Burbank Water and Power

Smart Grid Program

Scope of Work

Burbank Water and Power's (BWP's) Smart Grid Program included smart meters, communications infrastructure, an outage management system (OMS), distribution automation (DA), time-based rate programs, advanced customer service options, energy storage, and electric vehicle (EV) charging stations. The project implemented two-way communications and metering to enable customers to view their energy consumption at their convenience through systems such as web portals. The project also included DA to enhance the reliability and quality of electric delivery and reduce operations and maintenance costs. In addition, the project included controls for distributed energy resources to manage peak electric demand and integrate renewable resources into grid operations.

Objectives

BWP aimed to modernize its electric systems, improve customer service, promote energy and water efficiency and demand management, and improve operational efficiencies.

Deployed Smart Grid Technologies

- **Communications infrastructure:** BWP deployed and integrated two network types: a fiber optic network and a city-wide secure wi-fi mesh radio frequency network. The fiber optic ethernet network allows for monitoring and control of the electric distribution system. Radio devices in smart meters transmit data through the new wi-fi network. The new meter data management and outage management systems use data and notifications from smart meters and automated distribution equipment. These networks provide two-way communication between BWP and customer meters and enable demand response and advanced electric service options.
- **Advanced metering infrastructure (AMI):** Smart meters were installed for all 51,928 residential, commercial, and industrial customers. AMI enables time-based rate programs and electric service options for customers. BWP expects lower operational costs from remote meter reading and prompt identification of electricity theft. New AMI features such as outage notification and remote service switches enable BWP to respond to outages and customer requests quickly and efficiently. Data analysis software provides a dashboard for easy access and analysis of AMI meter voltage and loading data that allow engineers and maintenance personnel to very easily evaluate distribution

At-A-Glance

Recipient: Burbank Water and Power

State: California

NERC Region: Western Electricity Coordinating Council

Total Project Cost: $50,934,209

Total Federal Share: $20,000,000

Project Type: Integrated and/or Crosscutting Systems

Equipment

- 51,928 Smart Meters
- AMI Communications Systems
  - Meter Communications Network (Radio Frequency Mesh)
  - Wireless Wide Area Communications
- Meter Data Management System
- 50 In-Home Displays
- Distribution Automation Equipment for 130 out of 138 Circuits
  - Digital Relays with Autoreclosing Circuit Breakers
  - Distribution Automation Communications Network (Fiber Optic Ethernet)
- 34 Thermal Energy Storage Units
- 11 Electric Vehicle Charging Stations

Time-Based Rate Programs

- Time of Use (for commercial customers)
- Time of Use (for electric vehicle owners)

Key Benefits

- Improved Service Reliability
- Reduced Operating and Maintenance Costs
- Enabled New Service Offerings

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transformer loading and voltages, feeder loading, substation loading, feeder section loading, and transformer loss-of-life.

- **Time-based rate programs:** In conjunction with advanced metering, BWP has initiated time-of-use pricing for commercial customers and electric vehicle owners, as well as related information services. Rate programs encourage consumers to shift their energy consumption from on- to off-peak periods.
- **Advanced electricity service options:** BWP provided customers with new devices in conjunction with time-based rate programs, enabling customers to monitor and better control electricity use. In addition, BWP is demonstrating in-home displays for customers who volunteer to receive this type of information feedback. Customer electricity consumption data are available through a web portal, and residential customers receive printed Home Energy Reports.
- **Distribution automation systems:** Automated digital relay protection and autoreclosers were installed on 130 circuits. The distribution automation equipment helps to improve reliability, reduce outage duration, and lower operations and maintenance costs. Distribution automation helps integrate distributed energy resources.
- **Electric vehicle charging stations:** Eleven new stations provide convenient charging capabilities for plug-in electric vehicles. The stations use smart meters to track vehicle charging patterns and costs.
- **Distributed energy resource interface and control systems:** BWP deployed 250 kilowatts of thermal energy storage, in conjunction with 2,850 kilowatts of customer-owned photovoltaics not funded by the Smart Grid Investment Grant (SGIG) program.

Benefits Realized

- **Reduced operating and maintenance costs:** Prior to the AMI installation, BWP used an average of 2,500 field service requests every month for off-cycle meter reading or service connection/disconnection purposes. With the AMI system in place, such requests have been reduced 87% to approximately 300/month (13,200 field visits avoided through July 2014). Furthermore, the integrated AMI/MDMS system is improving the efficiency and quality of call center operations for customers.
- **Improved service reliability:** Burbank's DA system assets provide more rapid fault detection and response, reducing the amount of energy involved in the event, which reduces stress on equipment and minimizes hazards for field crews. BWP's DA deployment has achieved 61% reduction in Customer Minutes of Interruption (CMI) during 2012–2013. As deployments progressed, BWP has observed improvements in System Average Interruption Frequency and Duration Indices (SAIFI and SAIDI) as well. Furthermore, crews can now wear lighter safety gear and work more comfortably in warm weather.

Lessons Learned

- Modern communications systems should be designed and deployed to support a wide range of objectives, with appropriate reliability and expandability to meet future information needs.
- Utilities should seek opportunities to leverage smart grid investments for new revenues, e.g., fiber optics.
- Physical and cybersecurity works best when designed and embedded into technology solutions early; bolt-on security systems require increased investment and interoperability and performance testing.
- Software is continually evolving in response to customer feedback. Version upgrades are expensive and challenging if they are required relatively soon after completing initial deployments. Project teams should identify version upgrade roadmaps before committing to software procurement.

- Organizational resistance to change and failure to revise and update work processes are two common obstacles to achieving the full benefits of grid modernization investments. Early engagement of key stakeholders and robust department-level impact analysis can help mitigate risks to effective deployment.

Future Plans

BWP plans to integrate Smart Grid systems and update work processes to achieve the full benefit of the SGIG investments. Specific efforts may include further migration to time-of-use rates, including new tariffs for medium-sized commercial customers, and implementation of an integrated automated dispatch system. Furthermore, BWP is analyzing its new data sources and leveraging them to target capital investments. For instance, BWP has identified voltage problems of which utility personnel were previously unaware. This discovery has significantly refocused capital improvement projects. BWP plans to add more field capacitor banks, voltage regulators, and sectionalizing switches.

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