

Pacific Northwest Smart Grid Demonstration Project

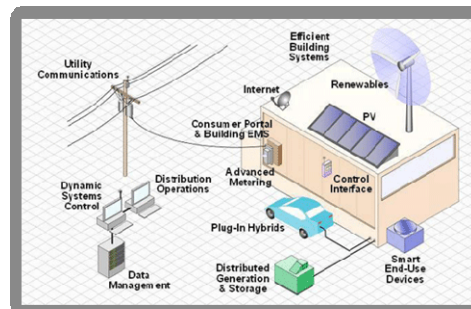
Northwest Energy Efficiency Taskforce
Lee Hall, BPA Smart Grid Program Manager
June 17, 2010



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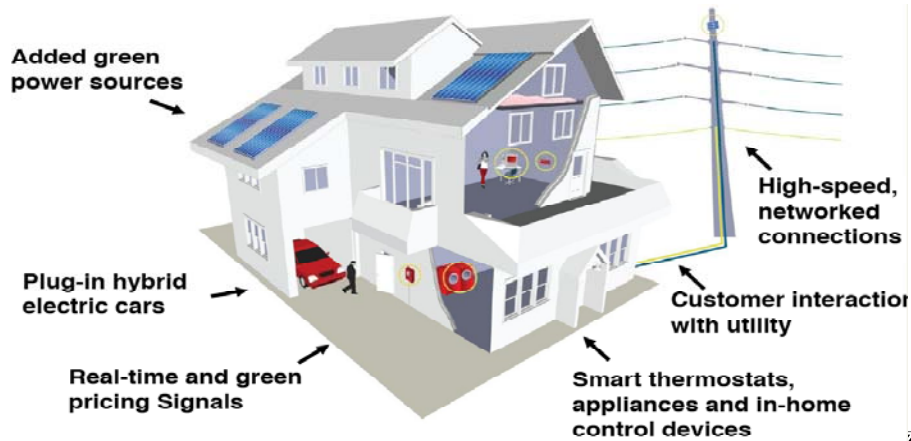
What is Meant by “Smart Grid”?

- Smart Grid is a system that uses various technologies to enhance power delivery and use **through intelligent two-way communication**.
- **Power generators, suppliers and end-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.
- **Empowers customers** to choose to control their energy usage
 - Smart meters
 - Home/building/industrial energy management/control systems
 - User information interfaces and support tools



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The End-user is the Centerpiece of the Smart Grid



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PNW - Smart Grid Demonstration Project

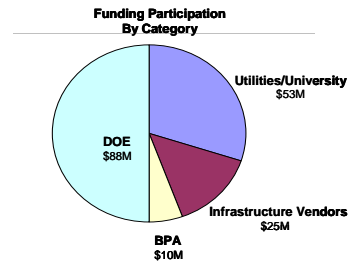
- **Unique in geographic scale and scope of grid engagement**
- **Seek to validate both local and regional grid benefits of smart grid**
- **Touches on key regional/national energy agenda for renewables, efficiency, reliability, consumer engagement and choice**
- **Linked to other smart grid and energy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



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PNW Smart Grid Demonstration Overview

- **Substantially increases smart grid asset installation in the region by purchasing and installing smart grid technology**
 - \$178 Million project led by Battelle
 - Project participants include **Battelle, BPA, utilities/universities and infrastructure partners**
 - Over 60,000 metered end-users
 - 112 MW of responsive resources (loads and generation)
 - Five years in duration
- **Demonstrates coordination of smart grid assets locally and across the region using communication and control system**
 - **Hierarchical communication**—from generation through transmission and distribution, and then onward to the end users
 - **Transactive control**—incentive signal that coordinates smart grid resources



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Project Goals and Objectives

Goals:

- Provide **two-way communication** between distributed generation, storage, and demand assets and the existing grid infrastructure
- Validate new smart grid technologies and inform business cases. **Quantify smart grid costs and benefits**
- Advance **interoperability standards** and **cyber security** approaches for transactive control
- Integrate rapidly expanding portfolio of **renewable resources**



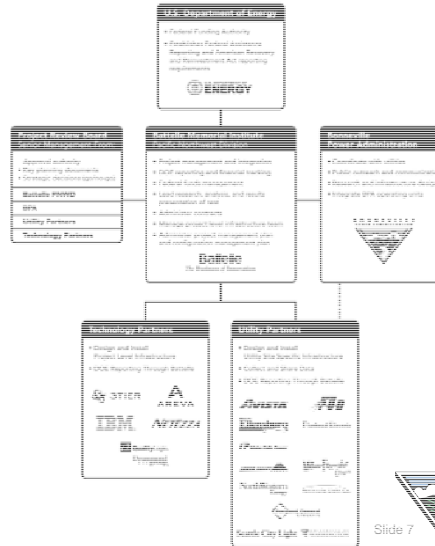
Objectives:

- 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

Project Structure / Roles

- Battelle Memorial Institute, Pacific Northwest Division
- Bonneville Power Administration
- 11 utilities (and UW) and their vendors
- 5 technology infrastructure partners



Battelle's Role

- Prime Contractor
- Overall technical leadership and project management
- Responsible for all aspects of data management
- Operate the Electricity Infrastructure Operations Center (EIOC), a secure user facility to host partners' computing hardware and software throughout the term of the Project
- Ties project together from an organizational point of view



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BPA's Role

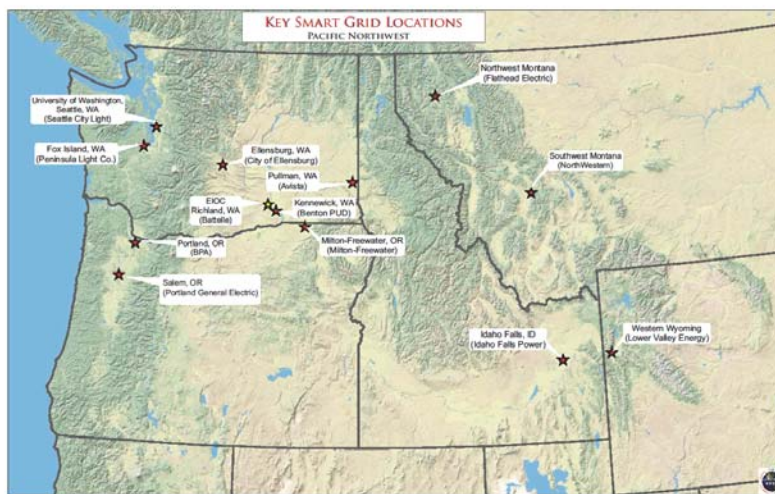
- **Coordinate with Utilities**
 - BPA policies in the region
 - Utility advocate
- **Public Outreach and Communication (with Battelle)**
 - See next slide
- **Support of Research and Infrastructure Design**
 - Support design of system
 - Integrate BPA data streams to system
- **Integration of BPA Operating Units**
 - Policy and standards development
 - Resource planning, wind integration
- **Coordinate with Battelle on cost/benefit analysis and regional business case**



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Subproject Site Locations



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Infrastructure Partner Roles

- **IBM**
 - Servers, InfoSphere™ software, cyber security, architect of interoperable transactive signal system
- **3TIER™**
 - Renewable energy wind, hydro, and solar resource forecasting and assessment
- **AREVA T&D**
 - Operations software: Real-time Dynamic Pricing, Renewable Energy Management Platforms
- **Netezza**
 - Highly parallel data storage appliance located in demonstration's operations center
- **QualityLogic/Drummond Group**
 - Interoperability testing, standardization, conformance testing, certification



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Demonstration Project Timeline

	2010	2011	2012	2013	2014
Phase 1 - Concept Design	7 mos				
Phase 2 - Build Out		24 months			
Phase 3 - Data Collection & Analysis			24 months		
Phase 4 - Cost Benefit Analysis & Reporting					6 months

- Complete contracts
- Design the "system of systems"

- Install equipment at subproject
- Build 'system of systems'

- Sites up and running
- Gather two years of data
- Perform data analysis

- Finalize cost/benefit
- Draft transition plan

Periodic progress reports are required:

- Monthly financial reports to DOE
- Semi-annual program review meetings
- Technical reports
- Up to five presentations/meetings to DOE on final reports



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ARRA in the Pacific Northwest

- Smart Grid Investment Grants
 - Investment in SG technology deployment
 - Avista, Central Lincoln PUD, Idaho Power Company, Snohomish County PUD, PNGC
 - WECC – PMU Synchro-Phasors
- PNW Smart Grid Demonstration Project
 - ARRA funds directly to PNW utilities
- Smart Grid Workforce Training
 - Washington: Centralia College, WSU, Incremental Systems Corp.
 - Oregon: Oregon Institute of Technology
 - Idaho: Critical Intelligence, Key Training Corp

Funds to the region:

\$120 M

\$53 M

\$15 M

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Contact Information

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For more Smart Grid Information:

Battelle: www.battelle.org

PNNL: www.pnl.gov

BPA: www.bpa.gov/Energy/N/smart_grid/index.cfm

DOE OE: www.oe.energy.gov

Smart Grid: www.smartgrid.gov

Smart Grid Task Force:
www.oe.energy.gov/smartgrid_taskforce.htm

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