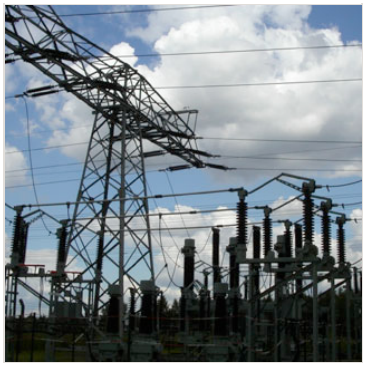
August 13, 2008 | 4 comments

The 2003 Northeast Blackout--Five Years Later

Tougher regulatory measures are in place, but we're still a long way from a "smart" power grid

By JR Minkel



POWER LINES
ISTOCKPHOTO

Key Concepts

E-MAIL
PRINT
COMMENT
Digg
submit
Like it?
Thumbs-up
Stumble!

On August 14, 2003, shortly after 2 P.M. Eastern Daylight Time, a high-voltage power line in northern Ohio brushed against some overgrown trees and shut down—a fault, as it's known in the power industry. The line had softened under the heat of the high current coursing through it. Normally, the problem would have tripped an alarm in the control room of FirstEnergy Corporation, an Ohio-based utility company, but the alarm system failed.

Over the next hour and a half, as system operators tried to understand what was happening, three other lines sagged into trees and switched off, forcing other power lines to shoulder an extra burden. Overtaxed, they cut out by 4:05 P.M., tripping a cascade of failures throughout southeastern Canada and eight northeastern states.

All told, 50 million people lost power for up to two days in the biggest blackout in North American history. The event contributed to at least 11 deaths and cost an estimated $6 billion.

So, five years later, are we still at risk for a massive blackout?

In February 2004, after a three-month investigation, the U.S.–Canada Power System Outage Task Force concluded that a combination of human error and equipment failures had caused the blackout. The group's final report made a sweeping set of 46 recommendations to reduce the risk of future widespread blackouts. First on the list was making industry reliability standards mandatory and legally enforceable.

Prior to the blackout, the North American Electricity Reliability Council (NERC) set voluntary standards. In the wake of the blackout report, Congress passed the Energy Policy Act of 2005, which expanded the role of the Federal Energy Regulatory Commission (FERC) by requiring it to solicit, approve and enforce new reliability standards from NERC, now the North American Electricity Reliability Corporation.

FERC has so far approved 96 new reliability standards.* These cover the three Ts—"trees, training and tools"—identified by the blackout task force but are not limited to them, says Joseph McClelland, director of FERC's Office of Electric Reliability, which was established last September. Standard PER-003, for example, requires that operating personnel have at least the minimum training needed to recognize and deal with critical events in the grid; standard FAC-003 makes it mandatory to keep trees clear of transmission lines; standard TOP-002-1 requires that that grid operating systems be able to survive a power line fault or any other single failure, no matter how severe. FERC can impose fines of up to a million dollars a day for an infraction, depending on its flagrancy and the risk incurred.

If the standards have reduced the number of blackouts, the evidence has yet to bear it out. A study of NERC

blackout data by researchers at Carnegie Mellon University in Pittsburgh found that the frequency of blackouts affecting more than 50,000 people has held fairly constant at about 12 per year from 1984 to 2006. Co-author Paul Hines, now assistant professor of engineering at the University of Vermont in Burlington, says current statistics indicate that a 2003-level blackout will occur every 25 years.

He says many researchers believe that cascading blackouts may be inherent in the grid's complexity, but he still sees room for improvement. "I think we can definitely make it less frequent than once every 25 years."

The U.S. power grid consists of three loosely connected parts, referred to as interconnections: eastern, western and Texas. Within each, high-voltage power lines transmit electricity from generating sources such as coal or hydroelectric plants to local utilities that distribute power to homes and businesses, where lights, refrigerators, computers and myriad other "loads" tap that energy.

Read Comments (4) | Post a comment 1 2 3 Next >

SHARE

You Might Also Like

A Power Grid for the Hydrogen Economy

Bracing the Satellite Infrastructure for a Solar Superstorm

Healing the Grid

Lights Out?: How the Grid Copes When a Nuclear Power Plant Goes Down

Preventing Blackouts

Final report by the U.S.-Canada Power System Outage Task Force


A Plan to Power 100 Percent of the Planet with Renewables


World Changing Ideas: 20 Ways to Build a Cleaner, Healthier, Smarter World

Discuss This Article

© 2010 Scientific American, a division of Nature America, Inc. All Rights Reserved.

ADVERTISEMENT