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## Grid expectations

*Emergence of the smart grid presents opportunities for electrical distributors.* by **Susan Bloom**

**Most Americans recall** the famous power blackout that enveloped the Northeast and parts of the Midwest in August 2003. Triggered when a power plant in Ohio tripped offline, the initial outage set off a domino effect of power loss as one backup transmission line after another got similarly overloaded and tripped offline in the summer heat. The impact? The outage, recorded as the second-most widespread blackout in history to that point, affected 45 million people in eight states and another 10 million people in Canada, leaving large chunks of North America without power for up to several days.

The Pacific Northwest National Laboratory recently estimated that U.S. power outages stemming from routine causes such as storms, damaged utility poles, animal interference, etc., cost the nation \$150 billion a year in lost productivity. Add to this the impact of extraordinary events like the one described above and power outages represent an even costlier and more critical threat to our nation's security and prosperity.

Outages, in fact, are so costly and disruptive that the federal government recently mandated measures to improve the efficiency and reliability of the nation's electricity transmission and distribution system. In 2007, the *Energy*

*Independence and Security Act (EISA)* established the need for investments to modernize the aging grid, while the subsequent *American Recovery & Reinvestment Act (ARRA)* backed those investment needs with \$4.5 billion in funds.

"The result has been the emergence of the smart grid, a two-way flow of electricity from anywhere to anywhere that will be more information rich, allowing the grid to behave more efficiently, react to changes, and heal itself more quickly," said Chris Irwin, program analyst for the DOE.

Irwin explained that the grid has traditionally been more of a one-way de-

livery system, where electricity was generated in large quantities and stepped down for use by consumers, who had very little information about their usage patterns or reduction opportunities other than their bill.

"Through the smart grid, those who control generation and distribute electricity through lines and poles will receive much more information about the health of those systems. Electricity users will be much more empowered too," Irwin said.

"Previous systems were all supply-side based and did very little to curb demand," added Pat Davis, director of the energy division of Texas-based Facility Solutions Group (FSG). "As a result, the grid was slow to react and the damage was usually done before there was a chance to take measures to impact the outcome."

However, thanks to federal investments, "tremendous progress has been made," noted Irwin, referring to the roughly 15 million meters that have been installed in homes and businesses nationwide through a partnership between the government and utility companies and the anticipated 15 to 20 million more that will be added onto the grid by 2013 to 2014.

Thanks to such technology, utilities no longer have to wait for customers to report outages, as smart meters will alert utilities automatically. In addition to these meters, approximately 1,000 phasor measurement units have already been installed in grid points across the United States.

"These provide a national picture of the system—almost like an MRI for the grid," Irwin noted. "The result will be that the smart grid will be more resilient. It will be able to detect and prevent disruptions at the national level and recover from disturbances more swiftly; it will also be more secure and resistant to cyber attack.

"Overall," Irwin continued, "the development of the smart grid will present people with insightful information so that they can make more proactive decisions about their electricity usage."

## A SMART OPPORTUNITY

FSG, a national provider of electrical products, services, and energy management solutions that has completed some of the largest U.S. metering projects, decided to pursue business opportunities around the smart grid.

"The convergence of the supply and demand sides within the energy marketplace has intersected with the convergence of IT and building technologies. We wanted to position our customers at this intersection," said Davis.

Another distributor that has elected to play in this market is Fargo, North Dakota-based Border States Electric (BSE), which launched its "Grid Solutions" program—designed to provide value-added services and material management for substations, power transmission, wind and solar energy, data/telecommunications, and high-voltage industrial projects—in July 2009.

"The world today, including our industry, is becoming more and more automated with a much closer focus on energy use," said Patrick Novak, BSE's utility marketing manager. "We felt it was in our best interests to evolve with the industry and provide smart grid solutions for our customers."

In terms of opportunities for electrical distributors, Davis suggested that distributors can begin tapping into this business by first understanding how many conventional technologies—such as meters, sensor networks, and smart breaker panel boards—would be implemented toward a smart grid option. He also suggested that distributors familiarize themselves with what local or regional electric providers are doing and understand where deregulation has taken place in their respective territories. "It's also wise to talk to your independent system operator [ISO] about plans

to support smart grid initiatives," he noted.

Irwin suggested that distributors ultimately encourage customers to share their energy load profile with them so that they can be part of a determination as to where and with what products reductions could be made.

"Ultimately, electricity and information are going to be a merged service, and anything that requires electricity will need to communicate through switches, a market that distributors can help serve," he added. "With the ability to provide both critical electrical products and energy-related expertise, electrical distributors are clearly at the forefront of this demand." ■

**Bloom**, an 18-year veteran of the lighting and electrical products industry, is a freelance writer and consultant. Reach her at [susan.bloom.chester@gmail.com](mailto:susan.bloom.chester@gmail.com).

## LED Update

## NEMA publishes LED dimming standard

LEDs and dimming control theoretically make a great team. Dimming reduces LED internal temperatures, which can increase service life. Light output and wattage are proportional across the dimming range, resulting in consistent efficacy until the low end, when lower internal temperatures cause light output to increase. (This may mean light output and dimmer settings may drift out of proportion at the low end of the dimming range, but some higher-end products compensate for this effect.) High-end products can dim from full light output to 1%.

As with CFLs, the biggest challenge for dimming control of LED lighting is when a retrofit lamp replaces an incandescent lamp and operates with an existing line-voltage incandescent dimmer.

The first concern is that not all LED replacement lamps are compatible with all existing dimmers, and not all lamps are even compatible with dimming at all. Some lamps are designed to operate directly on 120VAC without driver circuits, and may exhibit flicker. Other lamps use an integrated driver circuit to minimize flicker. The driver may be constant current or voltage; constant current is generally recommended for LED replacement lamps.

NEMA recently published an important standard that should help: *NEMA SSL 6-2010, Solid State Lighting for Incandescent Replacement—Dimming*. Produced by NEMA's

Lighting Controls and Solid-State Lighting sections, the standard focuses on integrated LED lamps intended for retrofit into systems that previously used incandescent screwbase lamps. The standard addresses dimming of these products and the interaction between the dimmer control and the lamp and introduces requirements to help ensure good dimming performance and prevent damage to either component.

Until products are built around this standard, selecting LED replacement lamps and matching them with existing dimmers should be approached with caution. Verify that all lamps and controls are compatible; until this verification is made, assume they are not.

Also, make sure that any chosen product meets safety performance requirements as well as power quality and industry standard specifications and that the driver has a rated life comparable to the LED array (20,000 to 50,000 hours). Finally, the LED lamp should meet dimmer requirements related to operating incandescent lamps, such as minimum load.

*NEMA SSL 6-2010* may be viewed at no charge at [nema.org/stds/ssl6.cfm](http://nema.org/stds/ssl6.cfm). NEMA is now proceeding to develop standards for other applications of LED dimming. ■

**Craig DiLouie**, LC, principal of Zing Communications ([zinginc.com](http://zinginc.com)), is a lighting industry journalist, analyst, marketing consultant, and author. Reach him at [cdilouie@zinginc.com](mailto:cdilouie@zinginc.com).