



Pacific Northwest Smart Grid Demonstration Project SUCCESS STORIES

SEPTEMBER 30, 2014



CITY OF ELLENSBURG

Renewable expansion for a historic utility

There's a lot of sunshine in the heart of Washington State. So much so that the City of Ellensburg uses the area's most abundant natural resource — the sun — to help meet the needs of its energy consumers. In 2006, the nation's first city-owned community solar array was installed north of Interstate 90. The successful system brought with it an audience of onlookers and inspired lawmakers. So, when the chance to expand its renewable resources came along, the utility sought funding from the Pacific Northwest Smart Grid Demonstration Project.

A mix of public and private entities funded half of the \$178 million regional cost. That includes the Bonneville Power Administration's \$10 million contribution. The other half of the funding came from the Department of Energy. Participants of the project, which is led by Battelle Northwest, includes 11 utilities across five states, five technical firms and two universities.

Washington State's oldest municipal utility invested \$850,000 to test the effectiveness of a variety of wind and solar systems and to gather information to share with the public.

What the customer wants

In this tight-knit town of just under 10,000 people, when the customers speak, the utility listens. One message was loud and clear: Offer more distributed energy options.

"There was a lot of interest in residential wind and solar generation," said Larry Dunbar, the city's director of Energy Services. "So we wanted to test which ones would work."



**CITY OF ELLENSBURG
LIGHT DIVISION**

Ellensburg, Washington

- Founded in 1891 serving and electricians
- 9,300 electronic customers

INVESTMENT IN PNWSGDP:

- \$ 850,000

HIGHLIGHTS:

- Renewable energy park expansion
- Residential wind turbine demonstration
- Advanced SCADA communications network
- Real-time data system for education and research

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After all, the city had already achieved great success with the 300-watt solar array at the Ellensburg Community Renewables Park, one of the first of its kind in the nation.

“Residents were invited to purchase a (solar) panel, which ranged from \$250 and up,” said Beth Leader of Ellensburg’s Energy Services group. “Then they receive a percentage of that generation in the form of a rebate on their utility bills.”

With that kind of community investment, the city knew they needed to make very careful decisions.

Research and development

The city conducted a significant amount of research before selecting the technology for the project. Nine residential-class wind turbines were selected, ranging from 1.0 to 10 kilowatts, with a total output of about 45 kilowatts. The turbines were purchased from separate vendors to allow for a performance comparison. A meteorological tower was also installed to capture wind and temperature data in real-time. In addition, the existing solar array was expanded with an additional

40 kilowatts of thin-film panels. Finally, the city’s fiber communications system was connected to tie all of the resources together.

The resulting array could have won awards for its artistic appeal.

Small wind a blow

The different turbine designs, staggered at differing heights, were visually appealing. But their performance was problematic. The smaller turbines required frequent maintenance.

The first tower that we installed was a great producer with no issues,” said Dunbar. “Then one of the turbines failed.”

That was just the beginning.

Months after installation, several other turbines stopped producing energy. Of the nine turbines, only five produced data significant to the project.

Then, a tower structure failed under high winds.

It turned out that four of the tallest tower structures, at nearly 80 feet, actually posed a safety risk, due to sustained winds of 30 to 40 mph. This is one of the windiest locations in the state — a good thing for

“ It was beneficial in finding out what technology is out there, what it does, and what it takes to make it work. And seeing how it responds in whatever conditions it’s in.”

– LARRY DUNBAR,
CITY OF ELLENSBURG DIRECTOR OF ENERGY SERVICES

wind generation, but not if your turbines aren't designed for it.

"That prompted a safety review of every turbine mounting," said Shan Rowbotham, the city's power and gas manager.

Ultimately, two blade casings came apart and fell to the ground. Windy conditions sent the blades airborne — threatening public safety at the park, where a trail wanders through the base of each turbine. Although no one was hurt, all towers were quickly deconstructed and removed.

"Having to take down the wind turbines was a very sensitive matter for us," said Dunbar. "We don't want to be portrayed as being anti-wind, but public safety is the most important thing."

Although the wind element was a blow to the project, the utility still saw solar success and fiber-optic fame of sorts.

Fiber fame and a school tool

The city's fiber system has drawn the attention of much larger cities, like Seattle. In fact, the City of Ellensburg fiber-optic network is well known throughout the state. Millions of points of data are delivered in real-time each second through five or six streams of information. The fiber network is connected to the utility's centralized computer system to capture data from the turbines and the solar array. That data will be used to help Central Washington University develop a K-12 renewables curriculum.

Learning from the project is important to the city.

Lessons to share

For the small utility, with less than 10,000 meters, buying into the technology and installing it was one thing. Keeping it operating and generating was another. Special products and special tools were required.

"It's imperative to do that research," said Dunbar. "Expect to take chances with

new technology, expect things aren't always going to work out as planned. There's going to be some trial and error. That's the whole point of doing a project like this."

Other lessons learned from the project include:

- A fleet of small wind generation is very costly to maintain
- Carefully vet small vendors before making payments
- Use extra due diligence with ever-evolving experimental software and control systems
- Get expected costs right up-front



WHAT'S NEXT

for City of Ellensburg?

After disappointing results from the demonstration project, the utility plans to march forward with planning for the future. With energy costs rising, looking at alternative energy options is top-of-mind. And the solar array isn't going anywhere.

"We're excited as we move forward to have the solar photovoltaic array operating until the end of its life," said Dunbar.

That's in 11 years.