

Pacific Northwest Smart Grid Demonstration Project

Congressional Briefing

January 25, 2010

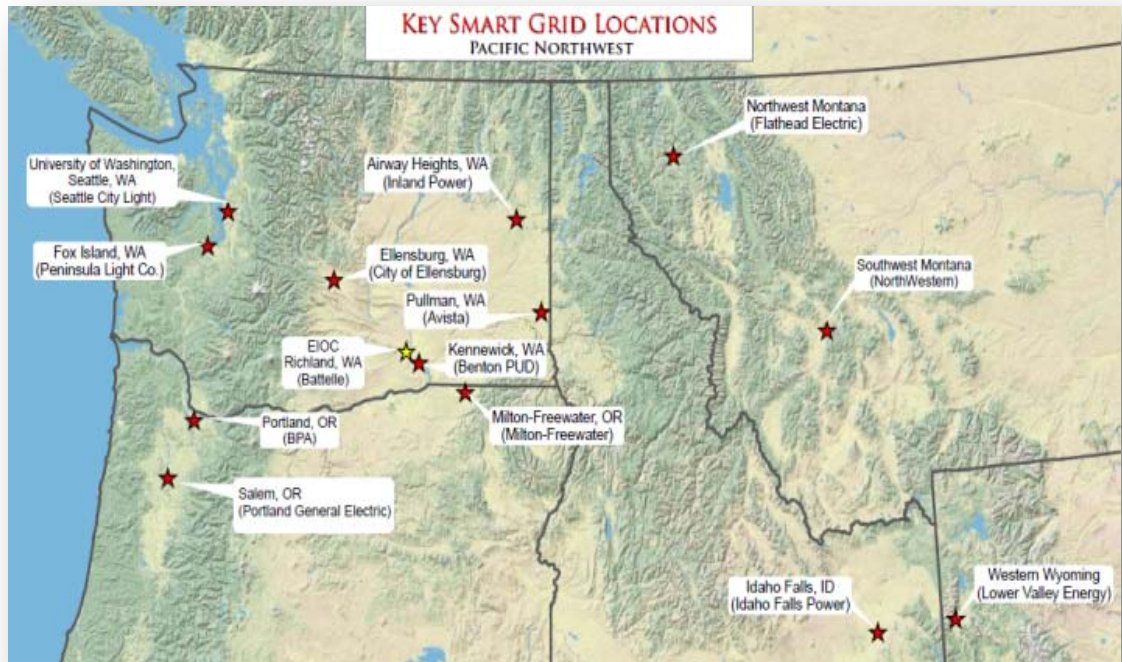
Discussion Topics

- Introduce the project and the potential impact to the region and the nation
- Project plan brief
- Q & A



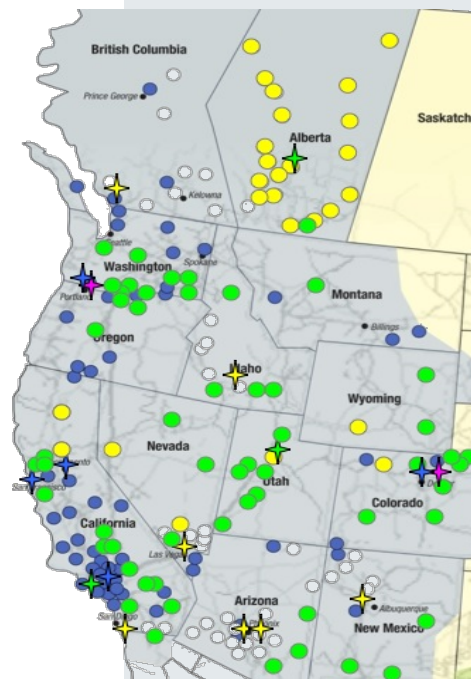
Regional Smart Grid Outlook

- Unique in geographic scale and scope of grid engagement
- Seek to validate both local and regional grid benefits of smart grid
- Touches on key regional/national energy agenda for renewables, efficiency, reliability, consumer engagement and choice
- Linked to other smart grid and energy activities
 - Western system smart grid phasor build-out
 - Renewables integration
 - Efficiency and carbon benefits of smart grid
- Positions the region for leadership overall grid and energy agenda

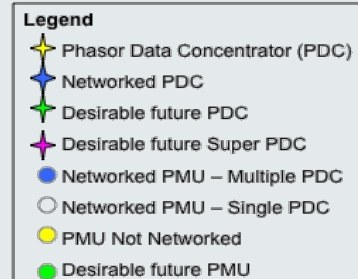


Other Regional Smart Grid Activities

- Opportunity to include other regional smart grid deployments
- Consideration of transmission, renewable integration strategies, energy storage will be informed by smart grid demonstration
- Western Interconnection Phasor Network smart grid investment grant award (\$108M)
 - Wide area monitoring and control
 - Aid renewable integration, unlock transmission
 - BPA, PacifiCorp, Idaho Power represent region



Phasor Measurement Units (PMU) in the Western Interconnection



This project is a cornerstone of the Pacific Northwest regional electric agenda. Coordination with other activities positions the region for continued leadership in transforming our electric power system.

About the Project (PNW-SGDP)

- American Recovery and Reinvestment Act (ARRA) award to demonstrate how smart grid technology can enhance the safety, reliability and efficiency of energy delivery
- Substantially increase smart grid asset installation in the region by purchasing and installing smart grid technology
 - Over 60,000 metered customers directly affected
 - 112 MW of responsive resources (loads and generation) engaged
 - 12 utilities with 15 distinct sites over 5 states
- Demonstrate coordination of smart grid assets locally and across the region using innovative communication and control system
 - Hierarchical communication—from generation through transmission and distribution, and then onward to the end users
 - Transactive control—innovative incentive signal that coordinates smart grid resources to support regional needs for transmission, reliability, renewables, etc.

Goals and Objectives

Goals:

- Validate new smart grid technologies and inform business cases
 - Provide two-way communication between distributed generation, storage, and demand assets and the existing grid infrastructure
 - Quantify smart grid costs and benefits
 - Advance interoperability standards and cyber security approaches
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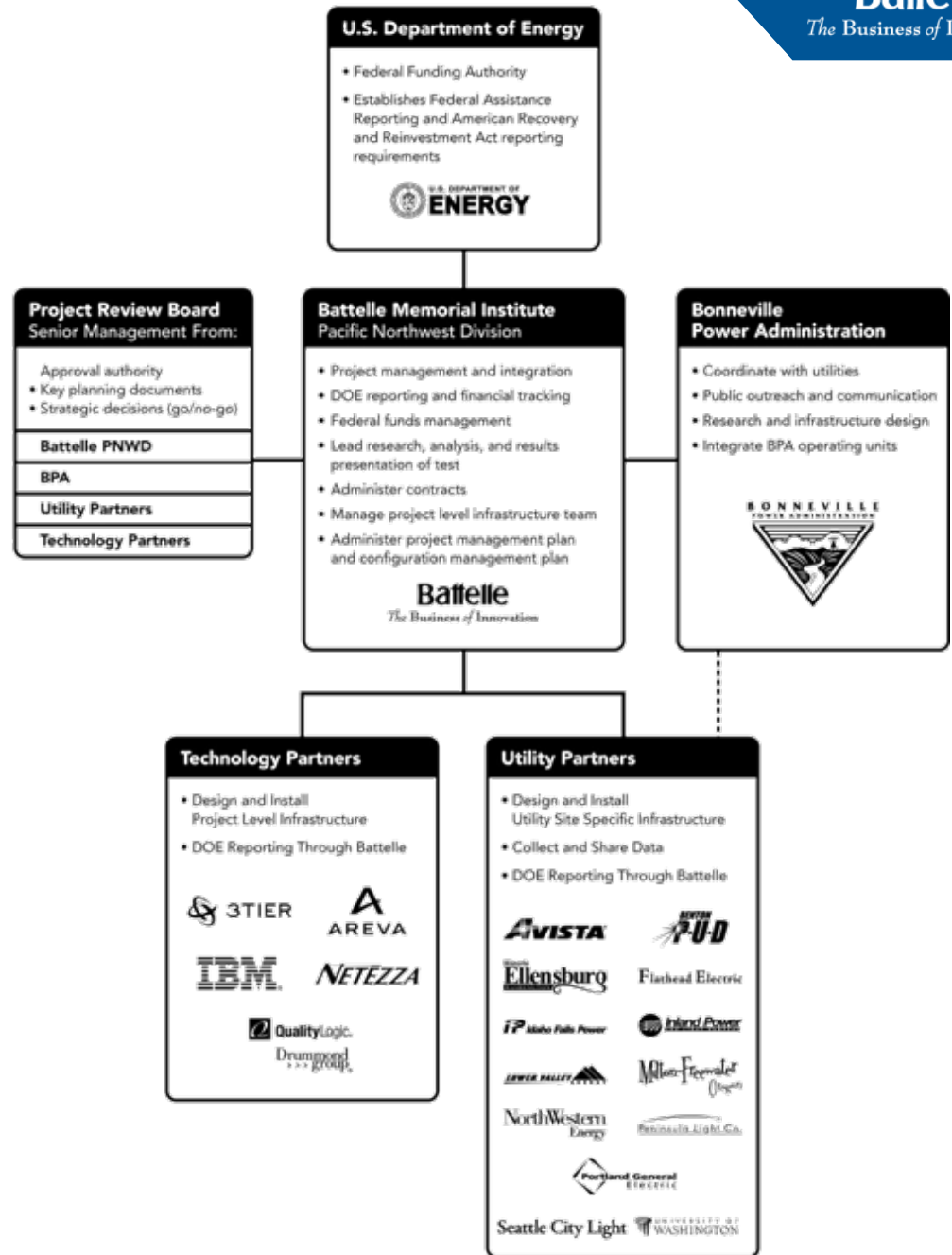
Objectives:

- Manage peak demand
- Facilitate integration of wind and other renewables
- Address constrained resources
- Select economical resources
- Improve system efficiency
- Improve system reliability
 - Load Management
 - Conservation Voltage Reduction
 - Distributed generation

Regional effort extensible
to large portions of the
United States

Team

- Battelle Memorial Institute, Pacific Northwest Division
- Bonneville Power Administration
- 12 utilities and their vendors
- 5 technology infrastructure partners



Participant Site Locations



- | | |
|---|--|
| <p>1 Portland General Electric – Salem, Oregon</p> <p>2 Bonneville Power Administration – Portland, Oregon</p> <p>3 Peninsula Light Co. – Fox Island, Puget Sound, Washington</p> <p>4 University of Washington/Seattle City Light – Seattle, Washington</p> <p>5 City of Ellensburg – Ellensburg Renewable Energy Park, Ellensburg, Washington</p> <p>6 EIOC: Electricity Infrastructure Operations Center, Battelle Memorial Institute, Pacific Northwest Division – Richland, Washington</p> <p>7 Benton PUD – Kennewick, Washington</p> | <p>8 Milton-Freewater City Light & Power – City of Milton-Freewater, Oregon</p> <p>9 Inland Power & Light Co. – City of Airway Heights, Washington</p> <p>10 Avista Utilities – Port of Whitman Business Park; Washington State University; City of Pullman (three sites), Pullman, Washington</p> <p>11 Flathead Electric Cooperative, Inc. – Libby and Kalispell area, Northwest Montana</p> <p>12 NorthWestern Energy – Helena and Phillipsburg area, Southwest Montana</p> <p>13 Idaho Falls Power – Idaho Falls loop microgrid; City of Idaho Falls (two sites), Idaho</p> <p>14 Lower Valley Energy – Lincoln, Sublette, and Teton counties, Western Wyoming</p> |
|---|--|

Project Timeline

	2010	2011	2012	2013	2014
Phase 1 - Design	6 months				
Phase 2 - Build Out		24 months			
Phase 3 - Data Collection			24 months		
Phase 4 - Cost Benefit Analysis & Reporting					6 months

- Notification of Award – 11/25/2009
- Cooperative Agreement Signed – 1/29/2010
- Detailed Design, 1/1/10 – 6/30/10
- Installation of infrastructure, 7/1/10-6/30/12
- All sites up and running, 7/1/12-6/30/14
- Evaluation and analysis, 7/1/14-12/30/14
- Periodic progress reports are required:
 - Monthly financial reports to DOE
 - Semi-annual program review meetings
 - Technical reports
 - Up to five presentations/meetings to DOE Final project reports and presentations

Project Basics

- Install and implement a unique distributed communication, control and incentive system
- Use a combination of devices, software and advanced analytical tools to enable consumers to manage their electric energy use
- Collect data over a 24-month consecutive period to provide insights into consumers' behavior while testing new technologies

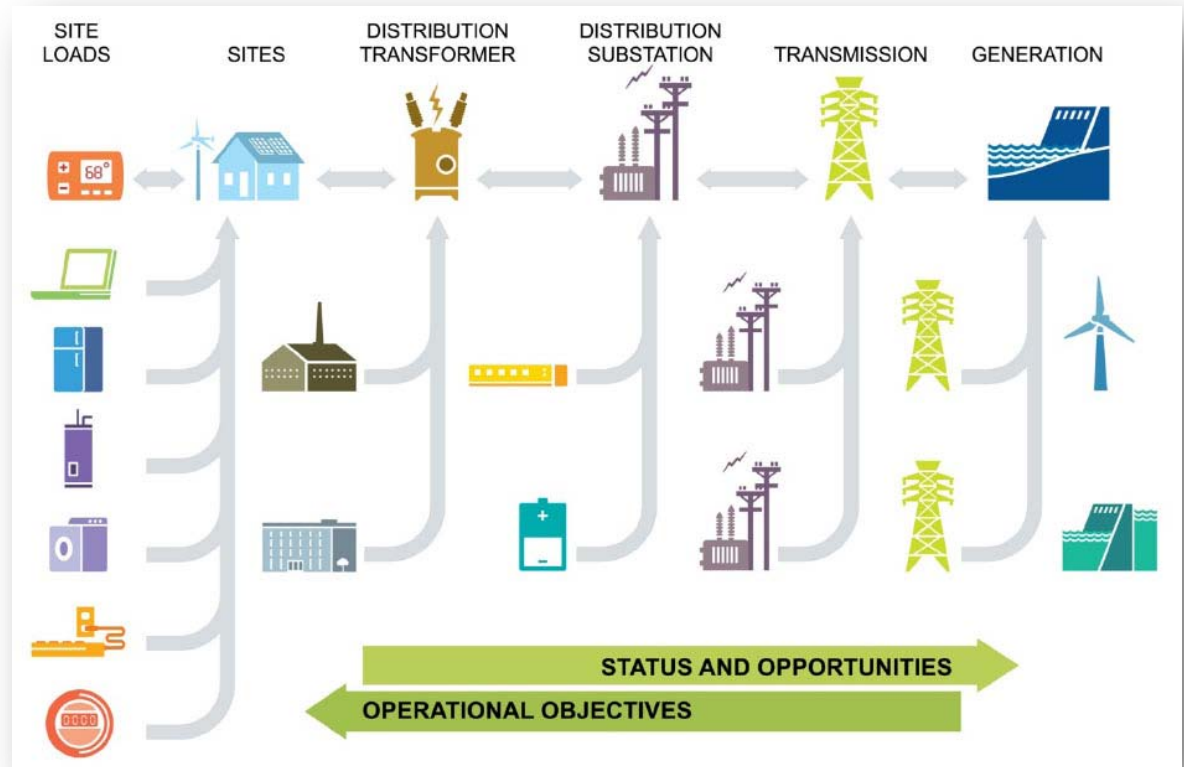
Key attributes:

- Leave an installed operational base of smart grid assets and successful operational strategies for the region
- Stimulate the regional and national economy by creating approximately 1,500 jobs and a vibrant smart grid industry

Project Basics (cont'd)

Operational objectives:

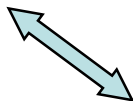
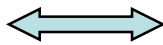
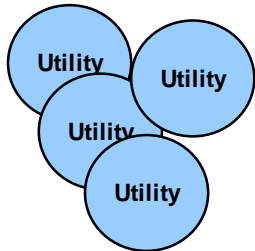
- Manage peak demand
- Facilitate renewable resources
- Address constrained resources
- Improve system reliability and efficiency
- Select economical resources (optimize the system)



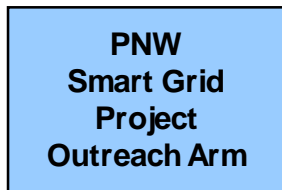
Aggregation of Power and Signals Occurs
Through a Hierarchy of Interfaces

Outreach and Education

Partner Utilities



Central Outreach



General Public & End Users



- 12 million people in region
- 60,000 impacted customers

Educational Institutions



- Regional Colleges and Universities,
 - University of Washington/SCL collaboration (sub-project site at UW)
 - Washington State University/Avista collaboration (coursework)
- Establishment of new university partnerships, educational outreach
- Local Schools

Over 100 Non-partner Utilities



- Smart grid information sharing with other NW utilities

Energy Organizations



- Also, NW Energy Leadership Orgs:
 - Northwest Power Planning Council
 - Northwest Power Pool
 - Northwest Utility Trade Associations

Government



- States (via governor offices):
 - Washington (Olympia)
 - Idaho (Boise)
 - Oregon (Salem)
 - Montana (Helena)
 - Wyoming (Cheyenne)

NW Congressional Delegation
Western Governors Assoc, Local Gov & PUCs

Tribes



- Affiliated Tribes of Northwest Indians
- Tribe Utilities

Direct PNW-SGDP Value

- Economic stimulus - \$178 million over five years
 - 1,500 jobs at peak
 - Spur adoption of new technology
 - Updated infrastructure and improved reliability
- Cost-benefit analysis to guide utilities in making future technology investments
- Increased automation for utilities to deliver improved services and value
- System optimization through two-way communication from electricity generation to the consumer
- Potential reduction in greenhouse gases and carbon footprints through better integration of renewable resources



Enduring smart grid infrastructure lays the foundation for future smart grid deployment in the Pacific Northwest

Questions

