.5 million smart meters and more than 10,000 devices on its grid and is viewing and managing multiple smart grid applications atop a single network, including energy usage information from smart meters, distribution automation, and advanced smart grid analytics solutions. This unified platform approach expands the functionality and performance of FPL's distribution system, resulting in increased reliability, additional energy efficiency opportunities, and reduced operations and maintenance costs.

Benefits from this networked approach have already materialized. In 2012, instead of dispatching crews, FPL resolved 42,000 issues remotely, reducing the duration of outages by about two hours in each case. Sensors to monitor transformer health and performance have identified 400 ailing neighborhood-level transformers before they failed. And, following Tropical Storm Sandy, FPL communicated with customers' smart meters to confirm power was on, reducing repeat calls for unrestored outages by 51 percent.

Situational use of real-time data coming from meters and sensors is helping utilities detect outages and faults and restore power faster than ever before. Immediately following the immensely destructive EF5 tornado that struck Moore, OK, in May 2013, Oklahoma Gas & Electric (OGE) used data from smart meters to identify where the outages were in the aftermath of the storm. By overlaying information from the National Weather Service, the GIS system, and information from the meters, OGE was able to identify where the damage was, develop staging areas, deploy crews, and restore power. In this instance, shaving time off restoration was critically important to customers.

As technology companies work with utilities to ensure that the legacy equipment on the grid "talks with" more recent investments, a key step in the process is to develop a networked systems approach where data serve as the bridge. In the evolving optimization of the grid, one critical component is the communication between smart meters and outage management systems, so that power restoration is expedited and efficient and customers have a better sense of when power will be restored. Over the past few years, the term "smart grid" has evolved to mean a power system composed of resilient, communicating, and secure infrastructure.

Southern Company and Consolidated Edison are seeing dramatic differences in their outage prevention/outage mitigation capabilities from investments in distribution automation equipment—fault circuit indicators, synchrophasors, sectionalizers, reclosers, capacitor banks—that allow control center operators to detect a fault, isolate the problem, and reroute power. This capability improves grid resiliency and enhances value to customers.

While seemingly rudimentary, theft protection and asset management remain the low-hanging fruit of data analytics. For example, utilities like Commonwealth Edison are using smart meter data to pinpoint losses from electricity theft. At FPL, temperature sensors along the distribution system are used to identify stresses on assets to allow operators to modify circuit loading and notify asset managers of preventive maintenance needs.

Across the United States, utility investments in smart grid technologies are improving energy management, reliability, and grid resiliency. New grid technologies are allowing grid operators, restoration crews, and customer call centers to be more effective quarterbacks of the power grid. ◆

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