Quarterly Newsletter

Vol. 1, No. 2, Fall 2010

Our short and cool summer is turning into autumn and plenty is happening with the Pacific Northwest Smart Grid Demonstration Project. All of the contracts between Battelle and the project level infrastructure participants – 3TIER, Alstom Grid, IBM, Netezza and QualityLogic – have been signed, and the cooperative agreements between Battelle and participating utilities have been executed or are very close to completion. The project team is hard at work designing systems and procuring or installing equipment.

The cooperative agreement between Battelle and the Department of Energy was finalized at the end of September. Full funding for the project has been released and is now available for project execution. Although this is later than we had hoped, it is very good news and allows all parties to proceed into a more active phase of the project. This phase will enable us to test a variety of smart grid technologies and processes that will help us achieve our regional objectives.

Over the next three issues, we'll be bring you background information on what the individual participants are doing locally at the sub-project level, how the transactive incentive signal will work at the project level, and how everything will fit together to help us determine the best approach for moving forward with a variety of smart grid technologies that make business sense for the region.

Ron

Ronald B. Melton, PhD
Project Director

Dashboard

Funding from DOE in 1st Quarter	
Initial deliverables (Updated Project Mgmt Plan, Cybersecurity/Interoperability Plan, NEPA) to DOE in 2nd Quarter	
Project Phase I (Project Design) complete by 3rd Quarter	
Project Phase II (Build Out) initiated by 2nd Quarter	
All project participant contracts by 2nd Quarter	
DOE Coop. Agreement signed in 2nd Quarter	

Project Objectives and Attributes

Primary Objectives:

- Develop and validate an interoperable distributed communication and control infrastructure using incentive signals
- Measure and validate smart grid costs and benefits
- Contribute to the development of standards and transactive control
- 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
- Select economical resources

Key Attributes:

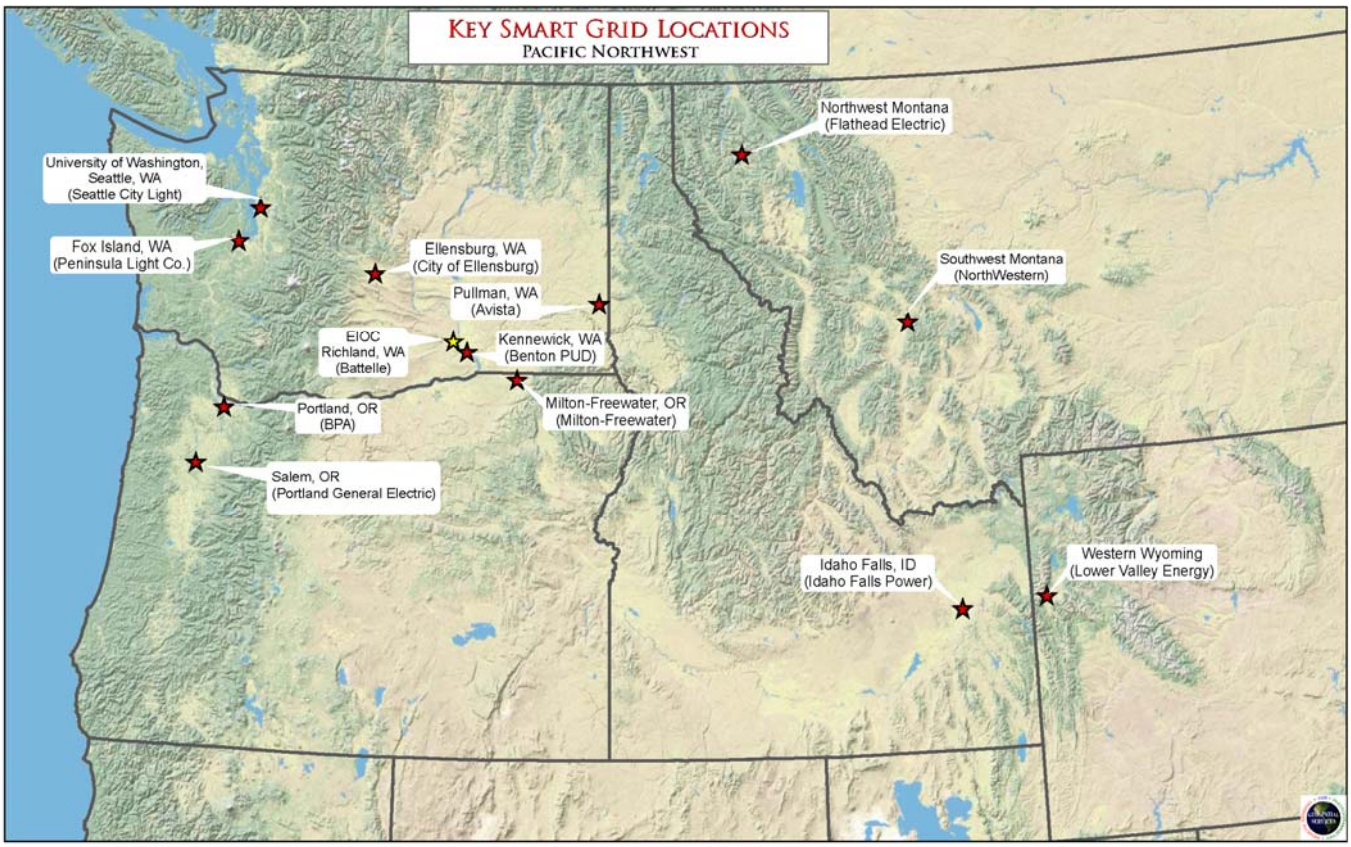
- Leave an installed operational base of smart grid assets and successful operational strategies for the region
- Stimulate the regional and national economy by creating jobs and a vibrant smart grid industry

Summary of the Pacific Northwest Smart Grid Demonstration: Sub-Project Descriptions

What are utilities doing locally?

Smart grid can be thought of as the convergence of modern communications (including the Internet) and the electric power system. In addition to the two-way communication introduced by this convergence, a smart grid includes intelligent devices and sensors at all levels of the power system to improve power delivery and reliability and to increase efficiency. A smart grid enables the use of more renewable sources of power, provides consumers greater information about their own energy consumption, and helps electricity providers optimize resource use and power delivery.

The wide geographic area, climate and demographics of the project will provide a rigorous test of various smart grid technologies and determine which technologies can satisfy operational objectives and also be cost-effective. No single entity could conduct this research; each member of the collaborative contributes to a portion of the research effort. In meeting their own local objectives, utilities will support broader regional objectives so that a comprehensive picture emerges of which technologies work best and why across the Pacific Northwest region, and similarly situated utilities will have guidance for making their own smart grid investments. In this issue, we summarize what the individual utilities are planning to explore and evaluate in order to improve the value of the service they provide to their customers. In the next issue of this newsletter, we will discuss the Project Level Infrastructure and how transactive incentive and feedback signals will tie all the sub-projects together to help optimize use of the grid in the Pacific Northwest.



Washington

Avista Utilities is an investor-owned utility based in Spokane, Washington, serving 340,000 electric and 300,000 gas customers in four states. Most of its 30,000 square mile territory is in eastern Washington and northern Idaho. Avista serves its customers with a mix of hydroelectric power, natural gas, coal and biomass generation delivered over 2,100 miles of transmission line, 17,000 miles of distribution line and 6,100 miles of natural gas distribution mains. Avista has two sub-projects. For the community of Pullman, Washington, Avista will use a variety of smart grid technologies, including voltage optimization, demand response, capacitor bank controls, and smart transformers to improve reliability and efficiency and contain costs. Avista will also work with Washington State University to procure and install controls for air handlers for campus buildings, chillers, and backup generators as opportunities for load shedding and energy reduction in both summer (up to 1.8MW) and winter (up to 0.4MW).

Benton PUD is a public utility district in south-central Washington with headquarters in Kennewick. Benton PUD will use four 1-kW storage devices to help with integration of wind resources, and will also procure software to develop an integrated distribution automation system. Benton PUD hopes to improve the ability of its staff to access and use data for increased reliability and customer service, improve wind integration, and keep rates low.

The City of Ellensburg is located in Kittitas County, central Washington, and has a population of over 17,000. It is the only municipal utility in the state with both electric and gas service. Ellensburg will demonstrate that, for a utility, a single interface for renewables provides quality control, crew safety, better load predictability, and higher customer satisfaction. For the customer, a centralized renewable project is less expensive and more accessible and economies of scale are achieved more quickly. Ellensburg will provide comparative data of various small renewable resources for university research and K-12 curricula development and show the ability of centralized small renewables to cost effectively act as a relief valve during periods of regional over-generation. Ellensburg's existing renewable energy park will expand to include 3-kW of concentrating solar, 40.5-kW of thin-film nanotechnology solar, and up to 70-kW of wind generation.

Peninsula Light Company is located in Gig Harbor, on Fox Island in the Puget Sound, and is the second largest cooperative electric utility in Washington. It serves 27,700 members and has 31,000 electric meters. Sales in 2009 were 68aMW (166 peak MW), mostly for residential service. Peninsula Light serves Fox Island in south Puget Sound via two feeders. These feeders are near capacity and are among the least reliable and most costly to improve. Voltage routinely runs above 120V, and load factor is poor since the service is primarily residential. The combination of deploying smart grid technologies and ongoing capital improvements projects will enhance overall reliability for the Fox Island community in the near future. To help improve service to its customers and defer expensive capital improvements as a means of containing costs, Peninsula Light will:

- Implement and evaluate SCADA/GIS model-based, real-time distribution automation (fault detection, isolation, optimal restoration)
- Implement and evaluate model-based, real-time CVR capability
- Integrate and evaluate capacity, resource, and regional-based DSM.

The University of Washington (UW) is one of the oldest public universities on the West Coast, founded in 1861. It serves more than 40,000 students, has over 29,000 faculty and staff, and covers a square mile site in Seattle. Energy usage is 34aMW and 55MW peak. UW is working with Seattle City Light (SCL) and is SCL's second largest customer. It has a diverse set of facilities: research, classroom, dormitory/residential, medical, and stadium, all of which will be used to explore smart grid technologies, behavior modification, efficiency gains and cost savings. It is unique among PNW-SGDP participants in that it is a university and customer-owned distribution system, with two 2MW standby generators and a 5MW turbine. They hope to use a facilities energy management system as a data warehouse and as a means to identify opportunities for energy savings as well as to assist with energy trend analysis. They also plan solar PV electric vehicle charging stations and acknowledge a need to develop parking policies. UW anticipates benefits of:

- Up to 5% reduction in electricity use based on building system optimization and awareness campaign
- Potential to improve how energy costs are allocated to actual end users
- Regional smart grid participation
- Providing information to students, faculty and facility operators on energy use in classrooms, dorms, etc.
- Providing smart grid infrastructure for follow-on research.

Idaho

Idaho Falls Power (IFP), located in Bonneville County of southeast Idaho, is the largest municipal utility in the state of Idaho. IFP serves 26,000 metered customers over a 17-square-mile service territory. It owns and operates five hydroelectric facilities on the Snake River with a peak generating capacity of 47MW. IFP will involve local schools, residential, commercial and industrial customers in its sub-project to explore benefits of smart grid technologies in seven key areas:

- Conservation Voltage Reduction
- Automated Power Factor Control
- Distribution Automation
- Energy Management
- PHEV
- Energy Storage and Automation
- Transmission System Automation.

Oregon

Milton-Freewater City Light & Power was established in 1889 and is the oldest municipal utility in Oregon. Its service area size is 65 square miles and it is served from two substations. Milton-Freewater's AMI Project will install 3,600 single-phase meters, 610 three-phase meters, and 2,400 water meters. The City also will install 700 demand response units, test conservation voltage reduction, and install 100 Grid Friendly Water Heaters using a rebate incentive. Their goals include:

- Peak reductions of 3-5MW
- Savings from remote reading of water and electric meters and disconnect/reconnect electric meters
- Tamper and leak detection
- Assisting customers with bill complaints
- Increasing load management options
- Improving power quality
- Assisting with outage management.

Portland General Electric, an investor-owned utility based in Portland, Oregon, serves the northern

Willamette Valley. Their sub-project is located in a primarily industrial area of Salem, Oregon. Their objectives are to:

- Intentionally island a feeder segment with distributed resources
- Demonstrate self healing of a feeder after a transmission or major distribution outage.
- Improve power reliability for customers in a high reliability zone
- Reduce peak demand using a battery/inverter storage system and DSG
- Develop battery controls to accept wind energy in off-peak hours.

Montana

Flathead Electric Cooperative is the largest member-owned electric cooperative in Montana, serving 47,766 primarily northwestern members. Flathead will compare four different levels of technology in areas served by Libby and Haskill Substations, including:

- Residential AMI metering with real-time outage management and automated meter reads
- Residential AMI plus in-home displays
- Residential AMI plus water heater DRU
- Residential AMI plus wireless home area networks with options for smart appliances.

In the Libby area, Flathead will install 5,582 TWACS (AMI) meters and recruit 100 volunteers who want to participate in increasing levels of smart grid technology. In the area served by the Haskill substation, Flathead will install 1,775 meters and recruit 50 volunteers. Flathead will explore the value and benefit to its members of the increasing levels of technology to determine the most cost-effective approach for its membership to reduce "Peak Time" power supply costs in the future.

NorthWestern Energy is an investor-owned electric and gas utility serving communities in Montana and Yellowstone National Park. Its electricity service territory is 97,540 square miles – about two-thirds of the state – with 21,400 miles of distribution and 7,000 miles of transmission lines. Its gas service extends over 70,500 square miles. In urban Helena, NWE will use CVR and automation on three feeders, and will install Home Area Networks and AMI in 200 homes and five to seven government buildings. In rural Philipsburg, CVR and automation will be installed at one feeder, and AMI installed for 50 customers. NWE's objectives are to:

- Gain experience for better validation of many assumptions used to perform economic analysis of smart grid deployment
- Develop knowledge to better inform decision-making about potential future expansion of the smart grid
- Test the ability to deploy enhanced distribution system reliability, asset management and operating efficiencies
- Implement utility-imposed customer demand controls
- Monitor and measure customer acceptance and energy use behavior changes
- Provide customers with new and innovative ways to control usage.

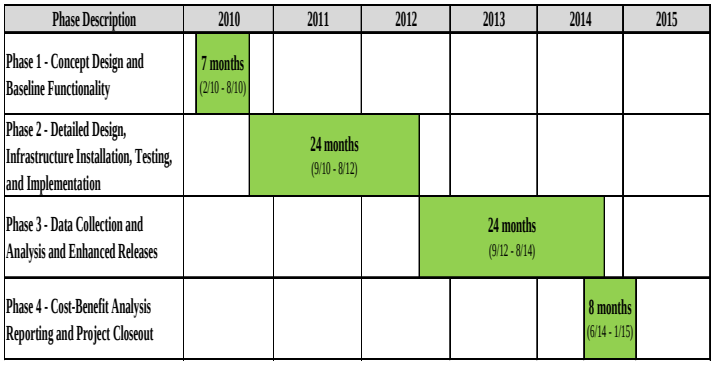
Wyoming

Lower Valley Energy, with headquarters in Afton, is an electric and natural gas member-owned utility serving Caribou, Sublette and Teton counties in western Wyoming and a small portion of eastern Idaho. It serves 26,000 electric and 4,000 gas customers. TWACS (AMI) metering is already installed for 22,000 electric and 3,000 gas meters. Lower Valley intends to use two-way AMI for real-time customer voltage inputs into SCADA for end-of-the-line voltage reduction (CVR), and integrate real-time voltage into its Outage Management System (OMS). It currently has deployed 50 water heater demand response

units and will add 500 DRUs (with under-frequency/low-voltage/cold load pickup capability), and 500 volunteers will use in-home displays for integration of water heat and thermostat control. LVE also will use smart grid technologies to improve power quality and reliability on a 70-mile long feeder, and also will work with the Jackson Hole Ski Resort's 2200kW generator for demand response.

Project timeline

To date, the project timeline has been at a very high-level. Battelle has been working with all participants to establish a more detailed, integrated timeline that shows how all activities of the participants will flow over the life of the project. The initial integrated timeline will help identify potential timing issues that will need to be addressed, and will facilitate improved project management. For stake-holders as well as participants, the integrated timeline will be a means of understanding what to expect and when to expect it. An abbreviated version of this timeline is below:



The first seven months of the project, which will be wrapped up this quarter, are dedicated to the high-level design of the "system of systems" that will connect the utility sub-projects to PNNL's Electricity Infrastructure Operations Center (EIOC) as planned. We are currently in Phase II, which will last for two years. During this phase, project participants will be purchasing, installing and testing their facilities and systems. Phase III (Data Collection) will take place in the two-year period following Phase II, and Phase IV (Analysis) will be the final six months of the project.

Outreach Activities

Road Shows/Community Events

In order to create awareness about smart grid and the Pacific Northwest Smart Grid Demonstration Project, project participants are scheduling appearances across the region. Three such events have occurred so far:

A media road show and open house was held on June 15 at the Milton-Freewater Library. Presentations addressed the regional project, the specifics of Milton-Freewater's goals and objectives and how it contributes to the regional project, and how the project will benefit the City's water and electric customers.

Peninsula Light Company participated in the annual Fox Island Community Fair at the Nichols Community Center on August 13. PenLight had materials available and answered questions.

The project was represented at the annual Idaho Falls Power Open House on September 25. Approximately 2,000 people visited the Idaho Falls annual event and had an opportunity to obtain materials and information on the project and the Idaho Falls sub-project.

Education Outreach

The Department of Energy has emphasized the need of smart grid demonstration project funding awardees to reach out to education. Connecting with education is critical for curriculum development at all levels of education, ensuring that the training students receive properly prepares them for the jobs of tomorrow, and that utilities and technology companies have a well-trained workforce. The Pacific Northwest Smart Grid Demonstration Project is proud to include many educational institutions as participants or stakeholders.

Avista – ***Washington State University*** is a sub-project location and Avista is collaborating with WSU in smart grid research and curriculum development. Avista is also working other Washington colleges including ***Centralia College*** (smart grid workforce development grant recipient) and ***Gonzaga University***.

City of Ellensburg – Ellensburg is working with ***local Ellensburg schools and Central Washington University***, sharing renewable energy data for research and helping with curriculum development.

Idaho Falls Power – Collaborating with the ***Center for Advanced Engineering Study at Idaho State University*** on certain technical aspects of its sub-project. Renewables at ***local Idaho Falls schools*** are included in the sub-project.

Lower Valley Energy – Sharing data with the ***University of Wyoming*** on consumer behavior modification.

University of Washington – UW is a participating sub-project.

Bonneville Power Administration – BPA is acting as a liaison to the ***Centralia College*** workforce development project and on the advisory board for that project.

Project Milestones

Cooperative Agreements

The agreement between Battelle and DOE was signed September 30, 2010. All agreements between Battelle and all project level infrastructure participants are in place. All but two agreements between Battelle and utilities are signed; outstanding items for the more complex utility activities will be resolved this quarter.

Project Phase I

The Conceptual Design phase is underway, with the functional requirements for the project complete and core design in progress. Two face-to-face meetings were held in September with Battelle, 3TIER, Alstom, BPA, IBM, Netezza, and Quality Logic/Drummond Group to determine how the transactive incentive and feedback signals will be structured and communicated.

Project Phase II

Battelle and sub-project utilities have determined individual local test cases. Most utilities are procuring/installing equipment, and some have started outreach to participating end-users.

Integrated Schedule

The draft integrated project schedule – showing all project-level and sub-project level timelines – is complete.

Project Calendar

October 18-21: GridWeek, Washington, DC; Ron Melton presenting (http://gridweek.com/2010/)

November 2-3: Smart Grid Road Show, Portland, OR; Luncheon panel discussion on the Pacific Northwest Smart Grid Demonstration Project (http://portland.smartgridroadshow.com/)

November 9: Smart Grid Oregon Policy Forum, Portland, OR; presentation on the Project (http://www.smartgridoregon.org/)

November 24: Happy Birthday! One Year Anniversary of receiving notice of being selected as one of 16 demonstration projects!

In the News…

- Project Director Ron Melton was interviewed on Federal News Radio's "Federal Drive" on Sept. 23. (http://www.federalnewsradio.com/?nid=15&sid=2060448)
- Project Director Ron Melton and Principal Investigator Don Hammerstrom co-authored an article about the project in the October 2010 issue of *Metering International* magazine, pp. 66-68 (http://www.ezine.metering.com/Index.aspx).

Reasons to like smart grid?

Reason #18: Supports more clean energy like wind

Reason #37: Contributes to energy independence

Reason #89: Can tell you when the dogs are watching TV when you're away from home???