Regional Transmission Resources

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PSE transports power from its origination point to our service area over the regional transmission grid through contracts with various transmission providers. Expanded capacity and new transmission routes are needed to meet growing demand, but the number of parties and jurisdictions involved create a complicated challenge. Recently, there have been signs that new processes and collaborations may help address some longstanding problems.

1. Introduction

The Pacific Northwest's regional transmission situation is marked by an increasing frequency and duration of transmission constraints and curtailments frequently brought about by insufficient transmission. The ability to build new transmission has been hindered by:

- Limited coordination between generation and transmission development,
- The absence of a single regional transmission planning body,
- Timing and duration of transmission study process and construction, and
- No central permitting and siting authority.

There are signs that some of these problems are being addressed:

- The Bonneville Power Administration (BPA) has instituted a Network Open Season (NOS) process to facilitate planning and construction of new transmission lines.
- Other regional utilities are planning large transmission projects to interconnect generation, particularly renewable resources, from outside the Pacific Northwest.

A number of new projects are in the development and study stage, sponsored by utility members of the two regional planning groups, ColumbiaGrid and Northern Tier Transmission Group (NTTG), and by merchant developers.

- The Federal Energy Regulatory Commission (FERC) Order 890 requires transmission companies to establish a coordinated, open and transparent planning process. The region is responding to this requirement by using ColumbiaGrid to perform the regional transmission planning function.

This section describes PSE's current transmission situation, and discusses the efforts to improve the Northwest's regional transmission situation.

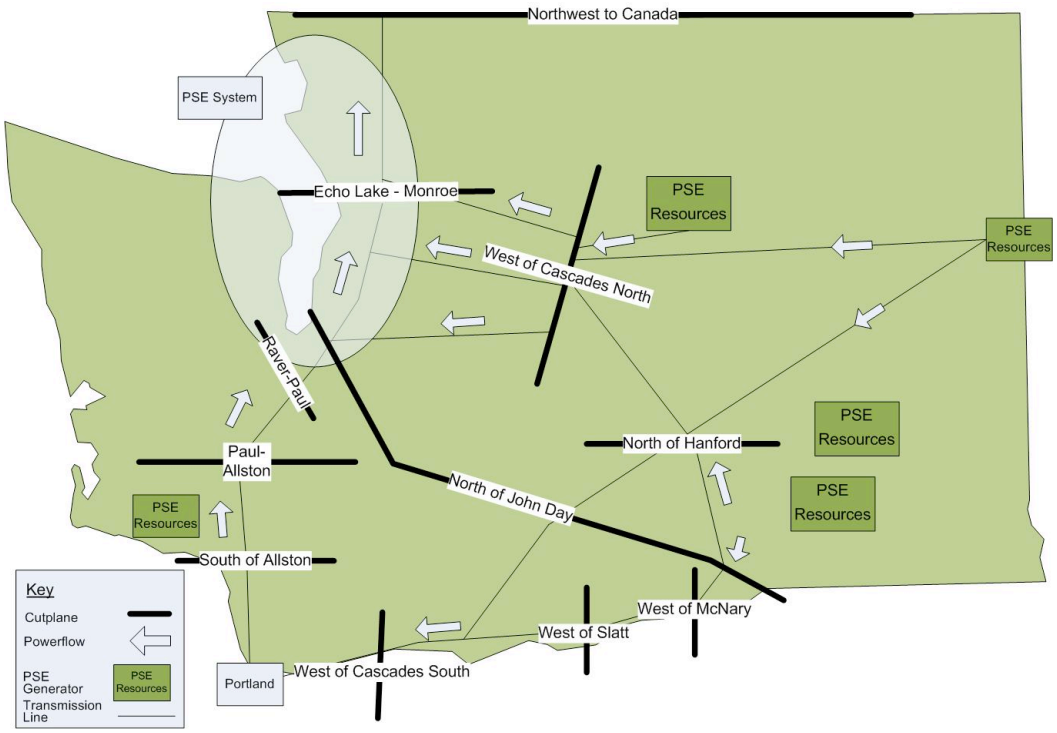
2. The State of PSE's Current Transmission System

BPA provides roughly 70 percent of the high voltage transmission in the Pacific Northwest region. Historically, PSE and other regional utilities have relied on BPA's transmission system to transport energy and capacity resources. However, as PSE and the region's resource portfolios have grown in conjunction with increasing loads and renewable energy standards, the Pacific Northwest's transmission system has not kept pace with these demands in recent years. As a result, the region is experiencing significant transmission constraints during various times of the year, resulting in curtailments of firm contractual transmission rights. This situation is a growing challenge for PSE, in particular as we move significant amounts of energy and capacity resources to the west from eastern Washington (east of the Cascades) and from the south through the I-5 corridor.

Figure E-1 below illustrates how power is transmitted from remote resources, generally located south of Seattle and east of the Cascades, to PSE's service area. The thick, black bars in Figure E-1 represent a cutplane or path, often consisting of several transmission lines or sets of lines in parallel to each other. The flow of power is indicated by the arrow symbol and typically flows on two paths: Cross-Cascades North and Cross-Cascades South. The portion of power flowing in the southward direction is also traversing the constrained cutplanes of North of John Day, West of McNary, and the I-5 corridor. Most of the paths in the Northwest are constrained, in the sense that there is

little to no capacity available to sell, and under certain operating conditions they need to be monitored by system operators to ensure they do not exceed system operating limits. In order for incremental power to flow through an already congested transmission cutplane, it will require new transmission lines and/or some additional or improved reliability protection schemes.

Figure E-1
BPA Transmission System Constraint on PSE Remote Resource Delivery



PSE is investigating the following options to relieve congestion on the paths illustrated above:

a) Rely on BPA to build and/or improve the congested paths through its NOS process.
b) Develop transmission projects that meet the projected resource additions.

Transmission development by PSE, however, is limited to projects connected to our system because of BPA's reluctance to enjoin joint development transmission projects. A joint project would be more than likely "islanded," or remote from PSE's transmission

system, yet still require BPA transmission to deliver energy to PSE's load. West of Cascades North is the primary flowgate PSE could relieve congestion on through transmission development. The Echo Lake – Monroe and Raver – Paul flowgates could be improved through PSE transmission development as well, but are better addressed by BPA system improvements. Any transmission developments must be coordinated with BPA, as it manages all of the cutplanes shown in Figure E-1.

PSE's need for additional transmission is driven primarily by increasing loads and the necessity and location of new generating resources. This requirement for additional resources results from a combination of continued load growth, loss of contracted generation, the potential retirement of existing resources, and compliance with the state's renewable portfolio standards (RPS). Our 2009 IRP identified wind and gas-fired generating resources as PSE's primary options for additional energy and capacity. These two resource types are typically located in different parts of the state; gas-fired generation is traditionally built west of the Cascades near the actual load centers and the natural gas pipelines, while wind resources are built east of the Cascades where the topography and wind conditions are more favorable. Each of these generating resources requires a different transmission solution.

Those resources on the west side are close to PSE's load center and usually connect to the company's transmission system, requiring simpler and less expensive transmission solutions. However, resources located east of the Cascades typically rely on transmission capacity from or through the Mid-Columbia area, which involves complex solutions and is more costly to build and upgrade. The required level of transmission capacity varies depending on the actual size and location of the future resources.

The BPA Role in PSE's Future Resources

One option for acquiring additional transmission is to work through BPA. While this has historically involved submitting an OASIS (Open Access Same-time Information System) request to BPA, the agency now requires participation in NOS, which was designed to obtain financial commitments from utilities to purchase transmission from BPA. Currently, NOS is held annually, though BPA has recently proposed to extend the process to 18 to 24 months. It is expected that the NOS will assist BPA's transmission customers in acquiring incremental transmission. NOS enables BPA to more efficiently augment its transmission system through better planning and financial commitments. Instead of

responding to one request at a time, BPA plans and accelerates the process by performing a “Cluster Study,” which combines all financially committed NOS participants into a single group. The Cluster Study identifies key areas of reinforcement on the BPA network that would address all requests received. From the 2008 NOS, BPA proposed five transmission reinforcement projects and is currently constructing the West of McNary Reinforcement projects. No additional transmission reinforcement projects have been approved since the 2008 NOS. In order to accommodate PSE’s Lower Snake River wind projects in eastern Washington, BPA also is planning to upgrade the Little Goose transmission line, which will increase capacity and reliability. Lastly, BPA’s I-5 transmission project, also intended to increase capacity and reliability, is important to integrate any future west-side generating resources.

Wind power will play a major role in both meeting the region's future energy needs and satisfying RPS requirements. In fact, approximately 5,000 MW of renewable generation (predominantly wind power) will be necessary to fulfill the combined RPS requirements of Washington and Oregon. To meet this increase, BPA must continue to build transmission lines and substations to deliver renewable electricity from these new wind projects often located in remote areas. Integrating this amount of wind energy into the region’s electrical grid poses many challenges, and BPA’s role will certainly require innovative and cooperative approaches to effectively manage the variability of wind power to meet consumer and legislative demands.

One operational protocol BPA has implemented in order to manage the growing amount of wind energy on its system is Dispatcher Standing Order (DSO) 216. The purpose of DSO 216 is to either curtail generation schedules altogether, or to limit generation to the scheduled amount when there is insufficient regulating capacity on the federal hydroelectric system. Regulation is an ancillary service that BPA provides to integrate wind. However, that service is not always available, as shown by DSO 216 curtailments. Curtailments may result in lost energy and/or Renewable Energy Credits, without compensation.

PSE’s future resources – especially renewables – will most likely face tough economic and technical challenges, along with business uncertainties. Continuing to rely on BPA to integrate our wind resources has a limit, which means we must continue to look for alternatives to integrate wind either directly into our Balancing Authority (BA), or seek other innovative lower-cost approaches.

PSE Transmission Development

PSE may need to design, permit and build our own transmission to accommodate the development or acquisition of new resources, in the event that other options do not meet the need. Again, BPA's reluctance to enjoin joint development and "islanded" transmission projects has traditionally limited PSE transmission projects that connect to BPA's system. One potential transmission project is the reinforcement of the West of Cascades North path, which would increase PSE's transmission capacity at the Mid-Columbia market. This project requires both coordination with BPA and additional studies before any decision is made to proceed.

3. Regionally-Based Transmission Efforts

In response to the Pacific Northwest's significant transmission constraints, various organizations have undertaken many efforts to address long-term regional transmission planning and expansion issues. The following summarizes some of these efforts:

ColumbiaGrid

ColumbiaGrid is a non-profit membership corporation formed in 2006 to improve the operational efficiency, reliability, and planned expansion of the Pacific Northwest's transmission grid. While ColumbiaGrid does not own transmission, PSE, other members, and additional parties to ColumbiaGrid's agreements *do* own and operate an extensive network of transmission facilities. ColumbiaGrid's members are PSE, Avista, BPA, Chelan County PUD, Grant County PUD, Seattle City Light, Snohomish PUD, and Tacoma Power.

ColumbiaGrid has substantive responsibilities for transmission planning, reliability, OASIS, and other development services. These tasks are defined and funded through a series of "Functional Agreements" with members and other participants. Development of these agreements is carried out in a public process with broad participation. ColumbiaGrid's transparent processes encourage broad participation and interaction with stakeholders, including customers, transmission providers, states, and tribes. It also provides a non-discriminatory forum for interested parties to receive and present pertinent information concerning the regional interconnected transmission system.

Planning and Expansion

ColumbiaGrid's Planning and Expansion Program is intended to promote single-utility planning and expansion of the regional grid. The Planning and Expansion Functional Agreement (PEFA), which has been signed by all of ColumbiaGrid's members and two non-member participant (Snohomish County PUD and Cowlitz County PUD), defines the obligations under this program.

In short, the agreement charges ColumbiaGrid with answering three key questions concerning the transmission network: what should be built, who should build it, and who should pay for it. ColumbiaGrid will provide a number of services in this planning program, including performing annual transmission adequacy assessments, producing a Biennial Transmission Plan, and identifying transmission needs. ColumbiaGrid also will facilitate a coordinated planning process for the development of multi-transmission system projects.

In December 2010, ColumbiaGrid completed its second cycle of planning and produced a draft of the 2011 Biennial Transmission Expansion Plan. In support of the Biennial Plan, there are four main Study Teams active within ColumbiaGrid addressing specific regions. These study teams include: Puget Sound Area Study Team (PSAST), Northern Mid-Columbia Area Study Team, Wind Integration Study Team (WIST), and the Cross Cascades Study Team. PSE has actively participated in all four teams. The PSAST group worked on several issues over the last year, including a review of seasonal operating limit studies, creating a transmission expansion plan, and analyzing an increased path rating on the Northern Intertie. Currently, PSAST is finalizing the long-term transmission expansion plan that includes the following projects:

- Rebuild the Bothell-SnoKing 230 kV double circuit line.
- Add series inductors to the Broad Street-Massachusetts and Broad Street-East Pine 115 kV underground cables.
- Extend the Northern Intertie Remedial Action Scheme (RAS) for the combined loss of Monroe-SnoKing-Echo Lake and Chief Joseph-Monroe 500 kV lines.
- Reconductor the Maple Valley-SnoKing 230 kV double circuit line with high temperature conductor.
- Add a third Covington 500/230 kV transformer.

- Add a second Portal Way 230/115 kV transformer.

The Northern Mid-Columbia Area Study Team has developed a one-utility plan to resolve the system deficiencies in the greater Wenatchee area. These deficiencies were identified in the 2008 ColumbiaGrid System Assessment and individual utility studies for high generation scenarios during summer conditions. These plans have also been tested during other seasons and with potential wind development in the Central Washington area.

The Wind Integration Study Team (WIST) was formed to facilitate the integration of Renewable Generation into the northwest transmission grid. The current focus of the group is on two issues:

- Technical evaluation of dynamic transfer limits (the amount of variable energy that can be transferred across a transmission path without impacting reliability or degrading equipment)
- Develop a planning methodology that seeks a balance between the cost of transmission capacity and the value of delivered wind energy

The Cross Cascades Study Team is currently investigating the extent of system problems on the Cross Cascades North and South paths, and is evaluating the performance and interaction of various potential transmission projects. These paths deliver remote resources from east of the Cascade Mountains to west-side load areas. Critical outages on these paths during a winter cold snap could result in voltage stability limits.

ColumbiaGrid OASIS

ColumbiaGrid provides program participants with a common OASIS portal, which is a single OASIS interface website, to facilitate transmission service requests within and across member and qualified non-member systems.

This ColumbiaGrid portal displays information common to those participants that have their own OASIS, and provides links to those OASIS systems for the actual transmission requests. Additionally, the OASIS portal allows posting of available transmission by participating utilities that do not have their own OASIS site.

The initial efforts are focused on developing methodologies for determining common Available Transmission Capacity (ATC) and common queuing of requests for transmission service and interconnection. As a common methodology becomes accepted and implemented, the ColumbiaGrid OASIS will provide common ATCs calculated using that methodology.

ColumbiaGrid will also participate in efforts to identify and develop business practices, products, and tariff provisions common among the participants, and will post these on the ColumbiaGrid OASIS.

Joint Initiatives

In mid-2008, representatives from three West Coast sub-regional planning groups (Northern Tier Transmission Group, ColumbiaGrid and WestConnect) joined forces to pursue a number of projects that would benefit from a broader reach of expertise and geography. Each group had begun work in areas that captured the interest of its peers, and a mutual Joint Initiative program was conceived and begun.

As part of the Joint Initiative, two "Strike Teams" are addressing technical exploration of individual projects using resources from entities that see value in participation. One team works on Products & Services concerns, while the other focuses on the issues related to System Infrastructure. A broad stakeholder "Think Tank" group acts as a steering committee that provides a place for information sharing. Those parties that decide to move forward with implementation of the projects developed by the Strike Teams will do so pursuant to an Implementation Agreement. The teams are exploring the following initiatives:

- Within-Hour Transmission Purchase and Sale Business Practices - facilitate more efficient use of the transmission system.
- Intra-hour Transaction Accelerator Platform – an automated information exchange to facilitate intra-hour transmission products such as Balancing, Redispatch, etc.
- Dynamic Scheduling System – provides mechanism to facilitate dynamically-scheduled products such as regulation and load following between participating BAs.

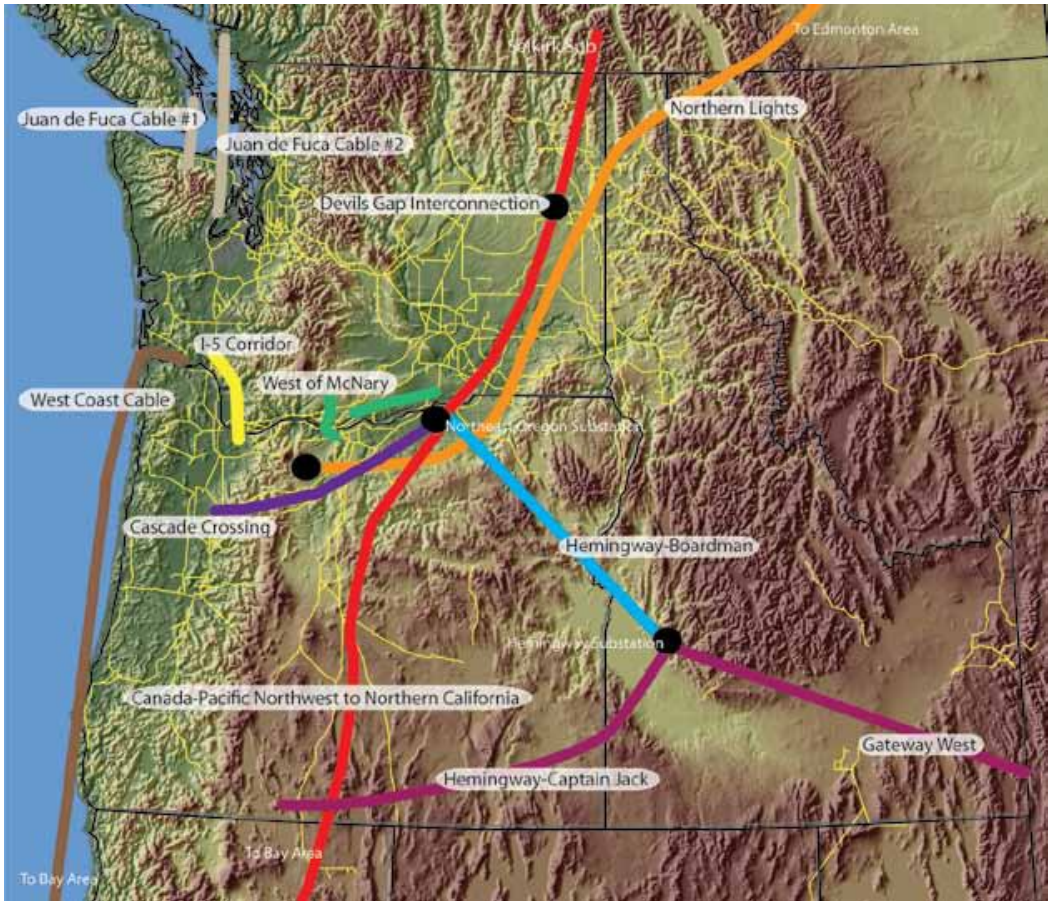
Major Regional Transmission Projects

There are several major transmission projects proposed for the Pacific Northwest. These projects may impact each other as well as the existing Western Electric Coordinating Council (WECC) paths. All project sponsors are required to proceed in an open and transparent planning process. For that reason, the Transmission Coordination Work Group (TCWG) was formed in 2008 through the Northwest Power Pool (NWPP) to aid the project sponsors with coordinating the planning studies and project communications.

Nine major regional projects with project sponsor, name, estimated cost, timeframe, and status are listed below. These projects are shown in Figure E-2.

1. PacifiCorp's Gateway West: ~ $2.7 billion, 2014, WECC rating process
2. TransCanada's Northern Lights: ~ $2 billion, 2014, unknown
3. Idaho Power's Boardman to Hemmingway: ~ $600 million, 2013, WECC rating process
4. PG&E's Canada-Pacific Northwest to Northern California: ~ $billions, 2015, re-evaluating
5. PGE's Southern Crossing: ~ $100's million, 2013, WECC rating process
6. See Breeze's Cable Projects: ~ Costs unknown, timeframes unknown,
7. PacifiCorp's Hemmingway to Captain Jack: ~ $750 million, 2014, re-evaluating
8. BPA's West of McNary: ~ $362 million, 2012, under construction
9. BPA's I-5 Corridor Reinforcement: ~ $342 million, 2015, environmental review

Figure E-2
Regional Proposed Transmission Projects



Source: "2011 Biennial Transmission Expansion Plan," ColumbiaGrid

The main benefits these projects bring to the region are: 1) the access to significant incremental renewable resources in Canada and in the northwestern states, 2) the improvement in regional transmission reliability, and 3) the market opportunities in dealing with participants outside of the region. However, none of the proposed transmission projects terminates in the Puget Sound area with the exception of the Juan de Fuca Cable projects, as the intention of many merchant project developers is to deliver renewables to the California market.

BPA Network Open Season

As mentioned above, BPA's NOS is a process to determine future regional transmission needs by aligning resource development plans with projected load forecasts. The NOS process utilizes cluster studies to analyze impacts and new transmission facility requirements on an aggregated basis for the long-term transmission requests. Commencing in 2008 and in accordance with FERC approval, BPA initiated a NOS process under its Open Access Transmission Tariff (OATT). A multi-step process was implemented beginning with transmission customers submitting Transmission Service Requests (TSR) for desired transmission. BPA responded with an offer of a corresponding Precedent Transmission Service Agreement (PTSA), requiring a security deposit in an amount equal to the charge for 12 months of transmission service at the tariff rate. The PTSA obligates the customer to take service for its TSR if BPA satisfies the following precedent: (1) BPA determines that it can reasonably provide service for the TSR in the cluster at embedded cost rates, and (2) if facilities must be built to provide the service, BPA decides, after completion of a BPA-funded NEPA study, to build the facilities.

As a result of the 2008 NOS, BPA proposed that transmission service enabled by the following new facilities be provided at embedded (rolled-in) rates:

1. West of McNary Reinforcement (WOMR)
    a. McNary – John Day
    b. Big Eddy – Knight (line and substation)
2. Little Goose Area Reinforcement
3. West of Garrison Remedial Action Scheme (no new construction)
4. I-5 Corridor Reinforcement

The total direct cost for the above projects totals $806 million, and enables 3,699 MW in addition to the 1,782 MW already authorized in the queue restack. This totals 5,481 MW enabled at a cost of $147,000/MW. The 20-year average rate impact is projected to be 2.02 percent per year.

Rationale for the above projects includes an estimated $8 million to $10 million annually in thermal production variable cost savings, reduced congestion on BPA's network flowgates, supporting multi-state RPS requirements, geographic diversity of new

renewable generation, and reduced curtailment events impacting the loss of service associated with non-firm service.

PSE requested transmission service for the following projects in BPA's 2008 NOS:

1. Hopkins Ridge Infill – 7 MW
2. Cross Cascades – 150 MW
3. Goldendale Duct Firing – 27 MW
4. Lower Snake River (LSR) Wind Project – 600 MW

BPA has awarded PSE the Hopkins Ridge Infill, Cross Cascades, and Goldendale transmission, and 250 MW of the 600 MW for the LSR Wind Project that begins in the requested month of December 2011. The additional 350 MW of transmission for the LSR Wind Project is contingent upon the completion of BPA's proposed Little Goose and West of McNary Reinforcement projects.

PSE requested 12 MW for Mint Farm Duct Firing in the 2009 NOS and was awarded Conditional Firm transmission with up to 400 hours of potential curtailment. The 12 MW will be converted to long-term firm once BPA completes the I-5 Corridor Reinforcement.

PSE did not request transmission in the 2010 NOS since there was no new off-system resource development that required a transmission request.

4. Outlook

Recommended options

With projected load growth, I-937 RPS requirements, and expiring resource contracts, PSE continues to have significant resource needs. Our current resource strategy includes aggressive demand side resource acquisition, as well as aggressive acquisition of renewables and natural gas generating resources. Additional transmission capacity will be required to transmit electricity from these new resources to PSE's load center.

PSE can pursue the following options:

1. Continue to participate in BPA's Annual Network Open Season for additional transmission capacity to transmit wind and other resources. We have already committed to the transmission offered in BPA 2008 and 2009 NOS processes. We may continue to make transmission requests with BPA through the OASIS and/or take part in the future NOS processes, as the need arises.
2. Consider self-build options of transmission lines to increase transfer capability and system reliability.

Remaining Regional Transmission Issues

1. Lack of coordinated regional planning

Requesting transmission is a cumbersome process, involving multiple steps and the possible requirement of completing one or more planning studies. This process can take anywhere from a few months to several years. If a project requires service from multiple transmission providers, the applicant utility must make requests with each provider. Since the timing of review processes may not match (e.g. one provider can offer immediate service while the other requires facility upgrades), the transmission applicant may face the decision to sign up for one section of the transmission before securing rights for the entire route.

ColumbiaGrid has established a process for its members to jointly plan the transmission systems of its members systems. The Northern Tier Transmission Group accomplishes this task for its members. Jointly the two groups cover most if not all of the Northwest utilities.

These two groups do not currently coordinate transmission requests. Per FERC rules, transmission providers must sell long-term firm transmission rights through their OASIS. Resource developers, therefore, must identify and apply to the individual transmission providers necessary to transmit electricity from the point of receipt (the generator) to the point of delivery (load center).

2. Lack of centralized transmission siting

Transmission siting issues and development risks are commensurate with those for resource development. To construct new transmission, resource developers must be prepared to work with multiple jurisdictions observing differing processes for each jurisdiction.

Early assessment of environmental issues associated with resource development will determine the level of permitting necessary to gain regulatory approval. Common regulatory permits at the federal and state levels include SEPA/NEPA, Endangered Species (biological assessments), Army Corps of Engineers section 404 and 10 permits, Department of Fish/Wildlife HPA, and the Department of Ecology (NPDES). At the city or county level, common permitting needs are conditional use permits for shorelines, clearing and grading, critical area review, and right-of-way use.

Public involvement is incorporated throughout the planning and development phases of transmission projects. This involves engaging stakeholders in many of the necessary decisions.

Routing of transmission lines can require the use of corridors other than those available via municipal, county, or state rights-of-way. In these instances, easements from individual property owners are required. Because negotiation of these rights can become contentious and ultimately result in condemnation, careful consideration is critical.