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Getting 'Smart' on Outages

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By Rebecca Smith,

As utilities face calls to storm-proof electric systems following mass outages from Sandy, some power companies are exploring an alternative approach: investing in technology to get the lights back on faster.

A growing number of utilities—including Commonwealth Edison, a unit of Exelon Corp. EXC +0.80% serving Illinois, and the city-owned utility in Chattanooga, Tenn.—are upgrading their electric systems to restore power more quickly after storms in addition to spending money on "storm hardening."

The systems use advanced technology to pinpoint problems, automatically reroute power around trouble spots and tell repair crews where to go to get the most customers restored fastest.

"I believe that, as a result of Sandy, there will be even more interest in automation," said Rita Wells, an engineer who works at the Department of Energy's Idaho National Lab in its critical-infrastructure-protection unit.

These measures are a departure from standard practice for utilities, which have spent billions of dollars burying electric lines and installing tougher power poles in an attempt to insulate service networks from losing electricity during big storms. Such storm hardening is expensive and still doesn't prevent outages during massive winds and mass floods such as the ones wrought by Sandy, which knocked out power to more than 10 million homes and businesses across 16 states.

So the new watchword among utility experts is resiliency: accepting that damage will happen but using advanced technology to isolate problems and put systems back together faster. Some utilities now use "smart meters" that can warn a control center when a home is losing power, rather than waiting for customers or crews to report problems. That gets crews out faster because they spend less time trying to determine where power has gone out.

"There's a lot of thoughtful work happening in this area," said Thad Allen, the retired U.S. Coast Guard admiral who oversaw the federal response to the Deepwater Horizon oil spill in the Gulf of Mexico two years ago, and now advises utilities for consultancy Booz Allen Hamilton Inc.

While a number of larger power companies have begun embracing the so-called smart-grid approach, "there's far more we could do," said former New York Gov. George Pataki, now a lawyer advising utilities and other energy companies at Chadbourne & Parke LLP in New York.

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Chattanooga's "self-healing" network, built with \$100 million in federal assistance, uses high-speed fiber-optic lines to communicate what is happening on the electrical system. To get that information, it depends on 1,200 newly installed "smart switches" that direct the flow of electricity over power lines and can respond to changing circumstances. The switches are sold by Chicago-based S&C Electric Co.

If a tree falls into a power line, for example, a nearby switch cuts off power to that spot and reroutes electricity around the problem so as many nearby customers as possible still get power. Without such technology, the nearby cluster of customers would lose power until a crew came out and diagnosed the problem and, often manually, changed the switch configuration to restore power to a section. That often takes hours.

While the smart-grid upgrades were costly, they were far cheaper than burying Chattanooga's lines, which would have cost as much as \$2 billion, said David Wade, chief operations officer for the city utility, called the Electric Power Board.

The Chattanooga system, which serves 170,000 homes and businesses, got its first big test during a windstorm in July, when about 35,000 homes and businesses lost power for as long as three days. But 42,000 locations suffered only momentary outages, often nothing more than a quick blink of lights, as the smart switches analyzed the problem and rerouted power to as many people as possible. In the past, they would have gone dark too.

It took up to three days to restore service to everyone, but Mr. Wade said that, without the switches, it would have taken an extra day and a half. One reason is that crews would have spent more time locating problems. Mr. Wade said the city's technology, which includes smart meters, reduced the number of people affected and got those who were affected restored faster.

Chicago-based Commonwealth Edison is spending \$150 million over the next five years building a network in northern Illinois that is similar to Chattanooga's grid and estimates that the 400 or so smart switches installed this year prevented 70,000 power outages for individual customers.

Ultimately, ComEd will have more than 5,000 smart switches trying to limit outages for its 3.8 million customers, said Terry Donnelly, ComEd's chief operating officer. Over the next decade, ComEd hopes to spend up to \$2.6 billion on system hardening and smart-grid improvements, spending roughly equally on each. It is still working out the specifics with state regulators.

ComEd said it gets its switches from the same supplier as Chattanooga's utility—S&C Electric in Chicago—and also from G&W Electric Co. of Bolingbrook, Ill.

PPL Corp. of Allentown, Pa., is putting similar technology to work in the Pocono Mountains. Sixteen substations will get upgrades next year including smart switches. "That area has the highest durations of outages anywhere in our system," said PPL spokesman Michael Wood.

Technology is being used for more than restoring service.

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In California, where wildfires have destroyed thousands of homes in recent years, San Diego Gas & Electric Co. has created 140 small weather stations across its arid distribution system. They collect information on wind speeds, humidity and temperatures and report back to an operations center to help prevent wildfires, especially ones that could be started from the utility's own electric system and threaten nearby homes.

"If conditions are right for fires, we dispatch fire crews with our work crews," armed with the field data, said Mike Niggli, president and chief operating officer of SDG&E, a unit of Sempra Energy SRE -1.40%. The stations also share information with state forestry firefighters.

Utilities have been required by regulators to modernize power systems, but Sandy "will put more impetus behind it," said Irwin "Sonny" Popowsky, the recently retired head of the Pennsylvania's People's Counsel, which represents ratepayers in utility cases.