Quarterly Update

Pacific Northwest SMART GRID DEMONSTRATION PROJECT

Winter 2013

Why a good headline sometimes hits the cutting room floor

The concept of "collaboration" doesn't make for interesting headlines. But this kind of good news is definitely worth noting, even as other highlights of the project may seem much more exciting.

For example, with the Pacific Northwest Smart Grid Demonstration Project, people are largely interested in the two-way communication signal that is expected to help revolutionize power system management. And certainly, the nearly $100 million in assets installed at the utility level, all of which will help with reliability, renewables integration and consumer choices, is an excellent success story.

But I feel compelled to emphasize the collaboration across our project team. I hope you are as excited about it as participants of the project are, from utilities and universities to the technology vendors and infrastructure partners.

The PNWSGDP is the largest smart grid demo of its kind in the nation, spanning five states, 60,000 metered customers and nearly a dozen utilities with numerous and varying goals – all glued together with the transactive control system, and more importantly, with collaboration. It's truly amazing how we are working to unite the partners with a very complex communication protocol to address both regional and utility requirements.

In this issue, we promise not to wax too poetically about collaboration specifically, but we will focus on how the project's goals, and that of the utilities, are coming to life because we are working together.

Ron

Ronald B. Melton, PhD
Project Director

What's inside

Project Objectives and Attributes

Primary Objectives:

- Develop and validate an interoperable distributed communication and control infrastructure using transactive control signals;
- Measure and validate smart grid costs and benefits;
- Contribute to the development of standards and transactive control; and
- Apply smart grid capabilities to support the integration of renewable resources.

Operational Objectives:

- Manage peak demand;
- Facilitate wind integration;
- Address constrained resources;
- Improve system reliability;
- Improve system efficiency; and
- Select economical resources.

Key Attributes:

- Leave an installed operational base of smart grid assets and successful operational strategies for the region.
- Stimulate the regional and national economy by creating jobs and a vibrant smart grid industry.

Collaboration is king

Blake Scherer is a straight-talking, down-to-earth System Engineering Supervisor at Benton Public Utility District. He's interested in keeping the lights on and optimizing resources, including wind power, to make that happen. To that end, part of Benton's participation in the PNWSGDP involves a 10 kilowatt battery to help store energy.

"We are looking to capture intermittent wind generation and deploy it when needed," Scherer says matter-of-factly.

But Scherer really comes to life when he specifically talks about the work with his "sister utilities" in the Tri-Cities area regarding that 10 kilowatt battery. Although Franklin PUD and the City of Richland are not part of the PNWSGD, they are tying their own batteries to Benton PUD through their involvement with the Tri-City Development Council's Mid-Columbia Energy Initiative. The three storage devices take energy from the grid during off-peak hours, then store and provide up to four hours of energy, releasing it back to the grid during times of peak demand.

Benton PUD's Grid.Balancer

"We are interested in the technology, of course," Scherer says, "But the cross collaboration – developing a resource that we all three can pull from, is exciting. We want to know if a small group of utilities can be part of the regional solution for intermittent wind. I feel that we are really doing ground-breaking work, here."

PNWSGDP Principle Investigator Don Hammerstrom agrees wholeheartedly with Scherer's statement, and also about how working together is the key to success. From his perspective, the collaboration at the project level offers a unique, distributed approach to power system management, and that comes in the form of the transactive control signal.

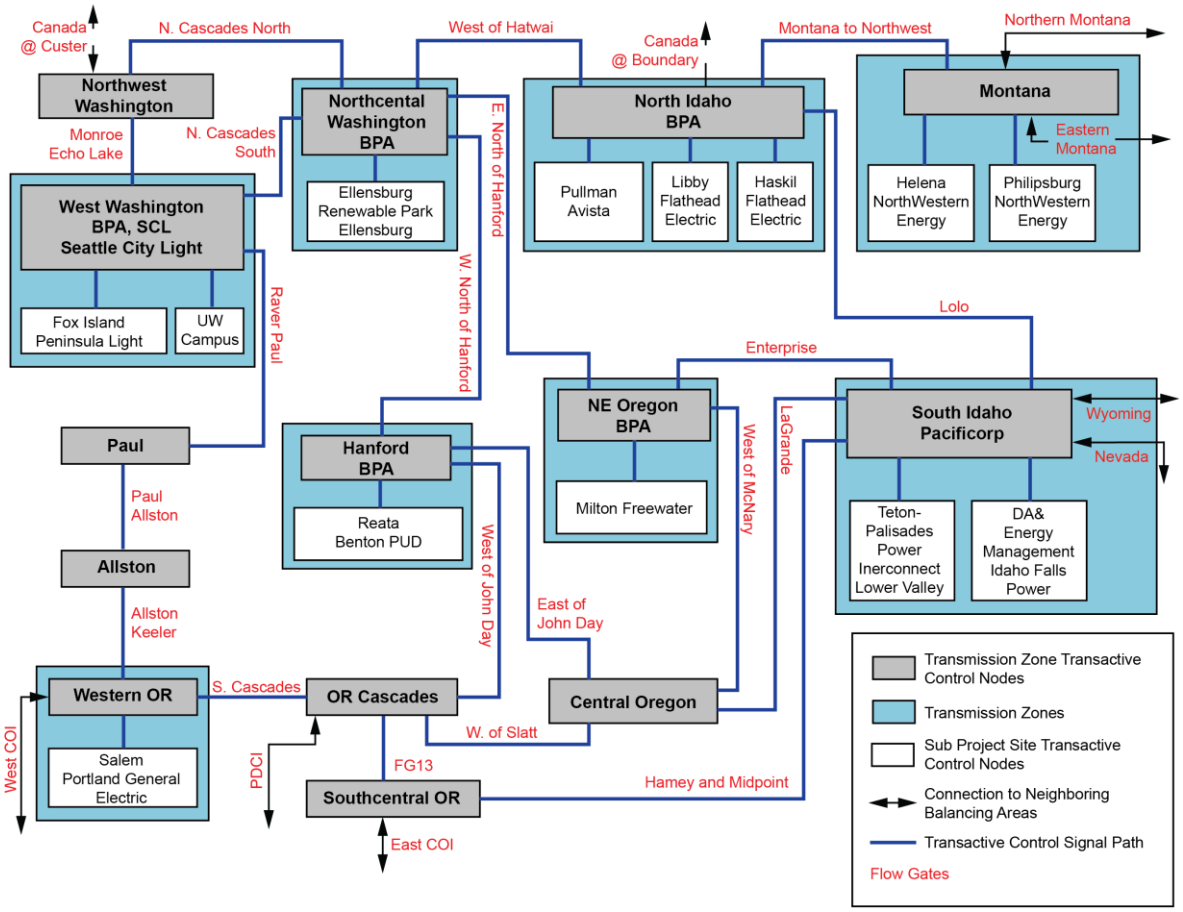
"There are many ways to accomplish the goals of the project," he says. "What's unique about the transactive control approach is that it offers an opportunity that is not dependent on a single controller or central authority. The transactive control signals represent many objectives, instead of a unique pairing between an objective and a responsive asset." In other words, collaboration instead of silos.

It might seem like Hammerstrom is more focused how the technology will work together, but he actually attributes the success so far to an "amazing team who will look back on this and recognize that we did something strikingly new."

What happens next with the project? Implementation of the signal is happening in a staged approach because of the complexity of the system. Scherer says Benton PUD is pleased to have their battery responding to the signal. Many other utilities either have their assets under control, or will soon.

Hammerstrom says they are addressing bugs in the system, such as "noise" in the signal that occurs when calculations must travel across time intervals of different sizes, and numerous generation inputs like hydro, fossil fuels and wind.

Regional and Subproject Transactive Control Nodes and Network Topology



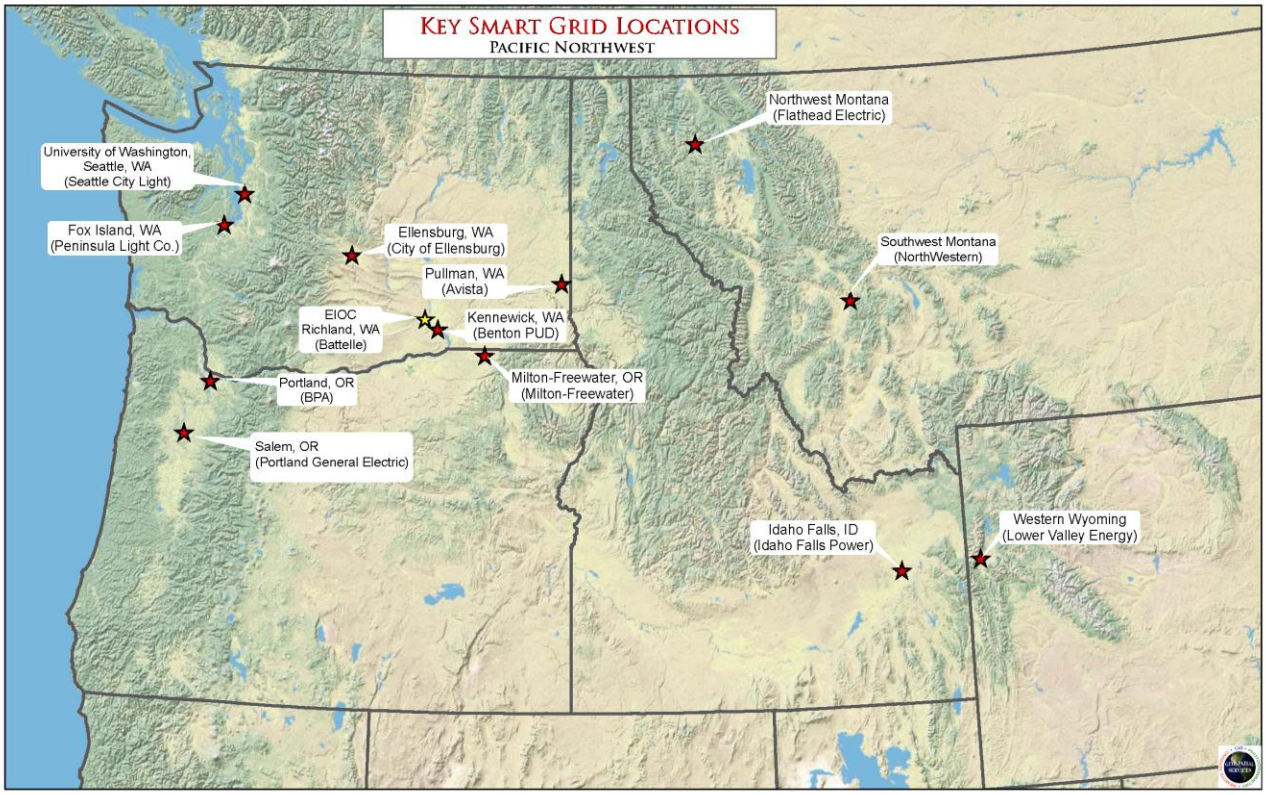
"I'm looking forward to the phase when we start collecting data from the transactive control system," Hammerstrom says. "But keep in mind, that is only about one third of the overall data we'll collect. We have efficiency tests, which will show changes in energy consumption, and those tests will yield quick results. We also have reliability tests, which will take longer to quantify because we already have a fairly reliable system."

At the utility level, reliability is also a big part of Benton's test. Scherer says, "We also have meter alarm tracking as a subcomponent of the project. This includes alarm events like high voltage, low voltage and power failure. We're leveraging our existing automated metering infrastructure system to improve power quality and to provide outage management."

The PNWSGDP can potentially provide many benefits to utilities and consumers – enhanced reliability, efficiencies, cleaner energy, the delaying of infrastructure investments, and choices on how, when and possibly, at what price, to use energy. Plus the project will provide a wealth of knowledge for the energy industry. The story for the PNWSGD is as of yet unfinished, but there are still many successes that can be counted – included the not quite so "breaking news" topic of collaboration.

To learn more about what each utility is testing and installing, click here.

To learn more about the transactive control system, click here.



Other notable events

The Pacific Northwest Smart Grid Demonstration Project published its Annual Report 2012, describing how it rolled out its distinctive two-way communication signal between electric providers and users in 2012, and how the project will evaluate the signal's ability to smooth out grid operations. A copy of the report can be found here.

Outreach calendar:

- February 24-27: Project to present at IEEE ISGT conference in Washington, DC.
- May 23-24, 2013: Project to participate in First International Conference and Workshop on Transactive Energy: Implementing the Future of the Electric System, World Trade Center, Portland, OR.

Project description

The Pacific Northwest Smart Grid Demonstration project is a regional endeavor funded by the Department of Energy under the American Recovery and Reinvestment Act of 2009. The goal is to verify the viability of smart grid technology and quantify smart grid costs and benefits. This information will help validate new smart grid business models at a scale that can be adapted and replicated nationally.

With the 50 percent DOE matching funds, this project has a $178 million budget.

Smart grid can help meet increasing power demands, reduce greenhouse gas emissions, promote energy independence, enhance reliability and help improve national security. It is a system that uses technology to enhance power delivery and use through intelligent two-way communication. Power generators, suppliers and users are all part of the equation.

With increased communication and information, smart grid can monitor activities in real time, exchange data about supply and demand and adjust power use to changing load requirements. Smart grid technology includes everything from interactive appliances in homes to substation automation and sensors on transmission lines.

The regional project, the largest smart grid demonstration project in the nation, is led by Battelle Memorial Institute, Pacific Northwest Division. Participants include the Bonneville Power Administration, utilities, universities and infrastructure partners. It includes 112 megawatts of responsive resources and will last for five years.