Atlantic City Electric Company

Smart Grid Project

Scope of Work

The Atlantic City Electric Company's (ACE's) Smart Grid Project deployed distribution automation (DA) assets on 27 circuits, 43,782 direct load control devices, and a wireless communications network. Customers were offered direct load control devices and associated financial incentives for allowing ACE to cycle air conditioners or control thermostats during peak periods. DA equipment deployed included smart substation devices, equipment condition monitors, and automated feeder reclosers/switches and capacitors.

Objectives

The main objective of the project was to use DA equipment to improve system reliability and power quality, decrease operations and maintenance costs, and reduce distribution line losses. In addition, the direct load control program gives Pepco the ability to lower peak usage, reducing the need for additional generation capacity. Peak load control thus saves both Pepco and customers money and reduces stress on the grid.

Deployed Smart Grid Technologies

- **Communications Infrastructure**: A wireless mesh network supports both DA and the direct load control devices. The network includes data collectors (access points), mesh repeaters, and end devices. The data collectors connect via a point-to-multipoint network to radio towers on a fiber optic network, which transmits the data to the head end system.
- **Direct load control devices**: ACE deployed 43,782 direct load control devices. Participating customers chose either a switch mounted outside near the air conditioning unit or a programmable communicating thermostat installed in the home. In response to a wireless radio signal sent by ACE, the devices cycle air conditioning units off and on during peak load times or system emergencies. The direct load control program provides a bill credit to participating customers.
- **Distribution automation systems:** The project deployed new automated feeder reclosers/switches and associated controllers, capacitor controllers, substation transformer monitors, electronic substation relays, substation distributed remote terminal units (DRTUs), and automatic sectionalizing and restoration (ASR) programs. Automated feeder reclosers/switches, electronic relays, DRTUs, and the ASR programs work together to detect and isolate faults more precisely, reducing the number of customers affected by power outages. Substation transformer monitors

At-a-Glance

Recipient: Atlantic City Electric Company

State: New Jersey

NERC Region: ReliabilityFirst Corporation

Total Project Cost: $37,798,787

Total Federal Share: $18,697,069

Project Type: Electric Distribution Systems
Customer Systems

Equipment

- **43,782 Direct Load Control Devices**
  - **11,692 Programmable Communicating Thermostats**
  - **32,090 Air Conditioner Direct Load Control Outdoor Cycling Switches**
- **Distribution Automation Equipment for 27 out of 345 Circuits (300 are 12 kV and below)**
  - **Distribution Automation Communications Network (Wireless Mesh)**
  - **Control of 164 Automated Distribution Circuit Reclosers/Switches**
  - **27 Automated Capacitors**
  - **21 Transformer Health Sensors/Monitors**
  - **8 Substation Upgrades with Smart Devices**

Key Benefits

- **Improved Electric Service Reliability and Power Quality**
- **Reduced Operating and Maintenance Costs**
- **Reduced Costs from Equipment Failures and Distribution Line Losses**
- **Reduced Greenhouse Gas and Criteria Pollutant Emissions**

analyze the gases in the transformer insulating oil, alerting ACE about maintenance needs and enabling the utility to avoid equipment failures.

- **Distribution system energy efficiency improvements:** Automated controls were added to centrally controlled capacitor banks. The new devices help ACE better regulate reactive power in the distribution system and manage power factor and voltage to tighter tolerances, improving power quality while reducing energy losses.

Benefits Realized

- **Improved electric service reliability:** Over 1,000 customer outages have been prevented since project initiation. ACE plans to complete system optimization work by the end of 2014, which will increase performance.
- **Advanced customer service options and peak load control:** Through 2013, ACE operated 18 curtailment events, reducing demand by 83 megawatts. Participating customers received a total of $2,236,550 in bill credit incentives, and each participating customer had a web-programmable thermostat or outdoor direct load control switch installed on his or her home.

Lessons Learned

- **Direct load control:** Customer education was vital to project success and entailed significant effort. Customers generally do not have the same level of understanding about kilowatt hours as they do about miles per gallon. A variety of communications tactics is needed to increase awareness and understanding of smart grid technologies. A blend of traditional "snail" mail and online outreach tactics allowed ACE to reach out to different customer segments.
- **Distribution automation:** Cyber security should be addressed during planning activities. Project teams should work with equipment manufacturers to enforce the value of application-level encryption and encourage them to develop solutions. While smart systems can reduce operational costs, additional maintenance funding is needed to keep added equipment and systems operational. In addition, newer telecommunications and smart devices will not follow traditional utility asset life assumptions (e.g., 10–15 years versus 30 years), and planning should account for these differences.
- **General:** Having a central program management office to provide project management, change management, and process improvement and coordinate earned value reporting proved to be very effective. In addition, new skill sets were required to design, deploy, and maintain Smart Grid systems, which will change the paradigm of the utility worker.

Future Plans

ACE plans to continue to optimize the communications network that supports DA and direct load control to maximize the benefits gained from these technologies. DA technologies will continue to be deployed as the need arises.

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