Exh. RAV-1T
Docket UE-21____
Witness: Richard A. Vail

BEFORE THE WASHINGTON

UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PACIFICORP dba PACIFIC POWER & LIGHT COMPANY Respondent.	Docket UE-21____

PACIFICORP

DIRECT TESTIMONY OF RICHARD A. VAIL

July 2021

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ATTACHED EXHIBITS

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, business address, and present position with PacifiCorp.

A. My name is Richard A. Vail. My business address is 825 NE Multnomah Street, Suite 1600, Portland, Oregon 97232. My present position is Vice President of Transmission. I am responsible for transmission system planning, customer generator interconnection requests and transmission service requests, regional transmission initiatives, capital budgeting for transmission, transmission and distribution project delivery, and administration of the Open Access Transmission Tariff (OATT). I am testifying for PacifiCorp dba Pacific Power & Light Company (PacifiCorp or the Company).

Q. Please describe your education and professional experience.

A. I have a Bachelor of Science degree with Honors in Electrical Engineering with a focus in electric power systems from Portland State University. I have been Vice President of Transmission for PacifiCorp since December 2012. I was Director of Asset Management from 2007 to 2012. Before that position, I had management responsibility for a number of organizations in PacifiCorp's asset management group including capital planning, maintenance policy, maintenance planning, and investment planning since joining PacifiCorp in 2001.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to provide an overview of PacifiCorp's transmission system, explain the specific transmission investments that the Company is seeking a prudence review of in this proceeding, and explain the process used to exclude

transmission voltage radial lines connecting resources that are not otherwise included in Washington rates consistent with the Washington Inter-Jurisdictional Allocation Methodology (WIJAM).

III. OVERVIEW OF PACIFICORP'S TRANSMISSION SYSTEM AND INVESTMENT DRIVERS

Q. Please briefly describe PacifiCorp's transmission system.

A. PacifiCorp owns and operates approximately 16,500 miles of transmission lines ranging from 46 kilovolts (kV) to 500 kV across multiple western states. PacifiCorp has nearly two million customers with approximately 137,000 customers located in Washington. PacifiCorp operates two balancing authority areas (BAAs) – PacifiCorp East (PACE) BAA and PacifiCorp West (PACW) BAA. The PACW BAA includes interconnections with the Bonneville Power Administration (BPA), the northern portion of the California Independent System Operator (CAISO), and other utilities in California, Oregon, and Washington. The PACE BAA includes interconnections with utilities in the intermountain west and southwest, which also provides access to the southern portion of the CAISO. PacifiCorp has two generation facilities that are "pseudo-tied" into the PACW BAA, but physically located in other BAAs – the Jim Bridger generation facility and the Colstrip generation facility.

Q. Please describe PacifiCorp's responsibility for maintaining reliability on its transmission system.

A. In 1996, the Federal Energy Regulatory Commission (FERC) issued Order No. 888,[1]

[1] *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Pub. Util.; Recovery of Stranded Costs by Pub. Util. and Transmitting Utilities*, Order No. 888, 61 FR 21540 (May 10, 1996), FERC Stats. & Regs. ¶ 31,036 (1996), order on reh'g, Order No. 888-A, 62 FR 12274 (Mar. 14, 1997), FERC Stats. & Regs. ¶ 31,048 (1997), order on reh'g, Order No. 888-B, 81 FERC ¶ 61,248 (1997), order on reh'g, Order No. 888-C, 82 FERC ¶ 61,046 (1998).

which required that transmission system owners provide non-discriminatory access to their transmission systems. PacifiCorp is obligated under its OATT to plan its transmission system for the open access of all transmission customers. Through the OATT Attachment K local planning process and the FERC Order 1000 regional and inter-regional planning processes, PacifiCorp participates in open stakeholder planning processes covering its entire transmission footprint. These planning processes result in system plans that incorporate economics, reliability, and public policy inputs and requirements. PacifiCorp must also coordinate with other entities in the region for transmission planning purposes as required under FERC Order No. 1000.[2] In addition to these more general requirements, PacifiCorp also must comply with the specific requirements of the mandatory reliability standards approved by FERC.

Q. Who establishes transmission reliability standards?

A. FERC directs the North American Electric Reliability Corporation (NERC) to develop Reliability Standards to ensure the safe and reliable operation of the Bulk Electric System (BES) in the United States in a variety of operating conditions. On April 1, 2005, NERC established a set of transmission operations reliability standards. A subset of the transmission reliability standards are the transmission planning standards (TPL Standards). The purpose of the TPL Standards is to "establish Transmission system planning performance requirements within the planning horizon to develop a BES that will operate reliably over a broad spectrum of System

[2] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Pub. Util.*, Order No. 1000, 76 FR 49842 (Aug. 11, 2011), FERC Stats. & Regs. ¶ 31,323 (2011), order on reh'g, Order No. 1000-A, 139 FERC ¶ 61,132 (2012), order on reh'g, Order No. 1000-B 141 FERC ¶ 61,044 (2012).

conditions and following a wide range of probable Contingencies."[3] The TPL Standards, along with regional planning criteria (*i.e.*, regional planning criteria established by the Western Electricity Coordinating Council (WECC)) and utility-specific planning criteria, define the minimum transmission system requirements to safely and reliably serve customers.

Q. How does PacifiCorp ensure compliance with the TPL Standards?

A. The Company plans, designs, and operates its transmission system to meet or exceed NERC Standards for BES and WECC Regional standards and criteria. To ensure compliance with applicable TPL Standards, PacifiCorp conducts an annual system assessment to evaluate the performance of the Company's transmission system and to identify system deficiencies. The annual system assessment is comprised of steady-state, stability, and short circuit analyses[4] to evaluate peak and off-peak load seasons in the near-term (one-, two-, and five-year) and long-term (10-year) planning horizons. The assessment is performed using power flow base cases maintained by WECC and developed in coordination among all transmission planning entities in the Western Interconnection. These base cases include load and resource forecasts along with planned transmission system changes for each of the future year cases and are intended to identify future system deficiencies to be mitigated.

As part of the annual system assessment, corrective action plans are developed to mitigate identified deficiencies, and may prescribe construction of transmission

[3] *See* http://www.nerc.com/files/tpl-001-4.pdf.

[4] Analyses consist of taking a normal system (N-0) and applying events (N-1, N-1-1, N-2, etc.) within each category (P0, P1, P2, P3, etc.) listed within the TPL Standards in order to identify system deficiencies. Example: An N-1-1 event describes two transmission system elements being out of service at the same time, but due to independent causes. An example of an N-1-1 event would be a planned outage of one 230 kV transmission line followed by an unplanned outage of any element in the system being used to continue service with the initial element out.

system reinforcement projects or, as applicable, adoption of new operating procedures. In certain instances, operating procedures prescribing action to change the configuration of the transmission system can prevent deficiencies from occurring when there are two back-to-back (N-1-1) (or concurrent) transmission system events. However, the use of operating procedure actions has limitations. In particular, actions taken in connection with operating procedures that are designed to protect the integrity of the larger integrated transmission system in the Western Interconnection of the United States can lead to large numbers of customers being at risk of an outage upon the occurrence of the second of two back-to-back (N-1-1) events. An effective corrective action plan is critical to ensuring system reliability so that large numbers of customers are not subjected to avoidable outage risk.

Q. Is compliance with the reliability standards optional?

A. No. The reliability standards are a federal requirement, subject to oversight and enforcement by WECC, NERC, and FERC. PacifiCorp is subject to compliance audits every three years and may be required to prove compliance during other NERC or WECC reliability initiatives or investigations. Failure to comply with the reliability standards could expose the Company to penalties of up to $1 million per day, per violation. Accordingly, and as described more fully later in my testimony, compliance with reliability standards is a major driver for the new capital investments in PacifiCorp's system transmission assets identified in and supported by my testimony.

Q. Please identify other drivers that are relevant to the capital investments in PacifiCorp's distribution and transmission systems described in your testimony.

A. There are several other drivers that inform whether PacifiCorp will build new distribution and transmission facilities, including increased demand for transmission capacity, requests for transmission service, increased demand for distribution capacity, and the age and condition of existing distribution and transmission facilities. The specific drivers for the projects addressed in my testimony are described in more detail later in my testimony.

IV. OVERVIEW OF INVESTMENTS DESCRIBED IN TESTIMONY

Q. What specific transmission system investments are you addressing in your testimony?

A. My testimony provides updates on the following projects:

The Aeolus to Bridger/Anticline 500 kV Transmission Project includes the construction of facilities to integrate approximately 1,150 megawatts (MW) of new wind generation resources located in southeast Wyoming (*i.e.*, TB Flats, Cedar Springs, and Ekola Flats, collectively referred to as New Wind Projects or individually referred to as a New Wind Project)[5] and deliver energy from those resources across PacifiCorp's system. Those facilities include:

- A 140-mile, 500 kV transmission line (Aeolus-to-Anticline line), which includes construction of the new Aeolus (500/230 kV) and Anticline (500/345 kV) substations; a map of the proposed line can be found attached in Exhibit No. RAV-2;
- A five-mile, 345 kV transmission line that will extend from the proposed Anticline substation to the Jim Bridger substation, along with associated interconnection facilities at the Jim Bridger substation to accommodate the

[5] The Energy Vision 2020 Wind Projects are more thoroughly discussed in the testimony of Mr. Timothy J. Hemstreet.

interconnection of the 345 kV line from the proposed Anticline substation; and

- A voltage control device at the existing Latham substation.

Additional network upgrades are also required to accommodate the Aeolus to Bridger/Anticline 500 kV Line Project and the interconnection of the New Wind Projects (230 kV Network Upgrades). These network upgrades include:

- A new 16-mile 230 kV transmission line parallel to an existing 230 kV line from the Shirley Basin substation to the proposed Aeolus substation, including modifications to the Shirley Basin substation to accommodate the new line;
- The reconstruction of four miles of an existing 230 kV transmission line between the proposed Aeolus substation and the Freezeout substation, including modifications of the Freezeout substation to accommodate the new line; and
- The reconstruction of 14 miles of an existing 230 kV transmission line between the Freezeout substation and the Standpipe substation, including modifications to the Freezeout and Standpipe substations to accommodate the transmission lines.

The reconstructed sections are proposed to be in a parallel alignment to the existing 230 kV transmission lines. The Aeolus to Bridger/Anticline 500 kV Transmission Project and 230 kV Network Upgrades are needed to support interconnection of the New Wind Projects, which are described in the testimony of Mr. Timothy J. Hemstreet.

Q. What are the actual costs through May 2021 for these transmission investments and their associated in-service dates?

A. Table 1 identifies the specific projects, associated costs, and in-service dates.

Table 1		
Project	**Total Company Cost ($m)**	**In-Service Date**
Aeolus to Bridger/Anticline 500 kV line[6]		
Sequence Three (In Service)	$12.7	January 2020
Sequence Four (includes 2021 closeout costs)	$626.7	November 2020
230 kV Network Upgrades		
Q707 TB Flats 1 (includes 2021 closeout costs)	$35.8	September 2020
Q712 Cedar Springs Wind 1ts) (includes 2021 closeout costs)	$58.5	November 2020

These amounts include costs associated with engineering, project management, materials and equipment, construction, right-of-way (including rights acquired by condemnation), and an allowance for funds used during construction.

Q. Please briefly describe the benefits associated with these investments.

A. The benefits associated with these investments include increased load serving capability, enhanced reliability, conformance with NERC Reliability Standards, improved transfer capability within the existing system, relief of existing congestion, and interconnection and integration of new wind resources into PacifiCorp's transmission system. These benefits will be described more fully below.

Q. Are PacifiCorp's OATT transmission customers paying for some of these assets?

A. Yes; transmission customers pay through OATT transmission charges. The Company's current transmission formula rate (included in PacifiCorp's OATT) was approved by FERC in Docket No. ER11-3643.[7] The Company's transmission formula rate is updated annually with the annual transmission revenue requirement (ATRR) that represents the annual total cost of providing firm transmission service

[6] As discussed later in my testimony, Sequence One was placed into service in 2011.
[7] *In re PacifiCorp*, 143 FERC ¶ 61,162 (May 23, 2013) (letter order approving settlement agreement establishing formula rate).

over the test year. The ATRR calculation incorporates all transmission system investments by the Company, a return on rate base, income taxes, expenses, and certain revenue credits, among other specific elements and adjustments. Transmission assets, including new transmission capital, are included in the ATRR, weighted by months in service. The ATRR is converted into a rate by dividing the ATRR by firm transmission demand. All third-party revenues for transmission service (along with third-party revenues for ancillary services) are included as revenue credits in the calculation of rates in each of the Company's state retail jurisdictions.

Q. Please explain how network upgrade cost allocation works under the OATT.

A. In accordance with its OATT, when PacifiCorp receives a request for generation interconnection or transmission service, the Company completes studies to determine what new facilities or upgrades to existing facilities are required to accommodate the request. The studies identify the facilities and upgrades required and classify the asset additions required to support the service into two categories: direct assigned or network upgrade. Direct assigned assets are those assets that only benefit or are used solely by the customer requesting generator interconnection or transmission service. Those costs are directly assigned and paid for by that customer and will not be included in either the Company's ATRR or retail rate base. Network upgrades, on the other hand, are those assets that benefit all customers using the transmission system. Costs associated

with network upgrades are investments by the transmission provider and are included in PacifiCorp's ATRR[8] and retail rate base.

V. AEOLUS TO BRIDGER/ANTICLINE 500 KV TRANSMISSION PROJECT

Q. Please describe the investment for the Aeolus to Bridger/Anticline 500 kV Transmission Project.

A. The Aeolus to Bridger/Anticline 500 kV Transmission Project was placed in service in four sequences. The first sequence was the purchase of property used for the new Aeolus and Anticline substations, which were placed in service in March 2011. The second sequence was to construct a replacement access bridge over the Medicine Bow River and complete associated upgrades to an existing unpaved county road for $4.1 million in July 2018. The third sequence of work, completed in January 2020, was the expansion of the Latham Substation with a new line termination bay to accommodate the installation of a static synchronous compensator voltage control device. Finally, the last sequence of plant in-service, completed in November 2020, included the two 500 kV substations (*i.e.*, Aeolus and Anticline), the static synchronous compensator voltage control device and the 500 kV transmission line.

Q. Please describe the 230 kV Network Upgrades.

A. The generation interconnection projects selected as part of a request for proposal to interconnect 1,150 MW of new wind generation to the transmission system in eastern Wyoming were fully described in the Company's last general rate case, docket

[8] For generation interconnection customers, those customers may be required to pay the initial cost of network upgrades, subject to refund through credits to invoiced charges for transmission service and full refund of any remaining amounts after 20 years. *See* Section 11.4 of PacifiCorp's Standard Large Generator Interconnection Agreement (OATT Attachment N, Appendix 6 and available at http://www.oasis.oati.com/woa/docs/PPW/PPWdocs/20190601_OATTMASTER.pdf); *see also* Standardization of Generator Interconnection Agreements and Procedures, Order No. 2003-B, 109 FERC ¶ 61,287 (December 20, 2004).

UE-191024 (2021 Rate Case)[9] and are summarized below. Separate generation interconnection agreements were negotiated and signed for each of the projects.

Q707 TB Flats 1 was placed in service in November 2020 for $36.8 million of network upgrades. This project included a new 16-mile 230 kV transmission line parallel to an existing 230 kV line from Shirley Basin substation to the proposed Aeolus substation and included modifications to the existing Shirley Basin substation.

Q712 Cedar Springs Wind was placed into service in December 2020 and requires $59.1 million of network upgrades. This project included the reconstruction of four miles of an existing 230 kV transmission line between the proposed Aeolus substation and the Freezeout substation, including modifications required at the Freezeout substation; the reconstruction of 14 miles of an existing 230 kV transmission line between the Freezeout substation and the Standpipe substation including modifications as required at the Freezeout and Standpipe substations; and the reconstruction of 16 miles of an existing 230 kV transmission line from the proposed Aeolus substation to the existing Shirley Basin substation.

Q. Please explain why this investment in the Aeolus to Bridger/Anticline 500kV Transmission Project was needed.

A. As described in more detail in the testimony of Mr. Rick T. Link, the Aeolus to Bridger/Anticline 500 kV Transmission Project supports the Company's short- and long-term energy demands for serving customers across the entire PacifiCorp system, and will strengthen the overall reliability of the existing Wyoming transmission system and therefore PacifiCorp's entire transmission system.

[9] *WUTC v. Pac. Power & Light Co*., Docket Nos. UE-191024, UE-190750, UE-190929, UE-190981, UE-180778 (cons.), Order 09 / 07/ 12 (Dec. 14. 2020).

The Aeolus to Bridger/Anticline 500 kV Transmission Project has long been recognized as an integral component of PacifiCorp's long-term transmission planning, but the construction of the project has not been economic until now. The renewal of the federal wind production tax credits (PTCs) created a unique opportunity for the Company to acquire significant cost-effective, zero-emission wind resources, generating PTCs that provide cost savings necessary to economically construct the project. To achieve the full customer benefits of the PTCs, however, the Company had to develop the New Wind Projects and the Aeolus to Bridger/Anticline 500 kV Transmission Project together.

Q. How is the Aeolus to Bridger/Anticline 500 kV Transmission Project benefiting customers and improving system performance?

A. The Aeolus to Bridger/Anticline 500 kV Transmission Project: (1) relieves congestion and increases transmission capacity across Wyoming, allowing interconnection and integration of new generation resources and more efficient dispatch of and greater flexibility managing existing resources; (2) provides critical voltage support to the transmission system; (3) improves system reliability; and (4) reduces energy and capacity losses. Remarkably, customers are able to receive all of these benefits, while taking advantage of the PTCs from the New Wind Projects to offset the costs of the project.

Q. How does the Aeolus to Bridger/Anticline 500 kV Transmission Project increase transmission capacity in southeastern Wyoming?

A. Before the project, the Company's transmission system in southeastern Wyoming was operating at capacity, which limited transfer of existing resources from eastern

Wyoming and precluded the ability to interconnect and integrate additional resources east of Bridger/Anticline. This investment increased the transfer capability from east to west across Wyoming by 951 MW. Now that the Aeolus to Bridger/Anticline 500 kV Transmission Project is complete, the Company is able to accommodate up to approximately 1,510 MW of additional new wind resources east of the Bridger/Anticline substation.

The increased transmission capacity also provides improved access to existing generation resources, and options to access other resources, including renewable resources. The resulting increase in capacity allows flexibility to use future generation and interconnected transmission facilities.

Q. How is the Aeolus to Bridger/Anticline 500 kV Transmission Project impacting the dispatch of the Company's existing generation resources?

A. The Aeolus to Bridger/Anticline 500 kV Transmission Project increased the ability to dispatch the Company's existing resources. With the project located between eastern Wyoming and Jim Bridger/Anticline, eastern Wyoming transmission congestion is mitigated and wind resources entering the Jim Bridger energy hub can flow onto the Bridger West transmission path to PacifiCorp load centers. With increased wind generation entering the Jim Bridger energy hub, Jim Bridger generating plant can be dispatched to maximize wind transfers out of the energy hub.

Q. Will the increased capacity benefit customers in any other ways?

A Yes. To provide low-cost energy, the Company must have the ability to acquire power from numerous generation sources and negotiate the most competitive pricing. By adding transmission capacity, the Company has increased its ability and options to

obtain additional generation sources at competitive pricing. The Aeolus to Bridger/Anticline 500 kV Transmission Project provides a stronger transmission system in southern Wyoming and therefore throughout PacifiCorp's entire service territory.

Q. Is the increased capacity provided by the Aeolus to Bridger/Anticline 500 kV Transmission Project consistent with the Company's obligation to provide transmission service under its OATT?

A. Yes. The Company's OATT, approved by FERC, details the Company's requirements and obligations to provide transmission service. Section 28.2 of the OATT defines the Company's responsibilities, which include the requirement to "plan, construct, operate, and maintain the system in accordance with good utility practice." Section 28.3 states the requirement for the Company to provide "firm service over the system so that designated resources can be delivered to designated loads." The Company is required to provide adequate and non-discriminatory service to all network customers. Although the Aeolus to Bridger/Anticline 500 kV Transmission Project is not specifically mandated by the Company's obligations under its OATT, the project will allow the Company to more efficiently meet current and forecasted customer energy demand by relieving the existing transmission congestion in southeastern Wyoming.

Q. What are the benefits resulting from the critical voltage support that are provided by the Aeolus to Bridger/Anticline 500 kV Transmission Project?

A. Under certain operating conditions, voltage control issues have limited the ability to add additional resources, particularly wind resources, in southeastern Wyoming.

The Aeolus to Bridger/Anticline 500 kV Transmission Project is enhancing the ability to control voltage issues and allow additional wind generation to be integrated into the Company's system.

Q. How does the Aeolus to Bridger/Anticline 500 kV Transmission Project improve system reliability?

A. The transmission grid can be affected in its entirety by what happens on an individual transmission line or path. For example, the transmission system between eastern and central Wyoming is comprised of several individual transmission lines or line segments. A single outage on any of the individual lines or line segments due to storm, fire, or other external human interference can and does cause significant reductions in transfer capability, which can negatively impact the Company's ability to serve customers. Line outages require the Company to curtail generation resources to stabilize system voltages and require less efficient re-dispatch of system resources to meet network load requirements. This in turn places a burden across the entire interconnected system as generation resources across PacifiCorp's service territory, using PacifiCorp's transmission system, are used to ensure the continued reliability of energy supply to all PacifiCorp customers.

In the event of a line outage, the redundancy provided by the Aeolus to Bridger/Anticline 500 kV Transmission Project will allow the Company to continue to meet native load service obligations and other contractual obligations to third parties. Strengthening this path and increasing system redundancy will benefit all customers by reducing the risk of outages and inefficient dispatch resulting from those outages.

In addition, the Aeolus to Bridger/Anticline 500 kV Transmission Project will improve the Company's ability to perform required maintenance without significant operational impacts to the system, and reduce impacts to customers during planned and forced system outages. Transmission line and substation maintenance windows were limited because the system is highly utilized. By relieving congestion and providing additional transmission paths, this investment allows greater flexibility to the Company in the operation of its transmission system.

Q. Can you provide an example where the Aeolus to Bridger/Anticline 500 kV Transmission Project would have mitigated the impact of an outage on the 230 kV transmission system?

A. Yes. For an outage of the Latham – Point of Rocks 230 kV line, the Aeolus to Bridger/Anticline 500 kV Transmission Project eliminates the overload on the Dave Johnston – Amasa 230 kV line. For an outage of the Mustang – Spence 230 kV line, the Aeolus to Bridger/Anticline 500 kV Transmission Project eliminates the overload on 230 kV lines west of Platte. For an outage of the Riverton – Wyopo 230 kV line, the Aeolus to Bridger/Anticline 500 kV Transmission Project eliminates overloads on 230 kV lines west of Platte. For an outage of the Dave Johnston to Amasa 230 kV line, the Aeolus to Bridger/Anticline 500 kV Transmission Project eliminates the overload on the 230 kV lines west of Platte. For an outage of the Platte to Standpipe 230 kV line, the Aeolus to Bridger/Anticline 500 kV Transmission Project will eliminate the need to trip approximately 130 MW of wind generation at Foote Creek.

Q. Will the Aeolus to Bridger/Anticline 500 kV Transmission Project also enhance the Company's ability to meet the reliability standards applicable to its transmission system?

A. Yes. Although the Company currently meets or exceeds the applicable reliability standards and criteria, the addition of the Aeolus to Bridger/Anticline 500 kV Transmission Project will allow the Company to do this more efficiently.

Q. How do NERC and WECC standards and criteria influence the need for the Aeolus to Bridger/Anticline 500 kV Transmission Project?

A. The mandatory standards, particularly NERC's TPL-001-4 standard, require the Company to have a forward-looking transmission plan of action to reliably serve current and anticipated customer demands under certain planning horizon conditions, including normal system operations (all system elements in service) and during system contingencies (where elements of the transmission system are out of service), both planned or otherwise.

As described earlier in my testimony, the Company performs annual reliability assessments to determine that its transmission system complies with minimum mandatory system performance standards, which require that during loss of any single transmission system element (N-1 single contingencies) that firm service is maintained, no system overloads exist, and there is no loss of customer demand.

The Aeolus to Bridger/Anticline 500 kV Transmission Project is sub-segment D.2 of Gateway West, which, as part of Energy Gateway, has been included in the Company's annual TPL-001-4 assessment as part of its short- and long-term plans to dependably meet NERC and WECC reliability requirements. The Aeolus to

Bridger/Anticline 500 kV Transmission Project's new transmission segments are particularly effective in increasing system reliability under the various multiple contingency categories of the TPL-001-4 standard.

The NERC Standard TPL-001-4 has category P6 (N-1-1) that results in outage of multiple transmission elements. This category outage allows adjustment of the transmission system after the first outage following which the second outage is conducted. The Aeolus – Anticline 500 kV line will significantly help under these N-1-1 conditions. For example, the N-1-1 outage of Riverton – Wyopo 230 kV line followed with an outage of Spence – Mustang 230 kV line without the 500 kV line would require curtailment of the TOT4A path by approximately 500 MW. But with the addition of the 500 kV line this curtailment would not be required. The study was performed with TOT4A flows at 1,030 MW in the original case. The addition of the 500 kV line prevents thermal overload on the 230 kV transmission system west of Platte.

Q. Has the Aeolus to Bridger/Anticline 500 kV Transmission Project been included in WECC path rating studies?

A. Yes. The Aeolus to Bridger/Anticline 500 kV Transmission Project has undergone WECC's Three Phase Ratings Process, and has been approved by WECC for Phase 3- "Construction Phase" status as part of the overall Energy Gateway project. The Aeolus West transmission path and three other Gateway West transmission paths (TOT 4A, Bridger/Anticline West and Path C) have completed the Three Phase Rating Process and were granted Phase 3 status on January 5, 2011.

Q. What is WECC's Three Phase Ratings Process?

A. The purpose of the Three Phase Rating Process is to provide a formal process for project sponsors to attain an accepted rating and demonstrate how their Project will meet NERC Reliability Standards. The Three Phase Rating Process addresses planned new facility additions and upgrades, or the re-rating of existing transmission facilities. It requires coordination through a review group comprised of the project sponsors and representatives of other systems that may be affected by the project. An accepted rating affords the project sponsor some protection against erosion of established capacity of the rated transmission facility when further expansion of the western interconnected transmission system is proposed or new limitations are discovered.

Q. Why is WECC's Three Phase Ratings Process important to the Aeolus to Bridger/Anticline 500 kV Transmission Project?

A. This WECC approval is necessary because it allows the Company to interconnect the Aeolus to Bridger/Anticline 500 kV Transmission Project to the wider transmission system in the area and to reliably operate the new line at its approved ratings. The Aeolus to Bridger/Anticline 500 kV Transmission Project, especially when complemented with other Energy Gateway projects (specifically Aeolus to Clover, included in the 2019 Integrated Resource Plan (IRP) preferred portfolio, and Anticline to Populus and Oquirrh to Terminal, included in the PacifiCorp's IRPs over the last several cycles), will greatly strengthen the Company's transmission capacity and flexibility. The Aeolus to Bridger/Anticline 500 kV Transmission Project is regarded as a necessary interconnection point to support the long-term transmission

expansion planning established in the WECC Region plans and in the most recent Northern Tier Transmission Group sub-regional plan.[10]

While the Aeolus to Bridger/Anticline 500 kV Transmission Project provides the next necessary increment of transmission capacity in the area, it also supports and complements other future transmission investments that are currently proposed by the Company as included in the 2019 IRP preferred portfolio, provides recognition for continued permitting and supports the reliability of other utilities in the region as shown in the NTTG regional plans. The construction of this line, as an integral component of the larger Energy Gateway project, positions the Company to be strongly interconnected to other regional projects currently being planned and provides options for access to additional resources.

Q. How does the Aeolus to Bridger/Anticline 500 kV Transmission Project reduce energy and capacity losses?

A. Reduced energy and capacity losses on the transmission system have the potential to provide monetary savings over time. The addition of a new transmission line operated in parallel with existing lines reduces the electrical impedance of the transmission system, resulting in lower energy line losses (megawatt-hours) over the

[10] PacifiCorp participates in FERC Order 1000 regional planning through membership in the Northern Tier Transmission Group. Under FERC Order 1000, regional planning groups were established to facilitate coordinated and transparent transmission system planning among the participating member entities to ensure regional transmission stability and efficiency. Currently, there are four sub-regions in the Western Interconnection of the United States, including Northern Tier Transmission Group, ColumbiaGrid, WestConnect, and California ISO. These four sub-regions each develop independent regional plans and then coordinate on interregional planning across the Western Interconnection. Effective January 2020, Northern Tier Transmission Group and ColumbiaGrid will merge into the new NorthernGrid regional planning group, of which PacifiCorp will be a participating member. Further information on NTTG is available at: http://nttg.biz/site/index.php?option=com_docman&task=cat_view&gid=308&Itemid=31.

life of the project. Depending on the amount of power flow, line loss savings can be substantial.

Q. What were the major milestones to achieve in-service of the Aeolus to Bridger/Anticline transmission line and 230 kV Network Upgrades?

A. Major milestones are identified below:

500 kV Transmission

- Mechanical Completion; September 22, 2020
- Substantial Completion; November 4, 2020

500 kV Substations

- Mechanical Completion Aeolus 230 kV yard; May 27, 2020
- Substantial Completion Aeolus 230 kV yard; June 15, 2020
- Mechanical Completion (all remaining work); October 30, 2020
- Substantial Completion (all remaining work); October 31, 2020

230 kV Network Upgrades

- Aeolus to Shirley Basin Substantial Completion: October 31, 2020[11]
- Aeolus to Freezeout Substantial Completion: October 23, 2020[12]
- Freezeout to Standpipe Substantial Completion: October 13, 2020
- Aeolus to Shirley Basin (rebuild) Substantial Completion: November 5, 2020

Q. Please describe the total cost of the Aeolus to Bridger/Anticline transmission line compared to the amount included in rates in the 2021 Rate Case.

A. The actual and forecasted costs of the Aeolus to Bridger/Anticline transmission line are $652.9 million, approximately $26 million lower than the $679.2 million included

[9] Changed from May 15, 2020, due to additional restrictions imposed by the Bureau of Land Management.
[10] Changed from May 30, 2020, due to additional restrictions imposed by the Bureau of Land Management.

in rates in the 2021 Rate Case. The entire cost of the Aeolus to Bridger/Anticline transmission line will be incurred by the Company without contribution from any transmission customer projects.

Q. Please describe the total cost of the 230 kV Network Upgrades compared to the amount included in rates in the 2021 Rate Case.

A. The 230 kV Network Upgrades actual costs through May 2021 are $94.3 million, approximately $16.3 million more than the $78.0 million estimate included in rates in the 2021 Rate Case.[13]

Q. What are the drivers for the cost increase?

A. The increase in cost was due to the competitive bid price received for the transmission line elements of the 230 kV Network Upgrades, which exceeded the initial forecast value. The increase in transmission line costs are attributable to market conditions that changed after the initial cost estimate was prepared in early 2017. T he estimate was prepared using historical metrics to develop a cost plan, which could not have accounted for the rapid expansion of projects in the industry that occurred just prior to the time of the bid, including Pacific Gas & Electric Company's transmission improvement program, initiated in response to extensive wildfires in California. Further increases were caused by extreme weather conditions, birds and nesting environmental concerns, and delays in getting required outages from the Western Area Power Administration.

[11] *In the Matter of the Application of Rocky Mountain Power for a Certificate of Public Convenience and Necessity and Binding Rate Making Treatment for New Wind and Transmission Facilities,* Case No. PAC-E-17-07, Order No. 34104 (Jul. 20, 2018).

Q. Did the Company issue a request for proposals for the 230 kV Network Upgrades?

A. Yes. The competitively bid price reflected excess demand on lineman resources as a result of the increased project demand described above. In addition, the increase in projects also created cost impacts on steel and other materials. Several potential bidders who had previously done work for PacifiCorp declined to bid, citing lack of resources as their reason. Nevertheless, a subsequent final competitive auction among finalist bidders resulted in an approximate 4.5 percent reduction from the original bid value.

Q. How do the actual costs for the Aeolus to Bridger/Anticline transmission line compare to what was filed in your previous testimony in the 2021 Rate Case (Exhibit No. RAV-1T)?

The actual costs through May 2021 for the Aeolus to Bridger/Anticline transmission line were $639.4 million, approximately $39.7 million lower than the $679.1 million filed last year.[14]

Q. Please describe the total cost of the 230 kV Network Upgrades compared to the amount filed in your previous testimony in the 2021 Rate Case (Exhibit RAV-1T)?

A. The 230 kV Network Upgrades actual and forecast cost are $94.3 million, approximately $2.0 million more than the $92.3 million estimate approved by the Commission.

[14] The total cost includes the cost of Sequence 2, which was included in base rates in the 2021 Rate Case and not within the scope of this limited-issue rate filing.

Q. What are the drivers for the cost increase?

A. The increase in cost was due to the competitive bid price received for the transmission line elements of the 230 kV Network Upgrades, which exceeded the initial forecast value. The increase in transmission line costs is attributable to market conditions that changed after the initial cost estimate was prepared in early 2017 and approved by the Commission in the 2021 Rate Case. The estimate was prepared using historical metrics to develop a cost plan, which could not have accounted for the rapid expansion of projects in the industry that occurred just prior to the time of the bid, including Pacific Gas & Electric Company's transmission improvement program, initiated in response to extensive wildfires in California. Further increases were caused by extreme weather conditions, birds and nesting environmental concerns, and delays in getting required outages from the Western Area Power Administration.

Q. Did the Company issue a request for proposals for the 230 kV Network Upgrades?

A. Yes. The competitively bid price reflected excess demand on lineman resources as a result of the increased project demand described above. In addition, the increase in projects also created cost impacts on steel and other materials. Several potential bidders who had previously done work for PacifiCorp declined to bid, citing lack of resources as their reason. Nevertheless, a subsequent final competitive auction among finalist bidders resulted in an approximate 4.5 percent reduction from the original bid value.

Q. Why was there an increase for the 230 kV Network Upgrades but not for the Aeolus to Bridger/Anticline transmission line?

A. The Company sought bids for the Aeolus to Bridger/Anticline transmission line earlier in the process. The construction requirements in California following the wildfires, however, changed the market conditions when the Company went to bid the 230 kV Network Upgrade projects.

VI. EXCLUSION OF CERTAIN TRANSMISSION ASSETS UNDER THE WIJAM

Q. Why is PacifiCorp proposing to remove certain transmission lines from rates?

A. Consistent with the requirements of the WIJAM as adopted in the Commission final order from the general rate case, "PacifiCorp must present to the Commission a method to exclude all transmission-voltage, radial lines that connect PacifiCorp's interconnected, network transmission system with any resources not included in Washington rates."[15]

Q. What is the methodology that PacifiCorp used to identify these transmission lines that needed to be excluded from rates?

A. PacifiCorp compared a list of all transmission assets against system one-line diagrams to identify the transmission lines that connected to resources not otherwise included in Washington rates. These one-line diagrams allowed the Company to identify the distance, type of conductor, and voltage level. Please refer to the testimony of Ms. Sherona L. Cheung who describes how the costs associated with these lines were determined and how they were removed from rates.

[15] *WUTC v. PacifiCorp d/b/a Pacific Power & Light Co.*, Docket UE-191024 *et. al.*, Final Order 09/07/12 at 43 (Dec. 14, 2020).

VII. CONCLUSION

Q. Please summarize your testimony.

A. I recommend that the Commission determine that the projects stated above are providing benefits to Washington customers and are therefore prudent and in the public interest.

Q. Does this conclude your direct testimony?

A. Yes.