

## University of Washington's Smart Grid Deployment

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## Academic & Administrative Partnership

- UW College of Engineering
- UW Facilities Services



**Pacific Northwest  
SMART GRID**  
DEMONSTRATION PROJECT

- US DOE Grant, ARRA Funding
- 50% Cost Share
- \$10 Million UW Project (\$178M Total)
- 5 year Duration



## Utility Participants

- University of Washington
  - Avista (WSU)
  - Benton County PUD
  - City of Ellensburg
  - Flathead Electric
  - Idaho Falls Power
  - Lower Valley Energy
  - Milton-Freewater
  - Northwestern Energy
  - Peninsula Light
  - Portland General
- Battelle Memorial Institute (at PNNL),  
Bonneville Power Administration*



### Smart Grid Project: Research Potential

- Parallel data capture
- Simulated demand response switching
- Efficiency testbed at microscale – dorms
- Testbed for faculty/student research projects



### UW Seattle Campus – Quick Facts

- Over 40,000 Students
- Over 29,000 Faculty and Staff
- Over 16 million GSF
- One Square Mile

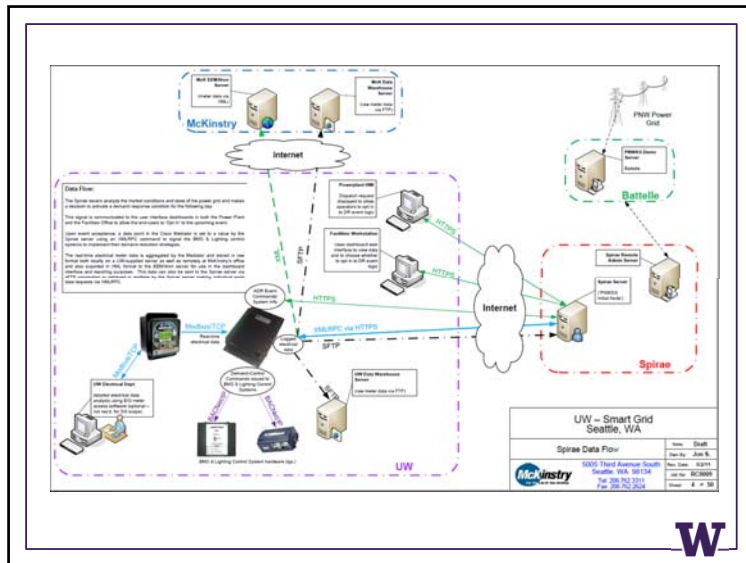


### UNIVERSITY OF WASHINGTON SMART GRID PROJECT

UW - A Laboratory for Smart Grid technologies

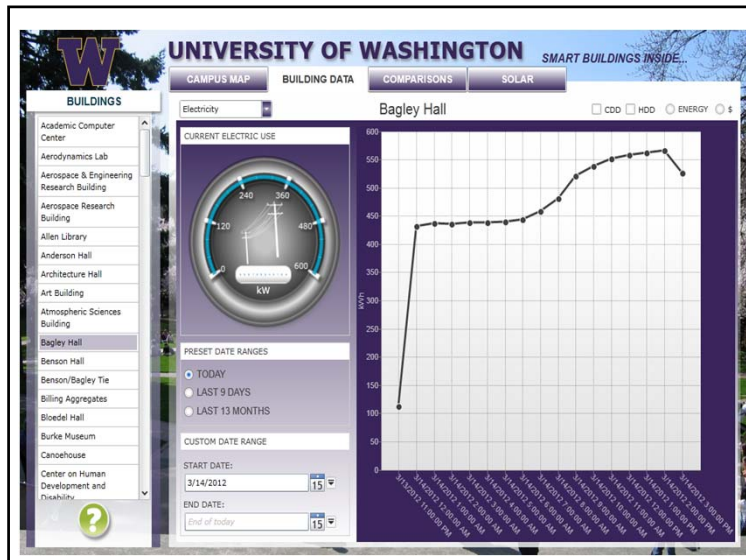
- Seattle City Light's largest customer
- Diverse set of facilities: research, classroom, residential, medical, stadium
- Customer-owned electrical distribution system
- Students/researchers can use campus as a test-bed for research.





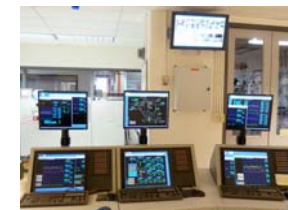
## Facilities Energy Management System (FEMS)

- Enterprise Platform Interface and Information System
- Metering Data Warehouse
- Energy Dashboards / Energy Trend Analysis
- Activity Based Budgeting Initiative
- Identify Opportunities for Energy Savings



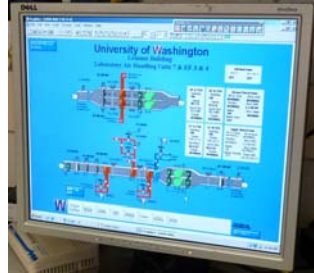
## Transactive Control Power Generation

- Two – 2000 kW Standby Generators
- 5000 kW Turbine Generator
- Incentive Demand Response Testing
- Renewable Energy Integration / Rate Design



## Building HVAC Controls (DDC)

- HVAC Controls – Transactive Control
- Low-Occupancy Set-back
- Cyber Security Issues
- Energy Savings Potential



## Solar PV Generation



## Solar PV Monitoring



## Student Housing Energy Conservation

- Floor by Floor measurement and display of energy use in new dorm
- Room by Room measurement, display and control in 240 rooms
- Behavioral response



## Laboratory, Classroom, and Office Buildings

- Electrical Sub-metering within buildings (Computer Science/Electrical Engineering and new Business School)
- Floor-by-floor sub-meter
- Two individual laboratories to be sub-metered at branch circuit level
- Behavioral response



Veris Branch Circuit Monitor



## UNIVERSITY OF WASHINGTON SMART GRID PROJECT

### Anticipated Campus Benefits

- 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.
- Platform to test cyber-security issues.
- Provide information to students, faculty and facility operators on energy use in classrooms, dorms, etc.
- Jump start hands-on learning with actual real-world smart grid application and real user data.
- Provide smart grid infrastructure for follow-on research.



## PROJECT BENEFITS BEYOND CAMPUS

### Local and Regional Benefits

- Test utility-level demand-response strategies, inform electricity rate design.
- Renewable generation integration.
- Findings transferrable to other institutions and businesses.
- One step forward towards developing and deploying a local, regional and national smart grid system.
- Regional reliability improvements



## What will the future bring?

Environment and Communications 50 years ago



## Paradigm Shift

Environment and  
Communications today



## Questions?

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