

TRANSMISSION PLANNING AND INVESTMENT

INTRODUCTION

During the development of PacifiCorp’s 2013 Integrated Resource Plan (“IRP”), stakeholders inquired about the proposed transmission scenarios for modeling with the IRP resource core cases and sensitivities. Specifically, stakeholders requested that the Company provide information supporting its use of Energy Gateway segments in its IRP evaluation process rather than allowing the IRP model to select transmission.

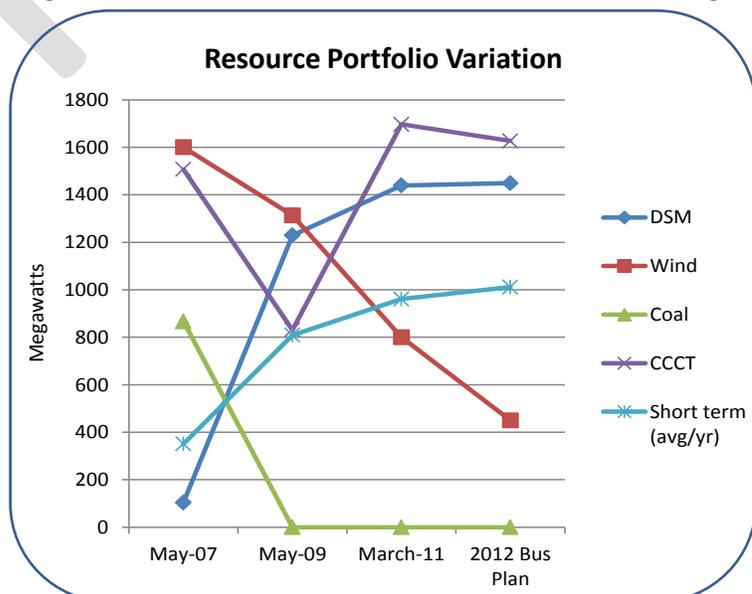
Given the long periods of time necessary to successfully site, permit and construct major new transmission lines, these projects need to be planned and sited well in advance of need or they will not be placed in-service in time to meet the customer need. The Energy Gateway Transmission Expansion Plan is the result of several robust local and regional transmission planning efforts that are ongoing and have been conducted multiple times over a period several years.

The purpose of this white paper is to provide important background information on the transmission planning efforts that led to the Company’s proposal of the Energy Gateway Transmission Expansion Plan, and to explain how the Company’s investments in short-term system improvements have helped to maximize efficient use of the existing system and to defer the need for larger scale infrastructure investment.

PLANNING ENERGY GATEWAY

BACKGROUND

Until the Company’s announcement of Energy Gateway in 2007, its transmission planning efforts traditionally centered around the generation additions identified in the IRP. As the figure here shows, the generation resources in the Company’s preferred portfolio have historically fluctuated significantly from one IRP to the next. With timelines of seven to 10 years required to site, permit, and build transmission, this traditional planning approach was proven problematic, leading to a perpetual state of transmission planning and new transmission capacity not being there when customers need it. The existing transmission system has been at capacity for several years and new capability is necessary to enable new resource development.



The Energy Gateway Transmission Expansion Plan, formally announced in May 2007, has origins in numerous local and regional transmission planning efforts discussed further below. Energy Gateway was designed to ensure a reliable, adequate system capable of meeting current and future customer needs. Importantly, given the changing resource picture, its “hub and spoke” design supports a variety of future resource scenarios by connecting resource-rich areas and major load centers across the Company’s multi-state service area. Energy Gateway has since been included in all relevant local, regional and interconnection-wide transmission studies.

PLANNING INITIATIVES

Energy Gateway is the result of robust local and regional transmission planning efforts. The Company has participated in numerous transmission planning initiatives, both leading up to and since Energy Gateway’s announcement. Stakeholder involvement has played an integral role in each of these initiatives, including participation from state and federal regulators, government agencies, private and public energy providers, independent developers, consumer advocates, renewable energy groups, policy think tanks, environmental groups, and elected officials. These studies have shown a critical need to alleviate transmission congestion and move constrained energy resources to regional load centers throughout the West, and include:

- ***Northwest Transmission Assessment Committee (2003-2007)***

The NTAC was the sub-regional transmission planning group representing the Northwest region, preceding Northern Tier Transmission Group and ColumbiaGrid. The NTAC developed long term transmission options for resources located within the provinces of British Columbia and Alberta and the states of Montana, Washington, and Oregon to serve Northwest loads and Northern California.

- ***Rocky Mountain Area Transmission Study (2004)***¹

Recommended transmission expansions overlap significantly with Energy Gateway configuration, including:

- Bridger system expansion similar to Gateway West
- Southeast Idaho to Southwest Utah expansion akin to Gateway Central and Sigurd-Red Butte
- Improved East-West connectivity similar to Energy Gateway Segment H alternatives

“The analyses presented in this Report suggest that well-considered transmission upgrades, capable of giving LSEs greater access to lower cost generation and enhancing fuel diversity, are cost-effective for consumers under a variety of reasonable assumptions about natural gas prices.”¹

¹ <http://psc.state.wy.us/rmats/rmats.htm>

- **Western Regional Transmission Expansion Partnership**

The WRTEP was a group of six utilities working with four western governors' offices to evaluate the proposed Frontier Transmission Line. The Frontier Line was proposed to connect California and Nevada to Wyoming's Powder River Basin through Utah. The utilities involved were PacifiCorp, Nevada Power, Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, and Sierra Pacific Power.

- **Western Governors' Association Transmission Task Force Report (2006)²**

Examined the transmission needed to deliver the largely remote generation resources contemplated by the Clean and Diversified Energy Advisory Committee. This effort built upon the transmission previously modeled by the Seams Steering Group-Western Interconnection, and included transmission necessary to support a range of resource scenarios, including high efficiency, high renewables and high coal scenarios. Again, for PacifiCorp's system, the transmission expansion that supported these scenarios closely resembled Energy Gateway's configuration.

"The Task Force observes that transmission investments typically continue to provide value even as network conditions change. For example, transmission originally built to the site of a now obsolete power plant continues to be used since a new power plant is often constructed at the same location."²

- **Northern Tier Transmission Group Transmission Planning Reports (2007-present)**

- 2007 Fast Track Project Process and Annual Planning Report³
- 2008-2009 Transmission Plan⁴
- 2010-2011 Transmission Plan⁵

Each Energy Gateway segment was included in the 2007 Fast Track Project Process and has since been reevaluated as part of each Northern Tier Transmission Group biennial planning process. These are open, stakeholder processes.

"The Fast Track Project Process was used in 2007 to identify projects needed for reliability and to meet Transmission Service Requests."³

² http://www.westgov.org/index.php?option=com_joomdoc&task=doc_download&gid=97&Itemid

³ http://nttg.biz/site/index.php?option=com_docman&task=doc_download&gid=353&Itemid=31

⁴ http://nttg.biz/site/index.php?option=com_docman&task=doc_download&gid=1020&Itemid=31

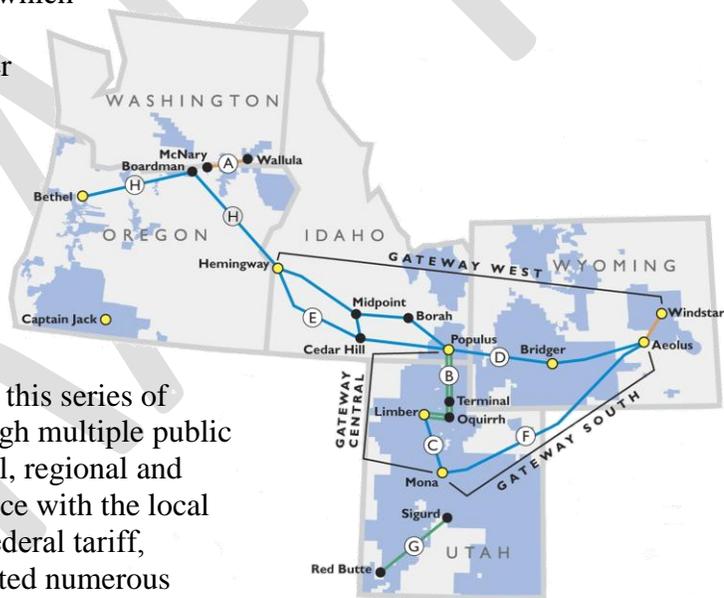
⁵ http://nttg.biz/site/index.php?option=com_docman&task=doc_download&gid=1437&Itemid=31

- **WECC/TEPPC Annual Reports and Western Interconnection Transmission Path Utilization Studies**⁶

These analyses measure the historical utilization of transmission paths in the West to provide insight into where congestion is occurring and assess the cost of that congestion. The Energy Gateway segments have been included in the analyses that support these studies, alleviating several points of significant congestion on the system, including Path 19 (Bridger West) and Path 20 (Path C).

“Path 19 [Bridger] is the most heavily loaded WECC path in the study... Usage on this path is currently of interest due to the high number of requests for transmission service to move renewable power to the West from the Wyoming area.”⁶

For addressing constraints identified on PacifiCorp’s system, as well as meeting system reliability requirements discussed further below, the recommended bulk electric transmission additions took on a consistent footprint, which is now known as Energy Gateway. This expansion plan establishes a triangle over Utah, Idaho and Wyoming with paths extending into Oregon and Washington, and contemplates logical resource locations for the long-term based on environmental constraints, economic generation resources, and federal and state energy policies.



Since Energy Gateway’s announcement, this series of projects has continued to be vetted through multiple public transmission planning forums at the local, regional and interconnection-wide levels. In accordance with the local planning requirements in PacifiCorp’s federal tariff, Attachment K, the Company has conducted numerous public meetings on Energy Gateway and transmission planning in general. Meeting notices and materials are posted publicly on PacifiCorp’s Attachment K Open Access Same-time Information System (“OASIS”) site. PacifiCorp is also a member of the Northern Tier Transmission Group (“NTTG”) and the Western Electricity Coordinating Council’s (“WECC”) Transmission Expansion Policy and Planning Committee (“TEPPC”). PacifiCorp’s transmission plan is continually evaluated by these groups in their efforts to develop and refine the optimal regional and interconnection-wide plans. Please refer to PacifiCorp’s OASIS site for information and materials related to these public processes.⁷

⁶ <http://www.wecc.biz/committees/BOD/TEPPC/External/Forms/external.aspx>

⁷ <http://www.oatioasis.com/ppw/index.html>

Additionally, the Project Teams conducted an extensive 18-month stakeholder process on Gateway West and Gateway South. This stakeholder process was conducted in accordance with WECC Regional Planning Project Review guidelines and FERC Open Access Transmission Tariff planning principles, and was used to establish need, assess benefits to the region, vet alternatives and eliminate duplication of projects. Meeting materials and related reports can be found on PacifiCorp's Energy Gateway OASIS site.

ENERGY GATEWAY EVOLUTION

While the core principles for Energy Gateway's design have not changed, the project configuration and timing continue to be reviewed and modified to coincide with the latest mandatory transmission system reliability standards and performance requirements, annual system reliability assessments, input from several years of federal and state permitting processes, and changes in generation resource planning and our customers' forecasted demand for energy.

As originally announced in May 2007, Energy Gateway consisted of a combination of single- and double-circuit 230 kV, 345 kV and 500 kV lines connecting Wyoming, Idaho, Utah, Oregon and Nevada. In response to regulatory and industry input regarding potential regional benefits of "upsizing" the project capacity (e.g. maximized use of energy corridors, reduced environmental impacts and improved economies of scale), the Company included in its original plan the potential for doubling the project's capacity to accommodate third-party and equity partnership interests. During late 2007 and early 2008, PacifiCorp received in excess of 6,000 MW of requests for incremental transmission service across the Energy Gateway footprint, which supported the upsized configuration. The Company identified the costs required for this upsized system and offered transmission service contracts to queue customers. These customers, however, were unable to commit due to the upfront costs and lack of firm contracts with customers to take delivery of future generation, and withdrew their requests. In parallel, PacifiCorp pursued several potential partnerships with other transmission developers and entities with transmission proposals in the Intermountain Region. Due to the significant upfront costs inherent in transmission investments, firm partnership commitments also failed to materialize, leading the Company to pursue the current configuration with the intent of only developing system capacity sufficient to meet the long-term needs of its customers.

In 2010, the Company entered into memorandums of understanding ("MOU") to explore potential joint-development opportunities with Idaho Power on its Boardman to Hemingway project and with Portland General Electric on its Cascade Crossing project. One of the key purposes of Energy Gateway is to better integrate the Company's East and West control areas, and Gateway Segment H from western Idaho into southern Oregon was originally proposed to satisfy this need. However, recognizing the potential mutual benefits and value for customers of jointly developing transmission, PacifiCorp has pursued these potential partnership opportunities as a lower cost alternative.

In 2011, the Company announced the indefinite postponement of the 500 kV Gateway South segment between the Mona substation in central Utah and Crystal substation in Nevada. This extension of Gateway South, like the double-circuit configuration discussed above, was a

component of the upsized system to address regional needs if supported by queue customers or partnerships. However, despite significant third-party interest in the Gateway South segment to Nevada, there was a lack of financial commitment needed to support the upsized configuration.

In 2012, the Company determined, due to experience with land use limitations and National Environmental Policy Act permitting requirements, that one new 230 kV line between the Windstar and Aeolus substations and a rebuild of the existing 230 kV line was feasible, and that the second new proposed 230 kV line planned between Windstar and Aeolus would be eliminated. This decision resulted from the Company's ongoing focus on meeting customer needs, taking stakeholder feedback and land use limitations into consideration, and finding the best balance between cost and risk for customers.

Finally, the timing of segments is regularly assessed and adjusted. While permitting delays have played a significant role in the adjusted timing of some segments (e.g., Gateway West), the Company has been proactive in deferring in-service dates due to permitting schedules, moderated load growth, changing customer needs, and system reliability improvements discussed below (e.g., Gateway South and Sigurd-Red Butte).

The Company will continue to adjust the timing and configuration of its proposed transmission investments based on its ongoing assessment of the system's ability to meet customer needs and its compliance with mandatory reliability standards.

SYSTEM PLANNING REQUIREMENTS

PacifiCorp is required to meet mandatory FERC, North American Electric Reliability Corporation (NERC) and WECC reliability standards and planning requirements.⁸ The Company conducts annual system assessments to confirm minimum levels of system performance during a wide range of operating conditions, from serving loads with all system elements in service to extreme conditions where parts of or all of the system are out of service. Factored into these assessments are load growth forecasts, operating history, seasonal performance, resource additions or removals, new transmission asset additions, and the largest transmission and generation contingencies. Based on these analyses, the Company identifies any potential system deficiencies and determines the infrastructure improvements needed to reliably meet customer loads.

EFFORTS TO MAXIMIZE EXISTING SYSTEM CAPABILITY

The system analyses described above continue to confirm the need for the Energy Gateway projects, but have also been used to identify short-term improvements throughout the Company's system that have helped maximize efficient use of the existing system and defer the need for larger scale infrastructure investment. Over the past 20 to 30 years, limited new transmission

⁸ [FERC requirements](#); [NERC standards](#); [WECC standards](#);

capacity was added to the system. Instead, PacifiCorp has maintained system reliability and maximized system efficiency through these smaller-scale, incremental projects.

System-wide, the Company has instituted more than 120 grid operating procedures and 17 special protection schemes to maximize the existing system capability while managing system risk. Since 2008, the Company has upgraded or rebuilt over 140 miles of existing Wyoming 230 kV transmission lines to achieve new capacity, relocated and reused more than 800 MVA of existing transformers, upgraded three major series capacitors to increase capacity, and obtained WECC approval of four major path rating upgrades. PacifiCorp is currently testing equipment that will allow real time dynamic line ratings on a critical 230 kV path in Wyoming. This equipment will allow the maximum capability of the conductor, or winter rating, to be used during periods of moderate temperature in summer months, as a way to maximize capability of the existing system. Other transmission system improvements include:

- Southern Utah:

- Installed 345 kV series capacitor at Pinto substation;
- Installed shunt capacitors at Pinto and Red Butte substations;
- Installed static var compensator at Red Butte substation;
- Installed second 230/345 kV transformer at Harry Allen substation in Las Vegas, Nevada.

➔ These investments, together, helped maximize the existing system's capability, improved the Company's ability to serve growing customer loads, increased transfer capacity across WECC Paths TOT2B1 (Four Corners to Pinto, Glen Canyon to Sigurd) and TOT2C (Harry Allen to Red Butte), and reduced the risk of voltage collapse following the loss of one of the two 345 kV lines serving the Red Butte area. Specifically, these benefits include the upgrade of Path TOT2C by 300 MW, the simultaneous operation of Paths TOT2C and TOT2B1 to approved limits, and elimination of a Path TOT2B1 de-rate with growing load in southern Utah.

- Wyoming

- Reconductored over 66 miles of 230 kV line between Windstar, Dave Johnston and Casper;
- Installed shunt capacitors at Riverton, Midwest and Atlantic City substations;
- Replaced components of the Jim Bridger transmission system Remedial Action Scheme (RAS);
- Upgraded the series capacitor at the Borah substation and the switches in the Borah and Kinport substations;
- Installed a dynamic line rating system on the Miners to Platte 230 kV line;
- Installed a phase shifting transformer at the Monument substation.

- These investments improved reliability and helped maximize the transmission system's capabilities, providing numerous system and customer benefits:
 - Maximized transfer capability between Windstar, Dave Johnston and Casper substations during all seasons;
 - Improved the Company's ability to move Wyoming resources to PacifiCorp's customer loads;
 - Increased transfer capacity of Paths TOT4A and TOT4B, which otherwise would have been downgraded, requiring curtailment of generation in Wyoming;
 - Increased Bridger West path rating from 2200 MW to 2400 MW, allowing integration of new resources and improved ability to serve large-customer load growth in Wyoming;
 - Reduced risk of customer impact during peak-condition operation of Jim Bridger generator;
 - Eliminated line overload conditions and generating plant output reductions.

- Idaho
 - Installed two 230 kV capacitor banks at the Meridian substation located in Oregon which supports an increased eastbound line rating on the Summer Lake to Hemingway line from 400 MW to 550 MW.
 - This investment supports load growth and the ability to move additional resources and reserves from PacifiCorp's western control area to its eastern control area, supporting reliability and load service.

- Oregon/Washington/California
 - Participated with BPA in a number of upgrades to the California-Oregon Intertie (COI), including two new series capacitor banks at Bakeoven substation; 500 kV capacitor banks at Captain Jack and Slatt substations; and reconductoring of a section of the 500 kV line;
 - Replacement and upgrade of the Malin substation series capacitor;
 - Reconductored the 230 kV tie line between Dixonville 500 kV and Dixonville 230 kV;
 - Installed the new Nickel Mountain 230-115 kV substation and converted Line 37 in southwest Oregon from 69 to 115 kV;
 - Converted Line 3 in the Medford, Oregon area and Line 1 in the Yreka, California area from 69 kV to 115 kV;
 - Reconductored 5 miles of the Union Gap to North Park 115 kV line in Yakima Washington.
 - These investments helped maximize the transmission system's capabilities and provided numerous system and customer benefits, including:
 - Increased the COI operating capability by 300 MW;

- Improved the Company's ability to move resources to customer loads;
- Enabled operation of the COI at its limits in the summer months, increasing the system capability by an average of 80 MW and supporting customer load growth;
- Improved reliability and support for customer load growth in southern Oregon and northern California;
- Complied with required NERC and WECC reliability standards and improved service to customers in the Yakima, Washington area.

These improvements have enabled more efficient use of the transmission system and, coupled with the recent economic sluggishness, have helped meet short-term needs. However, with projected long-term growth and the need for additional resources as depicted in our customers' load and resource forecasts, PacifiCorp's transmission system is approaching the point where no additional capacity is available, requiring additional transmission infrastructure to meet the long-term needs of our customers.

CONCLUSION

The Energy Gateway Transmission Expansion Plan is the result of years of ongoing local and regional transmission planning efforts with significant customer and stakeholder involvement. Since its announcement in May 2007, Energy Gateway's scope and scale have continued to evolve to meet the future needs of PacifiCorp customers and the requirements of mandatory transmission planning standards and criteria. Additionally, the Company has improved its ability to meet near-term customer needs through a limited number of smaller-scale investments that maximize efficient use of the current system and help defer, to some degree, the need for larger capital investments like Energy Gateway. The IRP process, as compared to transmission planning, is a frequently changing resource planning process that does not support the longer-term development needs of transmission, nor the ability to implement transmission in time to meet customer need. Together, however, the IRP and transmission planning processes complement each other by helping the Company optimize the timing of its transmission and resource investments for meeting customer needs.