



Pacific Northwest Smart Grid Demonstration

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TIP 35: Pacific Northwest Smart Grid Demonstration Project

Project Start: February 2, 2010

End Date: February 2, 2015

Total Project Budget: \$178M

BPA Budget: \$ 10M

Cost Share: DOE – 50% match

BPA Project Actuals (project start to date): \$2.50M

BPA FTE Budget: 3.5

BPA FTE Actuals (project start to date): 2.0

BPA PM: Lee J. Hall

Project Director: Ron Melton - Battelle

Principal Investigator: Don Hammerstrom - Battelle

Project Stakeholders: See additional detail

Pacific Northwest Demonstration Project

What:

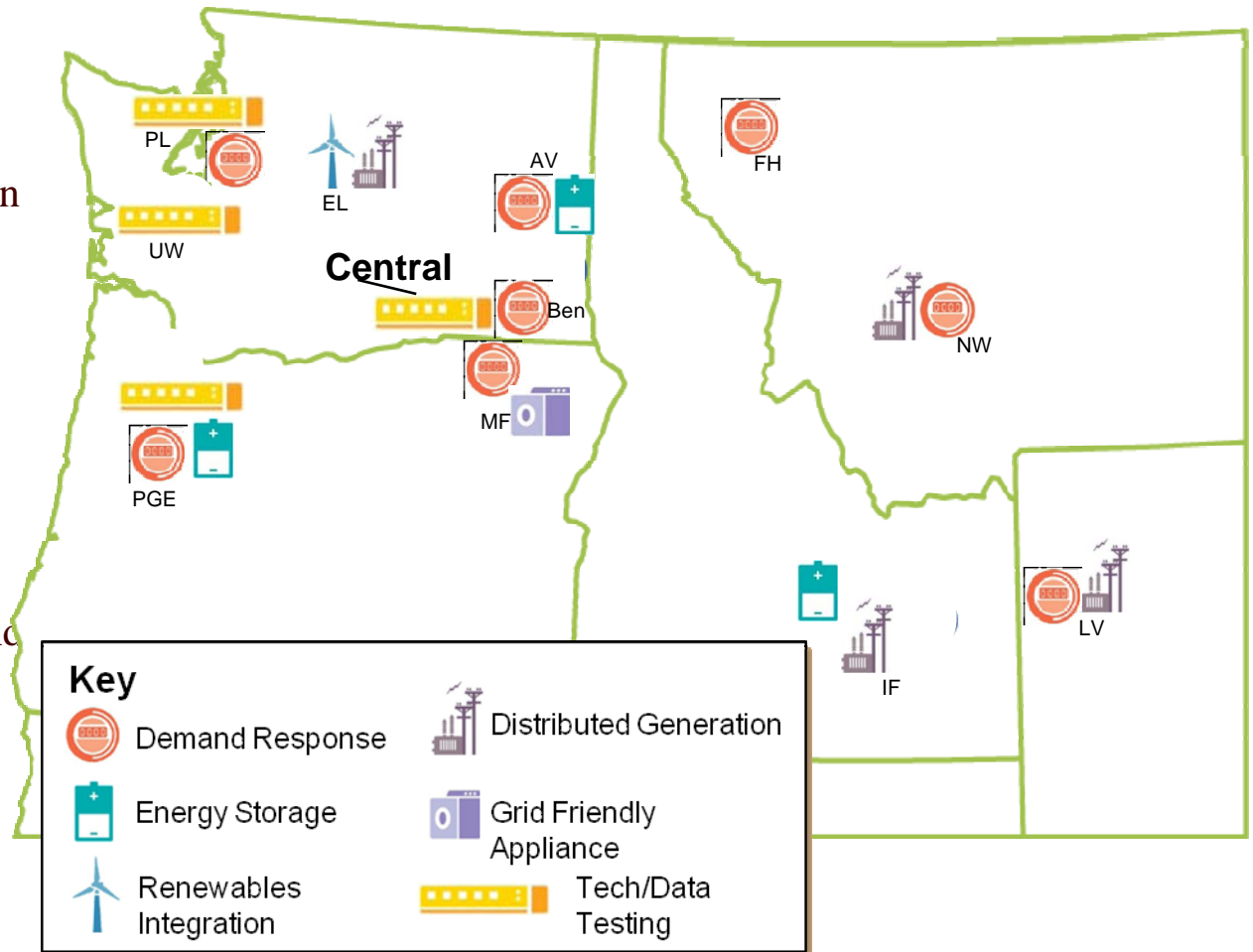
- \$178M, (\$89M private, \$89M ARRA-funded), 5-year demonstration
- 60,000 metered customers in 5 states

Why:

- Quantify costs and benefits
- Develop communications protocol
- Develop standards
- Facilitate integration of wind and other renewables

Who:

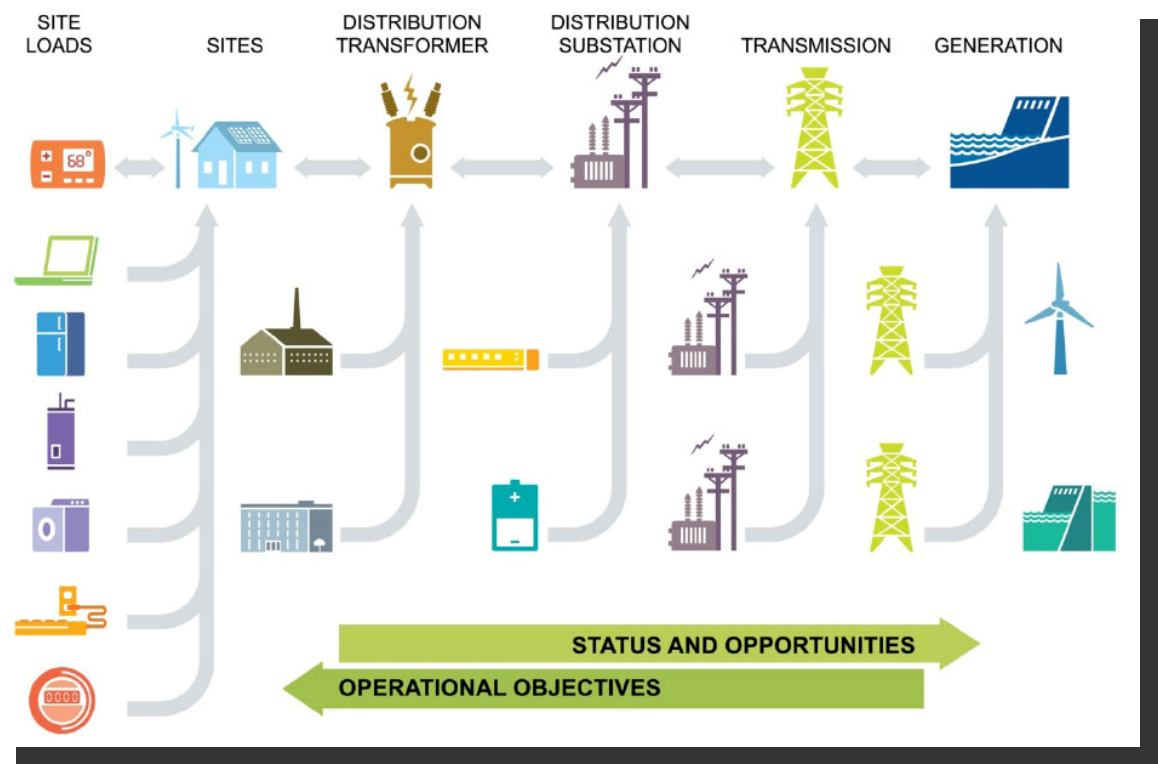
Led by Battelle and partners including BPA, 11 utilities, 2 universities, and 5 vendors



Project Basics

Operational objectives

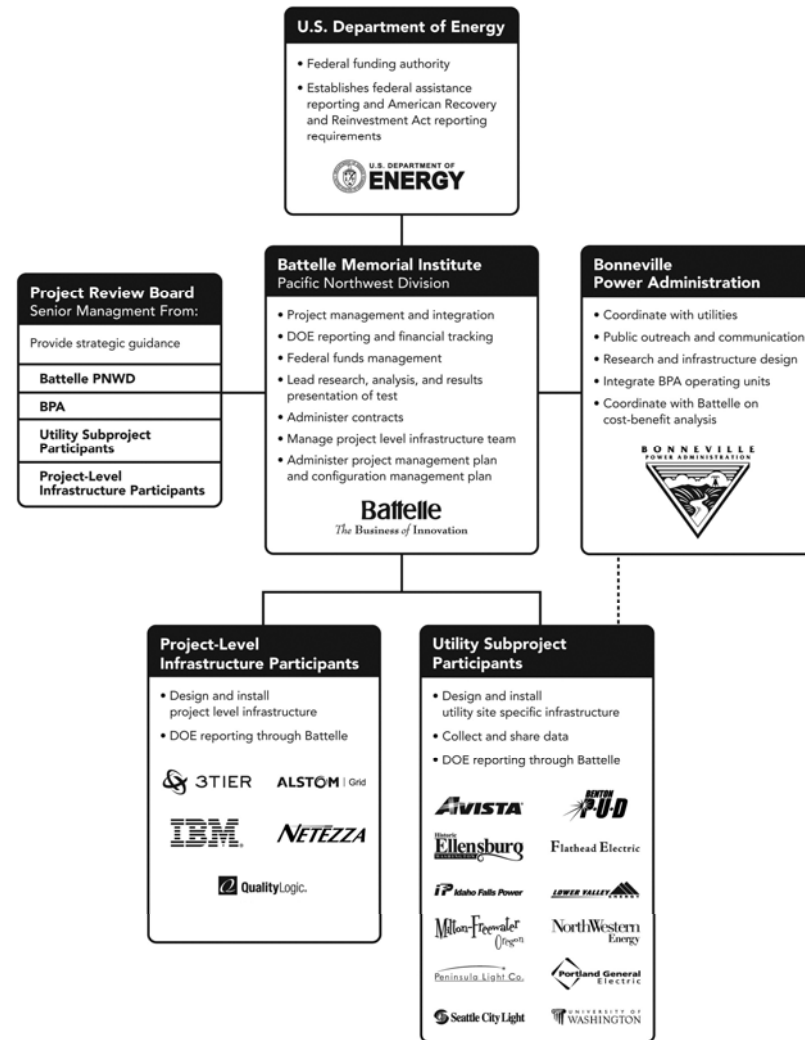
- Manage peak demand
- Facilitate renewable resources
- Address constrained resources
- Improve system reliability and efficiency
- Select economical resources (optimize the system)



**Aggregation of Power and Signals Occurs
Through a Hierarchy of Interfaces**

Project Structure / Roles

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





Expected Benefits

- **Costs and benefits will be quantified as one of the project objectives**
 - Benefits are long-term (analysis in years 3-5)
 - Multiple “mini-business cases” as specific technologies are evaluated
 - Introductory regional business case built by Navigant
- **Interoperable distributed communication and control infrastructure validated**
- **Contribution to the development of standards and transactive control methodologies for a secure, scalable, interoperable smart grid**
- **Advancement in the integration of renewables, potentially reducing GHG**
- **Individual utilities will advance their goals (& learnings will be shared with other non-participating utilities in the region)**
- **Increase in Smart Grid awareness & adoption through Outreach**
- **Project further positions BPA as a leader in Smart Grid thinking**

High Level Schedule Summary

- Five Year Project with four phases
- Phase 2: Release cycles
 - 3 release cycles, 8 mo/8 mo/6 mo

September 2012:
Fully operational
transactive control
system

Phase Description	2010	2011	2012	2013	2014	2015
Phase 1 - Concept Design and Baseline Functionality	8 months (2/10 - 9/10)					
Phase 2 - Detailed Design, Infrastructure Installation, Testing, and Implementation		23 months (10/10 - 8/12)				
Phase 3 - Data Collection and Analysis and Enhanced Releases				24 months (9/12 - 8/14)		
Phase 4 - Cost-Benefit Analysis Reporting and Project Closeout						8 months (6/14 - 1/15)

Feb 2011

Challenges: Designing and Implementing a Complex System

Utility Node Design

- A new approach as transactive control system is not “off the shelf”. Library of nodes being offered to the utilities, and option to use IBM supported technology.
- Conducted Initial test of connectivity with utilities

Infrastructure and Asset Build-Out

- Equipment installed at the EIOC in Richland, e.g. IBM and Netezza
- Utilities beginning to install and test equipment

Interoperability

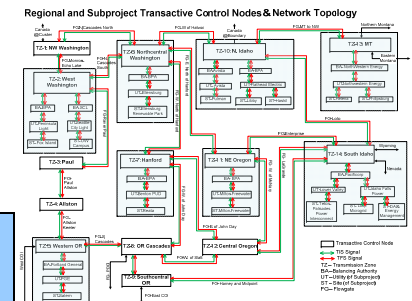
- Project designed around base standards, and identifying and selecting standards for implementation
- Testability is being designed into the system

Cybersecurity

- Cybersecurity Plan is in second cycle of update and review. BPA IT is involved with review.
- Using industry best practices with a risk management based approach
- Engaged utilities in cybersecurity and providing training/webinars to support them.

BPA Dataflows

- Data definitions complete (9 streams) with alternate streams processed as needed
- Legal, cybersecurity and technical reviews in process. Permissions for 3rd party being sought.



Subprojects: \$21M of \$178M spent as of December 2010

	Participant	Actual Cost (\$K)	Budget (\$K)
Technology Participants	IBM	\$3,164	\$14,930
	Alstom	\$817	\$12,053
	3Tier	\$556	\$11,318
	Quality Logic	\$969	\$11,158
	Netezza	\$2,701	\$3,832
Subprojects	Avista	\$4,029	\$38,116
	Portland General Electric	\$0	\$20,511
	University of Washington	\$339	\$10,145
	Idaho Falls Power	\$467	\$7,067
	Flathead Electric Co-Op	\$892	\$4,869
	Northwestern Energy	\$797	\$4,202
	Milton Freewater	\$901	\$3,177
	Lower Valley Energy	\$808	\$2,492
	Peninsula Light	\$254	\$2,474
	City of Ellensburg	\$348	\$1,516
	Benton PUD	\$98	\$647
Project Mgt	Battelle	\$3,784	\$20,000
	Unallocated funds		\$10,400
	Project Total	\$17,141	\$178,906

■ **Note:**
\$10.4M in unallocated funds represents DOE and cost share funds.

➔ Further detail on Battelle (BPA TI funds) on following pages

Appendix V: Subproject Location Map

