BPA's Energy Efficiency Overview
How are we changing the Pacific Northwest?

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The Bonneville Power Administration has embarked on a new era in transmission planning. As plans take shape to address load growth, constraints and congestion on the transmission system, BPA is considering measures other than building new lines, while maintaining its commitment to provide reliable transmission service. The agency, along with others in the region, is exploring "non-wires solutions" as a way to defer large construction projects.

BPA defines non-wires solutions as the broad array of alternatives, including but not limited to demand response, distributed generation, conservation measures, generation siting and pricing strategies that individually or in combination delay or eliminate the need for upgrades to the transmission system. The industry also refers to non-wires solutions as non-construction alternatives or options.

The Bonneville Power Administration owns and operates 75 percent of the Pacific Northwest's electrical transmission system, a system that includes more than 15,000 miles of high-voltage transmission line and 285 substations. At peak usage, the system transports about 30, 000 megawatts (MW) of electricity to customers in Oregon, Washington, Idaho and Montana, as well as to parts of Wyoming, Nevada, Utah and California. The BPA system, along with the high-voltage lines of other public and private utilities, is referred to collectively as "the transmission grid."

BPA has aggressively pursued conservation and energy efficiency for over 20 years. The idea of targeting these activities to defer constructing transmission lines first stirred the interest of planners in the late 1980's when BPA was contemplating a cross-Cascade 500-kV line. Instead of the line, a new substation was built, voltage-support devices were installed and the Puget Sound area was targeted for conservation.

As plans for the infrastructure projects were taking shape in 2001, BPA's Transmission Business Line (TBL) began to consider a wider-angle approach to planning, one that included non-wires solutions. If a reliable and cost-effective non-wires solution could be found, it was worth considering. TBL subsequently commissioned an in-depth study of its transmission planning process with an eye toward incorporating non-wires solutions. The consultants who conducted the study reviewed the existing procedures and identified improvements to ensure that options other than transmission line construction were considered appropriately and early enough to be used to address problems. The consultants also pointed out which of the problem areas on the transmission grid might be solved with a non-wires solution.

The consultants' November 2001 study, entitled "Expansion of BPA Transmission Planning Capabilities: A Report on Non-Transmission Alternatives," offered a number of recommendations and alternatives for improving the transmission planning process. And it provided a model for determining when non-wires solutions were cheaper than immediate construction of a new transmission facility. For example, load management is effective at shaving perhaps a 40-hour peak on an extreme cold winter day to meet reliability criteria, deferring the need for a new line. The savings available through deferring a multi-million dollar capital expenditure project for several years can be

substantial. The study strengthened TBL's commitment to incorporate non-wires solutions as an integral part of planning for transmission.

In 2002, BPA announced its Non-Wires Solutions initiative and laid out the following goals. To identify and investigate:

- Least-cost solutions that may result in deferring potential transmission reinforcement projects;
- Ways to incorporate the planning methodology proposed in the study into the transmission planning process;
- Opportunities for and potential constraints on integrating non-wires solutions into the transmission system;
- A set of criteria to help determine when non-wires solutions are feasible and when they are not, including developing a set of screening tools for future non-wires candidates; and
- Ways to integrate the work from this effort sufficiently early in the planning process so that non-wires solutions can make a difference.

The initiative included forming a round table, screening transmission projects for their potential as candidates for non-wires solutions, preparing a biennial system-wide report that looks 10 years into the future, conducting non-wires pilot projects and preparing a programmatic environmental impact statement (EIS) for transmission policy issues.

One of the key recommendations in the 2001 consultants' study was to enhance the transmission planning process by gathering insights and feedback from experts and interest groups in the region. BPA followed up on that suggestion for forming the Non-Wires Solutions Round Table, which met for the first time in January 2003.

BPA formed the round table to gain a region-wide perspective on non-wires solutions. Specifically, BPA wanted a broader discussion of the issues involved and an opportunity to build understanding around the Northwest about the overall goals of the non-wires solutions initiative. In addition, BPA wanted the round table to assist in expanding consideration of non-wires solutions, keeping system reliability in mind, as it proceeded with planning for a number of major transmission upgrades.

The 17 members of the round table from outside BPA represent a diverse cross-section of interests in the region, including public and private utilities, environmental groups, regulators, large energy users, an organization of Indian tribes, renewable resource advocates and independent power generators. Members accepted the invitation to participate with the understanding that their charge is to offer insights and perspectives on key questions and to ensure balance in BPA's transmission planning process.

As a result of the round table's work, BPA has reconfigured its transmission planning process to include an initial screening of projects to assess their potential for a non-wires solution. BPA is now committed to using non-wires solutions screening criteria for all

capital transmission projects over $2 million so it becomes an institutionalized part of planning.

In addition, with electric reliability in the national spotlight following the Aug. 14, 2003, East Coast blackout and possible mandatory reliability standards at a federal level, the challenges of making non-wires solutions competitive with transmission should not be underestimated. Given the potential reliability risk a retail utility faces in a transmission constrained area targeted for non-wires alternatives, any portfolio of non-wires measures put in place to defer a transmission project should provide the same reliability as the transmission fix.

BPA is sponsoring pilot projects to test technologies, resolve institutional barriers and build confidence in using non-wires solution. In 2004 and 2005, the Non-Wires Solutions institutive undertook a variety of pilot projects.

The Olympic Peninsula has received particular attention since it is an environmentally sensitive area with increasing demand for electricity and limited transmission capacity. Two of the pilots are on the peninsula, where a significant transmission construction project, including a new 20-mile 230-kV line, is being contemplated.

Aggregated Distributed Generation:
BPA is testing the feasibility of using small-scale power generation technology, such as the backup generators at hospitals and local-government sites, to defer construction of a new transmission line on the Olympic Peninsula. An energy services company, Celerity Energy, is working with BPA to aggregate about 5 MW of distributed generation on the peninsula.

Celerity installed automatic controls to dispatch generation from this resource on an emergency basis when it is needed to support the transmission system. Celerity identified a dozen potential generators and hopes to put agreements in place with the owners to become part of the pilot project. BPA plans to run a test this winter, once the agreements are in place, to see if augmenting generation locally can meet peak demand on the transmission system.

Demand-Reduction: A demand-reduction pilot carried out in March 2004 provided encouraging results for easing congestion on transmission lines serving the Olympic Peninsula. During the four days of tests, BPA simulated a severe weather event and asked participants – in this case, a utility and three large electricity users – to reduce their needs for transmission services. BPA posted the hourly rate it would pay for each megawatt of reduction.

BPA was able to purchase an average of 22 MW of demand reduction during each hour of the test. The power is equivalent to more than one-year's load growth on the peninsula. BPA plans to run the pilot again this winter at peak-use time periods to see what demand reduction is possible.

Load Reduction and Micro-turbine Generation: BPA has undertaken two pilot projects at Pacific Northwest National Laboratory (PNNL) facilities in Richland, Wash. The pilots are Internet-based load-control projects. One involves load reduction in commercial buildings and the other entails remote operation of a micro-turbine at the PNNL site.

Load in the commercial buildings will be reduced for one-hour periods to find the maximum possible reduction in a super-peak period on the transmission system and the micro-turbine will be remotely controlled to reduce consumption during peak periods at the facilities. Both pilots are controlled from BPA in Portland via the Internet.

Direct-Load Control*:* A pilot project in Ashland, Ore., tested the feasibility of direct-load control and its potential to reduce demand charges and contribute to transmission line deferrals. The load-control pilot, which includes both commercial and residential customers, links customers and BPA via the Internet.

The connection allows BPA to remotely monitor and shift electricity use to periods when demand is lower. This is accomplished by remotely curtailing "discretionary" electricity uses, such as resetting thermostats and air conditioning units. The shifts are intended to reduce peak loads on the transmission system. The equipment needed to carry out the remote operations is being installed, and the city of Ashland is continuing to recruit participants.

BPA is currently installing 2,500 direct load control devices for residential end-users in the service territories of three of our customers on the Olympic Peninsula – Clallam Public Utility District (PUD), Mason One PUD, and Mason Three PUD. This expansion of the previous effort in Ashland will give BPA and our customer partners more experience of how to effectively manage electric space and water heat during cold weather events when reliability is a critical issue.

A smaller project is also being run in the Northwest with funding provided by U.S. DOE. In this effort 100 homes are receiving two-way communication devices that also control space and water heat. The key difference is that smart appliances are being provided that can automatically dispatch themselves when there is an issue on the grid. This is the first field test of what we are calling, "Grid Friendly Appliances." Our partners in this effort are Pacific Northwest Laboratory, Portland General Electric, PacifiCorp, and Whirlpool.

The final determination whether a Non-Wires Solution is to be applied for the Olympic Peninsula or any other location will be determined when a full Environmental Impact Analysis is undertaken and completed. For the Olympic Peninsula, that review is likely to occur during calendar year 2006. In the meantime, BPA will continue to apply Non-Wires screening process to all planned transmission projects and pursue more detailed analysis where an approach other than the traditional build approach is warranted.