

PacifiCorp

**Local Transmission
System Plan (LTSP) -
(2016-17 Biennial Cycle)**

December 14, 2017

TABLE OF CONTENTS

INTRODUCTION4

 FERC ORDER 1000, ATTACHMENT K, LOCAL TRANSMISSION PLANNING.....4

 PROCESS DISCUSSION THAT TIES THIS WORK TO OUR EXISTING PLANNING.....4

 LOCAL PLANNING6

 OBJECTIVES OF THE TRANSMISSION SYSTEM PLAN7

 SUB-REGIONAL & REGIONAL COORDINATION.....8

 PLANNING PROCESS AND TIMELINE8

LOCAL TRANSMISSION SYSTEM PLAN INPUTS AND COMPONENTS9

ASSUMPTIONS/DATABASES10

THE ASSUMPTIONS USED TO DEVELOP THE TSP ARE OUTLINED BELOW:10

 GENERAL DESCRIPTION OF PACIFICORP’S TRANSMISSION SYSTEM.....11

PacifiCorp East Balancing Area – Description.....12

 ENERGY GATEWAY TRANSMISSION PLAN.....16

PacifiCorp West Balancing Area – Description20

 LOAD AND RESOURCE PROCESS.....21

 PACW LOAD FORECAST OVERVIEW21

 RELIABILITY ASSESSMENT.....22

 AREA PLANNING STUDIES.....23

 10-YEAR PLANNING HORIZON24

 ECONOMIC STUDIES24

 COST ALLOCATION25

APPENDICES.....26

 APPENDIX 1 – ATTACHMENT K PUBLIC MEETINGS27

 APPENDIX 2 – PACE PROJECT LIST28

 ENERGY GATEWAY.....28

 BEN LOMOND – SYRACUSE – PARRISH 138 kV THREE TERMINAL LINE.....28

 GOSHEN LOAD TRIPPING RAS30

 GOSHEN – JEFFERSON 161 kV LINE RECONDUCTOR31

 GOSHEN 345/161 kV 700 MVA SPARE TRANSFORMER31

 INSTALL GOSHEN 345/161 kV 700 MVA SPARE TRANSFORMER32

 CONSTRUCT A NEW 161 kV LINE, GOSHEN – SUGARMILL - RIGBY32

 INSTALL SHUNT CAPACITOR BANKS AT SUGARMILL AND RIGBY 161 kV SUBSTATIONS.....33

 GOSHEN – WESTWOOD – RIGBY 161 kV LINE RECONDUCTOR.....33

 OQUIRRH - TERMINAL 345 kV # 3 AND #4 DOUBLE CIRCUIT LINE35

 PURGATORY FLAT NEW 138 kV NETWORK DELIVERY POINT36

 RED BUTTE/CENTRAL – ST. GEORGE CONNECT 4TH 138 kV CIRCUIT.....37

 SYRACUSE – INSTALL SECOND 345/138 kV TRANSFORMER38

 TERMINAL - GROW - PARRISH 138 kV LINE REBUILD.....39

 ST GEORGE SUBSTATION INSTALL 345/138kV TRANSFORMER AND EXPAND YARD.....39

 RAILROAD TO SILVER CREEK 138 kV LINE – BUILD LINE INTO PARK CITY AREA40

 WESTWOOD SUBSTATION.....40

<i>BRIDGERLAND SUBSTATION EXPANSION</i>	41
<i>SPANISH FORK 345/138 kV TRANSFORMER UPGRADE</i>	41
<i>CONSTRUCT NEW NAPLES 138-12.5 kV SUBSTATION IN EAST UTAH</i>	42
APPENDIX 3 – PACW PROJECT LIST	43
<i>DRY GULCH 115-69 kV CAPACITY INCREASE</i>	43
<i>LONE PINE TO WHETSTONE 230 kV LINE</i>	43
<i>MALIN 230 kV BREAKER ADDITION</i>	43
<i>MOXEE TO HOPLAND 115 kV RECONDUCTOR</i>	44
<i>SAMS VALLEY 500-230 kV SUBSTATION</i>	44
<i>SNOW GOOSE 500-230 kV SUBSTATION</i>	45
<i>VANTAGE TO POMONA HEIGHTS CONSTRUCT 230 kV LINE</i>	45
<i>WALLULA TO MCNARY 230 kV LINE #2</i>	46
IMPACTS ON OTHER SYSTEMS: THIS PROJECT HAS IMPACTS TO OTHER REGIONAL FACILITIES MOST NOTABLY BPA, AS THE PROJECT HAS A TERMINAL AT BPA’S MCNARY SUBSTATION. TTC STUDIES WILL BE SHARED WITH THE PROJECT REVIEW GROUP.	46
APPENDIX 4 - ENERGY GATEWAY	47
.....	51

INTRODUCTION

FERC ORDER 1000, ATTACHMENT K, LOCAL TRANSMISSION PLANNING

On June 13, 2014 PacifiCorp submitted a filing to the Federal Energy Regulatory Commission (“Commission” or “FERC”) containing a revised Attachment K to comply with the FERC's April 17, 2014 ruling on the September 16, 2013 Order 1000. Since that submission, PacifiCorp has moved forward to conduct local transmission planning consistent with FERC Order 1000, superseding Order No 890 and 890-A, as directed by the FERC staff. Order 1000 ensures that Commission-jurisdictional services are provided on a basis that is just and reasonable and not unduly discriminatory or preferential. PacifiCorp, jointly with other Northern Tier Transmission Group (NTTG) members, submitted filings to the FERC containing revised Attachment Ks to comply with Order 1000. Applicants noted in the filing letter that it is important to have their Attachment Ks be consistent with one another and approved contemporaneously so that coordinated regional, interregional and interconnection-wide efforts can be conducted in the most efficient manner. PacifiCorp’s Order 1000 compliance filings can be found in FERC Docket No. ER13-64-000.

PROCESS DISCUSSION THAT TIES THIS WORK TO OUR EXISTING PLANNING

PacifiCorp’s transmission planning obligations are governed by Attachment K of its Open Access Transmission Tariff Volume No. 11 (“OATT”). PacifiCorp’s Attachment K for the biennial planning cycle 2016 -17 is being developed in accordance with the directives of order No. 1000. PacifiCorp’s Attachment K and related information can be found on its Open Access Same-time Information System (“OASIS”) at: <http://www.oasis.oati.com/ppw/index.html>

This is PacifiCorp's fifth biennial Transmission System Planning cycle, which will result in a Local Transmission System Plan (LTSP) for years 2016-2017. The process:

1. allows for consulting with customers and neighboring transmission providers;
2. stipulates the notice procedures and anticipated frequency of meetings;
3. specifies the methodology, criteria and processes used to develop transmission plans;
4. provides the method for disclosure of criteria, assumptions and data underlying transmission system plans;
5. outlines the obligations of customers and methods for customers to submit data to the transmission provider;
6. provides the dispute resolution process;
7. defines the transmission provider's study procedures for economic upgrades to address congestion or the integration of new resources; and
8. stipulates the relevant cost allocation procedures or principles.

The major purpose of this LTSP report is to inform stakeholders at-large of transmission issues in the PacifiCorp footprint and allow tracking of solutions developed to address these issues.

PacifiCorp prepared this LTSP in consultation with stakeholders, pursuant to Section 2 of its Attachment K, identifying the upgrades and other investments related to PacifiCorp's local planning process. PacifiCorp bases its planning criteria on its own Internal Reliability Criteria, North American Electric Reliability Corporation ("NERC") and the Western Electricity Coordinating Council ("WECC") Reliability Standards (hereinafter referred to as NERC/WECC Standards), and industry standards (e.g., Institute of Electrical and Electronic Engineers - IEEE Standards). Additional information regarding how PacifiCorp implements Attachment K and details regarding the methodology, planning criteria, assumptions, databases, and processes

PacifiCorp used in order to prepare this LTSP can be found in the PacifiCorp Local Transmission Planning Practices Document on PacifiCorp's OASIS.¹

Unless otherwise specified, capitalized terms used herein are defined in Section 1 of Attachment K or in Section 1 of PacifiCorp's OATT. PacifiCorp seeks efficiencies by sharing study results openly; however, PacifiCorp is committed to preserving its right to protect customer proprietary data where appropriate, consistent with the FERC tariffs and applicable statutes.

LOCAL PLANNING

Section 1.26 of PacifiCorp's Attachment K defines TSP as the Transmission Provider's transmission plan that identifies the upgrades and other investments to the Transmission System and Demand Resources necessary to reliably satisfy, over the planning horizon, Network Customers' resource and load growth expectations for designated Network Load and Network Resource additions; Transmission Provider's resource and load growth expectations for Native Load Customers; Transmission Provider's transmission obligation for Public Policy Requirements; Transmission Provider's obligations pursuant to grandfathered, non-OATT agreements; and Transmission Provider's Point-to-Point Transmission Service Customers' projected service needs including obligations for rollover rights.

¹ <http://www.oasis.oati.com/PPW/PPWdocs/PlanningPracticesDocument v19 updated links pdf.pdf>

Pursuant to Section 1.59 of PacifiCorp's OATT, the Transmission System is defined as facilities (for PacifiCorp, these are generally operated at a voltage greater than 34.5 kilovolt) that are owned, controlled or operated by the Transmission Provider or Transmission Owner in a geographic region; that are used to provide Transmission Service under Part II and Part III of the Tariff; and that are included in the Transmission Provider's transmission revenue requirement periodically filed with the Commission. Accordingly, this LTSP details upgrades and other investments that resulted from PacifiCorp's local planning process, which involve only those transmission facilities that are owned, controlled, or operated by PacifiCorp.

OBJECTIVES OF THE TRANSMISSION SYSTEM PLAN

The basic objective of the 2016-17 biennial Attachment K LTSP is to identify all present and reasonably foreseeable upgrade needs to the transmission system given each customer's forecasted and assumed load and resource portfolios. To meet this objective, the LTSP attempts to define future planned transmission additions or upgrades that are necessary to provide for reliable system operation over a ten-year planning horizon. Annual studies are performed consistent with the NERC Compliance Enforcement process (the TPL-001-4 annual study program and the transmission system planning studies); methodology for Attachment K is more fully defined in the Local Planning Practices Document. The TSP also incorporates any economic congestion study results as requested by stakeholders and performed by PacifiCorp during the eight quarter planning cycle outlined in Section 2 of Attachment K.

SUB-REGIONAL & REGIONAL COORDINATION

To satisfy its Order 890 and 890-A and Order 1000 obligations to coordinate its planning processes with other transmission providers in a regional and interregional context, PacifiCorp is a member of NTTG and WECC's Transmission Expansion Planning Policy Committee ("TEPPC"). Additional detail regarding how these layered efforts will be coordinated can be found in Sections 3 and 4 of PacifiCorp's Attachment K, NTTG's website www.nttg.biz, and the Western System Transmission Planning Guidance for Customer and Stakeholder Participation also located on NTTG's website. PacifiCorp actively participates in the WECC interregional planning process.

The process used by PacifiCorp and NTTG to develop its local and regional plans are different in two ways. First, PacifiCorp's process focuses on developing a transmission plan to service its "balancing area" loads and resources, whereas the NTTG plan will focus on evaluating transmission projects that move power across the regional bulk transmission system to serve loads. Second, PacifiCorp's process is built using analyses of PacifiCorp's transmission customers' service need, whereas the NTTG regional planning process is optimized for serving future load for multiple member companies.

PLANNING PROCESS AND TIMELINE

Consistent with the two-year local planning process cycle outlined in Section 2 of its Attachment K and at the heel of the biennial planning cycle for 2014-2015, PacifiCorp has been holding quarterly public planning meetings since Quarter 1 of 2016. Detailed information including meeting agendas, presentations and minutes are posted each quarter and are currently available on the PacifiCorp's OASIS. PacifiCorp will hold its Quarter 4 meeting on December 8,

2016 in order to discuss and solicit feedback from eligible customers and interested stakeholders on this LTSP. PacifiCorp invites any interested stakeholder or eligible customer to attend this public meeting which will be held in PacifiCorp's offices in Portland and Salt Lake City and will be made available via Webinar. Notices regarding this meeting will be posted to PacifiCorp's OASIS at least ten days in advance.

LOCAL TRANSMISSION SYSTEM PLAN INPUTS AND COMPONENTS

PacifiCorp's planning process involves a number of sub-processes that are utilized to create a system-wide study as well as to focus on projects related to specific geographic area(s) (e.g. the Wasatch Front in Utah) or specific transmission line or lines that extend over large geographic areas. The TSP incorporates these different studies in order to create a coherent and comprehensive system-wide transmission plan. The study incorporates PacifiCorp's Annual Transmission Reliability Assessment² and a selection of PacifiCorp's Area Planning Studies. Inputs also include results from quarterly meeting discussions with our stakeholders; details (e.g., agenda, presentations and meeting minutes) are posted on the PacifiCorp OASIS under Attachment K: <http://www.oasis.oati.com/ppw/index.html>

² PacifiCorp's annual transmission planning (TPL) reliability assessment is conducted by its Main Grid and Area Transmission Planning departments. Study work is divided based on geographic area, which align with PacifiCorp's two balancing authority areas: PACW and PACE.

ASSUMPTIONS\DATABASES

The assumptions used to develop the TSP are outlined below:

1. Studies incorporate system loads and resources submitted in Quarter 1 for balancing areas as specified in the tariff. Four power flow cases, which represent even intervals over the next ten years, were used to assess the future transmission system adequacy. In each of the planning or operating scenarios, the load flow and stability models that were used originated from WECC-approved base cases which detailed the system to the 100 kV levels which are coordinated and compiled by the WECC member utilities. A major part of the base case development by PacifiCorp is to ensure that PacifiCorp's facilities are accurately represented.
 - a. Peak transmission uses and Network Load service do not necessarily occur at the same time for every path on the transmission system. Both heavy load situations and light load with heavy transfers are considered in determining transmission requirements.
 - b. Assumptions for Network Resource additions are consistent with the Integrated Resource Plans, developed by load serving entities corresponding to balancing authority areas PacifiCorp East and PacifiCorp West.
 - c. Reliability criteria is in accordance with WECC and NERC criteria, in addition to PacifiCorp's Reliability Criteria
 - d. Confidential and Critical Energy Infrastructure Information shall be handled in accordance with Attachment K or other rules and regulations as appropriate.
 - e. For economic studies, PacifiCorp uses the WECC\TEPPC database, made available through WECC.

GENERAL DESCRIPTION OF PACIFICORP'S TRANSMISSION SYSTEM

Service Area

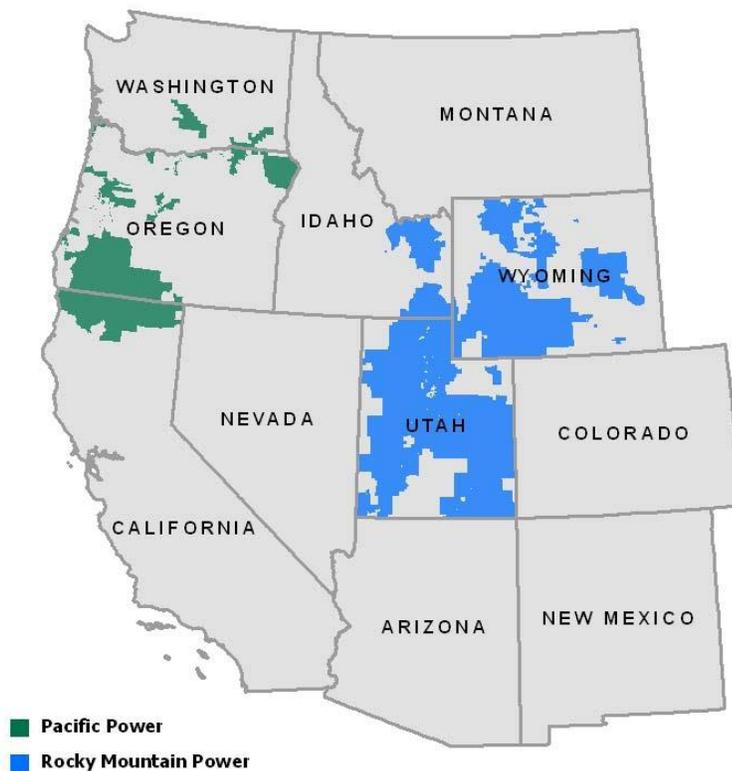


Figure 1 PacifiCorp West and PacifiCorp East Service Areas

PacifiCorp's Network Customers provided a 10-year load and resource forecast for the years 2016-2025 covering their respective areas, as depicted in figure 1. Network Load customers include: PacifiCorp Commercial and Trading (PacifiCorp), Utah Associated Municipal Systems (UAMPS), Utah Municipal Power Agency (UMPA), Deseret Power Electric Cooperation (DG&T), Bonneville Power Administration (BPA), Basin Electric Power Cooperative (Basin

Consistent with Section 31.6 of PacifiCorp's OATT, an annual L&R study is conducted to evaluate the adequacy of PacifiCorp's transmission system to serve forecasted Network Loads with Network Resources. This Load and Resource Study fulfills the FERC order No 890 Attachment K obligation to consider Network Load and Resource forecasts in PacifiCorp's transmission planning process.

The PACE Network Customers are spread across a large geographic region that includes southeast Idaho, Utah and Wyoming. For the purposes of this study, the PACE transmission network is divided into 12 smaller areas, or "load bubbles." The load bubbles are utilized to study and analyze transmission requirements to reliably serve forecasted loads, as well as for operational purposes. Some load bubbles are further segmented into sub-bubbles for study purposes. For example, the Wasatch Front is comprised of five sub-bubbles: Ogden, Salt Lake Valley, Utah Valley, Tooele and Park City.

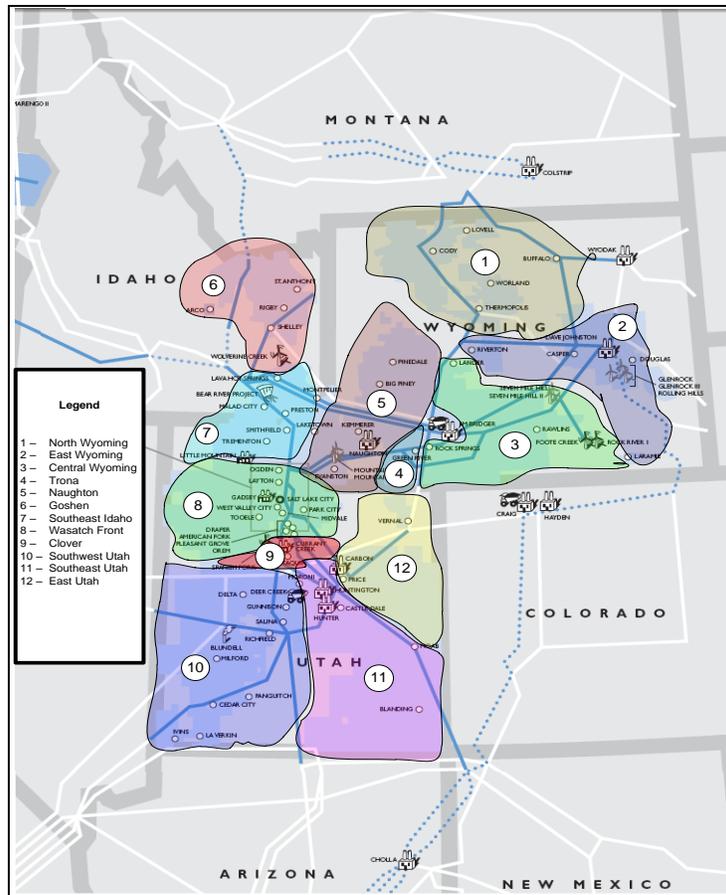


Figure 3 PACE Load Bubbles

The Plot below shows the summer load forecast for the PACE system, covering 10-year load forecast for the years 2016-2025.

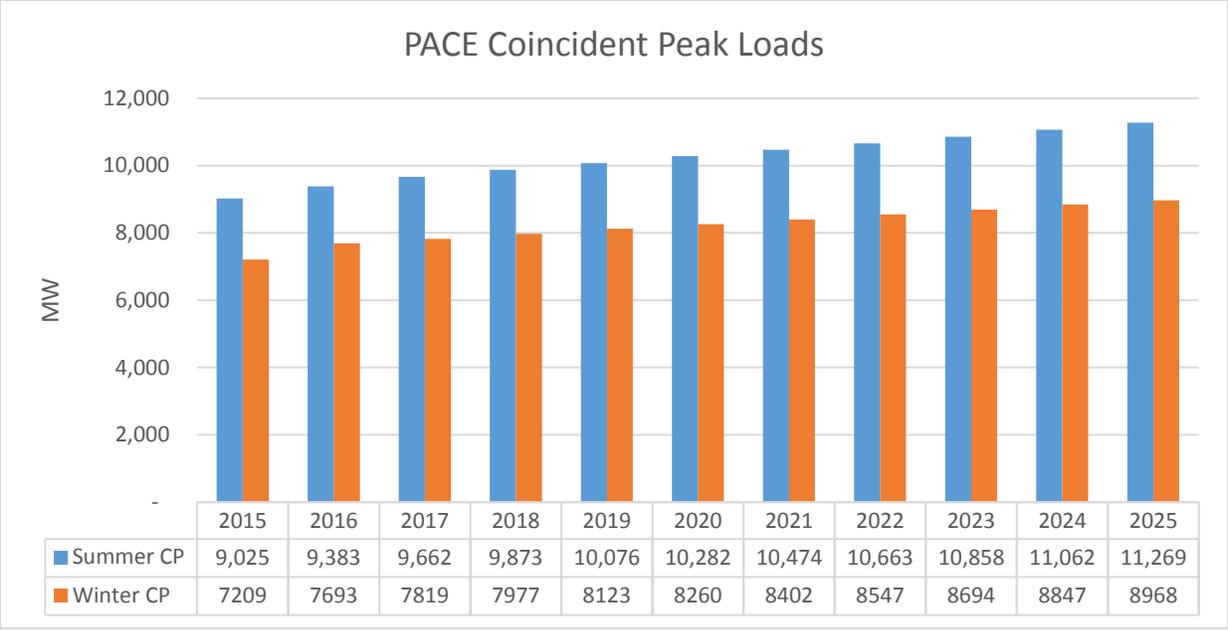


Figure 4 PACE Coincident Peak Loads

ENERGY GATEWAY TRANSMISSION PLAN

The Energy Gateway Transmission Plan projects will address many of the future transmission requirements necessary to serve Network Loads. As such, an overview of Energy Gateway and key projects are presented here. For additional information on Energy Gateway, go to Appendix 4.

PacifiCorp's Energy Gateway Transmission expansion plan was initiated in May 2007 and includes a multi-year investment plan that will add approximately 2,000 miles of new transmission line across the Western Interconnection. These projects will provide increased service to customers within PACE. Segment B, Populus to Terminal, was completed in November 2010. The Mona-Oquirrh Segment C was completed in May 2013. The Sigurd to Red Butte project, Segment G, is a new high-voltage 345 kV transmission line stretching approximately 170 miles from Sigurd substation in Sevier County, Utah, to the Red Butte substation in Washington County, Utah, that was placed into service on May 28, 2015. This 345 kV line segment is critical in meeting the needs for southwest Utah.

Gateway Central

Gateway Central consists of two projects and sub-segments together known as "segment B and C". The first segment, Segment B, Populus to Terminal, added a new double-circuit, 345 kV transmission line from Populus substation, near Downey, Idaho, to the existing Ben Lomond substation in Box Elder County, Utah, extending to Terminal substation in Salt Lake City, approximately 135 miles in length. This project was completed and placed into service on November 19, 2010.

The second segment, Segment C consists of two sub-segments, Mona to Oquirrh project which originates at a new substation, Clover, near the existing Mona substation in Juab County, Utah, and runs north to the future Limber substation site in Tooele County, Utah; this portion of

the line is constructed 500 kV but operated at 345 kV. From Limber to Oquirrh substation in Salt Lake County, Utah, the line is constructed double circuit 345 kV, with one circuit to be operated at 345 kV and the other at 138 kV with the 345/138 kV transformation at Limber. This project went into service on May 17, 2013. A double-circuit 345 kV extension from Oquirrh to Terminal in Salt Lake City is planned as part of this project with a target in-service date of 2021.

All portions of the Gateway Projects are being developed in order to meet “current and projected Network Load service” as well as maintain compliance with reliability performance standards.

Gateway West

Windstar to Populus, Segment D, will stretch approximately 488 miles starting near the Windstar substation in Glenrock, Wyoming, proceeding south to Medicine Bow and then spanning across southern Wyoming to the Populus substation in Downey, Idaho. The Windstar to Populus project will include seven expanded or new substations and will enable access to existing and new generating resources, including wind, for delivery of power to customers. The estimated line in-service date for this project is 2019 to 2024.

PacifiCorp transmission also is collaborating with Idaho Power to build additional facilities west of Populus (Populus to Hemingway 500 kV line, Segment E). Key project segments will originate at Populus and run approximately 502 miles across Idaho to Hemingway substation, near Melba, Idaho in Owyhee County. The Populus to Hemingway project will include five expanded or new substations and will enable the companies to access existing and new generating resources, including wind, and deliver electricity from these sources to customers throughout the region. PacifiCorp expects this western segment will be completed in the 2020-

2024 timeframe. Segment E will provide access to existing and new generating resources to serve retail and wholesale loads.

Gateway South

The Aeolus to Clover project, Segment F, establishes a new 500 kV transmission line stretching approximately 400 miles from Aeolus, a new substation planned in prime wind generation country near Medicine Bow, Wyoming, through northwest Colorado, continuing to Clover substation, in Utah. Estimated line in service for customers is 2020 to 2024.

The Sigurd to Red Butte project, Segment G is a new high-voltage 345 kV transmission line stretching approximately 170 miles from Sigurd substation in Sevier County, Utah, to the Red Butte substation in Washington County, Utah, that was placed into service on May 28, 2015. This 345 kV line segment is critical in meeting the needs for southwest Utah.

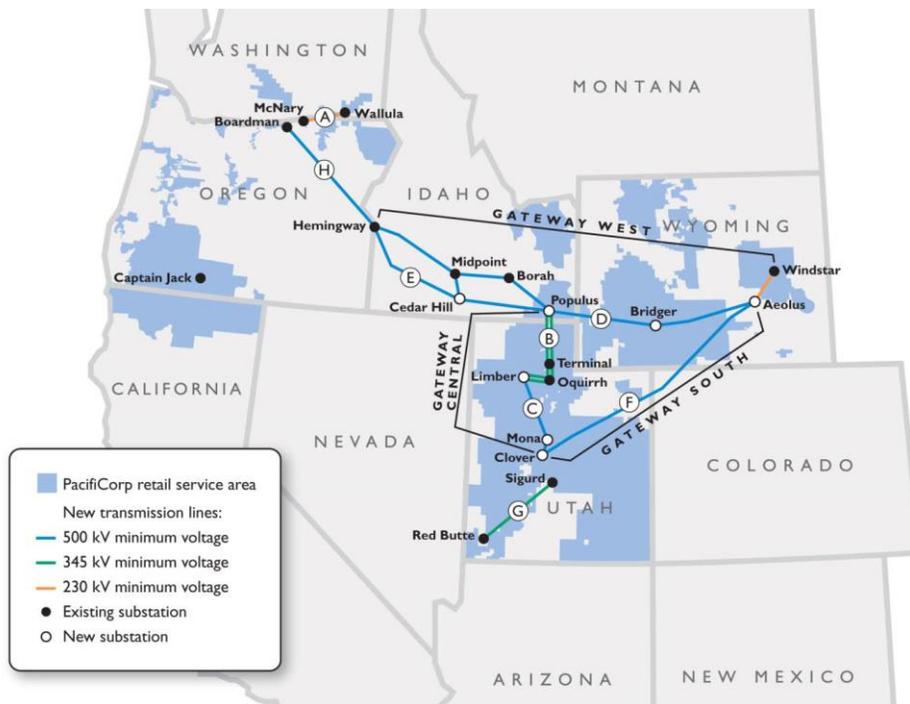


Figure 5 Energy Gateway Transmission Projects

Segment & Name	Description	Approximate Mileage	Status and Scheduled In-Service
(A) Wallula-McNary	230 kV, single circuit	30 mi	<ul style="list-style-type: none"> • Status: local permitting completed • Scheduled in-service: 2017 is sponsor driven*
(B) Populus-Terminal	345 kV, double circuit	135 mi	<ul style="list-style-type: none"> • Status: completed • Placed in-service: November 2010
(C) Mona-Oquirrh	500 kV single circuit 345 kV double circuit	100 mi	<ul style="list-style-type: none"> • Status: completed • Placed in-service: May 2013
Oquirrh-Terminal	345 kV double circuit	14 mi	<ul style="list-style-type: none"> • Status: rights-of-way acquisition underway • Scheduled in-service: 2021*
(D) Windstar-Populus	230 kV single circuit 500 kV single circuit	400 mi	<ul style="list-style-type: none"> • Status: permitting underway • Scheduled in-service: 2019-2024*
(E) Populus-Hemingway	500 kV single circuit	500 mi	<ul style="list-style-type: none"> • Status: permitting underway • Scheduled in-service: 2019-2024*
(F) Aeolus-Clover	500 kV single circuit	400 mi	<ul style="list-style-type: none"> • Status: permitting underway • Scheduled in-service: 2020-2024*
(G) Sigurd-Red Butte	345 kV single circuit	170 mi	<ul style="list-style-type: none"> • Status: construction began May 2013 • Placed in-service: May 2015
(H) Boardman-Hemingway	500 kV single circuit	500 mi	<ul style="list-style-type: none"> • Status: pursuing joint-development and/or firm capacity opportunities with project sponsors • Scheduled in-service: sponsor driven

* Estimated in-service date consistent with the 2015 IRP Update (March 31, 2016)

Table 1 Energy Gateway Projects

PACIFICORP WEST BALANCING AREA – DESCRIPTION

PacifiCorp’s western transmission system serves 545,000 customers in Oregon, 124,000 customers in southeastern Washington and 45,000 customers in Northern California. The map below shows the geographical locations of the PACW system. Most of the PACW load areas do not form a contiguous system but are interconnected with each other through third party transmission and legacy transmission contracts. In many cases, delivery of resources load areas may require the use of third party wheeling. PacifiCorp West is made up of twenty eight load areas that partially rely on wheeling over BPA’s transmission (see Figure 6).

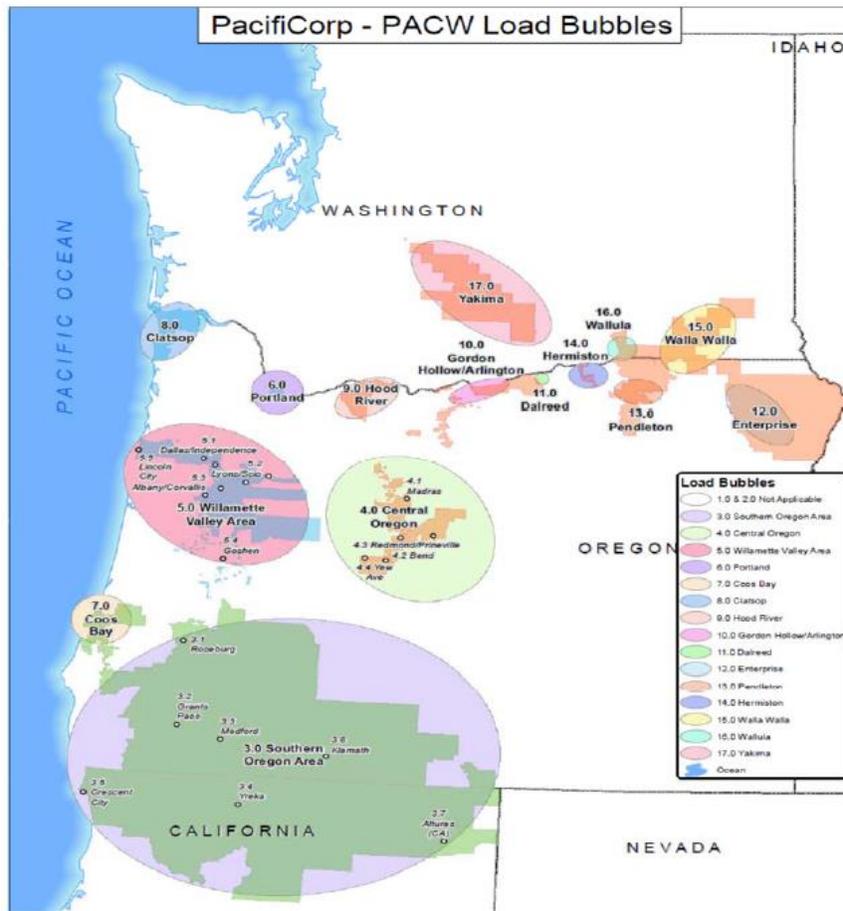


Figure 6 PacifiCorp West (PACW) – 28 Load Pockets

LOAD AND RESOURCE PROCESS

Each year Network Customers are required to provide a 10-year forecast of loads by geographic region and a 10-year generation or purchase power forecast as required to adequately serve peak loads and to cover planning and reserve margins. PacifiCorp aggregates all data submittals and provides this information to WECC for use by the Reliability Coordinator. PacifiCorp also utilizes the customer supplied information as the foundation for all planning studies.

PACW LOAD FORECAST OVERVIEW

There are 28 area load bubbles in the PACW system. Overall the 2016 PACW system load forecast decreased by 0.10% for summer and decreased by 2.39% for winter in comparison with the 2015 load forecast. For the Southern Oregon bubble, load increased by 0.60% for summer and increased by 1.62% for winter 2016. For Central Oregon decreased by 0.30% for summer and decreased by 7.28% for winter 2016. For the Willamette Valley Area, loads were increased by 0.53% for summer and decreased by 0.87% for winter 2016. For the remaining bubble areas there were decreases for summer of 1.13% and decreases for winter of 4.93% as compared to the 2015 load forecast. These increases and decreases for various bubbles are due to further evaluation and refinement of base load levels in comparison to the prior years and future loads through 2025.

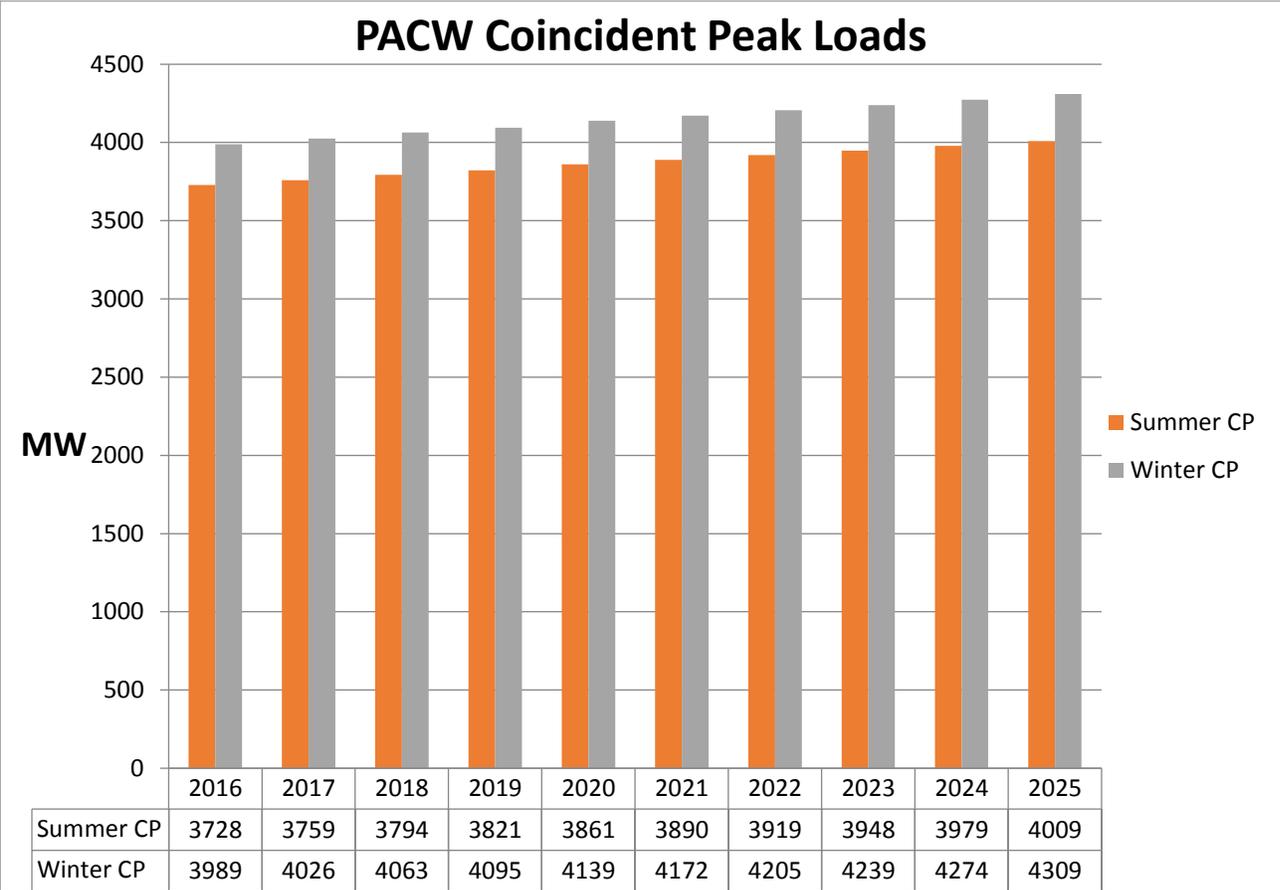


Figure 7 PACW Coincident Loads

RELIABILITY ASSESSMENT

PacifiCorp performs an Annual Reliability Assessment for each of its balancing authority areas, PacifiCorp East (“PACE”) and PacifiCorp West (“PACW”). Reliability studies involve:

1. the development of computer models of the combined electrical transmission grid with transmission lines, generators and loads modeled
2. model testing of the electrical performance of the system under normal and outage conditions, with expected load and generation scenarios, and

3. comparison of performance to planning standards and guidelines, governed by the planning criteria required by NERC, “WECC” Reliability Standards (hereinafter referred to as Reliability Standards), and industry standards (e.g., IEEE Standards).

The Annual Transmission Reliability Assessment incorporates portions of the annual reliability assessment studies. Transmission capacity planning then includes the identification, coordination and development of plans. Such plans are listed in Appendices 2 and 3.

AREA PLANNING STUDIES

While reliability studies analyze 100 kilovolts and higher voltage rated system, Area Planning Studies cover the sub-transmission system down to 46 kilovolts.

Within the various regions of PACE and PACW, Area Planning Studies are conducted to assess the lower voltage transmission systems and local area networks. These Area Studies address the overload and voltage problems below 161 kilovolts (138, 115 kilovolts and below). The purpose of these studies is to provide multi-year plans for the sub-transmission and substation systems in particular load serving areas. The plans are used to guide the development of construction forecasts, capital forecasts and operating plans. Generally these studies consider N-0 and N-1 conditions. These studies are very useful and provide for completing the full planning of transmission requirements. The two principals used for these five-year studies are as follows:

- Define system as it exists today
- A five-plus year planning horizon is adequate as a starting point, but will not in itself satisfy Attachment K requirements. Sensitivity is required for an additional five

years beyond the traditional five-year requirement such as the five year plan synchronize and coordinate with longer term need (10-year requirement).

The “Area Planning” construction forecast, covering load service, is integral to the TSP construction list in Appendices 2 and 3. To view high level summary reports of five year studies, go to Attachment K Information folder\Transmission Planning – Local Area Studies: <http://www.oasis.oati.com/ppw/index.html>

10-YEAR PLANNING HORIZON

Once Studies are completed, the investment requirements over the 10 year horizon identified, and the delivery organization within PacifiCorp assesses the timelines required to design, procure, and build projects.

ECONOMIC STUDIES

Section 2.7 of PacifiCorp’s Attachment K states Any Eligible Customer or stakeholder may submit an Economic Congestion Study Request during either Quarter 1 or Quarter 5 of the planning cycle, pursuant to the procedures specified in the transmission planning business practice. Transmission Provider will complete up to two high priority Economic Congestion Studies during the planning cycle: one during the first year of the biennial planning cycle and one during the second year of the biennial planning cycle. For Economic Study Request Form, go to Attachment K Information\Economic Planning Studies Requests:

[http://www.oasis.oati.com/PPW/PPWdocs/econPlanStudyRequestRev2_\(2\).pdf](http://www.oasis.oati.com/PPW/PPWdocs/econPlanStudyRequestRev2_(2).pdf)

No Economic Study Requests were submitted in Q1 of the 2016-17 planning cycle.

COST ALLOCATION

Section 3.8 of PacifiCorp's Attachment K states a Project Sponsor intending to submit its Sponsored Project for cost allocation must satisfy the pre-qualification requirements set forth in Section 3.7.1, submit the Sponsored Project as set forth in Section 3.7.2.2, and request cost allocation as set forth in Section 3.7.2.3. An Applicant desiring for its project to be considered for cost allocation as an unsponsored project must submit the unsponsored project as set forth in Section 3.7.2.2 and request cost allocation as set forth in Section 3.7.2.3. Transmission Provider may elect to allocate costs of its project through either participant funding as set forth in Section 3.8.1 or through NTTG's cost allocation process as set forth in Section 3.8.2 as either a Sponsored Project or unsponsored project, provided that the Transmission Provider complies with the applicable requirements specified above.

APPENDICES

APPENDIX 1 – ATTACHMENT K PUBLIC MEETINGS

Detailed information covering meeting agendas, presentations and meeting minutes are posted, by quarter, on the PacifiCorp OASIS at:

<http://www.oasis.oati.com/ppw/index.html>

Attachment K Quarterly Public Meetings Summary																
	2014				2015				2016				2017			
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Date	27-Mar-14	12-Jun-14	25-Aug-14	11-Dec-14	19-Mar-15	11-Jun-15	24-Aug-15	10 Dec-15	10-Mar-16	9-Jun-16	29-Sep-16	8 Dec-16	22 Feb-17	22 Jun-17	14 Sep-17	14 Dec-17
Time	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	9:00 - 10:00 am PDT	8:00 - 9:30 am PDT	9:00 - 10:00 am PDT	9:30 - 11:00 am PDT
Location	LCT 16A & NTO 130K	LCT 16A & NTO 270B	LCT Skybridge, NTO 270B	LLC Deschutes, NTO 270B	LCT-720 & NTO 270B	LCT 16A & NTO 270B	LLC Deschutes, NTO 270B	LLC Deschutes, NTO 270B	LCT 16A & NTO 130K	LLC Deschutes, NTO 120J	LLC Deschutes, NTO 270B	LLC Deschutes, NTO 270A	LCT-720 & NTO 270A	LCT-720 & NTO 270A	LCT 16A & NTO 120J	LCT 16A & NTO 120J
Web Conference	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync	Lync
Number of Stakeholders (non - PAC Transmission)	0	1	0	3	2	1	1	3	1	1	1	2	0	2	1	
Number of Attendees from PacifiCorp	12	11	10	9	9	8	7	10	8	13	12	12	7	9	6	

APPENDIX 2 – PACE PROJECT LIST

ENERGY GATEWAY

Project Description

- A. Participants: PacifiCorp
- B. Status: Majority of permitting attained; in progress. Earliest projected in-service dates unlikely to occur before 2019.
- C. Impact on Other Systems: See Appendix 4 of this report.

BEN LOMOND – SYRACUSE – PARRISH 138 KV THREE TERMINAL LINE

Project Description

- A. Participants: PacifiCorp
- B. Status: Complete. In-service 11/15/17.
- C. Facilities: Energize the presently unused west circuit of the double circuit line from Ben Lomond to Parrish constructed at 230 kV as a three-terminal 138 kV line from Ben Lomond to Syracuse and Parrish. A new 138 kV circuit breaker at Ben Lomond and at least two new circuit breakers at Syracuse will be required to terminate the line. The line previous was terminated at a 138 kV breaker at Parrish.
- D. Studies: The 2014-15-16 TPL studies with heavy loading scenario were studied with N-1 and N-2 contingencies in the northern Utah area. The study indicated that loss of the Terminal – Grow 138 kV line overloads the Terminal – Parrish 138 kV line. The N-2 outage of the Terminal – Cudahy – Parrish and Terminal – Parrish 138 kV lines overloaded the Grow – Parrish 138 kV line. Adding Ben Lomond – Syracuse – Parrish 138 kV line along with the second Syracuse transformer resolved the existing N-1 and N-2 thermal overload issue on the Terminal – Parrish 138 kV line.
- E. Impact on Other Systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

BULL RIVER – CARTER SUBSTATION 138 KV CONVERSION

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date 5/15/19.
- C. Facilities: In the Lehi, Utah, rebuild 2.3 miles of the Lehi Bull River tap to Saratoga tap 46 kV line to 138 kV using raptor safe construction and 1272 ACSR conductor.

- F. Studies: Increased load service for the Lehi-UAMPS network customer (Lehi City Bull River and Carter substations) as reported for the 2016 Load and Resource (L&R) submittal, is projected to result in voltage below 0.90 pu at Carter Substation in 2019 during steady-state operation. This assumes Vineyard is converted to 138 kV and Pelican Point has been offloaded to Saratoga.
- G. Impact on Other Systems: The Timp-Bull River Tap 46 kV line runs through an area of Lehi that has experienced and continues to experience rapid growth. Lehi City has agreed to convert their Bull River Substation to 138 kV making it and the Carter Substation radial without an alternate backup source on a temporary basis.

CAMP WILLIAMS - OQUIRRH 345 kV REBUILD WITH HIGH TEMPERATURE CONDUCTOR

Project Description

- A. Participants: PacifiCorp
- B. Status: Preliminary planning. Planned in-service date 5/15/22.
- C. Facilities: This project is the second of three intricately linked projects intended to increase transfer capability across the constrained Wasatch Front South (WFS) transfer path in central Utah. The combined Oquirrh-Terminal projects increase the transfer capability of the WFS path by 555 MW (from 4945 MW to 5500 MW).

This project will reconductor 8.36 miles of the Camp Williams – Oquirrh 345 kV double circuit #1 and #2 lines with high temperature conductor. It is assumed that eight existing 3000A circuit breakers (four at Oquirrh and four at Camp Williams) will need to be upgraded to 4000A circuit breakers to accommodate the higher current. This project is part of three dependent projects:

- Project #1 (Gateway): Build new double circuit between Oquirrh - Terminal 345 kV #3 and #4 lines. In-service date is May 15, 2021.
 - Project #2: Rebuild the double circuit between Camp Williams – Oquirrh 345 kV #1 and #2 lines with high temperature conductor. In-service date is May 15, 2022.
 - Project #3: Loop 90th South – Terminal 345 kV into Midvalley 345 kV. In-service date May 15, 2023.
- D. Studies: In conjunction with the companion projects, this project will increase the transfer capability across the Wasatch Front South boundary to 5122 MW. This project is necessary to accommodate the next Oquirrh-Terminal #3 project -- looping the Ninety South – Terminal 345 kV line into Midvalley 345 kV. Together, these projects will significantly improve operating flexibility, particularly with Gateway South in-service, and will allow additional transfers from

Clover/Mona as well as from southern Utah to PacifiCorp's primary load center, the Wasatch Front. This improvement will also enhance reliability to one of the fastest growing areas of the country, Utah County.

- E. Impact on Other Systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

GOSHEN LOAD TRIPPING RAS

Project Description

- A. Participants: PacifiCorp and Idaho Power Company
- B. Status: Complete. In-service November 2017
- C. Facilities: Install a new remedial action scheme (RAS) to automatically shed load in the Goshen/Rigby area for the loss of both 345 kV sources at Goshen. The RAS will monitor the thermal loading on the underlying 138 kV and 161 kV transmission lines that are connected to the Goshen Substation and will issue a transfer trip signal to the RAS controller if the emergency rating on any of the underlying tie lines is exceeded. Once the RAS controller has received a transfer trip signal, it will confirm the loss of the 345 kV source. Once the loss of 345 kV source is confirmed, the RAS controller will issue a transfer trip signal to breakers in the Goshen/Rigby area to shed load. Refer to Preliminary Goshen RAS Logic Diagram in Section 11.
- D. Studies: The 2014, 2015 and 2016 TPL studies indicate that under heavy load conditions in the Goshen area, the loss of the 345 kV sources at the Goshen Substation can cause the other tie lines into the Goshen area to overload above their emergency ratings and can also cause low voltage issues in the area. Also, the loss of the Goshen 345 kV source causes Idaho Power Company's 138 kV line from Don - Pingree - Blackfoot (one of the tie lines) and the Blackfoot 138/161 kV transformer to overload above their emergency ratings. Thus, the load serving capability is highly impacted if the Goshen 345 kV sources are lost. In order to prevent the tie lines into the area from overloading above their emergency rating following the loss of the Goshen 345 kV sources, load shedding up to 450 MW may be required in the Goshen 161 kV system during the heavy load conditions.
- E. Impact on Other Systems: Reduction of load and generation dropping; third parties include BPA and UAMPS members and Idaho Power Company.

GOSHEN – JEFFERSON 161 kV LINE RECONDUCTOR

Project Description

- A. Participants: PacifiCorp and Idaho Power Company
- B. Status: In progress. Planned in-service date May 15, 2018.
- C. Facilities: The Goshen-Jefferson section (29.5 miles) of the 161 kV line will be completely reconstructed using 795 ACSR (Drake) conductor (238/263 MVA: steady state/4 hour rating). The section from Jefferson to the Idaho-Montana state line (61 miles) will correct 212 clearance issues with 57 structures identified for upgrade between Jefferson and Big Grassy substations. The structure work between Jefferson substation and the Stateline is scheduled to be completed in 2016 and the Goshen to Jefferson line rebuild is scheduled to be complete in 2018. Construction schedules are contingent on obtaining the Bureau of Land Management permit and line outage schedules.
- D. Studies: During heavy load conditions in the Goshen area, various N-1 outages (NERC TPL-001-4 Category P1) in the Goshen area have indicated thermal overload on the Goshen – Jefferson 161 kV line. The analysis considers that the Idaho Falls 161 kV system is normally open between PacifiCorp’s Sugarmill and Bonneville Power Administrations (BPA) Westside substations at Idaho Falls Harrison Substation.
- E. Impact on Other Systems: The project will increase the transfer capability for both line owners: Idaho Power Company and PacifiCorp. The reconductor also helps load service for BPA and UAMPS customers during outage conditions.

GOSHEN 345/161 kV 700 MVA SPARE TRANSFORMER

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned completion date April 15, 2018
- C. Facilities: Order a new spare 345/161 kV 700 MVA transformer for the 345 kV substation yard at Goshen, located in Bingham County, Idaho. A transformer pad and transportation will also be required. The new transformer is expected to have a normal rating of 700 MVA and emergency rating of 770 MVA.
- D. Studies: The 2015 and 2016 TPL Assessment identified that the failure of one of the 345/161 kV transformers at the Goshen substation may expose a large amount of Goshen area load (approximately 250 MW) to extended outages during peak load conditions, depending on

availability of wind and hydro generation in the area. There is no system spare and no mobiles of this size in the PacifiCorp's East system.

- E. Impact on Other Systems: The project will reduce load outage duration for all Goshen area load serving entities in the event of a transformer failure: PacifiCorp, UAMPS, BPA, Idaho Power Company.

INSTALL GOSHEN 345/161 kV 700 MVA SPARE TRANSFORMER

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned completion date 10/15/2020
- C. Facilities: This project will install the spare 345/161 kV 700 MVA transformer at the Goshen Substation. This will required addition of four 345 kV breakers and 16 161 kV breakers. The Goshen 161 kV yard will also be converted into a breaker and half configuration and several existing 161 kV lines will be terminated into the new 161 kV yard.
- D. Studies: The 2016 Goshen area studies indicated that by 2021, loss of any one of the Goshen 345/161 kV transformers can overload the remaining Goshen 345/161 kV transformer above its emergency rating. The exiting Goshen 161 kV bus is not sufficient to serve the peak load in the area and can limit the rating of the new Goshen 345/161 kV transformer. Thus, a new bus and breaker and half configuration will be required to install the new Goshen 345/161 kV transformer.
- E. Impact on Other Systems: The new Goshen 345/161 kV transformer will improve load service to the Goshen area load customers (PacifiCorp, UAMPS and BPA).

CONSTRUCT A NEW 161 kV LINE, GOSHEN – SUGARMILL - RIGBY

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned completion date 10/15/2020
- C. Facilities: This project will construct a new line from Goshen to Sugarmill and Sugarmill to Rigby substations located in the southeast Idaho area. The project will rebuild the existing Goshen – Ammon – Sugarmill 69 kV line to 161 kV and will construct a new Sugarmill – Rigby 161 kV line. The new 161 kV line will be constructed using 1557 ACSR conductor. Line termination will be required at Goshen, Sugarmill and Rigby substations.

- D. Studies: The 2016 Goshen Area planning studies have indicated post outage line thermal and voltage concerns in the area. The 2017 TPL studies also have indicated reliability concerns for N-1 and N-1-1 events in the Goshen area. In order to resolve these concerns and improve load service in the area and new 161 kV line is required in the area.
- E. Impact on Other Systems: The new line will improve load service and reliability to PacifiCorp, UAMPS and BPA load customers in the area.

INSTALL SHUNT CAPACITOR BANKS AT SUGARMILL AND RIGBY 161 kV SUBSTATIONS

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned completion date 10/15/2018
- C. Facilities: This project will add 40 MVAR and 50 MVAR shunt capacitor banks at the Sugarmill and Rigby substations respectively. The shunt capacitor will require a breaker to interconnect to the 161 kV buses.
- D. Studies: The 2016 and 2017 TPL studies have indicated low voltage concerns post N-1 outages in the Rigby-Sugarmill area. Also, under radial operation of the Rigby-Sugarmill 161 kV system under heavy load conditions, can result into voltages lower than 0.95 pu during normal operating conditions. Thus, in order to improve the voltage profile in the Rigby-Sugarmill area shunt capacitor banks are required.
- E. Impact on Other Systems: The shunt capacitors will improve the voltage profile for PacifiCorp, UAMPS and BPA loads located in the area.

GOSHEN – WESTWOOD – RIGBY 161 kV LINE RECONDUCTOR

Project Description

- A. Participants: PacifiCorp
- B. Status: Proposed. Proposed completion date 5/15/2019.
- C. Facilities: Reconductor 31 miles of the Goshen –Westwood – Rigby 161 kV line to increase the line rating to 315 MVA continuous and 337 MVA emergency. A few structure replacements will be required and some structure reinforcements will be required. The new Westwood substation (now in-service)is constructed approximately 4.2 miles south of the existing Rigby Substation and the existing Goshen – Rigby 161 kV line will be looped into this new substation. It is assumed that structures required to loop the Goshen – Rigby 161 kV line into the Westwood Substation are capable of carrying the new conductor. This will need to be verified by transmission engineering. No switch or breaker replacement is identified

at the Goshen or Rigby Substation at this time. The Westwood Substation (switches and structures) is assumed to have sufficient capacity to carry the new conductor.

- D. Studies: The 2016-17 TPL Assessment and Goshen Area Analysis have indicated that the Goshen – Westwood – Rigby 161 kV line can overload post N-1 outage in the area.
- E. Impact on Other Systems: The project will reduce the risk of thermal overload on the PacifiCorp’s system and will improve the load serving capability in the Rigby-Sugarmill area (PacifiCorp, UAMPS and BPA load customers)

LOOP 90TH SOUTH – TERMINAL LINE 345 kV LINE INTO MIDVALLEY

Project Description

- A. Participants: PacifiCorp
- B. Status: Initial planning. Planned in-service date May 15, 2023
- C. Facilities: This project loops the 90th South – Terminal 345 kV line in and out of the MidValley 345 kV yard. To loop the line in and out of MidValley substation will require building a new bay #3 north of the existing bay #4 with a breaker and a half scheme (three 345 kV circuit breakers) and two line terminals. Also, adding new deadend structures will be required to move the existing line termination one bay north from bay #4 (existing) to bay #3 (new) to avoid line crossings. Following the above mentioned steps, the second 345 kV line can be looped in and out of the existing bay #4 with an addition of 250 feet of double circuit line – double bundled 1272 ACSR “Bittern,” and 660 feet of single circuit line – double bundle Bittern conductors. There is sufficient space at the MidValley substation to accommodate this project. Approximately 0.6 acres of land acquisition is required for additional clearance to the substation fence. This project is part of three dependent projects:
 - Project #1 (Gateway): Build new double circuit between Oquirrh - Terminal 345 kV #3 and #4 lines. In-service date is May 15, 2021.
 - Project #2: Rebuild the double circuit between Camp Williams – Oquirrh 345 kV #1 and #2 lines with high temperature conductor. In-service date is May 15, 2022.
 - Project #3: Loop 90th South – Terminal 345 kV into MidValley 345 kV. In-service date May 15, 2023.
- D. Studies: Based on internal studies conducted for the North of Huntington/Sigurd and Wasatch Front South transmission paths in Utah, this project would eliminate the overload of the 90th South – MidValley 345 kV #1 line during outage conditions under heavy transfer

conditions across the Wasatch Front South boundary. The Wasatch Front South (WFS) boundary is a critical transmission path within PacifiCorp's transmission footprint located in central Utah. The WFS path is primarily used to transfer power across the main grid transmission system from central Utah to northern Utah. These power transfers are critical to serving PacifiCorp's largest load concentration along the Wasatch Front. This path also provides important power transfers to northern Utah, southern Idaho and the Pacific Northwest. A December 2015 Wasatch Front South study identified the current WFS transfer capacity and limiting transmission constraints with various recommended mitigation activities to improve the path's transfer capability.

- E. Impact on Other Systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

OQUIRRH - TERMINAL 345 kV # 3 AND #4 DOUBLE CIRCUIT LINE

Project Description

- A. Participants: PacifiCorp
- B. Status: Initial planning. Planned in-service date May 15, 2021
- C. Facilities: The Oquirrh-Terminal project is to construct a new 345 kV double circuit transmission line to maintain adequate transmission capacity and deliver future resources to the Salt Lake valley. The new double circuit 345 kV transmission line is approximately 14 miles in length and will be constructed between the Oquirrh Substation, near 10200 South and 5600 West in West Jordan, north to the Terminal Substation, located south of the Salt Lake City International Airport. This section of new transmission will link together other new transmission sections – Mona to Oquirrh and Populus to Terminal – to complete the Gateway Central portion of the Energy Gateway Transmission Expansion. This project is part of three dependent projects:
- Project #1 (Gateway): Build new double circuit between Oquirrh - Terminal 345 kV #3 and #4 lines. In-service date is May 15, 2021.
 - Project #2: Rebuild the double circuit between Camp Williams – Oquirrh 345 kV #1 and #2 lines with high temperature conductor. In-service date is May 15, 2022.
 - Project #3: Loop 90th South – Terminal 345 kV into MidValley 345 kV. In-service date May 15, 2023.

- D. Studies: PacifiCorp's transmission system between the Mona area and the Wasatch Front is severely constrained. The northbound transmission capacity on the Wasatch Front South (WFS) transmission path (4945 MW rating) is fully utilized. Transmission planning studies have shown the need for investment in new transmission facilities is necessary in order to increase transmission capacity on this path, in order to meet anticipated Network Load service, reliability, contractual point-to-point commitments and enhance Energy Imbalance Market (EIM) benefits.
- E. Impact on Other Systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

PURGATORY FLAT NEW 138 kV NETWORK DELIVERY POINT

Project Description

- A. Participants: PacifiCorp, UAMPS, Deseret Power
- B. Status: Under construction. Planned in-service date April 15, 2018
- C. Facilities: The project includes construction of the Purgatory Flat Substation and installation of two 138/69 kV transformers. The yard is designed for future 138 kV and 345 kV expansions. The Middleton-Gateway line will re-terminate in the St. George Substation. The point of ownership will change at meter points in the 69 kV yard and the 138 kV yard in Purgatory Flat Substation.
- D. Studies: The April 2011 and updated 2015 Southwest Utah Joint Planning Study Report, showed a number of outage scenarios that led to the proposed in-service date of the Purgatory Flat 138/69 kV substation and conversion of the Middleton-Gateway-Purgatory Flat 69 kV line to 138 kV. Some of the more significant scenarios include a River-Mill Creek 69 kV outage, a River 138/69 kV transformer outage, the Church Farms-Ft. Pierce outage, and a Skyline-Green Valley 138 kV line outage (same as a Green Valley transformer outage).

Network transmission customers have requested that PacifiCorp install, own and operate all of the proposed Purgatory Flat facilities within a single substation and provide 69 kV and 138 kV delivery to the transmission customers. Dixie Power (Deseret Power member) will take one 69 kV delivery and one 138 kV delivery. UAMPS will take three 69 kV deliveries. The new substation will supply one 69 kV delivery to Rocky Mountain Power customers. This requires the 138/69 kV transformers, 138 kV and 69 kV facilities to be incorporated in the PacifiCorp Purgatory Flat Substation.

- E. Impact on other systems: Project driven based on UAMPS and Deseret request for new point of delivery; Rocky Mountain Power customers will also benefit from this new substation.

RED BUTTE/CENTRAL – ST. GEORGE CONNECT 4TH 138 KV CIRCUIT

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date May 15, 2018
- C. Facilities: This project will connect the already constructed but not energized, Red Butte – St. George 345 kV circuit (20.088 miles) and energize at 138 kV in Washington County, Utah. Connecting this circuit will require the following work to be performed at Red Butte, Central and St. George substations.

At Red Butte/Central Substation:

- Add a new 138 kV circuit breaker to existing bay 'B'
- Construct the necessary 138 kV line (approximately 0.18 miles) to move the existing Red Butte – West Cedar 138 kV line termination from bay 'D' to bay 'B'. The 138 kV construction will require steel poles to avoid guy wire.
- Move the existing Red Butte – St. George 138 kV line from bay 'E' to bay 'D'. This line will become the Red Butte – St. George 138 kV UAMPS line #1.
- Move the Central – St. George #1 138 kV line (UAMPS line #1) termination to the north available bay 'E' at the Red Butte substation. This line will become the Red Butte – St. George 138 kV UAMPS line #2. These two lines, Red Butte – St. George #1 and #2 138 kV lines are a double circuit line owned by UAMPS but operated and maintained by RMP.
- Move the Central – St. George 138 kV line #2 (PAC line #2) to the north from Central bay #5 to bay #4. This line is the east circuit of a double circuit 345 kV constructed line from Red Butte to St. George and serves as the Central – St. George #2 138 kV line.
- Construct the necessary 138 kV line (approximately 0.26 miles) and structures to terminate the west circuit of the double circuit 345 kV line into the Central bay #5. This line will become the Central – St. George 138 kV line #1. Refer to Figure 1 and Figure 2.
- The circuit breaker CB 341 at Red Butte should be operated at normal open position to prevent breaker failure scenario causing all the three Red Butte/Central 345/138 kV transformers to trip open.

At St. George Substation:

- Construct the necessary 138 kV line (approximately 0.19 miles) and dead end structures to terminate the west circuit of the Red Butte/Central- St. George 138 kV line into the available St. George 138 kV line position (west end of new bay constructed for Purgatory Flats project) and add one 138 kV circuit breaker (center). Terminating the Red Butte/Central- St. George 138 kV line on this new bay will avoid a reliability issue with the Red Butte – St. George #1 and Central – St. George #1 failure of the common center breaker.
- D. Studies: The 2015, 2016 and 2017 TPL Assessment identified overload issues on the 138 kV system in the area. This option not only mitigates the existing TPL overload, eliminating the need to drop load of up to 170 MW for an N-2 or N-1-1 outage, but also mitigates an N-1 TPL outage condition in 2022.
- E. Impact on other systems: Avoids pre-emptive load shedding for load served out of Red Butte.

SYRACUSE – INSTALL SECOND 345/138 kV TRANSFORMER

Project Description

- A. Participants: PacifiCorp
- B. Status: Complete. In-service date May 15, 2017
- C. Facilities: This project will install a second 700 MVA, 345/138 kV transformer as well as one 345 kV circuit breaker and at least three 138 kV circuit breakers at the Syracuse substation, which is located in Davis County, Utah. The project will use the Oquirrh 345/138 kV spare transformer and a new spare transformer will be purchased as part of this project.
- D. Studies: This project was first identified as a result of the 2015 TPL Assessment. The 2019 heavy summer TPL-003-0b Category C (loss of two bulk electric elements, Category P6 & P7) analysis performed in 2014-15 for the Ogden area identified several thermal overload issues. Adding a second Syracuse 345/138 kV transformer resolves many of the area's thermal overload issues.
- E. Impact on other systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

TERMINAL - GROW - PARRISH 138 kV LINE REBUILD

Project Description

- A. Participants: PacifiCorp
- B. Status: Preliminary planning. In-service date November 15, 2021
- C. Facilities: Rebuild 15 miles of the Terminal – Grow – Parrish 138 kV line with a 1557 ACSR conductor, which requires structure and conductor replacement. The Terminal – Grow – Parrish 138 kV line is located in Salt Lake City, Utah. Rebuilding the Terminal – Grow - Parrish 138 kV line will increase the line rating to a 290 MVA continuous and 322 MVA four-hour emergency, from a continuous and emergency rating of 132 MVA. It is anticipated that this project will be constructed in three phases.
- D. Studies: The 2016 Ogden Area TPL assessment indicated an overload condition on the Terminal - Grow – Parrish 138 kV line for the double line outage (Category P7) of the Terminal – Cudahy – Parrish and Terminal – Parrish 138 kV lines.
- E. Impact on other systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

ST GEORGE SUBSTATION INSTALL 345/138kV TRANSFORMER AND EXPAND YARD

Project Description

- A. Participants: PacifiCorp
- B. Status: Preliminary planning. Planned in-service date May 15, 2023.
- C. Facilities: This project includes three related segments necessary to provide anticipated growing energy demands in Southwest Utah and to maintain the company’s compliance with North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) reliability standards. The three segments are as follows:
 - Red Butte substation: Move the Harry Allen 345 kV line termination and reactor to the third bay at Red Butte and add a 345 kV breaker and dead-end structure.
 - Expand the St. George substation to include a new 345 kV yard: Install a new 700 MVA 345/138 transformer, control building, line termination and one 345 kV breaker.
 - Energize the existing Red Butte – St. George line at 345 kV: Connect line terminations to Red Butte 345 kV and St. George 345 kV switchyards and energize.
- D. Studies: The need for this project was identified by the Southwest Utah Joint Planning Study Group, which includes Rocky Mountain Power, PacifiCorp, UAMPS (and its members) and Deseret Power Electric Cooperative (and its member Dixie Escalante). The group

performs long-term studies for the area and recommends projects to best serve the needs identified.

- E. Impact on Other Systems: Project will increase load serving capability for all Red Butte area loads.

RAILROAD TO SILVER CREEK 138 kV LINE – BUILD LINE INTO PARK CITY AREA

Project Description

- A. Participants: PacifiCorp
- B. Status: Complete. In-service October 30, 2017.
- C. Facilities: Construct approximately 70 miles of 46 kilovolt transmission line at 138 kilovolts, from Railroad in Wyoming to Silver Creek near Park City, Utah. The project included building a new 138/46/12.5 kilovolt substation in Croydon, Utah, removing the Henefer substation, converting the Coalville substation to 138 kilovolts, and converting the remaining single phase 46 kilovolt substations along the route to 12.47 kilovolt (distribution).
- D. Studies: Studies indicate that when the total Park City area load exceeds 160 MVA, multiple outage scenarios will result upon the loss of either 138 kilovolt line or the Midway 138/46 kilovolt transformer. These scenarios result in low voltages at best and cascading outages at worst. A third 138 kV line into the area was recommended to mitigate issues observed during studies.
- E. Impact on Other Systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

WESTWOOD SUBSTATION

Project Description

- A. Participants: PacifiCorp
- B. Status: Complete. In-service 5/15/17.
- C. Facilities: Construct and build a greenfield substation in the Ucon/Ririe, Idaho area (North County Line Road at 75th Street) which will include, 1- 30 MVA 161-12.5 kV transformer with three 12.5 getaways, a two stage 12.5 kV 7.2 MVar capacitor and all the appropriate high side switching and protection. This substation will be situated as close as possible to the Goshen Rigby 161 kV line.
- D. Studies: Several system limitations have been identified in the Goshen – Rigby area of Idaho. The 6.6 mile Ririe – Ririe Tap 69 kV line will be loaded above its thermal rating (20 MVA) by the summer of 2017 due to a new block load that was recently contracted. The 3.1 mile Sand Creek – Sand Creek tap line will be loaded above its thermal rating (29 MVA) by the summer

of 2018 due to a load transfer from the Rigby substation to the Sugarmill substation to reduce the loading at Rigby.

- E. Impact on Other Systems: The project will be beneficial to Goshen area load serving entities: PacifiCorp, UAMPS, and BPA.

BRIDGERLAND SUBSTATION EXPANSION

Project Description

- A. Participants: PacifiCorp
- B. Status: Construction. Planned In-service 5/15/24
- C. Facilities: The proposed project is to expand the Bridgerland substation located in northern Utah to accommodate lines from Wheelon substation. As part of the project a new approximately 1.2 mile-long 138 kV line from Bridgerland to tap (Bridgerland Tap) the existing Wheelon – Smithfield Tap A – Green Canyon 138 kV line (D084) with a 1272 ACSR or a bigger conductor will be constructed. The existing Honeyville - Wheelon 138 kV line (D056) will be looped in and out of the Bridgerland substation and switch 175A at Wheelon will be opened to form Honeyville – Bridgerland and Bridgerland - Wheelon - Treasureton 138 kV line. The rebuild of existing Wheelon – Smithfield Tap 138 kV line will also to 1272 ACSR conductor is also included in the scope of the project and will be looped in the Bridgerland substation.
- D. Studies: The N-1 outages in the Cache Valley area located in northern Utah can result in thermal overloads on the Wheelon – Smithfield 138 kV line. Also, bus fault at Wheelon can result in thermal overloads in the Cache Valley transmission system. Also, the Bridgerland substation is planned to improve transmission system in the Cache Valley substation by moving lines from Wheelon to Bridgerland.
- E. Impact on Other Systems: Bridgerland Expansion project primarily improves transmission system service to PacifiCorp and UAMPS customers in the Cache Valley area.

SPANISH FORK 345/138 kV TRANSFORMER UPGRADE

- A. Participants: PacifiCorp
- B. Status: Design. Planned In-service 5/15/2020
- C. Facilities: This project will upgrade the existing Spanish Fork 448 MVA 345/138 kV transformer #3 to a 700 MVA transformer, which is located in Utah County, Utah.
- D. Studies: TPL-001-4 study analysis on 2017 and 2020 heavy summer cases identified an overload on the Spanish Fork 345/138 kV transformer #3 caused by NERC Standard TPL-

001-4 Category P3 and P6 (N-1-1) contingencies. Upgrading the existing Spanish Fork 345/138 kV transformer to a 700 MVA unit eliminates the load or generation curtailment or a need to reconfigure system and helps to serve Utah Valley customers more efficiently and reliably. The transformer overloading identified under heavy transfer flow of 4200 MW across North of Huntington/Sigurd for N-2 outage of Spanish Fork – Camp Williams 345 kV and Spanish Fork – Steel Mill 345 kV lines can also be resolved.

- E. Impact on Other Systems: The new Spanish Fork 345/138 kV transformer will improve transmission service to Utah Valley area customers (PacifiCorp, UAMPS and UMPA).

CONSTRUCT NEW NAPLES 138-12.5 kV SUBSTATION IN EAST UTAH

- A. Participants: PacifiCorp
- B. Status: Construction. In-service 11/15/2019
- C. Facilities: Construct a new approximately two mile of radial 138 kV from Vernal substation to the new Naples substation site and install a new 138/12.5 kV transformer at Naples substation. Approximately 20 MW of existing PacifiCorp load will be moved from Ashley and Vernal areas to the new Naples. The project will also add two 3.6 MVAR shunt capacitors at Vernal and Maeser 12.5 kV substations.
- D. Studies: Based on the 2016 North America Electric Reliability Corporation (NERC) Standard TPL 001-4 P1, P2 and P6 contingency (single and multiple contingencies) analyses, voltage deviation and low voltage issues are identified in the Ashley, Utah area beginning in summer 2017. By offloading the Ashley substation by 20 MW will resolve these low voltage and voltage deviation issues.
- F. Impact on Other Systems: The new Naples substation is expected to provide improved transmission service to the PacifiCorp customer at the Ashley substation.

APPENDIX 3 – PACW PROJECT LIST

DRY GULCH 115-69 kV CAPACITY INCREASE

Project Description

- A. Participants: PacifiCorp
- B. Status: Preliminary engineering. Proposed in-service date February 15, 2019.
- C. Facilities: Replace existing 115-69 kV, 20 MVA fixed ratio transformer with new 115-69 kV, 50 MVA transformer with on-load tap changer.
- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified TPL-001-4 performance deficiencies for Dry Gluch 115 kV bus fault.
- E. Impacts on other systems: WECC Path 6, BPA and Avista

LONE PINE TO WHETSTONE 230 kV LINE

Project Description

- A. Participants: PacifiCorp
- B. Status: Preliminary planning. Proposed in-service date May 15, 2020.
- C. Facilities: New 230 kV line between Whetstone and Lone Pine substations, approximately 11 miles. New 230 kV bus positions at Whetstone and Lone Pine substations.
- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified TPL-001-4 performance deficiencies following the overlapping single contingency (P6) loss of both existing Meridian-Lone Pine 230 kV lines.
- E. Impacts on other systems: Project is internal to the PacifiCorp load area. No impacts to adjacent systems are anticipated.

MALIN 230 kV BREAKER ADDITION

Project Description

- F. Participants: PacifiCorp
- G. Status: Preliminary planning. Proposed in-service date May 15, 2020.
- H. Facilities: New 230 kV circuit breaker at Malin Substation and modification of existing line terminations.

- I. Studies: North American Electric Reliability Corporation (NERC) screening studies identified TPL-001-4 performance deficiencies for P2-3 or P4 internal fault or stuck breaker at Malin 230 kV bus.
- J. Impacts on other systems: WECC Path 76, BPA and Nevada Energy

MOXEE TO HOPLAND 115 kV RECONDUCTOR

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date December 15, 2017.
- C. Facilities: Reconductor 0.67 mile Moxee-Hopland 115 kV line to minimum 170 MVA. Upgrade 115 kV switches at Hopland to minimum 170 MVA.
- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified a TPL-001-4 performance deficiency following the single contingency (P1) loss of the Wanapum-Pomona Heights 230 kV line, beginning in summer 2018.
- E. Impacts on other systems: Reinforces connection between the PacifiCorp Yakima load area and BPA's Midway source.

SAMS VALLEY 500-230 kV SUBSTATION

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date November 15, 2020.
- C. Facilities: Construct new 500-230 kV Sams Valley Substation, including 500-230 kV, 650 MVA transformer. Reconductor Sams Valley-Whetstone 230 kV line, 5.6 miles. Construct new Sams Valley-Grants Pass 230 kV line, approximately 18 miles. Replace three 230-115 kV, 125 MVA transformers at Grants Pass Substation with two new 230-115 kV, 250 MVA transformers. Add new 230 kV line position at Grants Pass Substation for new Sams Valley-Grants Pass 230 kV line.
- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified various TPL-001-4 performance deficiencies in the southern Oregon area. This project resolves 230 kV line outages due to single contingency (P1) and overlapping single contingency (P6) loss of 230 kV lines between Dixonville and Meridian substations, 500 kV line serving Meridian Substation and 500-230 kV transformers at Meridian Substation.

Additionally, this project resolves overlapping single contingency (P6) loss of two out of three 230-115 kV transformers at Grants Pass Substation, overloading the remaining transformer.

- E. Impacts on other systems: Improves voltage support and loading capability on the 230 kV system in the region reducing potential impacts to the California-Oregon Intertie WECC Path 66 and Reno-Alturas Tie WECC Path 76.

SNOW GOOSE 500-230 kV SUBSTATION

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date December 29, 2017.
- C. Facilities: Construct new 500-230 kV Snow Goose Substation, including 500-230 kV, 650 MVA transformer. The new substation will connect to the existing Captain Jack-Klamath CoGen 500 kV and Klamath Falls-Malin 230 kV lines.
- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified a TPL-001-4 performance deficiency due to single contingency (P1) loss of the Malin 500-230 kV transformer.
- E. Impacts on other systems: Improves voltage support and loading capability on the 230 kV system in the region which benefits BPA and NV Energy WECC Path 76 from Alturas to Reno.

VANTAGE TO POMONA HEIGHTS CONSTRUCT 230 kV LINE

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date May 15, 2019.
- C. Facilities: Construct new 230 kV line between BPA Vantage and PacifiCorp Pomona Heights Substations. Expansion of Pomona Heights 230 kV bus for new line position was completed in 2015.

- D. Studies: North American Electric Reliability Corporation (NERC) screening studies identified a TPL-001-4 performance deficiencies following various overlapping single contingencies (P6) in the Yakima area involving 230 kV lines, 230-115 kV transformers and 115 kV lines. Completion of the Vantage-Pomona Heights 230 kV line, in combination with the Union Gap 230-115 kV Capacity project and system reconfiguration will resolve the identified performance deficiencies.

- E. Impact on other systems: This project will increase reliability in the Mid-Columbia and Yakima region, reducing impacts of certain contingencies on the Bonneville Power Administration and Grant County Public Utility District facilities.

WALLULA TO McNARY 230 KV LINE #2

Project Description

- A. Participants: PacifiCorp
- B. Status: In progress. Planned in-service date November 15, 2018.
- C. Facilities: Construct new Wallula-McNary 230 kV line #2, add 230 kV line terminations at BPA McNary and PAC Wallula substations.
- D. The project is required as a result of a transmission service request due to insufficient total transfer capability on the requested path.

Impacts on other systems: This project has impacts to other regional facilities most notably BPA, as the Project has a terminal at BPA's McNary substation. TTC studies will be shared with the project review group.

APPENDIX 4 - ENERGY GATEWAY

Energy Gateway

Bringing new transmission to the West

Customer benefits

This investment is a fundamental part of PacifiCorp's plans to ensure long-term supply of reliable and affordable energy for existing and future customers.

- Long-term rate stability through increased protection from market price volatility into the future.
- More flexibility and stronger connections across the region to move energy resources from where they are located to where they are needed by customers.
- Provides necessary and required transmission infrastructure, ensuring safe, reliable, efficient and adequate levels of service customers need and expect.
- Access to diverse energy resource areas to support customer needs.
- More efficient use of existing generating resources while encouraging development of needed new generation, including renewable energy resources, to serve customers.
- Supports economic development of communities and cities.



Facts about this transmission expansion

The need for a robust transmission system has been identified by federal and state policymakers and industry experts as critical to meeting the growing needs of consumers as well as evolving energy policies. Yet, for a number of reasons, there has been very little regional investment in new transmission infrastructure for more than three decades. PacifiCorp is taking the lead and is moving forward with its multi-billion dollar transmission expansion plan to construct approximately 2,000 miles of new high-voltage transmission line. The new transmission lines will help the company meet the growing electrical needs of customers while improving the flow of electricity throughout the region.

PacifiCorp's transmission expansion plan was first announced in May 2007. The first major segment of Energy Gateway, Populus to Terminal, was placed into service in November 2010. Construction began in May 2011 on the second major segment, Mona to Oquirrh, which began serving customers in mid-May 2013. And construction began in May 2013 on the third segment, Sigurd to Red Butte. Outreach, siting and permitting processes continue for several other segments.

Why PacifiCorp?

PacifiCorp is uniquely positioned to make these essential investments in the regional transmission system.

- Through Rocky Mountain Power and Pacific Power, PacifiCorp serves almost 1.8 million retail electric customers in Utah, Oregon, Wyoming, Washington, Idaho and northern California, and is one of the largest owners of transmission infrastructure in the West. In addition to serving its retail customers, PacifiCorp is required by federal regulation to provide transmission service to other utilities, municipalities, public agencies and independent generators that use PacifiCorp lines to serve their own customers. Network service revenues reduce overall costs for PacifiCorp's retail customers.



- The Energy Gateway transmission expansion will position PacifiCorp to serve the long-term needs of its retail customers and network customers while improving the reliability of its overall transmission system.
- PacifiCorp already owns and operates approximately 16,200 miles of transmission line from southeast Utah to central Washington, and from northeast Wyoming across to Oregon and into California.
- The transmission expansion will help PacifiCorp ensure its system is capable of meeting future customer load growth. The new lines will move power to customer load centers across the system and support the needs of customers seeking a more diverse resource mix.
- The new transmission segments are a natural expansion of the transmission investment commitments MidAmerican Energy Holdings Company made when it acquired PacifiCorp in 2006.

Energy Gateway benefits

These are just some benefits of the Energy Gateway transmission investment:

- Strengthens the connections between PacifiCorp's east and west control areas, providing more flexibility to move energy resources where they are needed and maintaining low-cost delivery and service reliability for customers in the six-state service area.
- Provides substantial long-term benefits to the company's service area through an electric system backbone supporting cost-efficient, flexible and diverse resource development in resource-rich areas.
- Improves access to resources throughout the West, helping to provide long-term rate stability and protection from future market price volatility.
- Provides essential new electric transmission infrastructure in resource-rich areas, including those areas where no new wind generation can be accommodated until transmission capacity is increased.
- Provides necessary reliability and capacity to improve the delivery of electricity throughout the region.
- New transmission is necessary for development of new energy resources of all types.
- Allows more efficient use of existing resources – a critical step in addressing carbon/climate change issues.

Design features

- Energy Gateway's design significantly improves the connection between PacifiCorp's east and west control areas. Its major segments – Gateway Central, Gateway West and Gateway South – connect at key points throughout the company's service area to optimize each line's transfer capability.
- This design opens up improved access to customer load centers, existing generation and geographic areas rich with new resource potential. It provides flexibility and encourages new resource development. It also will help resolve an ongoing regional challenge where potential development of new resources is hindered by lack of transmission access.
- A map on the facing page shows the general corridors within which routes are being selected. For the most current information, go to pacifiCorp.com/energygateway.

Energy Gateway Update – November 2013

Six years since the announcement of Energy Gateway, approximately 235 miles of new transmission line is already completed and serving the needs of customers. The most recently completed segment was 100 miles of line from Mona to Oquirrh, which was placed in service in May 2013, just as construction began on the 170-mile Sigurd to Red Butte transmission line. Populus to Terminal was the first segment to be completed. This 135-mile double circuit line began serving customers in November 2010.

Outreach, siting and permitting processes continue for several other segments. While permitting delays have played a significant role in the adjusted timing of some segments, such as Gateway West and Gateway South, the company also has deferred some in-service dates to adapt to changing customer needs, slower load growth, changes in generation resource planning and annual system reliability assessments. Some near-term needs are also being met through a limited number of smaller-scale investments that maximize efficient use of the current transmission system and have helped to delay the need to make the larger Energy Gateway investments.

While PacifiCorp's priority in building Energy Gateway is to meet the needs of customers, the company encouraged third-party participation. Regional commitments for many of the segments have not materialized at this time, however, and

(continued on back page)



This map is for general reference only and reflects current plans. It may not reflect the final routes, construction sequence or exact line configuration.

April 2015

Energy Gateway Transmission Expansion

These planned in-service dates are subject to change based on customer and regional needs.

- (A) Walla Walla to McNary:** Wallula to McNary portion projected in-service date of 2017 is sponsor driven.
- (B) Populus to Terminal:** Part of Gateway Central. Completed and in service November 2010.
- (C) Monah to Oquirrh:** Part of Gateway Central. Completed and in service May 2013. **Oquirrh to Terminal:** Part of Gateway Central. Projected in-service date of 2021.
- (D) Windstar to Populus:** Part of Gateway West. Projected in-service date of 2019-2024.
- (E) Populus to Hemingway:** Part of Gateway West. Projected in-service date of 2019-2024.
- (F) Aeolus to Monah:** Part of Gateway South. Projected in-service date of 2020-2024.
- (G) Sigurd to Red Butte:** Part of Gateway South. Completed and in-service May 2015.
- (H) Boardman to Hemingway:** Projected in-service date subject to project sponsor.



(continued from page two)

the company is moving ahead with the appropriate investments necessary to serve our customers.

The company is pursuing joint development opportunities on alternatives to help better integrate its East and West control areas. As a potential option to its original proposal to build a line from southwest Idaho toward Klamath Falls, Oregon, PacifiCorp is discussing alternative options with Idaho Power on the proposed Boardman to Hemingway line. The original Hemingway to Captain Jack line route remains under consideration as development alternatives mature. The project, or its alternatives, will be brought into service as soon as appropriate or PacifiCorp customers.

PacifiCorp will continue to review and periodically adjust the timing of these investments based on the system's ability to meet customer needs and compliance with mandatory reliability standards. One thing that hasn't changed is that additional transmission infrastructure is still necessary. And, because of the long periods of time necessary to site, permit and construct major new transmission lines, these projects need to be planned well in advance so they can be in place in time to meet customer need.

For additional information, please visit pacifiCorp.com/energygateway.

Public outreach

- PacifiCorp continues discussions with landowners, the public and local, state and federal entities in the siting and permitting of Energy Gateway segments.
- Recognizing that collaboration is crucial in any project of this scale, open communication with customers and affected communities has been, and continues to be, a priority throughout the planning and construction of this project.
- Through Rocky Mountain Power and Pacific Power as local utilities, PacifiCorp will continue to keep the public informed through a variety of avenues, including meetings, newsletters and Web updates.

PacifiCorp remains committed to making this investment to meet the long-term energy needs of customers, but it will be made carefully and responsibly, to manage the eventual financial impacts.

Energy Gateway is a significant expansion of the region's electricity infrastructure, not an easy process to navigate to completion, but the end result is critical to meeting the long-term energy needs of our customers.



Pacific Power | Rocky Mountain Power