Pacific Northwest Smart Grid Demonstration Project
SUCCESS STORIES

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LOWER VALLEY ENERGY

Cold-climate co-op heats up with smart grid

Lower Valley Energy provides electricity to one of the biggest resort towns in one of the coldest climates in the Northwest. At the southern base of the Grand Teton and Yellowstone national parks, out-of-town visitors and residents alike rely on the home-grown electric co-op for heat, hot water and light — especially during cold snaps when the demand for power is highest.

That's one reason Director of Engineering Rick Knori wanted to complete the utility's deployment of its smart grid metering system and help its more than 26,000 electric customers better understand their energy use. That opportunity surfaced with the Pacific Northwest Smart Grid Demonstration Project, in which participants received matching funds from the Department of Energy through the American Recovery and Reinvestment Act of 2009.

With a focus on exceptional customer service, reliability and low rates, Lower Valley Energy jumped on the chance to improve the way it provides services. Eleven utilities were chosen from among 40 applicants to participate in the demonstration. Since the project's launch, utilities in five Northwest states have advanced proven technologies and tested emerging technologies.

Smart meters and demand response

Before the project, more than 12,000, or nearly half, of Lower Valley's members had smart meters that allow for two-way communications between the utility and end-user. As of March 2014, 100 percent of its members had smart meters installed in their homes. This technology is a necessary component of many smart grid technologies, including water heater demand response, which allows a utility to cycle off participants' water heaters during times of peak demand to reduce energy consumption.

LOWER VALLEY ENERGY

LOWER VALLEY ENERGY
Afton, Wyoming

- Began in 1937 with 10 members
- Provides electricity, natural gas and propane
- 5,616 square-mile territory
- 26,406 electric customers
- 195 megawatts

INVESTMENT IN PNWSGDP:
$1.2 million

HIGHLIGHTS:
- Adaptive Voltage Control
- 19,000 AMI meters before project, now complete

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> “Lower Valley consumers have been very excited to see the new technologies related to smart grid, and that we have been doing pilot projects to improve their power quality and efficiency.”
>
> – RICK KNORI, LVE DIRECTOR OF ENGINEERING

High-end tourism is big business in the Grand Teton area. One county in the Lower Valley service area is consistently rated one of the top five wealthiest counties in the United States. So, it’s no surprise that hot water is a hot commodity. Getting a cold-climate community warmed up to a program that even hinted at the risk of a cold shower was a tough sell.

A $15 a month incentive to participate in the demand response program just wasn’t enough for some members, but for others it was worth a try. Ultimately, the co-op deployed more than 500 demand response units and used them to temporarily turn off customers’ water heaters during periods of high demand, when energy prices are highest, thereby reducing energy consumption.

“They worked excellent,” said Knori. “These are going to be long-term assets that we keep and control.”

Now there are 100 people on Lower Valley Energy’s waiting list for a water heater demand response unit.

Adaptive voltage control a surprise

The most successful assets Lower Valley deployed were tools for adaptive voltage control, which can reduce a customer’s overall voltage during brief high-demand periods and result in short-term demand reductions.

Using regular feedback from its customers’ meters, Lower Valley reduced voltage — and therefore demand — during peak load periods at the utility’s East Jackson Substation. This technology provided the greatest benefit for the least investment of time and money.

Warren Jones, Lower Valley’s distribution engineer, programmed the adaptive voltage control signals.

“I think it was a surprise for us how well the adaptive voltage control worked,” said Jones. “That’s the one thing I would suggest to other utilities that have advanced metering infrastructure in place. It does open up some opportunities for a utility to use that intelligence to actually lower your voltage.”

Adaptive voltage control has the potential to greatly lower future monthly demand charges paid by Lower Valley to Bonneville, reducing energy costs to customers. The test case also proved that Lower Valley can easily expand adaptive voltage control to all of its distribution system substations in the coming years.

Solar success

Lower Valley wanted to capture wind and solar power during the day, store it in batteries and discharge it during the utility’s two-hour morning peak. The purpose was to test whether new technologies could reduce transmission system losses and improve voltage stability on a 60-mile distribution line to Bondurant, Wyo. At its Hoback Substation, Lower Valley installed a system of renewable energy resources and battery storage, including one 15-kilowatt solar photovoltaic, one 20-kilowatt windmill set and a 200-kilowatt-hour battery.

“The solar and inverters worked flawlessly,” said Knori. “We’re getting about a 17 to 18 percent capacity factor out of those units. And they’re working trouble-free. But the windmills were kind of a bust.”

After two years of operation, the total output of the four windmills was about 80 kilowatt-hours. Lower Valley installed an onometer on the windmills to prove to the vendor that the turbines were not producing to the expected capacity. But by the time the data was available from the onometer, the vendor was out of business.

The battery storage — the newest of the technologies — also presented some challenges. The batteries arrived damaged and had to be replaced, which caused a delay. After a couple of programming issues were worked out with the vendor, the batteries were up and running, but at half the expected 120 kilowatts of storage capacity.

In-home displays, in the drawer

Lower Valley also installed in-home display units to provide consumers information about their energy consumption. It was a lot of work for crews to install the 400 devices. Yet with minimal customer feedback, the tool's impact on consumer behavior is unknown.

Knori believes that few customers are paying attention to the display units because newer tools, such as smart phone applications that perform the same function, outpaced the in-home display technology.

WHAT'S NEXT for Lower Valley?

Continued use of the hot water heater demand response units will help Lower Valley keep electric bills affordable. As energy costs continue to increase over time, Lower Valley might decide to expand its demand response program.

By installing the adaptive voltage control technology to additional substations, the co-op will take advantage of even more energy savings.

Finally, with the help of the solar array, Lower Valley Energy looks forward to keeping more electrons where they belong by avoiding the losses that typically occur over long distances.