Quarterly Update

Pacific Northwest SMART GRID DEMONSTRATION PROJECT

Spring 2011

Standard + interoperable = sustainable

There's a reason that a USB port is the same for all makes and models of electronic devices – industry interoperability standards. Without interoperability, your smart phone couldn't talk to your computer, download directions or let you purchase concert tickets. You'd have to buy a lot more electronic gizmos, adaptors and cables to get the same benefits. But believe it or not, there's much more to interoperability and standards than technical compatibility.

The Pacific Northwest Smart Grid Demonstration Project aims to incorporate standards and interoperability into our region's electric grid. Our project objectives include 1) developing an interoperable infrastructure and 2) contributing to the development of standards. (see the grey box on the right.)

This Quarterly Update will focus on exactly what we mean by interoperability and standards, how project level infrastructure partners are helping to blaze the trail, what activities they are participating in and what results they are getting.

We'll also take a look at project updates and outreach activities. We're getting a lot accomplished!

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:

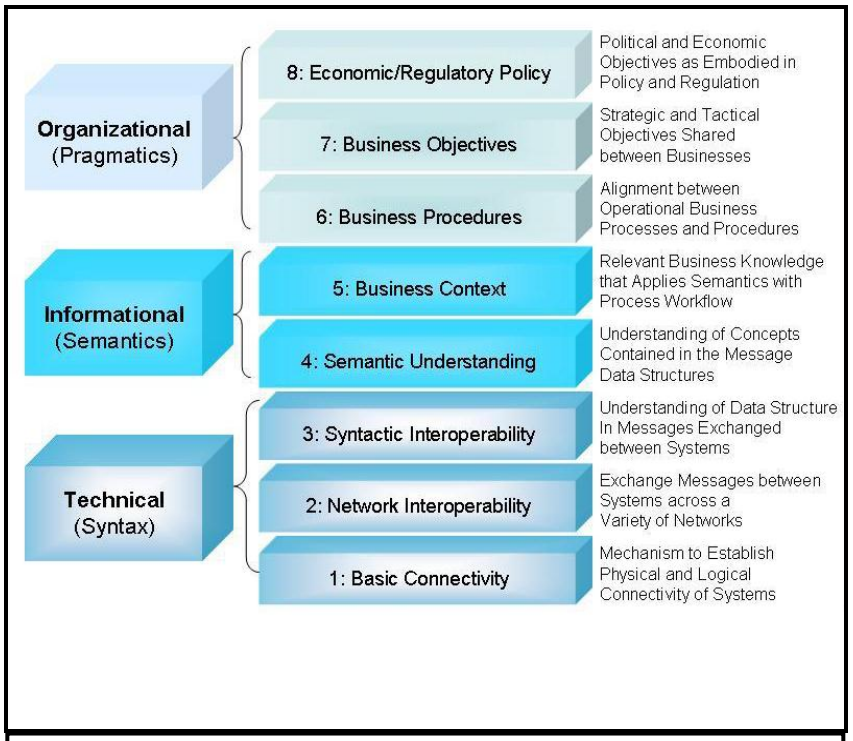
- Manage peak demand;
- Facilitate wind integration;
- Address constrained resources;
- Improve system reliability;
- Improve system efficiency; and
- Select economical resources.

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.

Interoperability and standards: *more than technology*

Interoperability is key to getting all pieces of the smart grid puzzle to fit together. A large part of interoperability is simply getting the right technical standards in place. Technical standards can help guide investment decisions and ensure the ease of communication between electronic devices, appliances, software and signals. The whole idea is to enable a variety of "smart" technology solutions to coexist, allowing for the free flow of information which will result in a modernized electrical system.



The GWAC Stack, a model created by the Gridwise Architecture Council, shows the many layers of interoperability.

The real key to interoperability involves the major pieces of the power system and how to enable those pieces to talk to each other. One of the significant boundaries in communication on an electrical system is between transmission (the high voltage lines that carry power long distances) and distribution (the lines feeding neighborhoods and business districts.) Utilities also have a major boundary between themselves and the end-users (the individual homes and businesses that use electricity.)

Interoperability can provide a means of exchanging information across those system boundaries, and the Pacific Northwest Smart Grid Demonstration Project is testing whether a transactive control signal can do just that. The transactive control signal represents the monetary value of power in terms of dollars-per-megawatt-hour, at a given point in time and specific location, in an electronic form. In theory, the signal can move through the system incentivizing the use and movement of power. (For more information see the Winter 2011 newsletter.)

If all parts of the power system, from generation to the end user, can exchange information and all agree what that information means, the region can take action on either side of those boundaries to optimize power use.

The Gridwise Architecture Council has established an eight-layer model to promote the standards development process. Affectionately called the "GWAC Stack", the model shows the many levels of standards and technologies needed to support interoperability from every aspect.

The Pacific Northwest Smart Grid Demonstration Project took a huge step forward this quarter in establishing the areas of technical and informational interoperability – the left side, bottom two layers of the GWAC Stack. During a – "Plug Fest" at the project's Electricity Infrastructure Operations Center (EIOC), the project's technology partners gathered at the EIOC and literally plugged in their hardware, software and everything that connects them to see if they were able to send and receive the transactive control test signal. It worked. This is a major milestone in the project. The actual transactive

control signal is slated to be fully functional by September 2012.

Team outreach calendar:

- March 2 – Project representatives attended a workforce development meeting with Pacific Northwest Center of Excellence for Clean Energy in Centralia, Wash. The Center identified BPA Energy Efficiency manager as the taskforce Chair.
- April 4 – Project management submitted a PNW-SGDP project summary to the Department of Energy for use in a White House report, expected in Summer 2011.
- April 12 – Project representatives met with the Consumer Council at Mission Valley Power, a non-partnering utility operated by Tribal members in Pablo, Mont., to discuss Smart Grid.
- April 15 – Project representatives attended webinar with the National Rural Electric Cooperative Association to discuss interoperability, cyber security and demand-side management. This organization also received a Department of Energy Smart Grid grant.
- April 20 – Project leadership presented a quarterly update to the PNW-SGDP's Project Review Board by teleconference.
- April 21 – Project representatives presented at the Smart Grid Oregon Conference in Portland.
- April 26 – Project representatives presented at the Columbia River Joint Operating Committee meeting in Portland, Ore. to representatives from the U.S. Bureau of Land Management, The U.S. Army Corps of Engineers and BPA.
- April 28 – Project outreach team presented at the Chartwell Consumer Education Summit in Phoenix, Az.
- May 3 – BPA project representatives served as guest lecturers at Portland State University in a course on energy technology innovation.
- May 10 – Flathead Electric and Milton-Freewater presented at BPA's utility Energy Efficiency Summit in Portland.
- May 22 – Project representatives participated in a panel discussions with Electricity Ambassadors from Peninsula Light Company in Gig Harbor, Wash.
- June 8 – Project representatives from BPA will present at an Energy Efficiency Business Council meeting in Bellevue, Wash.
- June 23 – Project representatives from BPA and PGE will participate in a panel discussion about Smart Grid Innovational Centralia College, in Centralia, Ore.

Milestones

- March: Plug Fest! Successful test of transactive control signal with project infrastructure level partners.
- March: The City of Ellensburg has gone out to bid for eight wind turbines.
- May: Lower Valley Energy annual report expected.
- April: Flathead Electric's substation is online

Interoperability for the Pacific Northwest Smart Grid Demonstration Project took a huge step forward this quarter with the "Plug Fest" at projects Electricity Infrastructure Operations center at Battelle in Richland, Wash.

- May: Avista has installed about 4,000 electric meters and is on track to finish this month.
- April: Milton-Freewater has installed 500 electric meters.
- April: Finalized the BPA/Alstom/Battelle cyber security plan for the BPA data stream.
- April: Successfully completed BPA/Alstom/Battelle connectivity test.
- April: Built baseline process flow with IBM, conducted walk-through discussion with Battelle, and discussed five regional constraint scenarios in light of the transactive signal.
- April: Finalized the Scope of Work for the next steps on the Regional Business Case.

Upcoming milestones:

- Complete Release Cycle One and begin Release cycle Two in min-June.
- June: Defining next steps on business process flows for the transactive signal, and how the regional constraint scenarios (e.g. integration of wind) might be supported.
- June: Completing the scope of work for developing a Regional Business Case document, and compiling supporting documentation. Beginning planning discussions on how to connect data from the test cases with the Regional Business Case and finalize which elements will have data from the PNW-SGDP.

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.