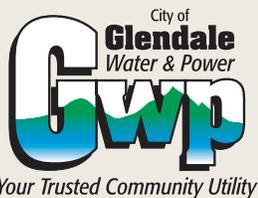


Utility Modernization Annual Report 2015

UTILITY MODERNIZATION



Glendale Water & Power
A Smarter Grid, A Smarter City

UTILITY MODERNIZATION

Glendale Water & Power A Smarter Grid, A Smarter City

America's electrical grid was born more than a century ago, when the country's electricity needs were simple and the demand for power was modest. Nowadays homes and businesses have increased the demand for power with the use of multiple electronic devices and modern technological capabilities under one roof. Utilities are challenged to meet the increased demand and seek new ways to respond in real time. A modernized utility grid makes this possible, resulting in more reliability and a sustainable infrastructure.

Modernized utilities give opportunities for consumers to save energy and water and for GWP to operate the grid in a more efficient, effective and reliable way. Our customers can now actively participate in programs that help them manage their energy and water use with more effective tools that allow them to see their near real time use with information and tips to help customer further reduce usage.

Additionally, GWP is developing and implementing new and innovative energy efficiency, load management, and demand response programs for its customers. Our customers are eager to take advantage of the many benefits and new programs a modernized utility system offers. Trends in utilities are leading towards providing digital communications that give customers real time and near real time usage information to help them take charge of their energy use.

Finally, a modernized electric grid greatly expands data acquisition and data sharing across business units, lowering system losses, preventing energy theft and dramatically improving outage and asset management, reducing maintenance and capital costs with the goal of keeping downward pressure on consumer prices.

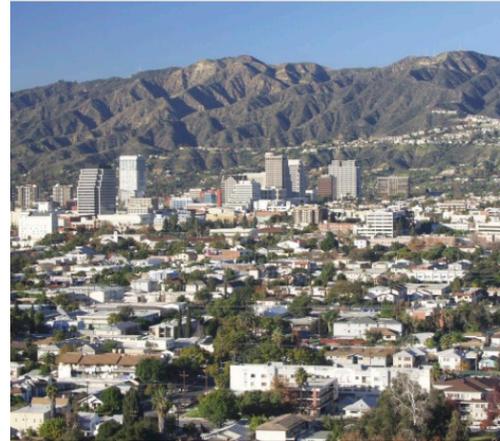
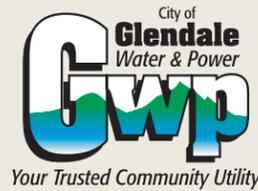
COMPLETED DEPARTMENT OF ENERGY AND CALIFORNIA ENERGY COMMISSION GRANTS

GWP just completed its U.S. Department of Energy (DOE)/California Energy Commission (CEC) grant project.

- Total Project Cost: \$51,302,105
- Total DOE Share: \$20,000,000
- Total CEC Share: \$ 1,000,000

Scope of Work

The City of Glendale's (Glendale's) Advanced Metering Infrastructure (AMI) Initiative Project involved system-wide deployment of advanced meters, use of customer systems and in-home displays, installation of distribution automation equipment systems, and management of distributed energy storage. The project implemented secure wireless communications (1) to allow customers to view their electricity consumption through web portals on mobile devices and in-home displays 24 hours a day, and (2) to provide



GWP is developing and implementing new and innovative energy efficiency, load management and demand response programs for its customers to help them conserve and save money.

Glendale Water & Power manages an electric service territory of 85,358 electric meters and 33,744 water meters with an all time peak load of 353 MW.



Glendale with ability to manage, measure, and verify targeted demand and voltage reductions during peak periods. In addition to the AMI deployment, Glendale upgraded selected feeders with distribution automation equipment to improve operational efficiency as well as system reliability.

Objectives

Reduce peak loads, overall electricity use, and operations and maintenance costs while increasing distribution system efficiency and reliability.

Deployed Modernized Grid Technologies

- Communications infrastructure: An Ethernet/Internet protocol backhaul and a local wireless radio frequency network enable two-way communication between meters and utility data systems and allows for the monitoring and control of select distribution automation equipment. Data management systems enable Glendale to develop actionable information from equipment notifications and customer electricity usage data. All capacitor banks include advanced controllers with communications devices that are remotely controlled via the Supervisory Control and Data Acquisition (SCADA) Distribution Management System.
- AMI: Glendale deployed 86,526 digital meters. These meters provide the capability for a variety of current and future customer electricity price and service options and reduce Glendale's costs of electricity delivery. New AMI features such as outage and restoration notification and a remote disconnect/reconnect switch enable Glendale to respond to outages and customer requests more efficiently.
- Advanced electricity service options: Glendale offered customers in-home displays, a mobile device application, and web portals facilitating two-way information exchange, allowing customers to view their consumption and manage their bills.
- Distribution Automation Pilot Project: The project allowed Glendale to demonstrate automated feeder switches, feeder monitors, remote fault indicators, and automated capacitor controls on select feeders. The distribution automation devices are integrated with the AMI communications infrastructure, allowing Glendale workers to detect and isolate outages to minimize their duration and the number of customers affected. These devices were implemented in conjunction with a Distribution Management System (DMS), and an Outage Management System (OMS). The combination of the distribution automation devices and the enterprise applications enables Glendale to improve distribution loading conditions and system reliability. In addition, implemented a distribution system efficiency pilot using Conservation Voltage Reduction (CVR) utilizing AMI data on two feeders.

COMPLETED DEPARTMENT OF ENERGY AND CALIFORNIA ENERGY COMMISSION GRANTS (continued)

- Enterprise computer system improvements: The project allowed Glendale to incorporate a number of computer system improvements designed to increase operational efficiencies, including an enterprise service bus, OMS, DMS, data warehouse, meter data analytics program, Integrated Voice Recognition upgrade, and an AMI based CVR Pilot Project.
- Time-based rate programs: Glendale implemented time-of-use pricing programs for all customer classes to encourage participating customers to shift consumption from peak- to off-peak periods.
- Electric Vehicle (EV) Charging Program: Glendale incentivized the installation of 60 residential charging stations to recognize and manage the effects of increased loading on the distribution system. The stations provide Glendale with information necessary to develop service options and pricing programs for customers with EV's.
- Distributed energy resources interface and control systems: Glendale implemented information systems for managing peak load and energy costs for 214 thermal energy storage units, which represent approximately 1.3 megawatts.

BENEFITS OF A MODERNIZED UTILITY REALIZED

- Reduced meter reading and customer service costs: Realized a \$3.6 million or 51% reduction in annual cost savings from lower meter reading and customer services operations since 2010:
 - Reduced meter reading errors from an average 2.82% a month in FY 10-11 to 0.04% a month in FY 14-15.
 - Reduced annual total truck rolls from 33,814 in FY 09-10 to 5,424 in FY 2014-15.
 - Reduced Customer Service staff by 15 from 61 people in 2011 to 46 people today.
- Reduced operating and maintenance costs: Full benefits still to be determined. We expect significant operational savings from enterprise computer system improvements, customer programs, and distribution automation programs. UtiliWorks™ study suggests total annual system benefits could exceed \$10 million by the tenth year of operation.
- CVR Pilot Project: The pilot realized 2.95% in energy savings on two feeders over the baseline suggesting that a full scale program could save a minimum 14,500 MWH a year.
- Behavioral Demand Response (BDR) Pilot Project: Pilot of 40,000 people in the summer of 2014 using AMI data. After three events, the following benefits were realized:

51% reduction in annual cost savings from lower meter reading and customer service operations since 2010



New digital meters reduce operating and maintenance costs, also reduce meter reading errors on average by 2.8%, reduce truck rolls significantly.

- Realized statistically significant savings (on-peak and off-peak) for the period of 8/27/2014 - 10/9/2014, yielding 10 kWh saved per household for a total of 392,000 kWh.
- BDR benefit-cost ratio using of 6.7 using Total Resource Cost (TRC) test for summer 2014 program.
- BDR remains cost effective at list price of \$4.50 per household.
- 85% satisfaction from participants receiving BDR communications.
- Reduced costs from equipment failures and distribution line losses: Once fully operational, it is expected that line loss savings equal to 1-2% of annual sales.
- Reduced greenhouse gas emissions and criteria pollutants: UtiliWorks™ study suggests CO2 reductions approaching 60,000 tons a year once programs reach full implementation.

NEW AND EXPANDED PROGRAMS

- **CEIVA/Thermostat Program** – Starting in the fall of 2015, GWP will be adding 1,000 customers once per year to the program. The CEIVA IHD is a digital picture frame that integrates customer's personal photographs with meaningful and useful historical water usage information and near real time electric consumption information. The CEIVA IHD works as a home gateway that simultaneously communicates with GWP's electric digital meters as well as the customer's existing home networks via Wi-Fi or Ethernet. In addition to providing interval energy and water consumption usage information, GWP has the ability to enhance outreach, by pushing energy efficiency program, conservation and event messages directly to the CEIVA IHD. New capabilities will provide customers the added capability to: remotely adjust set points, monitor temperature, control system status, manage thermostat schedules remotely via web and mobile applications, automatically respond to demand response events, receive customized energy conservation tips and notifications via digital frame.
- **BDR** – This summer GWP will again partner with Opower to provide a residential behavioral demand response (BDR) program. This program was very successful in summer 2014. This program leverage AMI data analytics, behavioral science, and multi-channel communications to give customers personalized insight on how to best trim their electricity use during peak events. It will again target 40,000 utility residential customers to receive electronic, IVR, and paper communication using a behavioral science approach, the communications encourages customers to adjust their energy consumption during periods of peak energy demand.

NEW AND EXPANDED PROGRAMS (continued)

- **Small and Medium Business Analytics** – GWP will be piloting a new business website portal and mobile platform for small and medium-sized business customers. The platform will provide comprehensive energy management information designed to provide insight and business customer interaction related to energy and water usage, energy efficiency and conservation, and device/appliance management for continuous improvement on energy management and energy decisions.
- **Unusual Usage Alerts** – GWP and Opower have partnered to launch Unusual Usage Alerts (UUAs) to all GWP customers that sign up for the service. UUAs are designed to analyze and consume AMI data to help customers save energy and money when they are likely to consume more energy than usual for a billing period. Before the end of a billing period, UUAs inform customers that they are likely to have high energy use, and they provide insights to help customers reduce their consumption before the billing period ends. Unusual Usage Alerts target multiple priorities for GWP. It shows the value of the digital meters to customers, empowers customer to save energy and money, creates an opportunity to prevent high bill CSR calls, provides tips to lower energy consumption and it empowers customers to control their energy usage.
- **CVR** – Building on the highly successful pilot program, GWP is working with Dominion Voltage, Inc. to expand its conservation voltage reduction (CVR) program system wide. CVR conserves electricity by operating electric customer voltages in the lower half of the ten percent (10%) voltage band required by equipment standards. Based on studies, DVI estimates that GWP should see energy savings of between 2% and 4%. Once fully implemented, this program is expected to save a minimum 14,500 MWH a year
- **Mobile My Connect** – GWP is expanding its free mobile application. The application is built on the award winning Smart Utility Systems (SUS) Smart Customer Mobile engagement platform and offers customers a new and interactive, engaging experience to better manage their energy and water usage on a SmartPhone, Tablet and Web anytime and anywhere. Called GWP – Mobile My Connect, the app features the GWP logo, allows customers to view current and historical bills as well as pay bills, set budget goals, submit service requests, view/report outages, send messages directly to GWP and obtain electric vehicle or solar panel usage information. The pilot program is free to all residential customers.

In home displays work as a gateway that communicates with the digital meter and customer's home network to display valuable energy and water saving information.



Customers can remotely adjust their thermostats through mobile applications and automatically respond to demand response events.



Programs that give customers access to information on their mobile or tablet offer customers new and interactive tools to engage with GWP and better manage their usage.

NEW DEVELOPMENTS IN THE TECHNOLOGY AND BUSINESS SYSTEMS

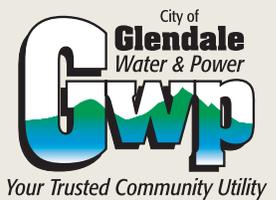
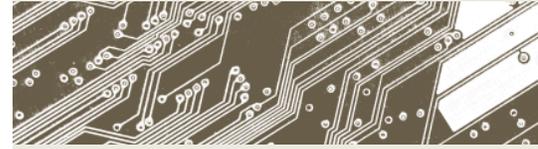
- **Energy Trading and Risk Management System (ETRM)**. This past year, GWP has been installing a new ETRM system. This system will record all of GWP's energy transactions, including electricity, transmission, natural gas, gas transport, renewable credits, and carbon allowances and offsets. The new ETRM will replace an aging and no-longer-supported system, and will help automate reporting for regulatory compliance and risk management, streamline settlements, and allow GWP to better manage our portfolio of resources, both near-term and long-term. The new ETRM will also help GWP move to industry standards regarding the separation of duties between front, middle, and back offices. Better and more timely information on GWP's portfolio will improve risk management, including protecting against price spikes in energy markets that would drive up rates.
- **Grandview Electric Substation Upgrade**. GWP's electric section is upgrading the Grandview Electric Substation which was built in 1930's. This substation is critically important to redundancy in electric service to the northwest portion of the City and the San Fernando Corridor. The substation capacity and voltage will be upgraded from 22.5 MVA and 4.16/34.5kV to 56MVA and 12.47/69kV, respectively. This project is being undertaken as part of the citywide 4kV to 12 kV conversion and Grid Modernization Projects.
- **Repowering the Grayson Power Plant**. GWP has started the process of repowering the Gray Power Plant. The Grayson Power Plant started operations in 1941 and is experiencing an increased frequency of unplanned and forced outages. These outages threaten local reliability and prevent the generation of renewable energy from landfill gas from Scholl Canyon. GWP has one major interconnection through the Air Way Substation to import energy from remote generation. These imports rely on available transmission, but the transmission grid has contractual and physical limitation to bring in all the energy that is necessary to provide reliable service to Glendale. Additionally GWP has outside generation sources that are planned for retirement or contract termination.

The Integrated Resource Plan that GWP developed addresses all of these issues and guides future decisions for the Grayson Power Plant. If the City Council elects to proceed with the repowering of the Grayson Power Plant, the City can meet all state environmental requirements associated with the construction of a large power project, prepare for demolition, and ensure proper and safe deconstruction, construction and commissioning of a new plant. Glendale must have local generation for reliable operations because of limits on imports

WHAT THE FUTURE HOLDS

GWP's newly adopted Strategic Plan includes a number of new modernization objectives, including:

- Implement a full scale Conservation Voltage Reduction Program.
- Automate a minimum six additional feeders each year through 2020.
- Automate Glendale Key Performance Indicators (KPIs) by December 2016.
- Implement mobile access to data for all customers and enroll 10,000 customers by June 2017.
- Develop a common customer experience across at least two residential customer interface channels and enroll 10,000 residential customers by June 2017.
- Implement full-scale in home area network program for residential customers and enroll 3,000 residential customers by June 2017.
- Have a fully functioning business intelligence program by June 2017.
- Implement new residential TOU and EV rates by June 2017.
- Fully integrate all Glendale Business IT Systems through the enterprise service bus by June 2019.
- Complete a functional-level business case for work and asset management by June 2017; implement effective mobile workforce and asset management by June 2019.



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