

Wednesday, January 28, 2009

Blackouts and the Electricity Grid: What's to Come?

Lauren Covello

FOXBusiness



Blackouts -- on a large or small scale -- can deal a devastating blow to businesses and the greater economy, as well as jeopardize the health and safety of those affected. The massive blackout that rippled through the Northeast in 2003, for example, resulted in a loss of hundreds of billions of dollars for the economy (approximately \$1 billion for New York City alone) and contributed to the deaths of at least 11 people across eight states and Canada.

Still, while the risk of blackouts is certainly a concern, some experts see them as a byproduct of a much bigger issue -- an aging and outdated electric grid.

As the nation's interest shifts toward building a more efficient electric system capable of handling growing demand and smoother incorporation of renewable energy sources, experts say the focus won't be on eliminating blackouts altogether, but on minimizing risk factors and improving reliability and response.

Why blackouts occur

The nation's power distribution system is a grid that delivers electricity from power plants to homes via three steps -- generation, transmission and distribution. The grid contains many interconnected parts, all of which work together to create electricity the moment customers flip a light switch or plug in a phone charger.

Stresses on the system, which can be as serious as a generator fire or as seemingly innocuous as a low-hanging tree branch touching a power line, may cause some part of the system to disconnect itself from the grid. When this happens, other parts of the system generally work to pick up its slack -- but if those other elements are already working at maximum capacity to meet the electricity demands imposed on them, they, too, shut down. The final result is a power outage.

According to a report released by the U.S.-Canada Power System Outage Task Force, the 2003 blackout was triggered by a series of events that began when a power plant near Cleveland, Ohio, maxed out on its capacity and disconnected itself from the grid. That event was then made worse when strained transmission lines came in contact with "overgrown" trees in another part of the state. The domino effect that ensued forced more than 100 power plants to shut down and 50 million to lose power in what remains the nation's most widespread blackout to date.

Articles of Interest



Blackout traffic, NYC 2003

Where the problems lie

According to the experts, trying to put a stop to blackouts entirely is basically a lost cause.

"Generally speaking, blackouts are going to happen. You can't always stop them. Frankly, to try and [stop them] is cost-prohibitive," said Kevin Kolevar, outgoing assistant secretary of the U.S. Department of Energy Office of Electricity Delivery and Energy Reliability.

Still, Kolevar believes the risk and devastation of blackouts can be minimized through the establishment of stronger regulatory measures and updated technology. A major roadblock during the 2003 outage, for example, was that some grid operators weren't able to effectively see disturbances to the grid as they were happening. Since then, significant improvements have been made in the way grid operators are trained as well as in the tools operators use to visualize stresses on the grid, Kolevar said.

But Kolevar and others agree those improvements likely won't be enough to sustain reliability into the future. With the Energy Information Administration estimating a 30% jump in annual electricity demand by 2030 and the push for integration of renewable resources gaining speed, experts say the country's dated electricity grid will inevitably need to undergo some serious structural and technological transformations.

The grid of the future

Much of the buzz surrounding the future of America's power system involves using "smart" technology to better manage the electricity needs of consumers and utilities, as well as building more transmission lines to channel renewable energy throughout the country.

The major idea behind the so-called "smart grid" is to promote two-way communication between utilities and consumers. As part of the plan, traditional electricity meters will be replaced with smart meters capable of showing both homeowners and grid operators the homeowner's real-time electricity consumption. For utilities, the meters make it easier to manage stresses on the grid and avert blackouts; for homeowners, the meters could be used to curtail any unnecessary electric use and help reduce electric bills.

Articles of Interest



Visualizing the electric grid

"It's that kind of intelligent stewardship which will enable customers to be part of the solution," said Jim Kelly, senior vice president of transmission and distribution at Southern California Edison (SCE), which has already installed about 5,000 smart meters as part of its multi-billion dollar "Circuit of the Future" project. The company, which services approximately 4.8 million customers in southern California, invested \$5 billion in expanding and overhauling its distribution infrastructure over the last five years and expects to invest another \$9 billion to continue its mission for the next five years.

For Kelly, exploring new technology and taking steps to improve infrastructure is critical in determining how best to design the grid of the future.

"A grid that doesn't serve customers better is not smart; it's just showmanship," he said.

As far as increasing the number of transmission lines across the country, experts say the future of electricity depends on it.

"Blackouts...they're the past. We're focusing on the future, which is why we need more transmission," said David Whiteley, executive vice president of the North American Electric Reliability Corporation, or NERC.

By "more transmission," Whiteley is referring not to the power lines homeowners see in their neighborhoods, but to the large high-voltage backbone transmission lines that span multiple states. Increasing the number of transmission lines will not only strengthen the grid, but allow for renewable energy resources (like wind power) to be transmitted from often remote areas to areas where electricity demand is high, he said.

What stands in the way

Both projects -- smart grid technology and additional transmission lines -- are bound to cost a pretty penny.

"It's clearly the case that both pursuits will be expensive, with costs in the billions, at least," said Kolevar of the Office of Electricity Delivery and Energy Reliability.

Articles of Interest



Workers repair damaged lines

But modernizing the nation's electric grid seems to be at the top of the administration's agenda. As part of his proposed \$825 billion dollar stimulus package, President Barack Obama has already stated he wants to see the installation of 40 million smart meters and 3,000 miles in new transmission lines over the course of the next few years.

Cost aside, the projects face other problems on the road to implementation. According to Whiteley of NERC, siting transmission lines (deciding where to build and getting permission to do so) is a long and sometimes contentious process bound to cause challenges for those involved. Whiteley also has concerns about cost allocation and recovery, as questions arise about how individual states will decide how to fund the construction of these cross-country transmission lines.

Whiteley said he believes both issues need to be resolved on a national level.

Another issue relates directly to the nature of electricity itself. Electricity currently cannot be "bottled up" or "inventoried" – it's made at the flick of a switch. According to Kelly of Southern California Edison, the addition of renewable energy sources to the grid -- particularly wind power -- could present a problem because it's not as "predictable" as conventional energy sources like coal or natural gas. In simple terms: when the wind's not blowing, the grid could suffer.

"For me, this is not politics or policy. If you ask me to incorporate too much renewable power [on the grid], than the system does start to become less reliable," Kelly said.

Still, Kelly believes that batteries are probably the best bet in allowing electricity to be inventoried and says he has faith that some kind of storage solution will soon be developed.