DISCUSSION PAPER: RELIABILITY ON THE OLYMPIC PENINSULA

ISSUE

Improvements to the electrical transmission system on the Olympic Peninsula are needed in order to improve reliability.

RELIABILITY

The Bonneville Power Administration ("BPA") owns and operates the electrical power transmission infrastructure on the Olympic Peninsula. The transmission system on the Peninsula currently runs from BPA's Olympia substation to Shelton, runs northward along the west side of Hood Canal, turns to run westward along the southern shore of the Strait of Juan de Fuca, then dead ends west of Forks. North of Shelton there are no substantial interconnections back to the grid.

The system is dependent on a single transmission link along this route rather than having benefit of the usual redundancy of multiple connections (known as network topology). A transmission line that is connected to the grid at only one end is referred to as a "radial connection" and is inherently weaker than a looped network topology connection. The radial connection serving the Olympic Peninsula is more vulnerable to outages than better connected systems.

Despite BPA's best efforts electrical transmission on the Olympic Peninsula is reliability constrained. The BPA has acknowledged its concern about maintaining reliable service in the face of the growing loads on the Peninsula.[1] A study team for ColumbiaGrid, of which BPA is a member, "identified low voltages and potential violations of voltage stability standards for several contingencies on the Olympic Peninsula ... precipitated by winter load growth."[2] Such instability "could impact a wide area that includes Puget Sound Energy's loads on the Kitsap Peninsula."[3] During normal winter weather a line outage anywhere along this line or a breaker failure at Olympia could result in an inability to meet Olympic Peninsula loads.[4]

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[1] 2008 BPA Transmission Plan at 7.

[2] Final Draft - 2009 Biennial Transmission Expansion Plan, Rev. 2, ColumbiaGrid, February 2009 ("ColumbiaGrid Plan") at 17.

[3] *Id.*

[4] *See* Olympic Peninsula Study of Non-wires Solutions to the 500kV Transmission Line from Olympia to Shelton and a Transformer Addition at Shelton, Energy and Environmental Economics, Inc. and the BPA Energy Efficiency Group & Transmission Business Line, January 12, 2004, accessed on June 11, 2009 at http://www.transmission.bpa.gov/planproj/Non-Wires_Round_Table/NonWireDocs/Olympic_NWS_011204.pdf.

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BPA is taking measures to address these vulnerabilities. BPA currently plans to reinforce the existing line from Olympia to Shelton and install a new line into Shelton from the Satsop area, both intended to improve voltage stability and prevent load loss.[5] However, these actions will not address system vulnerabilities beyond Shelton. BPA is contemplating reinforcing its transmission system from Shelton to Port Angeles, but pre-planning documents suggest that the timeframe for such reinforcements will be 2013 or beyond.[6]

In short, for the next few years the northern portion of the Olympic Peninsula will be vulnerable to loss of electrical service unless an alternate supply can be made available.

An alternative route feeding power into the system from its northern end would address such vulnerabilities. This is especially valuable since the greatest concentrations of population and industry on the Peninsula are located in the region encompassing Port Angeles and Sequim, areas that have continued to grow.

A NORTHERN LINK COULD RELIEVE CONGESTION IN THE GREATER PUGET SOUND REGION

Transmission paths in the greater Puget Sound region, including Olympia for the purposes of this discussion, are chronically congested.[7] This situation is expected to only get worse.[8] There are many reasons, but a short list includes: regional growth in population and economic activity, new generation sources coming on line and gaining access to the grid; tightened standards for system reliability; constraints on hydropower operations mandated by the need to protect species listed under the Endangered Species Act; growth in the market for energy, especially energy from renewable resources; and the transmission of energy through this region to markets outside it.[9]

Congestion can lead to system instability, especially when transmission levels are relatively high, and it makes the system vulnerable to cascading catastrophic outages.[10] Measures to control

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[5] 2008 BPA Transmission Plan at 7-8.

[6] Olympic Peninsula Reinforcement - North of Shelton Analysis ("BPA North of Shelton Analysis") at 9, BPA, accessed on June 17, 2009 at http://www.transmission.bpa.gov/PlanProj/Non-Wires_Round_Table/NonWireDocs/OlympicPeninsulaReinforcementNonWiresPres3-13-06.ppt..

[7] Challenge for the Northwest: Protecting and managing an increasingly congested transmission system, BPA, April 2006 ("BPA Congestion White Paper") at 1-2, accessed on June 11, 2009 at http://www.bpa.gov/corporate/pubs/Congestion_White_Paper_April06.pdf; National Electric Transmission Congestion Study, U.S. Dept. of Energy, August 2006 ("DOE Congestion Study") at 31-35; White Testimony at 4; 2006 Annual Report at 13, 15-16, BPA, accessed on June 11, 2009 at http://www.bpa.gov/corporate/Finance/a_report/06/AR2006.pdf.

[8] BPA Congestion White Paper at 7-10; 2006 Annual Report at 13, 15-16.

[9] BPA Congestion White Paper at 7-10.

[10] BPA Congestion White Paper at 4-5.

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excessive power flows include curtailing flows through redispatching generation or rescheduling transmissions.[11] However, there are limitations on the effectiveness of such tools, and they come at a price both in terms of purchasing replacement power and diminished customer service levels.[12]

Providing additional or alternative transmission infrastructure is another technique for relieving congestion, although it is often not the first choice due to the high costs, especially when congestion only occurs occasionally.[13] However, cost becomes less of an issue if new transmission capacity serves more than one purpose.

Here, the availability of an additional, parallel link between southern Puget Sound and British Columbia would provide an alternative pathway to serve loads on the Olympic Peninsula, easing congestion and freeing up transmission capacity on the north-to-south pathways east of Puget Sound and on the east-to-west pathway across the Cascades.[14] Further, the ability to provide electrical capacity and supply power from the north in emergency and contingency situations provides a distinct improvement in the reliability of electrical service to the Olympic Peninsula.

CONCLUSION

Providing a transmission link from Victoria to Port Angeles will improve the reliability of electrical service to the Olympic Peninsula. Further, any increase in transmission capacity between western Washington and British Columbia will help relieve congestion in the main transmission corridors east of Puget Sound.

[11] BPA Congestion White Paper at 11-15.

[12] BPA Congestion White Paper at 13-17.

[13] BPA Congestion White Paper at 21-22.

[14] The ColumbiaGrid study team stated that the JDF Cable would provide “Possible Significant Benefit” (the highest possible ranking) in the “British Columbia to Northwest” transmission path and “Possible Benefit” (the next highest ranking) on the “West of Cascades North” pathway. ColumbiaGrid Plan at 20-21.

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