

Iowa Association of Municipal Utilities *Smart Grid Demand Response Project*

Scope of Work

The Iowa Association of Municipal Utilities (IAMU) Smart Grid Demand Response Project comprised eight municipal utilities implementing advanced “smart” technologies. The project deployed advanced metering infrastructure (AMI) systems, a customer web portal, direct load control switches, programmable communicating thermostats, and a dedicated paging system to support demand response.

Objectives

The IAMU project implemented load control technologies that promote energy efficiency and enable reductions in peak demand and utility operating costs. The AMI systems support solutions that allow utilities to provide both household and commercial/industrial customers with better service and more insight into their energy consumption. These systems enable participating utilities to better manage, measure, and verify targeted demand reductions during peak periods and reduce overall operating costs.

Deployed Smart Grid Technologies

- **Communications infrastructure:** IAMU partners deployed wireless radio frequency (RF) mesh network technology connected to a fiber optic backbone that supports two-way data transfer between smart meters and the partner utility operations centers. A separate paging network supports communications between the utilities and their direct load control devices and programmable communicating thermostats.
- **Advanced metering infrastructure:** Project partners deployed smart meters for 11,265 residential, commercial, and industrial customers. The meters and associated AMI systems allow the utilities to provide customers with more useful energy consumption information, improved outage management service, and the option of time-of-use rates in the future.
- **Direct load control devices:** Project partners deployed 300 direct load control switches and 4,765 programmable communicating thermostats for residential air conditioning systems. These devices provide demand response options that support reduced electricity consumption of heating and cooling equipment during periods of peak demand. The load control technologies enable participating utilities to better manage peak loads, lower wholesale power costs, and reduce

At-A-Glance

Recipient: Iowa Association of Municipal Utilities

States: Iowa and Kansas

NERC Region: Midwest Reliability Organization

Total Project Cost: \$6,902,482.94

Total Federal Share: \$2,754,325.51

Key Partners: Algona Municipal Utilities
Atlantic Municipal Utilities
Breda Municipal Utilities
Cedar Falls Utilities
Kansas City Board of Public Utilities
Maquoketa Municipal Utilities
Rockford Municipal Light Plant
West Point Utility System

Project Type: Advanced Metering Infrastructure
Customer Systems

Equipment Installed

- 11,265 Smart Meters
- 59 Collectors
- AMI Communications Systems
 - Meter Communications Network (RF Mesh)
 - Backhaul Communications (Fiber)
- Customer Systems for 4,765 Customers
 - Customer Web Portal
 - 300 Direct Load Control Devices
 - 4,765 Programmable Communicating Thermostats
 - Dedicated Wireless Communications Network

Key Benefits

- Reduced Operations and Maintenance Costs
 - Reduced Truck Fleet Fuel Usage
 - Improved Customer Service
 - Improved Electric Service Reliability
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Iowa Association of Municipal Utilities *(continued)*

the need for peak generation units. The programmable communicating thermostats are remotely accessed and adjusted through customer web portals.

- **Advanced electricity service options:** One utility launched a new web portal that presents customers with AMI interval usage data and trending information to enable more informed decisions about home energy management.

Benefits Realized

- **Reduced operations and maintenance costs and truck fleet fuel usage:** Thanks to the remote reading capability of AMI, far fewer truck rolls are needed, reducing fuel usage, truck maintenance costs, and unnecessary labor hours—as well as associated greenhouse gas emissions. Manual meter reading costs have decreased at IAMU partner utilities, and meter reading personnel have been assigned to other tasks at the utilities.
- **Improved customer service:** With more granular data, utilities are better able to address billing complaints. In addition, the web portal and programmable communicating thermostats provide customers with information and tools to help them manage their energy usage.
- **Improved electric service reliability:** The AMI systems provide faster, more efficient outage detection and diagnosis, resulting in reduced outage durations.
- **Demand reduction:** Utilities are able to achieve some peak demand reduction through the programmable communicating thermostats and direct load control switches.

Lessons Learned

- Cross-divisional engagement is required for a project of this scope. When deploying an AMI system and integrating it with other business-critical systems, such as the billing system or outage management system, it is essential to engage all significantly affected organizations at project inception and at frequent intervals throughout the project.
- The generation and transmission markets for available time-of-use programs should be thoroughly investigated during the project's early planning stages to ensure expected program results align with core business objectives.
- The programmable communicating thermostats in this project operate with one-way communication. Customers are very much interested in two-way communication systems.
- Installed thermostats were found to contain design defects that prevent the thermostats from meeting the planned demand response goals. The thermostat manufacturer was not able to completely correct the thermostats by the end of the project, and initial demand response projections will not be met. Nevertheless, customers see the value of demand response programs and are expected to continue participation with modified thermostat setting and control procedures. The utilities are viewing the program as a good vehicle for designing and implementing demand response programs.
- In the initial stages of a program in which customers are to be provided advanced control systems, small pilot installations should be used to test the reliability of manufacturer's new products and the reactions of customers who use them and benefit from them.
- Over the past two years, the availability of lower-priced "smart thermostats" in retail stores has increased dramatically. Customers have conveyed their desire for two-way communication systems, and with ready access to a wide range of Wi-Fi products, some have switched to newer products.

Iowa Association of Municipal Utilities *(continued)***Future Plans**

IAMU utilities are considering a variety of options to add on to their AMI systems. One of the utilities is considering the addition of a meter data management system. Those utilities that implemented pilot AMI projects are planning to expand AMI into more of their service territories. Some IAMU partners plan to offer time-of-use rates. Those that did not implement web portals for access to energy consumption information are considering doing so. Utilities are also investigating programmable communicating thermostats that operate on two-way communication systems.

Contact Information

Sara Kaplan
Energy Services Engineer, Iowa Association of Municipal Utilities
skaplan@iamu.org
<http://www.iamu.org/>