Technology Innovation Project *Project Brief*

TIP 220: Smart End-Use Energy Storage and Integration of Renewable Energy

Context

There are currently more than 3,500 megawatts of wind energy connected to BPA's transmission grid. In the coming years, an additional 2,000 to 4,000 megawatts are expected to come online. Concerns have been raised over relying exclusively on the hydro system to provide balancing services. The widespread use of controllable loads would allow BPA to better utilize the excess wind energy produced in low-load hours, resulting in more efficient operation of the hydro system and improved transmission and distribution.

Description

This project supports the implementation of 1 to 3 megawatts of demand response with energy storage using commercial, industrial, and residential end-loads. It tests the use of controllable loads to support balancing services – both load down (INCs) and load up (DEC) – for BPA as well as for local utility needs, such as peak management.

Controllable loads that may be utilized in this project include the following:

- Space heaters (thermal storage furnaces)
- Water heaters
- Air conditioners and air handlers
- Chillers (cold storage warehouses)
- Wireless pneumatic thermostats (HVAC)

The project is being implemented by a coalition of cost-sharing partners led by Ecofys US that includes 8 public utilities, thermal storage and load control vendors, a demand/reponse aggregator, Pacific Northwest National Labs, Montana State University, and the Northwest Power and Conservation Council.

Several dispatch control algorithms are being tested to determine the benefits and limitations of smart charging and discharging storage devices. The project team will create customized utility business cases to assist in investment decisions for wider scale deployment, and will assess the cost/benefit for BPA of using thermal storage as a load-following balancing reserve.

The bundling of many controllable loads via modern inexpensive and fast communications systems allows monitoring of the real-world benefits of this technology implementation. The utility can see the benefits and inform their customers on the success of the energy management system.

Why It Matters

Electric storage is a priority identified in the Renewable Energy Technology Road Map. The storage technologies presented on the Road Map include the following:

- Super capacitors
- Flywheels
- Batteries
- Compressed air
- Superconducting magnetic energy storage
- Pumped storage hydro

Few of these technologies are widely available commercially nor cost effective. In contrast, the efficient dispatch of a large fleet of water heating, space conditioning, and chiller loads in response to grid conditions is expected to offer a significantly lower cost source of reliable energy storage. The project also tests the cost effectiveness of load reduction (demand response).

The project will establish a partnership among BPA customer utilities and the renewable energy industry in solving the question, "What about storage?" The project will show that utilities and their consumers can benefit, hand in hand with the renewable energy industry, by using storage technologies available today. Providing balancing services through end-use loads represents a win-win opportunity for consumer-owned utilities, BPA, and the wind industry that this project seeks to facilitate.

Goals and Objectives

The purpose of this proposal is to facilitate the rapid development and deployment of end-use controllable loads to provide both balancing services in the BPA balancing area and localized benefits to BPA's load- serving utilities.

The widespread installation of grid-responsive loads is expected to produce jobs at a time when new economic activity is sorely needed and to reduce the share of reserves now provided by the hydrosystem.

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Project Start Date: September 2010

Project End Date: September 2012

Participating Organizations

Project Lead: Ecofys US, Inc.

Project team includes members from: EnerNOC; Steffes Corporation; Spirae; Pacific Northwest National Laboratory; Montana State University; Carina Technologies; Cypress Envirosystems; UISOL (Alstom Grid); IC Systems; Logix; Sno-Temp Corporation

Utility partners

- City of Port Angeles
- City of Richland
- Consumers Power
- Cowlitz County PUD
- Emerald PUD
- Eugene Water and Electric Board
- Forest Grove Light and Power
- Lower Valley Energy

Analytical support and project guidance provided by:

- Renewable Northwest Project
- Horizon Wind Energy
- Iberdrola Renewables
- Northwest Power and Conservation Council.

Funding

Total Project Cost:	$662,164
BPA Share:	$352,221
External Share:	$309,943
BPA FY2012 Budget:	$102,221

For More Information Contact

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