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December 2, 2003

## MEMORANDUM

**TO:** Council Members

**FROM:** Terry Morlan

**SUBJECT:** Transmission Issue Paper

Depending on the recommendation of the Power Committee, the Council may be asked to approve the release of a revised Transmission Issue Paper.

Dick Watson briefed the Council on transmission issues at the last Council meeting in Coeur d'Alene. His briefing was based on a draft issue paper that was about 25 pages long with two appendices. The Power Committee asked the staff to revise and shorten the Transmission Issue Paper. The result is the attached five and a half page paper.

In very brief form, the paper describes how the transmission system is currently operated and managed and how the changing electricity market is affecting the transmission system. Some developing problems are described and regional efforts to solve them are reviewed. The paper then proposed some characteristics that a well-functioning electrical system should have and some properties that need to be preserved as the region designs changes to address the problems.

The earlier draft was intended to draw attention to the emerging transmission problems and to encourage the region to work out solutions. After a number of years of little agreement on solutions, there has been some promising progress in recent weeks. That progress is recognized and encouraged. The revised paper is more of an educational tool for people in the region who are not immersed in electricity issues on a day-to-day basis. In addition, the paper no longer requests comments on specific questions. This paper, in some form, may become part of the 5<sup>th</sup> power plan and regional reactions to it at this time may be helpful in developing the power plan.

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# Transmission Issues

## Introduction

An electrical power system requires constant, second by second, balancing of supply, demand, and transmission capability. Transmission system operators are primarily responsible for maintaining this delicate balance. Transmission system operations are organized into “control areas”, whose control area operators must continuously balance electricity demands with electricity generation while keeping power flows over individual transmission lines within specific limits for system operating reliability. There are 13 control areas in the Pacific Northwest U.S. Some control areas, such as Bonneville and PacifiCorp (which has two) are quite large, and some, such as Grant County PUD, are relatively small. Failure to maintain control over the transmission system can result in failure of the entire electrical system as illustrated by the Midwest and Northeast blackout of August 14, 2003.

The transmission system is operated for two primary objectives, (1) the security or reliability of the physical system, and (2) the economy of the system. Thus, from an operational perspective, it is transmission system operators who are responsible for achieving an efficient, economical, and reliable power supply. The Council’s interest in transmission stems from its charge under the 1980 Power Act to assure an adequate, efficient, economical and reliable power supply for the region. Nevertheless, in past power plans, the Council did not address transmission directly. Instead, the plans focused on long-term resource adequacy and cost effectiveness. It was assumed that the incentives for operational reliability and economy were adequate to assure reliable operation of the regulated system of vertically integrated utility service areas and that incentives were sufficient to ensure transmission system expansion if needed.

These assumptions are no longer warranted. The reliability of the system, which was assumed to be under adequate control in previous plans, is now threatened. Further, it has become the case that longer-term resource adequacy and cost effectiveness no longer solely depend on Council and utility planning, but also depend to a significant degree on a well-functioning wholesale power market. The transmission system is integral to that market and, therefore, has become an important focus for the Council. The region has experienced the consequences of a poorly designed wholesale power market and the Council does not want to see those experiences repeated.

This paper describes the evolution of the electrical system and the problems it has caused for the present operation and control of the transmission system. The paper describes some current efforts to solve these problems, and proposes some important characteristics that should be preserved as the region progresses toward a solution.

## Description of the Problems

Over the last 30 years, changes in the basic structure of the electricity sector have created challenges to the traditional operation of power systems. Changes in the technology of electricity generation have gradually led to the opening of electricity generation to more

competition and to a weakening of the rationale for monopoly electricity generation by vertically integrated utilities. New generating technologies such as combined cycle combustion turbines, cogeneration, wind power, and geothermal generation tended to be smaller in scale and lower in capital requirements than the then dominant utility-owned coal and nuclear plants. The 1978 Public Utility Regulatory Policies Act (PURPA) created a class of non-utility generators that had the right to sell their electricity to regulated utilities at prices that utilities would have incurred to develop their own generation. Ultimately, as technology continued to improve and electricity generation by independent parties proved increasingly competitive, Congress and the Federal Energy Regulatory Commission began taking actions to further facilitate competition in wholesale power supply.

Today independent generators play a significant role in electricity supply, and these entities have developed most of the recent and proposed new generating plants. While many independent generators were hurt financially in the aftermath of the 2000-2001 electricity crisis, it would be premature to think they will not be an important factor in the future. Electricity is and will continue to be bought and sold in wholesale markets in amounts and patterns not contemplated when the existing transmission systems and their operational procedures were put in place. This has created problems in the operation and control of the transmission system that, if not adequately addressed, threaten the reliability and economy of the region's electricity supply.

The growth of independent power generation and increased wholesale electricity trading have become increasingly incompatible with the traditional electricity system operation by individual control area operators, usually affiliated with regulated utilities and their affiliated merchant generators. Issues of how best to manage actual power flows for reliability and economy have become increasingly troublesome. Similarly, the problem of planning for and implementing transmission system expansion has become much more complex. The problem is no longer that of a single company linking its generation and loads. The issue now is how utilities, independent power developers, transmission owners, load-serving entities and even consumers can make coherent decisions about what to build and where to build in a vast interconnected and interdependent system and the incentive and cost recovery questions raised by those decisions.

By now the problems facing the regional transmission system as a result of industry restructuring are pretty clearly understood by parties close to the issue. In May 2002 the Council issued a paper that described the problems and discussed possible solutions.<sup>1</sup> More recently the Regional Representatives Group (RRG) of the RTO West developed a list of transmission problems and issues that reflects many of the same problems.<sup>2</sup> The problems include:

- Difficulty managing unscheduled electricity flows over transmission lines leading to increased risks to electric system reliability due to unexpected real-time operational requirements;
- Lack of clear responsibility and incentives for planning and implementing transmission system expansion leading to inadequate transmission capacity;

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<sup>1</sup> [http://www.nwcouncil.org/energy/transmission/rto2002\\_0517.pdf](http://www.nwcouncil.org/energy/transmission/rto2002_0517.pdf)

<sup>2</sup> [http://www.rtowest.com/Doc/RRGA\\_ReformattedList\\_July292003.pdf](http://www.rtowest.com/Doc/RRGA_ReformattedList_July292003.pdf)

- Inability to monitor wholesale electricity markets, identify market power abuse or provide mitigation and accountability;
- Difficulty in reconciling actual physical available transmission capacity with that available on a contractual basis, resulting in inefficient utilization of existing transmission and generation capacity;
- Transaction and rate pancaking, i.e. contracting and paying for the fixed costs of multiple transmission segments on a volumetric basis to complete a power sale, resulting in inefficient utilization of generation; and
- Competitive advantage of control area operators over competing generation owners causing inefficient utilization of generation and potentially a proliferation of control areas and greater operational complexity.

## Attempting to Correct the Problems

The problems likely to be created by the restructuring of electricity markets have been recognized for some time. The 1996 Comprehensive Review of the Northwest Energy System concluded;

“Transmission is the "highway system" over which the products of electrical generation flow. If there is to be effective competition among generators, transmission facilities should be operated independently of generation ownership. An independent grid operator (IGO) regulated by the Federal Energy Regulatory Commission with broad membership, including Bonneville and the region's other major transmission owners, is proposed as a means of ensuring independence of transmission operation and improving the efficiency of transmission operation. An independent grid operator should also have clear incentives to maintain reliability and encourage efficient use of the transmission system.”<sup>3</sup>

The Northwest has devoted enormous efforts to trying to find agreement on changes to the management and operation of the regional transmission system, first with IndeGO and later with RTO West. However, while there has been growing consensus on the problems, there has not been agreement on the solutions. Consequently, there has been little progress in implementing needed changes to the transmission system. Efforts by the Federal Energy Regulatory Commission to mandate specific solutions on a national level have not achieved substantial support in the Northwest and, have probably exacerbated the impasse.

For a number of reasons, this region should be at some advantage in adapting to the restructuring of electricity markets. To a greater extent than most areas, the Pacific Northwest has a long experience with active wholesale markets, and has a well-developed transmission system to facilitate them. This experience is due to Bonneville Power Administration marketing wholesale electricity throughout the region, the location of much generation distant from loads due to the locations of federal dams and coal deposits, and active seasonal exchanges and non-firm power sales to California. At the same time, these factors have created resistance to the dramatic changes to transmission management proposed by FERC, many in the region feeling that such large changes are not appropriate for the Pacific Northwest.

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<sup>3</sup> Comprehensive Review of the Northwest Energy System: Final Report. (96-CR26). December 12, 1996. page 8. <http://www.nwcouncil.org/library/1996/cr96-26.htm>.

Recently, the Regional Representatives Group (RRG) of the RTO West has taken some promising steps toward a resolution. The RRG, composed of members of interest groups in the region, including Bonneville, other utilities, and regulators has worked collaboratively to identify a structured, incremental approach to reforming the management and operation of the transmission system. The proposal identifies a desirable end state, but relies on incremental and voluntary steps toward that state. A structured process is defined for agreeing on significant changes to the system over time. Many details remain to be ironed out, but the process has potentially moved the region beyond its impasse and begun a constructive process to resolve the most serious problems. The Council supports this effort. It is important that the region move ahead to correct the growing problems in the regional power system.

## **Characteristics of a Well-Functioning System**

There are four characteristics that any successful transmission operation and management solution must have. In addition, there are a number of considerations that must be addressed in implementing changes with broad regional support.

### ***Reliability***

The foremost characteristic is that reliable operation of the regional power system be established and maintained. Central to this characteristic is a better set of tools for the region's Reliability Coordinator and movement toward transmission system management based on power system flows rather than contract paths. Consolidation of control areas will help this process work better. Any entity that operates a consolidated transmission system needs to be independent of commercial conflict of interest, but also accountable to the region.

### ***Efficiency***

A second key characteristic is to provide efficient, low-cost transmission system operation and to facilitate the operation of a well-functioning electricity-trading platform. This requires a system for transmission congestion management that promotes least cost solutions whether they be from generation redispatch, transmission system upgrades, or demand-side alternatives. Success in this area will require wholesale electricity markets and transmission systems that are open and accessible to all participants on an equal, nondiscriminatory basis. Transmission users need to have easy access to information about available transmission capacity and other market conditions so that all economic transactions can be executed.

### ***Planning and Capacity Expansion***

Part of electricity restructuring was the administrative separation of electricity transmission from generation. The separation was intended to improve access to the transmission grid for non-transmission owners, but it also had the effect of undermining an integrated planning process for both added generation and development of new transmission capacity. To ensure reliability and efficiency in a restructured environment, policy planners need to support a regional, or West-wide forum or organization with responsibility for a forward-looking assessment of long-term transmission system requirements and a mechanism to encourage investments to meet those requirements. This planning needs to consider future capacity needs in transmission, generation, and demand management and their possible locations, who will make investments in future

capacity, how the costs of capacity expansion will be recovered, and how adaptable the system will be to future changes in loads or technology.

Efforts are underway, both westwide and in the Pacific Northwest, to assess the long-term transmission system capacity expansion needs. The Seams Steering Group – Western Interconnection (SSG-WI) Planning Work Group provides a forum for an expansive westwide look at potential transmission needs over the next 10 years. It is intended to complement existing WECC reliability and path rating work. The Northwest Power Pool’s Transmission Planning Committee recently formed an open-membership group called the Northwest Transmission Assessment Committee (NTAC). The NTAC “is an open forum to address forward-looking planning and development for a robust and cost effective NWPP area transmission system”<sup>4</sup>. The NTAC has had initial meetings focused on defining its charter and approach to the issues.

Bonneville convened a large group of stakeholders beginning in January 2003 to consider how to identify and implement alternatives to transmission construction. These alternatives include demand side programs, conservation, distributed generation, and other possible approaches. Working with Bonneville’s transmission business line, this group is working on screening criteria, pilot projects, funding issues, and institutional hurdles. The product of this effort should provide an improved approach to incorporating alternatives into the transmission planning process.

### ***Market Monitoring and Evaluation***

Active market monitoring is important to making the current hybrid regulated/deregulated energy market work successfully. The transitional nature of these markets has resulted in vulnerability to poor market designs, misplaced incentive structures and exploitation of the markets in unintended ways. The nature of electricity markets, at least for the foreseeable future, will likely result in cases of significant market power under tight market conditions. An independent transmission operator should collect the data necessary to evaluate the market’s performance and report regularly on its competitiveness and efficiency.

### ***Other Considerations: Fairness and Protection During the Transition***

As the region struggles toward solutions to transmission system problems, there are important concerns and policies that need to be considered to maintain fairness and achieve regional support for needed changes in power system operations.

- To the extent possible, neither the costs of transmission nor the quality of service should be shifted among current transmission system users.
- Existing transmission rights should be preserved.
- The ability of utilities to serve their native loads should not be impaired.
- Electricity markets and transmission system operations should not impair the benefits from coordinated operation of the Columbia River Power System.

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<sup>4</sup> <http://www.nwpp.org/ntac/>

- To the extent possible, implementation of changes to the management and operation of the power system should be phased in and maximize the utilization of existing organizations and equipment to minimize additional costs.

## **Conclusion**

It is important that the region address the current problems in the management and operation of the regional transmission system. The problems are now widely understood. The Council is pleased that the RRG process appears to have moved beyond regional conflicts over transmission reform. It is making progress through a collaborative process toward designing significant improvements to the more serious problems affecting the transmission system. The Council supports the RRG process and will monitor its progress toward a transmission system that achieves the characteristics of a well-functioning power system while fairly preserving important regional values. The Council will continue to make its staff available to participate in the RRG process.