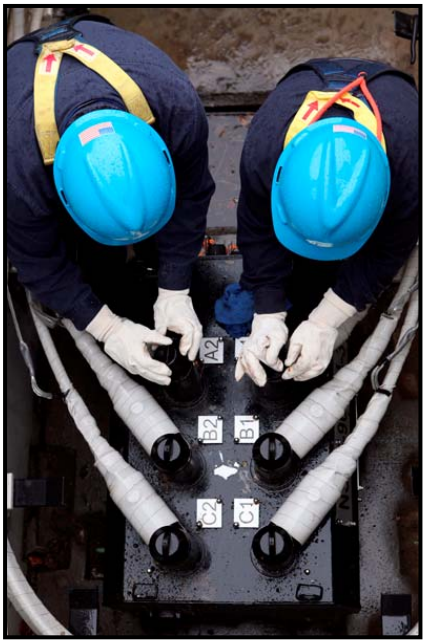
Bright Lights, Big City: A Smarter Grid in New York

The Consolidated Edison Company of New York, Inc. (ConEdison) operates the world's largest underground electric distribution system and serves more than 3.3 million customers in New York City and neighboring Westchester County. 86% of its system is underground, with 94,000 miles of underground electric cables and 36,000 miles of overhead electric wires. To provide New York City with more reliable and affordable power, Consolidated Edison is upgrading its distribution system to reduce the frequency and duration of outages and improve power quality.

Distribution Automation for More Reliable Power

Partially funded with $136.1 million in Recovery Act stimulus funds awarded by the U.S. Department of Energy, the Consolidated Edison project includes distribution system automation or upgrade for more than one-third of its circuits. ConEdison's initial distribution automation deployment targets critical areas across the service territory.



The smart switch is a main component of ConEdison's intelligent underground system.

"While customers may not notice the impact [of distribution automation] directly, tremendous benefits are realized in the reduction of risk of large-scale grid outages," says Aseem Kapur, department manager of ConEdison's Smart Grid Investment Group. "What [the distribution automation] does is help us mitigate the risk of a network shutdown resulting in a large-scale outage. The smart switches that we're deploying afford us the capability to rapidly isolate faults." As a result of the deployment of this technology, ConEdison expects that the risk of a large-scale outage will drop on average 40 to 50 percent in the city's top ten most critical networks.

Distribution Automation for Reducing Costs

In addition, ConEdison estimates that its capacitor automation program will increase system efficiency by reducing energy losses and increase system capacity that would enable deferral of expensive infrastructure upgrades required for meeting the increasing demand. The energy savings will be fully realized over a five- to ten-year period, occurring incrementally as the capacitors are installed. By 2013, ConEdison expects to save approximately 30 MW of energy as a result of the capacitor automation effort. In addition, these investments will help the Company achieve its targets for reducing carbon emissions.

Distribution Automation for the Long Haul

Getting the entire system in place is a "heavy lift," says Kapur. "It is certainly a challenge to integrate all the equipment." Deploying, integrating, testing, launching, training, learning to understand the new streams of information and apply the results—all of these steps take time. While the new technologies have been proven in grid applications around the world, they have to withstand the harsh environments found under the streets of New York City—or other urban underground systems across the United States. A utility would typically do this type of integration over a ten-year planning cycle, but with the help of Recovery Act funds, ConEdison is planning to accomplish it in three years.

An instructor at ConEdison's Learning Center examines an intelligent autoloop simulator

To ensure that the technology will function properly, ConEdison is performing significant testing upfront. One-third of the ConEdison project's timeline is dedicated to testing, with two-thirds spent on installation and operation. By the end of the project, ConEdison intends to demonstrate a tangible investment in infrastructure for customers, and quantify the savings. Transformer monitoring provides a good example. ConEdison is testing a system that enables real-time monitoring and control of underground transformers via two-way wireless communication. ConEdison's Vault Data Acquisition System provides information on transformer loading, temperature, pressure, and oil level. The secure, two-way radio communication between the vaults, where the transformers are located, and the control centers is accomplished via a wireless mesh network. This type of monitoring is very important, especially during summer peak periods, since real-time data enable immediate dispatch to replace or repair a transformer prior to failure. The system will also help reduce operating costs and increase efficiency by performing mandatory switching remotely rather than switching manually with field crews.

ConEdison is already reaching out to power companies to share lessons learned. Thanks to the recent federal grants supporting smart grid upgrades, utilities nationwide are sharing information while deploying these new technologies simultaneously. Multiple organizations are riding the smart grid learning curve. Over the next three to four years, ConEdison expects to benefit greatly from comparing deployment techniques, trading benchmarks, uncovering new benefits, and collectively building a smarter national grid.

Learn More

The American Recovery and Reinvestment Act of 2009 (Recovery Act) provided DOE with $4.5 billion to fund projects that modernize the Nation's energy infrastructure and enhance energy independence. For more information about the status of the other Recovery Act projects, visit www.smartgrid.gov . To learn about DOE's Office of Electricity Delivery and Energy Reliability's national efforts to modernize the electric grid, visit www.oe.energy.gov .