Quarterly Update

Pacific Northwest SMART GRID DEMONSTRATION PROJECT

Summer 2013

Setting the stage

At a recent national conference on smart grid, attendees were polled about their knowledge of transactive energy. Eighty percent could not explain what it was! Consider, these are smart grid industry/policy leaders from around the country. This survey was, of course, not scientific, but I still think the results are a pretty good indicator about the complicated nature of transactive energy. The transactive control system is the glue the binds the Pacific Northwest Smart Grid Demonstration Project. If our own colleagues have difficulty explaining transactive energy, imagine the challenges that may lie ahead in terms of communicating the concept to a broad group of stakeholders for potentially widespread implementation. To that end, this issue of the project newsletter is dedicated to outreach efforts, both current and in the future, to help people understand the demonstration, and what benefits it is bringing to the region.

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.

Demystifying transactive energy

Here in the region, utilities have noted that an easy-to-understand description of transactive energy would be helpful in educating the public, policy makers, and other stakeholders about the Pacific Northwest Smart Grid Demonstration Project (PNW-SGDP). Help has arrived -- the project's communication team, headed up by Battelle's Nik Foster, recently added a consumer-friendly page to the project website that comes complete with an animated video clip of how the signal travels through transmission zones. What's new and different about the websites' narrative about transactive energy? It is explained with a consumer perspective in mind, and with a focus on benefits. Here is a sample:

In a very simplified example, the signals say to your electric car, "Hey, electricity will cost less tonight. Would you like some?" Your car says: "Yes, I'll charge tonight." This allows the system to self-adjust and help the region to optimize the use of resources, such as renewable energy, while maintaining power quality and reliability at reasonable costs. Apart from encouraging electricity use when it's cheapest, the signals also communicate what different resources are available; allowing the best use of them, by, for example, using wind over coal.

PNW-SGDP participant Idaho Falls Power is testing electric vehicle charging

"We worked with utilities to find out what questions their customers have about the project, and what kind of information would be most

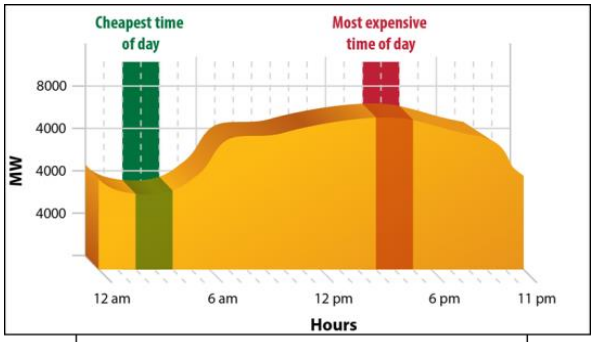


Illustration of cost of delivering electricity

useful," Foster says. "We made sure not to use jargon or acronyms, and we assumed that users have little background about how the grid operates."

For example, the new webpage explains a concept that many energy experts take for granted – the need to balance load and generation. Understanding the delicate juggling act that grid operators perform every minute of every day is crucial for people to comprehend why transactive energy could be helpful. Here's another passage from the webpage:

Every second, the amount of electricity used in the region must match the amount of electricity that is generated. That's harder than you might think! If the balance of energy use and energy production tips one way or the other, the grid can destabilize causing a blackout. For example, if the wind blows much harder than was forecast, people who manage the electrical grid must make adjustments for the extra incoming wind power. In the same way, if demand suddenly spikes — e.g., everyone turns on home air conditioners on a hot evening, the grid operators must either turn on short-term, expensive power or find ways to reduce demand quickly. The PNW-SGDP is testing new signals that will help grid operators to keep the grid in

balance by predicting the available power and anticipated demand.

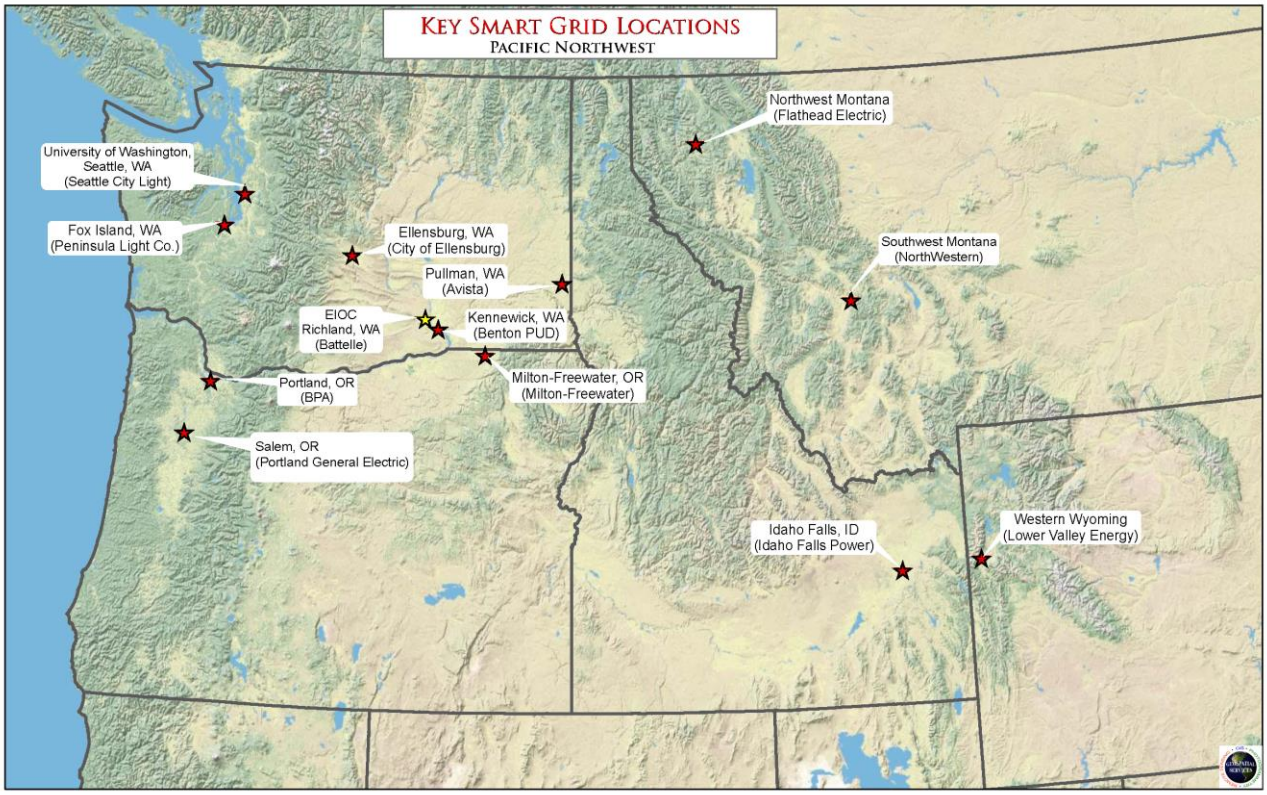
The website also features colorful photos of participating utilities, such as Flathead Electric's installation of smart meters, and graphics to explain system peaks. If you haven't surfed the project's online presence in a while, it's worth taking a look at the new pages, catching up on past issues of the quarterly newsletter, and generally checking out the latest news and publications.

Automatic Meter installation at PNW-SGDP participant Flathead Electric

Moving forward, the Bonneville Power Administration will also be working extensively with utilities, which spent over $75 million on implementing smart grid assets as a part of the project, to gather and share their learnings and benefits so far from. While transactive energy works behind the scenes to optimize the grid during the project, it is these physical installations – smart meters, substation upgrades, in-home devices, et cetera, that will make the grid more stable and resilient for decades to come. As part of a "key agency target," BPA will interview the utility participants, and, partnering with the utilities and Battelle, widely distribute the findings in the form of reports, videos, and good news stories. BPA will likely propose a smart grid summit for sometime next year, where participants can share successes and lessons learned in person.

These actions are, of course, in addition to the excellent work by subproject participants to highlight their activities locally – including PGE's widely attended unveiling of the new five megawatt battery facility this summer, and the kick-off event at the University of Washington in Seattle last October.

One of the communication lessons learned so far is the need for each utility to understand and speak to the demographics of its own customers. Foster says, "Within the upcoming year, it will be fascinating to see how utilities share information about their experiences with the transactive control system locally, and generally celebrate the project's progress."



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.