

# Pacific Northwest GridWise™ Demonstration

Pacific Northwest National Laboratory is teaming with regional utilities and industry in a first-of-its-kind demonstration involving 300 homeowners in Washington and Oregon who will test new energy technologies designed to improve grid efficiency and reliability while increasing consumer choice and control.

## The Pacific Northwest GridWise Demonstration projects include 300 homeowners:

- ▶ 200 homes on the Olympic Peninsula that will receive real-time price signals over the Internet and have demand-response thermostats and water heaters that can be programmed to automatically respond
- ▶ 50 of the homes on the Olympic Peninsula, plus an additional 50 homes in Yakima and 50 homes in Gresham will test Grid Friendly™ appliance controllers installed in clothes dryers
- ▶ 25 of the homes on the Olympic Peninsula and 25 of the homes in Yakima also will test Grid Friendly water heaters.



## PROGRAM BACKGROUND

Pacific Northwest National Laboratory is teaming with utility and industrial partners to launch the first two projects of the Pacific Northwest GridWise™ Demonstration. The projects will demonstrate how advanced, information-based technologies can be used to increase power grid efficiency, reliability and flexibility while reducing the need to build additional infrastructure. Through this effort, smart energy technologies and applications will be integrated with the vision and approach for our nation's future electric system, called GridWise. Funded by DOE's Office of Electricity Delivery and Energy Reliability, the outcome will be a first-of-its kind, highly visible program that demonstrates how key aspects of the transformed power grid envisioned by GridWise will function in the future.

## DEMONSTRATIONS

The projects will link key regional entities to launch two, large-scale demonstrations involving 300 homes as well as some municipal and commercial customers.

### Olympic Peninsula Distributed Resources Demonstration

The first project, the Olympic Peninsula GridWise Distributed Resources Demonstration, will integrate real, in-the-field demand response and distributed resources in a virtual operating environment to relieve congestion on the transmission and distribution grid during peak periods.



The demonstration will include:

- ▶ **Demand response** – automated control technology will be deployed that allows residential, municipal and commercial customers to reduce electricity consumption during times of peak demand or when prices are high.
- ▶ **Smart appliances** – 200 homes will test a home information gateway connecting smart thermostats, water heaters and clothes dryers.
- ▶ **A virtual real-time market** reflecting the actual costs of producing and delivering electricity – backed with real cash incentives – will be used to motivate customers to reduce peak demand.
- ▶ **Contract choice** – the experiment will provide insight into how customers might adjust their energy consumption based on changes in price – by giving customers the choice of purchasing electricity in a variety of ways ranging from today's fixed price to real-time prices.
- ▶ **An Internet-based communications system** will send price signals to customers and monitor and display the performance of customers, markets and the grid.

- ▶ **Distributed generation** – existing backup generators at municipal and commercial customer sites also will be used to displace demand for electricity and produce power locally.

### Grid Friendly™ Appliance Demonstration

The second project, the Grid Friendly™ Appliance Demonstration, focuses on improving grid reliability and will involve 150 homes – 50 on the Olympic Peninsula, 50 in Yakima and 50 in Gresham.

Clothes dryers in 150 homes and water heaters in 50 homes will test the ability of PNNL-developed Grid Friendly appliance controllers to detect fluctuations in frequency that indicate the grid is under stress and quickly respond by reducing demand.

Grid Friendly appliance controllers automatically turn off some of the appliances' functions for a few seconds or minutes, enabling grid operators to rebalance the system.

The technology's field performance will be assessed by correlating when each appliance automatically turned

itself off with known fluctuations in frequency that indicate when the grid was under stress. Customer acceptance will be assessed through a post-experiment survey conducted by the appliance manufacturer.

## PROJECT PARTICIPANTS

The demonstration projects involve numerous Northwest entities, including the Bonneville Power Administration, PacifiCorp, Portland General Electric, Clallam County PUD and the City of Port Angeles. Large, in-kind contributions from industrial collaborators include Sears Kenmore dryers manufactured by Whirlpool Corporation and communications and market integration software from IBM.

## ABOUT PNNL

Pacific Northwest National Laboratory, a U.S. Department of Energy Office of Science laboratory, solves complex problems in energy, the environment, and national security by advancing the understanding of science. PNNL employs more than 4000 staff, has a business volume of \$750 million, and has been managed by Ohio-based Battelle since the lab's inception in 1965.

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