

Non-Construction Alternatives – A Cost-Effective Way to Avoid, Defer or Reduce Transmission System Investments

Prepared by “Who Funds? Who Implements?” Subcommittee of the BPA Non-Construction Alternatives Round Table. March 2004.

Current Situation

Transmission systems throughout North America have come under increasing stress as end use consumption and grid utilization have increased substantially in the last 20 years with comparatively little investment in new transmission infrastructure. The result is a grid under stress as evidenced by the widespread outages in the West during the summer of 1996 and the 2003 blackout in the East/Midwest. Even the load reductions that have occurred in recent years in the Pacific Northwest have resulted in changing patterns of grid utilization and more strain on the region’s transmission system.

There is a growing awareness of the need to reinforce transmission systems across North America including the Pacific Northwest. However, economic and environmental factors make it necessary and appropriate to consider Non-Construction Alternatives (NCAs) such as energy efficiency, load management and distributed generation, in addition to more traditional “wires” solutions.

- Energy efficiency programs have been successfully implemented in the Northwest for many years. After a period of aggressive implementation in the 1980s and early 1990s, these efforts were lessened in the late 1990s, but have accelerated again following the energy crisis of 2000-2001.
- Load management programs (reducing energy consumption during peak periods, sometimes by shifting it to off-peak periods) have historically received less attention in the hydro-based, energy-constrained Northwest than in other regions. However, as the Northwest’s hydro system becomes increasingly constrained and spot market prices become increasingly volatile, there is a growing interest in programs that can reduce peak utilization. The value of load management programs was amply demonstrated during the energy crisis of 2000 and 2001.
- Environmentally acceptable distributed generation technologies are becoming more cost effective and reliable. With the passage of net-metering laws in many states, distributed generation may be poised for rapid growth.

Different NCAs may provide different benefits for generation, transmission and distribution providers as shown by the examples included in the attachment to this paper. All of the examples indicate there are at least some generation and/or distribution benefits in addition to the benefits to the transmission system. However, at present, there is a lack of processes and mechanisms to evaluate the NCAs in a “total system” context where all

NCA benefits are recognized, and for all parties benefiting from the NCAs to participate in their funding.

Some NCA Examples

The use of NCAs to avoid, defer, or reduce transmission investments is not new to the Northwest. However, NCAs have usually been considered in unique circumstances rather than as part of a comprehensive planning process. A few examples demonstrate the value that has been achieved through the application of NCAs.

Puget Sound Area Electric Reliability Plan

In the late 1980s and early 1990's regional transmission planners began to more fully understand reliability risks associated with voltage collapse. A study of the transmission system serving the Puget Sound area indicated that voltage collapse would occur for certain contingencies and that the resulting level of risk violated transmission planning standards.

An obvious alternative to bring the system back into compliance was to build one (or more) high voltage transmission lines from Central Washington over the Cascade Mountains into the Puget Sound area. However, BPA, acting in concert with the other utilities serving the Puget Sound area, developed a lower cost alternative that included adding voltage support to the transmission system and accelerating and concentrating energy efficiency investments in the Puget Sound area.

This program has deferred the need for expensive new cross-Cascades transmission lines by more than a decade.

San Juan Islands

The San Juan Islands are electrically connected to the mainland transmission grid by three submarine cables. When one of these submarine cables failed in 1992, an obvious response would have been to replace it with a similar cable.

BPA worked with local utility Orcas Power & Light to develop alternatives that would defer this expensive cable replacement project. A robust load management program, including direct control of water heaters and building heating systems, switching to alternative heating fuels, implementation of thermal storage units, and distribution system voltage reductions, was implemented.

Although a third submarine cable was added in 2001, this expensive project was deferred for nine years by aggressive NCA implementation.

Current NCA Funding Mechanisms

Current funding for NCAs comes from a number of sources, which vary depending on the type and relative market maturity of the particular NCA.

Energy Efficiency Programs

The Northwest has made a substantial commitment to energy efficiency programs for the past two decades. Although the funding mechanisms for these programs have evolved over time, the primary funding sources continue to be utilities and consumers. In some instances, utilities may fund the entire cost of an energy efficiency program or measure, but in most cases the utility and the consumer share the costs. Typically, the utility makes its investment based on reducing its overall costs for energy supply, while the consumer's investment is incented by a lower utility bill (usually for energy supply and delivery services).

BPA continues to be a major player in funding energy efficiency, making direct investments through the Conservation Augmentation (ConAug) program, and providing incentives to its wholesale power customers through the Conservation and Renewables (C&R) discount. The C&R discount reimburses these customers for qualifying expenditures for energy efficiency and renewable resources.

Most (if not all) Northwest utilities offer some type of energy efficiency programs to their customers. Often these programs are part of least cost, integrated resource plans developed to minimize overall costs for energy supply. The scope and scale of these programs vary substantially depending on the particular circumstances faced by or supply options available to each utility. The costs of these programs may be expensed or rate-based depending on the particular utility and the policies of its governing board or state regulators.

In Oregon and Montana, funding for investor-owned-utility energy efficiency programs is provided by universal system benefits (USB) charges mandated by state law. In both states these mechanisms provide funding for low-income customer bill assistance and renewable energy in addition to energy efficiency. In Montana, USB funds are managed by the utilities, with input from an advisory committee and oversight by the Montana Public Service Commission. In Oregon, the Energy Trust of Oregon manages USB funds with oversight provided by the Oregon Public Utility Commission. The utilities contract with the Energy Trust for delivery of some energy efficiency programs and services.

Load Management/Peak Shaving

In addition to energy efficiency programs/measures that reduce peak demand, other NCAs that reduce load only during peak periods or that shift load away from peak periods can be valuable tools in avoiding, deferring, or reducing transmission investments. These NCAs can generally be classified as contractual or pricing mechanisms.

Contractual mechanisms require consumers to reduce load over peak periods. Examples include load buybacks (such as the programs that existed during the energy crisis), interruptible contracts, and direct control of consumer loads such as air conditioners or water heaters. Typically, these programs are funded by payments or rate reductions offered by utilities. Utilities offer these payments or rate reductions because the programs result in overall lower costs to serve peak loads.

Pricing mechanisms rely on voluntary action by consumers in response to price signals. Examples include time of use rates and market-based demand reduction/exchange programs. Again, utilities fund the necessary payments or rate reductions because the programs result in overall lower costs for the utilities.

Distributed Generation

Distributed generation is often thought of as smaller projects connected to distribution lines. However, distributed generation can also include larger projects connected at strategic locations on the transmission grid.

Many smaller distributed generation projects have been installed by consumers with special reliability requirements such as hospitals. Often these generators are designed to operate as emergency back up units disconnected from the grid. However, it may be possible for utilities to contract with these consumers to operate these generators (connected to the grid) during peak periods. Due to concerns about air quality it may be desirable to limit the use of some types of backup generation to only a small number of hours each year when the transmission system is severely stressed.

Net metering laws recently passed in the Northwest states provide opportunities for implementing smaller distributed generation projects. The effect of these laws is to allow the distributed generator to reduce both energy supply and delivery costs.

For the vertically integrated utilities of the past, transmission costs associated with the location of larger generators were considered in their internal planning processes. However, as transmission service has become unbundled, this direct linkage has been severed. Current transmission contracting and pricing policies offer mixed signals for locating new generators. FERC's "OR" policy under which generators can be required to pay above embedded cost transmission rates in some circumstances, rate pancaking under which generators may pay multiple transmission rates for long distance transactions, and FERC's new interconnection policy under which generators can be required to advance funds for system upgrades, do provide some incentives to locate new generation close to load. However, these are crude tools that do not deal effectively with many situations.

Distribution System Upgrades

Reducing distribution system losses by re-conductoring circuits, raising voltages on circuits or installing more efficient transformers may allow for transmission investments

to be avoided, deferred or reduced. These programs/measures are typically funded by local utilities.

Fuel Switching

Fuel switching can be a very effective, but controversial, NCA. Often fuel switching programs are funded by a combination of incentives offered by the company selling the alternative fuel and investments by consumers desiring to switch to a lower cost fuel.

TBL Participation in NCA Funding

BPA's NCA Round Table is focusing on cost effective alternatives to reinforcing or expanding BPA's transmission system, for the benefit of TBL and its customers. However, BPA's Power Business Line (PBL) only provides generation to a portion of the TBL's customers and BPA does not provide distribution services. The TBL needs to partner with the PBL and other generation providers and with distribution utilities to encourage the deployment of cost effective NCAs and maximize the benefits to end use consumers.

Given the wide range of situations it will encounter with different transmission savings, available NCAs and potential funding partners, the **TBL will have to employ a flexible case-by-case approach** to NCA cost sharing. In each instance where planning studies indicate NCAs may be cost effective, TBL should form a local working group including local utilities and their power suppliers (which may include PBL), consumers, regulators, NCA advocates and NCA suppliers to develop an implementation and cost sharing plan.

Direct Funding to Supplement Existing Programs

A preferred approach for TBL may be to provide supplemental funding for existing programs already offered by local utilities or other entities such as government agencies. This approach maximizes the effect of TBL's dollars by minimizing administrative and marketing costs. In exchange for this supplemental funding, local utilities may be willing to redirect or reallocate existing funds to programs/measures that provide equivalent benefits to the local utility in the generation and/or distribution areas but produce additional transmission benefits.

Funding for New Programs

In some cases, programs/measures that provide substantial transmission savings may not be offered by the local utilities. In that case it may be cost effective for BPA to work with local utilities and other stakeholders to initiate new programs.

Transmission Pricing

TBL should also work for transmission pricing reform that encourages economically efficient location decisions for new generators and allows NCAs to compete on an equal basis with traditional “wires” solutions. As an example, if an RTO-like entity is formed in the Northwest and implements new methods to manage congestion, demand response should be allowed to participate on the same basis as generation redispatch. The “Pricing Signals” Subcommittee of the Non-Construction Alternatives Round Table has developed a paper that discusses pricing issues in greater depth.