Key Activities

• WECC’s “Western Interconnection Synchrophasor Program” is installing more than 300 phasor measurement units (PMUs) and 60 phasor data concentrators (PDCs) across the Western Interconnection.

Aims and Strategies

• Provide grid operators and reliability coordinators with more frequent and time-synchronized system information.
• Better system visibility will help system operators avoid large-scale regional outages, better utilize existing system capacity, and enable greater utilization of intermittent renewable generation resources.

Results and Benefits

• 19 organizations are participating in the project, providing 100% coverage for the Western Interconnection.
• Real-time information and automated controls being deployed will enable grid operators to allow an additional 100 MW of operational capacity on the California-Oregon Intertie (COI). Similar system benefits are possible in other parts of the system.
WECC Synchrophasor Infrastructure

Phasor Measurement Units (PMUs) and Phasor Data Concentrators (PDCs) in the Western Interconnection

- PMU locations
- PDC locations
DOE’s Grid Modernization Efforts

• From Secretary Chu’s June 13, 2011 Grid Modernization speech:

“…The Western Interconnection Synchrophasor Program (WISP), led by the Western Electricity Coordinating Council (WECC) along with 18 additional participants, is an effort to modernize the operation of the Western transmission system, increasing reliability and system performance, and enabling greater use of renewable resources such as solar, hydro, and wind.

Continued ....
**DOE’s Grid Modernization Efforts**

- Secretary Chu’s speech … continued

  …Real-time information and automated controls available from synchrophasor technology will permit grid operators to **raise operating limits** on the California-Oregon Intertie and allow up to an additional 100 MW of operational capability, equivalent to providing enough power to supply over 100,000 homes. The **advanced capability of synchrophasor technology will be used to support numerous solutions** like this throughout the US, which would not have occurred for many years without funding from the Recovery Act.”
Why WISP is Significant

1. Interconnection-wide in scope;
2. The largest of the Smart Grid Investment Grant projects in the Electric Transmission Category;
3. Public, private, and international participating entities;
Why WISP is Significant

4. Deploys automatic detection and visualization of power system oscillations (a particular vulnerability in the West) and will provide decision support for mitigation;

5. Deploys automatic regional control schemes based on synchrophasor data; and

6. Demonstrates NASPInet.
WISP Synchrophasor Applications

Real Time

Oscillation Monitoring
- Mode Meter
- Spectral Estimation
- Ringdown Analysis

Oscillation Mitigation
- Decision Support

Voltage Stability
- Reactive Reserve
- Phase Angle
- Frequency

* Monitoring & Alarming

Multi-Layer Data Dashboard
- Playback
- Animation
- Capture
- Wide-Area View & Manipulation
- Intelligent Alarm Processing

Visualization

Off-Line

- Model Validation/Improvement
- Disturbance Evaluation
- Planning Studies
- Operational Studies
- Network Performance Baselining

PMU Data

RC
Vancouver, Wash.

Historical Archives

RC
Loveland, Colo.

PDCs

WECC

RC PDCs

Storage
- Data Mining Tools
- Reports
WISP’s Support of Model Validation

• Synchrophasor data archive
  o Short term full fidelity
  o Long term events
  o Data is accessible by all participants through secure web service

• Archive data
  o Post event analysis
  o Model validation