Oregon
Kate Brown, Governor

Public Utility Commission
201 High St SE Suite 100
Salem, OR 97301
Mailing Address: PO Box 1088
Salem, OR 97308-1088
Consumer Services
1-800-522-2404
Local: 503-378-6600
Administrative Services
503-373-7394

April 2, 2019

Via Electronic Filing

OREGON PUBLIC UTILITY COMMISSION
ATTENTION: FILING CENTER
PO BOX: 1088
SALEM OR 97308-1088

RE: Docket No. UE 352 – In the Matter of PACIFICORP, dba PACIFIC POWER, 2019 Renewable Adjustment Clause.

Enclosed for electronic filing is Staff Opening Testimony:

Exhibit 100 Redacted Opening Testimony
pages 15-16, 65-67 and 71-72 are confidential

Exhibit 101 Witness Qualifications

Certificate of Service and Service

CD containing confidential testimony and confidential work paper is being mailed to parties who have signed Protective Order: 18-490.

/s/ Kay Barnes
Kay Barnes
PUC- Utility Program
(503) 378-5763
kay.barnes@state.or.us

AWEC	
MYRALEIGH ALBERTO **(C)** DAVISON VAN CLEVE	1750 SW HARBOR WAY STE 450 PORTLAND OR 97201 maa@dvclaw.com
BRADLEY MULLINS **(C)** MOUNTAIN WEST ANALYTICS	1750 SW HARBOR WAY STE 450 PORTLAND OR 97201 brmullins@mwanalytics.com
TYLER C PEPPLE **(C)** DAVISON VAN CLEVE, PC	1750 SW HARBOR WAY STE 450 PORTLAND OR 97201 tcp@dvclaw.com
CALPINE SOLUTIONS	
GREGORY M. ADAMS RICHARDSON ADAMS, PLLC	PO BOX 7218 BOISE ID 83702 greg@richardsonadams.com
GREG BASS CALPINE ENERGY SOLUTIONS, LLC	401 WEST A ST, STE 500 SAN DIEGO CA 92101 greg.bass@calpinesolutions.com
KEVIN HIGGINS ENERGY STRATEGIES LLC	215 STATE ST - STE 200 SALT LAKE CITY UT 84111-2322 khiggins@energystrat.com
CUB	
OREGON CITIZENS' UTILITY BOARD	610 SW BROADWAY, STE 400 PORTLAND OR 97205 dockets@oregoncub.org
MICHAEL GOETZ **(C)** **(HC)** OREGON CITIZENS' UTILITY BOARD	610 SW BROADWAY STE 400 PORTLAND OR 97205 mike@oregoncub.org
ROBERT JENKS **(C)** **(HC)** OREGON CITIZENS' UTILITY BOARD	610 SW BROADWAY, STE 400 PORTLAND OR 97205 bob@oregoncub.org
PACIFICORP	
PACIFICORP, DBA PACIFIC POWER	825 NE MULTNOMAH ST, STE 2000 PORTLAND OR 97232 oregondockets@pacificorp.com
AJAY KUMAR **(C)** **(HC)** PACIFIC POWER	825 NE MULTNOMAH STE 800 PORTLAND OR 97232 ajay.kumar@pacificorp.com
ETTA LOCKEY **(C)** **(HC)** PACIFIC POWER	825 NE MULTNOMAH ST., STE 2000 PORTLAND OR 97232 etta.lockey@pacificorp.com
SBUA	
JAMES BIRKELUND SMALL BUSINESS UTILITY ADVOCATES	548 MARKET ST STE 11200 SAN FRANCISCO CA 94104 james@utilityadvocates.org
DIANE HENKELS **(C)** CLEANTECH LAW PARTNERS PC	621 SW MORRISON ST. STE 1025 PORTLAND OR 97205 diane@utilityadvocates.org
WILLIAM STEELE **(C)** BILL STEELE AND ASSOCIATES, LLC	PO BOX 631151 HIGHLANDS RANCH CO 80164 wa.steele@hotmail.com
STAFF	
SOMMER MOSER **(C)** **(HC)** PUC STAFF - DEPARTMENT OF JUSTICE	1162 COURT ST NE SALEM OR 97301 sommer.moser@doj.state.or.us
STEVE STORM **(C)** **(HC)** PUBLIC UTILITY COMMISSION OF OREGON	PO BOX 1088 SALEM OR 97308-1088 steve.storm@state.or.us

CASE: UE 352
WITNESS: STEVE STORM

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 100

Opening Testimony

April 2, 2019

Q. Please state your name, occupation, and business address.

A. My name is Steve Storm. I am a Senior Economist employed in the Energy Rates, Finance and Audit Division of the Public Utility Commission of Oregon (Commission). My business address is 201 High Street SE, Suite 100, Salem, Oregon 97301.

Q. Please describe your educational background and work experience.

A. My witness qualification statement is found in Exhibit Staff/101.

Q. What is the purpose of your testimony?

A. My testimony discusses PacifiCorp's (PAC or the Company) filing for the recovery of costs associated with the repowering of wind turbine generators (WTG) in several of the Company's wind resources[1] through the existing Renewable Adjustment Clause.[2] I discuss the purpose of the Renewable Adjustment Clause (RAC), PacifiCorp's economic analysis of costs and benefits related to this proceeding, risks associated with the repowering effort, the Company's revenue requirement analysis, and its proposed rate spread/rate design. I include recommendations related to some of these topics.

Q. Please summarize your recommendations in this proceeding.

A. Staff's recommendations include:

---

[1] Staff uses the terms wind resource, wind generation resource, wind facility, and wind farm interchangeably in this testimony.

[2] PacifiCorp's recovery of these costs is through rates in the Company's Schedule 202.

1. Staff recommends the Commission require a signed affidavit from PacifiCorp's (or Pacific Power's or Rocky Mountain Power's) Chief Executive Officer attesting to each wind repowering project in this proceeding having been placed in service and in commercial operation on or prior to its respective rate effective date.
2. Staff recommends the dollar benefits of each repowering project in this proceeding continue to be included in PacifiCorp's annual TAM filing, with the benefits clearly and separately identified in each such filing.
3. Staff recommends the Commission limit the dollar benefits of the repowering projects in this proceeding in such a way that PTC benefits, net of any applicable Wyoming wind tax (net PTC benefits), included in a TAM filing be no less than the net PTC benefits included in the Company's economic analyses supporting these wind repowering projects.

   For purposes of ratemaking in PacifiCorp's annual Power Cost Adjustment Mechanism (PCAM) proceedings, the benefits of the wind repowering projects in this proceeding will not be subject to any deadband, sharing, or earnings test restrictions.
4. Staff recommends Commission approval of gross plant in the amount of $358.060 million and $468.772 million for the October 1, 2019 and December 1, 2019 rate effective dates, respectively.
5. Staff recommends the revenue requirement in this proceeding be adjusted downward to offset the amount of annual revenue requirement associated with PacifiCorp's return on the removed equipment that is in current rates.

6. Staff recommends the annual revenue requirement in this proceeding be reduced to offset that associated with the ongoing net salvage accrual in current rates for the equipment removed as a result of the repowering projects.
7. Staff recommends the Commission approve PacifiCorp's proposed housekeeping edits to Schedule 202, which remove the reference to SB 408 due to that legislation being superseded by SB 967 in 2011.
8. Staff recommends the Commission approve PacifiCorp's proposal to change the applicability of the RAC schedule to include direct access customers.

Q. Did you prepare an exhibit for this docket?

A. Yes. I include Exhibit Staff/101, consisting of one page.

Q. How is your testimony organized?

A. My testimony is organized as follows:

ISSUE 1, THE RAC MECHANISM AND PACIFICORP'S FILING

Q. What is a Renewable Adjustment Clause?

A. Oregon Senate Bill 838 (SB 838), enacted on June 6, 2007, established a Renewable Portfolio Standard (RPS) for electricity and required that jurisdictional[3] electric utilities meet specified percentages of their respective Oregon loads with electricity generated by eligible renewable resources by specified dates. The legislation requires the Commission to establish an automatic adjustment clause or another method that allows timely recovery of costs prudently incurred for the construction or acquisition of renewable energy resources, costs related to associated electricity transmission and costs related to associated energy storage.

The Commission adopted, in Order No. 07-572,[4] the Renewable Adjustment Clause (RAC) to meet the requirements of SB 838. PacifiCorp's RAC is included in its Schedule 202.

Q. What is an "automatic adjustment clause?"

A. The term automatic adjustment clause (AAC) is defined, in ORS 757.210 and in the context of Oregon statutory language regarding utility regulation by the Commission, as "a provision of a rate schedule that provides for rate increases or decreases or both, without prior hearing, reflecting increases or decreases or both in costs incurred, taxes paid to units of government or

[3] An electric utility that has sales to Oregon retail electricity consumers that is less than three percent of all sales to Oregon retail electricity consumers is not subject to the RPS. This "small electric utility" exception in SB 838 results in the exclusion of Idaho Power Company from the RPS requirements.

[4] Docket No. UM 1330.

revenues earned by a utility and that is subject to review by the commission at least once every two years."[5]

Q. What are some implications of an automatic adjustment clause?

A. An AAC may allow more closely matching the timing of benefits with the timing of costs. To a large extent the perspectives on an AAC may vary between ratepayers and the utility, depending on whether a rate (and underlying cost) subject to an AAC is increasing or decreasing; i.e., what is viewed as a positive from the perspective of a utility is often a negative from the perspective of ratepayers. An automatic adjustment clause allows changes in rates "without prior hearing," which may reduce some of the effects of regulatory lag if an AAC can be utilized in lieu of a general rate case to add capital investments to rates.

Automatic adjustment clauses that are to recover utility capital investments—as does PacifiCorp's RAC—have additional characteristics, as they allow not only a more timely return *of* a utility's investment, but also of a more timely return *on* a utility's investment.

An automatic adjustment clause has another result: it does not allow for the evaluation of the cost to be recovered pursuant to the AAC in the context of overall rates. In short, an AAC amounts to single issue ratemaking, which the Commission generally disfavors. Commission Staff generally prefers to evaluate utility investments proposed for inclusion in customer rates in the

---

[5] Emphasis added.

context of a general rate case and not in a single issue rate case such as a RAC filing, as multiple issues that impact rates can be evaluated within the same proceeding and at the same time. This may be particularly true for cost recovery of large investments, such as has been requested in this RAC proceeding.

As one informed observer of utility regulation has stated:

> "A defining characteristic of an adjustment clause is that it effectively shifts the risk associated with recovery of the expense in question from shareholders to customers, because if the clause operates as designed, the company is able to change its rates to recover its costs on a current basis, without any negative effect on the bottom line and without the expense and delay that accompanies a [general] rate case filing."[6]

Note that PacifiCorp's RAC does allow for cost recovery of an investment, but this recovery is subject to Commission approval.

Q. Does Staff investigate the prudence of an investment in a PacifiCorp RAC filing for purposes of recovering investments in renewable generation?

A. Yes, and this is a primary purpose of this proceeding.

Q. How does PacifiCorp describe its RAC?

A. PacifiCorp describes its RAC at Exhibit PAC/100 Lockey/3:

---

[6] Page 1 of S&P Global's RRA "Regulatory Focus" article on adjustment clauses dated September 12, 2017.

> "The RAC is the automatic adjustment clause created in accordance with Section 13 of Senate Bill 838 to allow for the timely recovery of costs associated with renewable portfolio compliance."

Q. What costs may be recovered in a RAC filing?

A. The revenue requirement in a RAC filing for cost recovery in rates is to include:[7]

- The return of and return on capital costs of the renewable energy source and associated transmission;
- Forecasted operation and maintenance (O&M) costs;
- Forecasted property taxes;
- Forecasted energy tax credits; and
- Other forecasted costs and cost offsets authorized by Section 13(3) of SB 838 and not captured in the Utility's annual power cost update.

Additionally, the stipulation stated that all costs in the RAC rate schedules are to be updated annually, with the update to include an update to gross revenues, net revenues, and total income tax expense for the calculation of "taxes authorized to be collected in rates" pursuant to OAR 860-022-0041, and an update to the forecasted inter-jurisdiction allocation factors from the then current methodology approved by the Commission based on the same 12-month period used in Pacific Power's power cost update filing.[8]

---

[7] Page 3 of Order No. 07-572 in Docket No. UM 1330.

[8] See page 3 of Order No. 07-572 in Docket No. UM 1330.

There are also filing requirements associated with the RAC, including that it will be filed on April 1, concurrent with PacifiCorp's Transition Adjustment Mechanism (TAM) filing.

Q. Please summarize PacifiCorp's requests in this proceeding.

A. PacifiCorp requests Commission approval of the following:

- Recovery of capital costs associated with repowering nine Company-owned wind resources, with rate changes to be effective on October 1 and December 1, 2019 reflecting anticipated in-service dates. The annual revenue requirement impacts of these requests are $14.0 million and $18.2 million, respectively;
- Approval for housekeeping edits to remove the reference to SB 408 in the Company's Schedule 202, as that legislation was superseded by SB 967 in 2011;
- Application of Schedule 202 to direct access customers; and
- Including in future TAM filings certain benefits and Federal production tax credits (PTC) associated with those wind repowering projects included in this proceeding (which is consistent with the 2019 TAM).

Q. What is wind turbine generator (WTG) "repowering" and why did PacifiCorp make these investments at this time?

A. WTG "repowering" in this context refers to the upgrading of Company-owned wind generation resources located in Oregon, Washington, and Wyoming to include longer blades and new technology. PacifiCorp states that repowering "broadly describes the upgrade of an existing, operating wind facility with new

WTG equipment that can increase a facility's generating capacity and the amount of electrical generation produced from the facility. Specifically, PacifiCorp's repowering plan involves replacing the nacelle, hub and rotor of the WTG."[9]

According to the Company, these upgrades will "…increase the output of the wind facilities by 26.7 percent on average, extend the operating life of the facilities, and allow the facilities to requalify for federal production tax credits (PTC) for an additional 10 years."[10] PacifiCorp also states that, "…[t]o receive the full PTC benefits for customers, the repowered facilities must be commercially operational by the end of 2020" and that the costs included in this filing are those associated with specific repowered facilities the Company expects to come online by year-end 2019.[11]

Staff concludes that the reason PacifiCorp is making these wind repowering investments at this time is due to the benefits stated by the Company in direct testimony—including the availability of PTC—and not for RPS compliance purposes.[12, 13]

---

9 Exhibit PAC/200 Hemstreet/3. See Exhibit PAC/201 Hemstreet/1 for an illustration depicting the major components of a wind turbine generator.

10 Exhibit PAC/100 Lockey/2.

11 Ibid.

12 Staff identified three locations in the Company's direct testimony in this proceeding where the word "compliance" appears. In each of these locations "compliance" is related to the prospective December 1, 2019 "compliance" filing to update its Schedule 202 RAC rates. Staff did not identify any locations in the Company's direct testimony which included either the abbreviation "RPS" or the term "renewable portfolio standard."

13 See also page 2 of PacifiCorp's response to Staff's Public Meeting Memorandum, prepared for the December 5, 2017 Public Meeting and regarding the Company's 2017 IRP, including that "Energy Vision 2020 is neither merely an "economic opportunity" nor driven by compliance obligations under renewable portfolio standards."

Q. Did PacifiCorp discuss its wind repowering projects[14] in the Company's most recently filed IRP and did the Company include these as an action item?

A. Yes. PacifiCorp filed its 2017 IRP on April 4, 2017 in Docket No. LC 67. The Company stated that "[a]nalysis performed in the 2017 IRP supports repowering 905 MW of existing wind resources by the end of 2020 and demonstrates [the wind repowering projects] will save customers hundreds of millions of dollars."[15] Its 2017 IRP also included the Company's forecast for compliance with the state-specific RPS of Oregon, California, and Washington, and the Company stated that compliance with Oregon's RPS "...is achieved through 2034 with the addition of repowered wind, new renewable resources and transmission in the 2017 IRP preferred portfolio."[16] The preferred portfolio in PacifiCorp's 2017 IRP included the wind repowering projects[17] and Action Item 1a of its 2017 IRP Action Plan pertains to those projects.[18]

Q. What was Action Item 1a in PacifiCorp's 2017 IRP?

A. Action Item 1a in PacifiCorp's 2017 IRP, as filed, was stated as follows:[19]

---

14 While PacifiCorp typically applies the term "project" to the larger wind repowering effort involving multiple wind resources (multiple wind farms) in the Company's direct testimony, Staff prefers to consider the repowering of each individual wind resource (wind farm) as an individual project. Staff hopes its use of "project" or "projects" in this testimony is clear in context.

15 Page 235 of the 2017 IRP. See also page 3.

16 Page 8 of the 2017 IRP.

17 Pages 234 – 235 of the 2017 IRP.

18 Page 16 of the 2017 IRP.

19 Page 16 of the 2017 IRP.

- PacifiCorp will implement the wind repowering project, taking advantage of safe-harbor wind-turbine-generator equipment purchase agreements executed in December 2016.
  - o Continue to refine and update the economic analysis of plant-specific wind repowering opportunities that maximize customer benefits before issuing the notice to proceed.
  - o By September 2017, complete technical and economic analysis of other potential repowering opportunities at PacifiCorp wind plants not studied in the 2017 IRP (i.e., Foote Creek I and Goodnoe Hills).
  - o Pursue regulatory review and approval as necessary.
  - o By May 2018, issue the engineering, procurement, and construction (EPC) notice to proceed to begin implementing the wind repowering for specific projects[20] consistent with updated financial analysis.
  - o By December 31, 2020, complete installation of wind repowering equipment on all identified projects.

Q. How did the Commission modify PacifiCorp's Action Item 1a as filed?

A. The Commission, in Order No. 18-138 modified PacifiCorp's Action Item 1a as follows:[21]

[20] Staff infers from PacifiCorp's usage in this context that the Company considers, as does Staff, the repowering of each individual wind resource (wind farm) to be a discrete project; i.e., "…specific projects…"

[21] See page 19 of Order No. 18-138 in Docket No. LC 67.

Action Items 1a, 1b, 2a: (Energy Vision 2020[22])

- 1a - Wind Repowering - Repower over 900 MW of existing wind resources. PacifiCorp will implement the wind repowering project, taking advantage of safe-harbor wind-turbine-generator equipment purchase agreements executed in December 2016.

While Staff could not locate the term “Energy Vision 2020” in the 2017 IRP as filed, it did appear in the Order cited above; e.g., “PacifiCorp’s preferred portfolio includes a resource procurement plan called “Energy Vision 2020”—with the addition by 2020 of 905 megawatts (MW) of repowered wind resources... ”[23]

Q. Are the wind generation resources included in Action Item 1a of the 2017 IRP, as filed, the same as those for which the Company is now seeking cost recovery under its RAC rate schedule?

A. PacifiCorp, in a July 10, 2017 presentation to the Commission, expanded the scope of the wind repowering projects from those in the 2017 IRP to include repowering the Goodnoe Hills wind resource in Washington, which was not included as a wind resource to be repowered in the preferred portfolio in the 2017 IRP as filed.[24] PacifiCorp’s presentation stated that including the

[22] PacifiCorp’s Energy Vision 2020 included three different efforts proposed by the Company: the repowering of existing wind resources, construction of new wind resources in Wyoming, and construction of a new transmission facility (Aeolus to Bridger/Anticline) that was intended to reduce congestion and facilitate the addition of new Wyoming wind resources. See slide 2 of the July 10, 2017 presentation related to the 2017 IRP, pages 61 – 62 of the 2017 IRP, and pages 4 – 5 of Order No. 18-138 in Docket No. LC 67.

[23] Page 4 of Order No. 18-138 in Docket No. LC 67.

[24] See slide 3 of the July 10, 2017 presentation in Docket No. LC 67 at a Special Public Meeting.

Goodnoe Hills resource expanded the wind repowering scope from approximately 905 MW in the preferred portfolio to approximately 999 MW in the updated analysis included in the presentation. Note that, as above, the Commission's acknowledgement of the wind repowering Action Item 1a was for "…over 900 MW…" Table 1 lists PacifiCorp's owned wind resources, the state in which each is located, whether the Company planned to repower as of the filing in the instant proceeding, and which wind resources the Company included for cost recovery in this proceeding.

Table 1: Owned Wind Resources Repowered and Cost Recovery in UE 352

2017 IRP Owned Wind Resources[25]	State	To Be Repowered[26]	Included in RAC Filing (UE 352)[27]
Foote Creek	WY		
Leaning Jupiter	OR	✓	✓
Goodnoe Hills	WA	✓	✓
Marengo I	WA	✓	✓
Marengo II	WA	✓	✓
Glenrock I	WY	✓	✓
Glenrock III	WY	✓	
Rolling Hills	WY	✓	
Seven Mile Hill I	WY	✓	✓
Seven Mile Hill II	WY	✓	✓
High Plains	WY	✓	✓
McFadden Ridge I	WY	✓	✓
Dunlap I	WY	✓	

Q. What did Staff recommend related to the wind repowering projects and Action Item 1a in PacifiCorp's 2017 IRP?

[25] Table 5.5 on page 78 of Chapter 5 in PacifiCorp's 2017 IRP. Note that PacifiCorp has an 80 percent share of Foote Creek.

[26] Exhibit PAC/100 Lockey/9 does not list Rolling Hills as a wind resource to be repowered. PacifiCorp states at Exhibit PAC/400 McDougal/4 that the Rolling Hills wind resource is not currently in Oregon rates and the Company is not seeking recovery of the costs associated with repowering this resource in the RAC. See also footnote 1 at Exhibit/PAC Hemstreet/3. Footnote 1 at Exhibit PAC/100 Lockey/2 makes clear PacifiCorp plans to repower Rolling Hills.

[27] PacifiCorp states at Exhibit PAC/100 Lockey/10 that Glenrock III and Dunlap are not expected to come online until July 2020 and November 2020, respectively. See also Exhibit PAC/200 Hemstreet/3 – 4.

A. Staff recommended the Commission not acknowledge the wind repowering action item (Action Item 1a),[28] stating that "the proposed repowering project does not meet a capacity, energy, regulatory, or reliability need."[29]

PacifiCorp's date by which the Company needs additional renewable resources for purposes of RPS compliance has moved around. Staff, in the Staff Report prepared for the December 5, 2017 Public Meeting, documented five different expressions regarding the amount and timing of PacifiCorp's capacity needs,[30]

Staff noted PacifiCorp's assertion that "it has a current RPS compliance shortfall forecasted for 2025."[31] PacifiCorp's assertion was: "[t]he Energy Vision 2020 projects have the added benefit of allowing PacifiCorp to defer its RPS compliance shortfall, which is currently forecasted to occur in 2025."[32]

This "shortfall in 2025" forecast is **[Begin Confidential]** [redacted]

---

[28] Page 1 of the Staff Report (Staff Public Meeting Memorandum) for the December 5, 2017 Public Meeting (Agenda Item 3).

[29] Ibid, page 20.

[30] Ibid, pages 15-19.

[31] Ibid, page 14.

[32] Page 27 of PacifiCorp's Response Comments filed on October 30, 2017 in Docket No. LC 67, citing its Initial Application in its 2017-2021 Renewable Portfolio Standard Implementation Plan in Docket No. UM 1790, which was filed on July 15, 2016.

[redacted] **[End Confidential]**[33]

PacifiCorp's assertion of a 2025 compliance need, in a October 30, 2017 filing, seems inconsistent with the timing of compliance need in the 2017 IRP, as it "...was prepared with information *consistent with the Company's most recently filed Integrated Resource Plan—the 2015 IRP and 2015 IRP Update,* unless stated otherwise."[34]

Q. What did PacifiCorp include in its 2017 IRP regarding a compliance shortfall with respect to Oregon's RPS?[35]

A. PacifiCorp included a modeling sensitivity (RE-1a) that accommodated Oregon's RPS by adding additional renewables to physically comply with Oregon's RPS on a just-in-time (JIT) basis.[36] Figure 1 below is the Company's figure in the 2017 IRP depicting the results of this sensitivity.

---

33 Page 2 of Confidential Appendix A to PacifiCorp's Initial Application in its 2017-2021 Renewable Portfolio Standard Implementation Plan, filed on July 15, 2016 in Docket No. UM 1790.

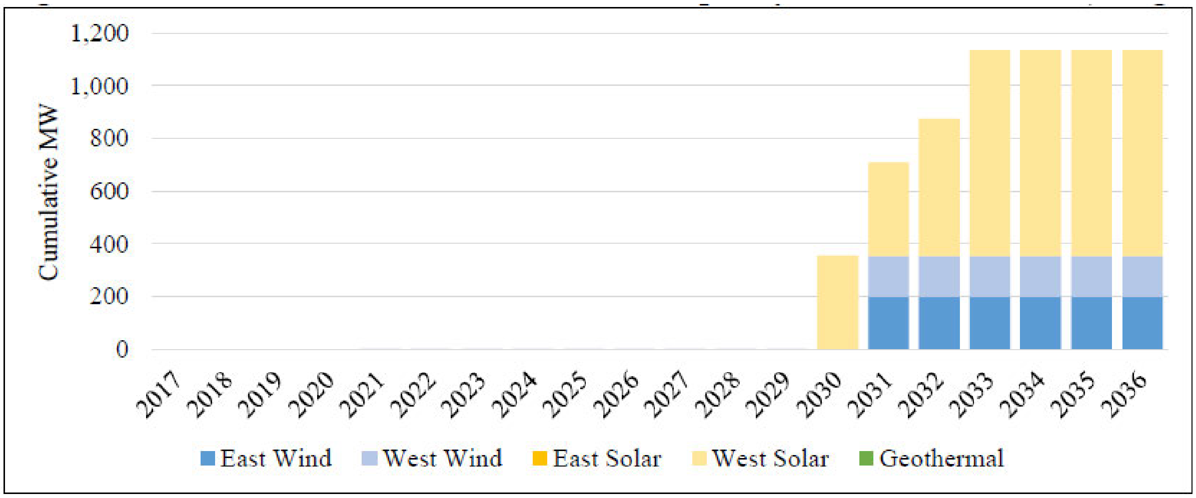
34 Ibid, page 2. Emphasis added.

35 Staff documented five different expressions of capacity need PacifiCorp presented in course of the 2017 IRP process. See pages 15 – 20 of the Staff Report dated November 21, 2017 and prepared for a December 5, 2017 Public Meeting regarding PacifiCorp's 2017 IRP.

36 Pages 201 – 202 of PacifiCorp's 2017 IRP. Figure 1 here replicates Figure 2.28 in the 2017 IRP.

Figure 1: Cumulative Situs Renewable Capacity

Core Case RE-1a (Oregon RPS)



As can be seen in Figure 1, PacifiCorp, on a JIT basis for Oregon RPS compliance only, first needs a physical renewable generation resource in 2030. Alternatively, the Company, in response to Staff Data Request 51 in Docket No. LC 67, stated that "[t]he new wind and transmission project will also allow PacifiCorp to deliver Oregon renewable portfolio standards (RPS) compliance benefits, extending *the period in which PacifiCorp has an incremental compliance need from 2028* out to 2034…"[37]

Q. Regarding Staff's Public Meeting Memorandum (above), what did PacifiCorp include in its response regarding renewable investments?

A. The Company's November 28, 2017 filing—its response to Staff's Public Meeting Memorandum for the December 5, 2017 Public Meeting—included the following:

[37] PacifiCorp's response to Staff Data Request 51 part b. Emphasis added.

"The Energy Vision 2020 projects meet both a near-term need within the two- to four-year period that otherwise would be filled by uncommitted FOTs, and a long-term energy and capacity need, at a heavily discounted cost and with reduced exposure to volatile wholesale markets that are driven by volatile fossil fuel prices and increasing carbon price risk. This is not the first time that renewables have provided an economic opportunity to displace FOTs at a lower cost and risk; in fact *all 1,698 MW of PacifiCorp's existing contracted and owned renewable resources included in rates today, not including qualifying facilities, were acquired and approved by the Commission because they were demonstrated to be least-cost, least-risk, displaced FOTs, and were acquired well before any thermal capacity or renewable portfolio standard (RPS) need."*[38]

Q. What observation did PacifiCorp make in Docket No. LC 67 regarding capacity expansion planning over a 20-year horizon that does not include thermal generation?

A. PacifiCorp's 2017 IRP Update, filed on May 1, 2018, stated that the Update represented "…the first time an IRP has not included new fossil-fueled generation as a least cost-least risk resource" for the Company."[39]

---

[38] Page 3 of PacifiCorp's November 28, 2017 filing in Docket No. LC 67, pertaining to the Company's 2017 IRP. Emphasis added.

[39] Page 2 of the 2017 IRP Update in Docket No. LC 67. PacifiCorp has typically used a 20-year time horizon in its IRPs.

Q. Do PacifiCorp's wind repowering projects serve to meet its Oregon RPS requirements?

A. Staff stated its conclusion above—that PacifiCorp is making these wind repowering investments at this time due to the benefits stated by the Company in its direct testimony, including the availability of the PTC—and not for RPS compliance purposes.

To the extent that a greater amount (MWh) of Oregon RPS-qualifying electricity is generated from the repowered wind turbine generators owned by PacifiCorp than would be the case absent the wind repowering projects, the wind repowering projects will likely serve to meet PacifiCorp's future Oregon RPS compliance requirements.

Q. Did the Commission acknowledge the Action Item regarding PacifiCorp's proposed wind repowering projects?

A. The Commission did acknowledge PacifiCorp's Action Item 1a proposing the wind repowering projects. As the wind repowering projects are motivated by potential economic benefits to customers and not by meeting some near-term and clearly identified capacity or RPS compliance need, the Commission included language that makes clear that it will appropriately mitigate risks to customers regarding a number of uncertainties associated with the wind repowering projects.[40] Additionally, the Commission stated that PacifiCorp's recovery of the costs of the wind repowering projects "…may be structured to

[40] Pages 7-8 of Order No. 18-138 in Docket No. LC 67.

hold PacifiCorp to the cost and benefit projections in its analysis." See Staff's discussion of the Commission's Order under Issue 2.

ISSUE 2, WIND REPOWERING COSTS, BENEFITS, AND RISKS

Q. What is the level of capital investment for PacifiCorp's wind repowering projects?

A. On a system basis for all wind repowering projects through 2020, and not just those repowering projects submitted for cost recovery in this proceeding, PacifiCorp's economic analysis "assumes an up-front capital investment totaling approximately $1.101 billion."[41] The capital investment associated with those projects PacifiCorp included in this filing for cost recovery total $827 million.[42]

Q. What did PacifiCorp assume in its February, 2018 economic analysis regarding the WTG equipment that will be removed and replaced with the wind repowering projects?

A. PacifiCorp assumed it "will fully recover the unrecovered investment in the original equipment and earn its authorized rate of return on the unrecovered balance over the 30-year depreciable life of each repowered facility."[43] The Company made this assumption in prior economic analyses of wind repowering projects, including in the July 28, 2017 filing in Docket No. LC 67 discussed below.

Q. What did PacifiCorp assume regarding the salvage value of the replaced equipment?

---

41 Exhibit PAC/300 Link/15.

42 Based on values in Corrected Exhibit PAC/401.

43 Exhibit PAC/300 Link/16-17. Staff discusses this assumption in the Revenue Requirement discussion below.

A. PacifiCorp assumed the replaced equipment would not have any salvage value.[44]

Q. What does PacifiCorp claim are the tangible benefits to ratepayers of the wind repowering projects submitted for cost recovery in this proceeding?

A. The Company identified the following as benefits of the repowering projects:

- Each repowered facility will qualify for an additional 10 years of Federal production tax credits (PTC);
- Each repowered wind resource will produce more energy;
- Each repowered wind resource resets its 30-year depreciable life and extends its useful life by at least 10 years;
- Each repowered wind resource will have lower run-rate operating costs;[45] and
- Energy Imbalance Market (EIM) benefits.[46]

PacifiCorp asserts that its "…economic analysis of the wind-repowering project demonstrates that net benefits, which include federal PTC benefits, net power cost (NPC) benefits, other system variable-cost benefits, and system fixed-cost benefits, more than outweigh net project costs."[47]

---

[44] Exhibit PAC/300 Link/17.

[45] Exhibits PAC/100 Lockey/11, PAC/200 Hemstreet/6-7, and PAC/300 Link/3.

[46] EIM benefits were included in the February 2018 economic analysis discussed below. See Exhibit PAC/300 Link/16.

[47] Exhibit PAC/300 Link/3.

Q. Will the increased generation resulting from repowering be of value to customers?

A. PacifiCorp said it plans to use the additional generating capacity provided by the repowered WTGs, but to do so the Company will need to modify its existing transmission interconnection agreements to accommodate the increased generation.[48] The Company also said it does not expect additional transmission capacity to be available for the Leaning Juniper or Goodnoe Hills resources due to transmission constraints.[49] However, the Company has asserted that its analysis shows that repowering is economic even if the repowered facilities are operated within their existing transmission capacity limits.[50]

Q. As there is likely a correspondence between available transmission capacity relative to increased electricity production resulting from the wind repowering projects and continued operation of coal plants, is this the appropriate time to discuss coal plant unit retirements?

A. Staff currently understands PacifiCorp's coal plant analysis is not complete as of the date this testimony is filed.[51] Additionally, scheduled dates for retiring the Company's coal plant units may be an outcome of negotiations in Docket No. UM 1050, PacifiCorp's Multistate Protocol (MSP) proceeding regarding

---

48 Exhibit PAC/200 Hemstreet/16.

49 Ibid.

50 Exhibit PAC/200 Hemstreet/17. See also footnote 3 on Exhibit PAC/200 Hemstreet/6 and Exhibit PAC/300 Link/45 - 46.

51 See; e.g., slide 5 of PacifiCorp's March 21, 2019 presentation regarding its 2019 IRP.

inter-jurisdictional cost allocations. For these reasons, Staff will not be discussing in this testimony the impact and timing of any coal plant unit retirements and any related increase in available transmission capacity of potential use for the greater production resulting from the wind repowering projects.

Q. Did PacifiCorp perform an economic analysis of the costs and benefits associated with the wind repowering projects?

A. PacifiCorp has performed more than one economic analysis of the wind repowering projects. The first was apparently in 2016 and prior to the Company's December 2016 "safe harbor" purchases,[52] which totaled $77.8 million.[53]

The 2017 IRP, filed April 4, 2017, included a brief description of the wind repowering effort[54] and the Company added wind repowering (the OP-REP case) "…as a sensitivity to evaluate, in the context of the IRP, the economic benefits of PacifiCorp's December 2016 safe-harbor wind-turbine-generator (WTG) equipment purchase, securing the option to repower existing wind facilities and re-qualifying the repower projects for PTC benefits over a 10-year period."[55]

---

52 Statement by PacifiCorp's Rick Link in the July 10, 2017 Commission workshop in Docket No. LC 67 in response to a question from Commissioner Bloom (audio file accessed March 20, 2019). See also Exhibit PAC/200 Hemstreet/8 and page 205 of the 2017 IRP.

53 Exhibit PAC/300 Link/4-5.

54 Page 3 of the 2017 IRP. See also page 179 and page 205, which pages discuss the projects, and related analyses, in more detail.

55 Page 204 of the 2017 IRP.

Q. How did PacifiCorp evaluate the wind repowering sensitivity in the 2017 IRP?

A. A primary metric the Company uses for comparing alternatives in its IRPs is the difference in the present value of revenue requirements (PVRR) between the given alternative and some base (or other alternative) case, or what the Company refers to as PVRR(d).[56] PacifiCorp evaluated the PVRR(d) of the wind repowering sensitivity versus a benchmark non-repowering case (OP-NT3). The resulting PVRR(d) values,[57] in multiple scenarios and including stochastic risk modeling,[58, 59] were negative, indicating a net benefit (decline in PVRR) associated with wind repowering. The lowest level of net benefit (least negative PVRR(d) value), both when evaluated over the 20-year planning horizon of the 2017 IRP and evaluated when extending the timeframe through 2050, was obtained in scenarios that included low natural gas prices. That material benefits, as modeled by PacifiCorp, are realized beyond the 20-year timeframe of the 2017 IRP is reflected in levels of PVRR(d) for the low gas price scenarios through 2036 (PVRR(d) values of negative $51 million and negative $48 million) versus those levels in the same

---

[56] Page 146 of the 2017 IRP lists the costs and revenues included in the system PVRR values, as used in the Company's system optimizer (SO) modeling. See also pages 143 – 156 generally.

[57] Pages 205 – 206 of the 2017 IRP. The ending year 2050 reflects the expected extension of WTG lives as a result of repowering. In other words, the repowered WTGs continue to generate electricity after the expected end-of-life date if the WTGs are not repowered. See also slide 3 of the July 10, 2017 presentation at a Commission Workshop in Docket No. LC 67.

[58] See pages 156 – 157 of the 2017 IRP.

[59] PacifiCorp's economic analyses of the wind repowering projects appear to incorporate methodologies consistent with those used in recent PacifiCorp IRPs. Staff has presumably vetted these methodologies—as necessary—in the course of these IRP proceedings.

scenarios through 2050 (PVRR(d) values of negative $340 million and negative $333 million).[60]

PacifiCorp stated that "…with all-in economic savings for customers—the company can add 905 MW of repowered wind resources…"[61] and the Company included wind repowering projects in the preferred portfolio of its 2017 IRP.[62]

Q. What is your opinion of using a modeling timeframe that extends beyond the 20-year horizon of an IRP?

A. PacifiCorp assumes it would—absent the wind repowering projects—retire the existing wind resources between 2036 and 2040, and the Company expects the repowering projects to extend the useful operating lives of the existing wind resources that are repowered by approximately 10 years.[63] Most, if not all, of this 10-year period is beyond the 2036 horizon of the 2017 IRP. Therefore, the wind repowering projects result in generation from the repowered wind resources over approximately 10 years (or more) that would otherwise not be produced, unless the Company invested in other generation resources. Use of a timeframe that includes the last year assumed by PacifiCorp to include generation from the repowered WTGs[64] seems

---

[60] See Table 8.6 on page 206 of the 2017 IRP.

[61] Page 234 of the 2017 IRP. See also Exhibit PAC/300 Link/6 – 14.

[62] See, e.g., page 233 of the 2017 IRP. Exhibit PAC/300 Link/4 – 8 also discusses wind repowering in the 2017 IRP.

[63] See, e.g., Exhibit Pac/200 Hemstreet/21 – 22.

[64] See also Exhibit PAC/300 Link/19-21 regarding use of a timeframe extending through 2050 in the context of analysis performed subsequent to that included in PacifiCorp's 2017 IRP.

appropriate in context and presumably captures the “end effects” Commission guidelines say IRP analyses are to include.[65]

Q. PacifiCorp filed its 2017 IRP on April 4, 2017. What took place after that date and prior to the December 5, 2017 Public Meeting that included Commission acknowledgement of Action Items in the 2017 IRP as an agenda item?

A. PacifiCorp presented its 2017 IRP to the Commission, in a Special Public Meeting (Commission Workshop) on July 10, 2017. The Company’s presentation included nine slides related to its Energy Vision 2020 projects and it noted that it had updated its economic analysis of these projects and would provide this and the associated work papers in its state IRP proceedings.[66]

Q. What changed in this economic analysis by PacifiCorp?

A. PacifiCorp stated in the July 10, 2017 presentation that it had updated the forward price curve and environmental policy assumptions, updated cost and performance assumptions for the Energy Vision 2020 projects, and expanded the wind repowering project’s scope to include the repowering of its Goodnoe Hills wind resource.[67]

---

65 See page 2 of Appendix A in Order No. 07-047 in Docket No. UM 1056. Staff acknowledges that the greater the time horizon, the more uncertainty is introduced into an economic analysis, all else being equal.

66 Slide 3 of the July 10, 2017 presentation of PacifiCorp’s 2017 IRP in Docket No. LC 67.

67 Ibid, slide 4. See also page 15 of PacifiCorp’s July 28, 2017 information filing discussed below.

Q. What were the results of the updated wind repowering economic analysis, as presented by PacifiCorp on July 10, 2017?

A. PacifiCorp's presentation included PVRR(d) results of wind repowering that were generally negative when analyzed over the timeframe through 2036; i.e., results generally showed net customer benefits. There were two exceptions to this general result: the repowering projects represented a net cost (positive PVRR(d)) to customers for the two natural gas price – carbon policy scenarios that combined a low natural gas price forecast and either the no or medium future CO_2 price assumptions.[68] Table 2 replicates the tabular information on slide 5 of the Company's July 10th presentation.

Table 2: Wind Repowering Results ((Benefit)/Cost: 2036) in $Millions[69]

Price-Policy Scenario	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Low Gas, Zero CO2	$33	$43	$44
Low Gas, Medium CO2	$0	$9	$8
Low Gas, High CO2	($18)	($17)	($19)
Medium Gas, Zero CO2	($33)	($24)	($25)
Medium Gas, Medium CO2	($22)	($13)	($15)
Medium Gas, High CO2	($41)	($35)	($36)
High Gas, Zero CO2	($75)	($40)	($43)
High Gas, Medium CO2	($64)	($34)	($37)
High Gas, High CO2	($103)	($80)	($85)

PacifiCorp submitted an informational filing in Docket No. LC 67 on July 28, 2017, identified as "2017 Integrated Resource Plan – Energy Vision 2020 Update" (July 28, 2017 Update), fulfilling the commitment it made to do so in

68 Ibid, slide 5. The results in this slide did not include any benefits from incremental RECs resulting from the repowering projects.

69 Ibid. See also Table 3.1 on page 16 of the Company's July 28, 2017 Update in Docket No. LC 67.

the July 10, 2017 workshop regarding the Energy Vision 2020 projects proposed in the 2017 IRP. Table 3.1 of the July 28, 2017 Update includes the same tabular values presented on slide 5 of the Company's July 10, 2017 presentation as Table 2 above.

The Company's July 28, 2017 filing included that, "[a]s was assumed in the 2017 IRP, the updated economic analysis continues to assume that PacifiCorp will fully recover the unrecovered investment in the original equipment on existing wind resources and earn its authorized rate of return on the unrecovered balance over the remainder of the original 30-year depreciable life of each repowered wind facility."[70]

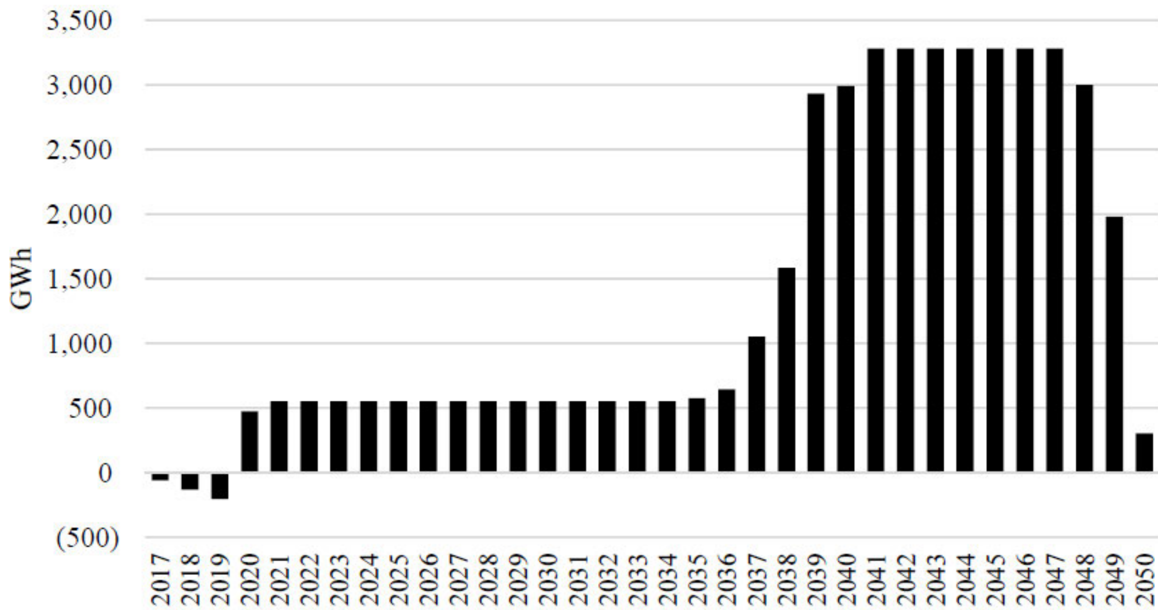
PacifiCorp's July 28, 2017 Update filing included a figure showing the change in incremental wind energy output do to wind repowering, which Staff has replicated below as Figure 2.[71] As can be seen in this figure, PacifiCorp estimates the life extension of WTGs as a result of the repowering projects will produce relatively large increases in wind energy output, as—absent repowering—WTGs would be removed from service beginning in 2036.

---

[70] Page 14 of the July 28, 2017 Update in Docket No. LC 67. See also Exhibit PAC/300 Link/16 – 17. Staff discusses this in the discussion of Issue 3, Revenue Requirement.

[71] Page 18 of the July 28, 2017 Update in Docket No. LC 67. The same information, based on visual inspection, appeared on slide 6 of PacifiCorp's July 10, 2017 presentation in Docket No. LC 67 at the Special Public Meeting on that date.

Figure 2: Change in Incremental Wind Energy Output Due to Wind Repowering



Q. Regarding PacifiCorp's wind repowering projects (Action Item 1a) in the Company's 2017 IRP, please identify the Company's most recent economic analysis prior to the Commission's acknowledgement decision with respect to Action Item 1a?

A. Commission Order No. 18-138 memorialized the Commission's decision made and effective at the December 11, 2017 Special Public Meeting for Commission deliberations related to Docket No. LC 67 (PacifiCorp's 2017 IRP). The Staff Report (Public Meeting Memorandum) related to this decision is dated November 21, 2017 and was prepared to accompany Agenda Item 3 in the December 5, 2017 Public Meeting, which was in regards to Commission acknowledgement of PacifiCorp's 2017 IRP. PacifiCorp filed its response to this Staff Report on November 28, 2017. Neither this Staff Report nor PacifiCorp's response includes any quantitative valuation of costs and benefits of the wind repowering projects.

The most recent quantitative information regarding costs and benefits of the wind repowering projects available to PacifiCorp prior to the Commission's decision appears to be information presented at a workshop regarding the Company's 2017 IRP in a Special Public Meeting on September 14, 2017.

Q. What quantitative cost and benefit information related to the wind repowering project did PacifiCorp include in its September 14, 2017 presentation?

A. Slide 5 of the presentation contains the only material in the presentation specifically related to the costs and benefits of the wind repowering projects. This slide included two charts and three bullet points. The left-hand chart shows the range in annual revenue requirement over the period 2018 – 2050, with positive values indicating a net cost (positive revenue requirement impact) to customers and negative values (negative revenue requirement impact) indicating a net benefit. Staff includes this chart as Figure 3.

Figure 3: System Annual Revenue Requirement from Wind Repowering

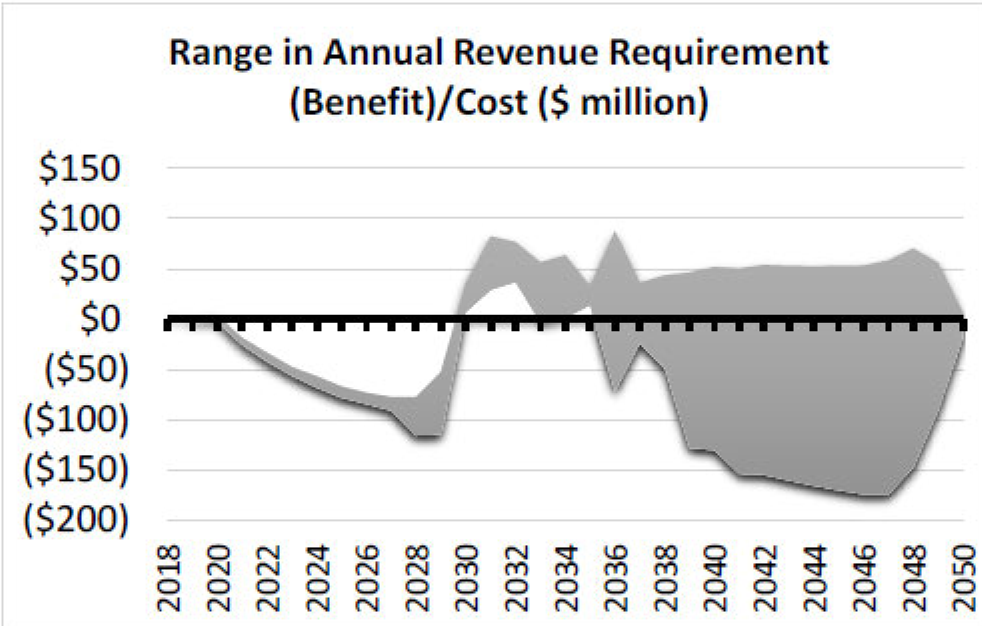
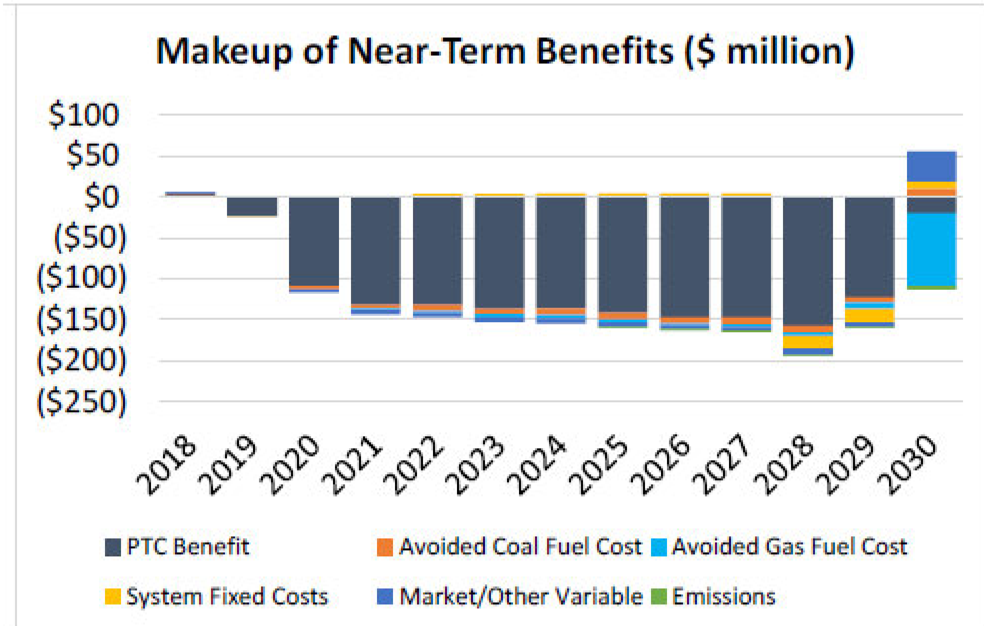


Figure 3 shows that the range of net benefits/costs—as translated into annual revenue requirements—does not include a net cost (positive revenue requirement) in any year prior to at least 2029 and after PTC are no longer available to PacifiCorp related to the wind repowering projects included in this proceeding.

The right-hand chart on slide 5 of the presentation shows the composition of estimated benefits resulting from the wind repowering projects over the period 2018 – 2030, inclusive. Annual benefits are decomposed into Federal production tax credits (PTC), avoided fuel costs (separately identified for gas- versus coal-fired generation), system fixed costs, market and other variables, and the benefit associated with fewer emissions. Staff includes this chart as Figure 4.

Figure 4: Makeup of Near-term Benefits from Wind Repowering



PacifiCorp included three bullet points below the two charts in slide 5 of the presentation, which Staff has replicated below.

- Near-term net benefits are not speculative and are nearly immediate.
- Federal production tax credits, avoided fuel costs, and avoided system fixed costs make up approximately 96% of the benefit stream (~4% tied to primarily to increased market sales and emissions).
- Net power cost benefits are expected to persist over the long term, with significant incremental wind generation beyond 2036; longer-term benefits would increase if coal-unit retirements occurred sooner than assumed.

Realization of incremental production tax credits (PTC) accounts for 89 percent[72] of the benefits over the 2020 – 2029 timeframe, while avoided

[72] Value calculated using information provided by PacifiCorp in response to Staff Data Request 10.

fuel costs account for approximately 6 percent of benefits over the same timeframe.

Q. Regarding PacifiCorp's right-hand chart in slide 5 of the Company's September 14, 2017 presentation (Figure 4, above), what was the estimated dollar value of 2019 benefits on an Oregon-allocated basis?

A. Approximately $6.0 million,[73] using the inter-jurisdictional allocation factors used in Docket No. UE 339. System-level annual PTC benefits, as estimated by PacifiCorp for 2020 – 2030, appear in Figure 5 below.[74]

Q. What was the forecasted dollar value of 2019 benefits, on an Oregon-allocated basis and attributed to PacifiCorp's wind repowering projects, reflected in net power costs in the Company's 2019 TAM proceeding for inclusion in customer rates?

A. Including the wind repowering projects' benefits in the 2019 TAM reduced Oregon-allocated net power costs by approximately $7.7 million.[75] Customer benefits for 2019, as estimated and modeled by PacifiCorp, appear to have increased from the September 14, 2017 presentation to the 2019 TAM filing.

Q. What are the system-level annual PTC benefits in Figure 4, as estimated by PacifiCorp and included in the Company's September 14, 2017 presentation?

---

[73] Value calculated using information provided by PacifiCorp in response to Staff Data Request 10.

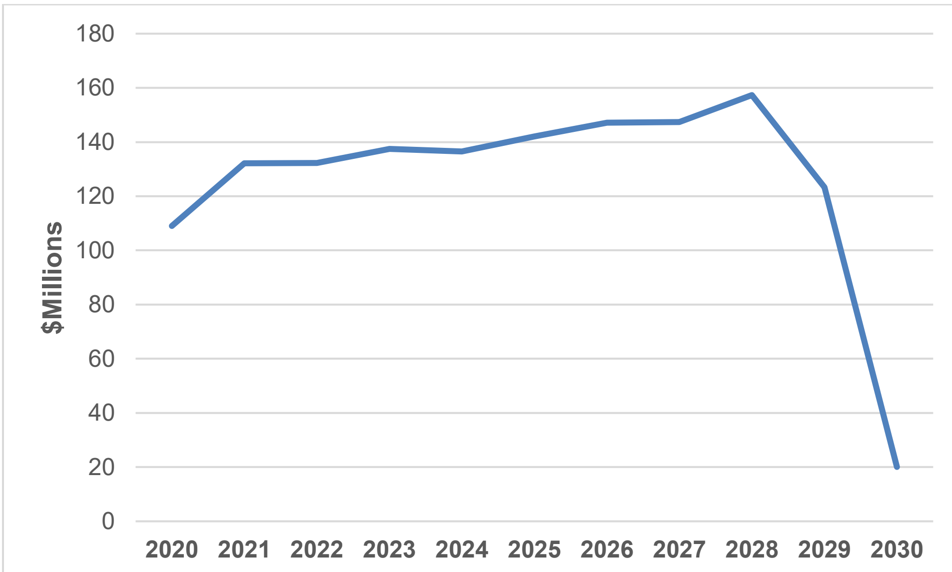
[74] Values provided by PacifiCorp in response to Staff Data Request 10.

[75] Page 3 of Order No. 18-421 in Docket No. UE 339.

A. PacifiCorp's estimate of system-level annual PTC benefits for 2020 – 2030 appear in Figure 5.[76]

Figure 5: Annual PTC Benefits from Wind Repowering Projects

PacifiCorp's September 14, 2017 Presentation



Q. Where does the preceding discussion leave us regarding the Company's most recently completed economic analysis prior to the Commission's acknowledgement decision with respect to Action Item 1a?

A. Staff assumes—based on chronological order—that the most recent information was that included in PacifiCorp's September 14, 2017 presentation and the July 28, 2017 informational filing. As above, information specifically regarding the wind repowering effort only appeared on slide 5 of

[76] Values provided by PacifiCorp in response to Staff Data Request 10.

the former, which Staff has replicated in Figures 3 and 4, presented in Figure 5, or included as bullet points Staff replicated above.

Q. What quality distinguishes PacifiCorp's proposed wind repowering projects from other investments the Company has typically proposed in its IRPs?

A. The primary difference was that PacifiCorp proposed the wind repowering projects as actions what would benefit customers economically, not because the projects were to meet some near-term capacity or RPS compliance need.

Q. Did the Commission acknowledge PacifiCorp's 2017 IRP Action Item related to the Company's wind repowering projects?

A. Yes, in Order No. 18-138 and after restating to:

Action Items 1a, 1b, 2a: (Energy Vision 2020)

- 1a - Wind Repowering - Repower over 900 MW of existing wind resources.[77]

See also the discussion regarding Action Item 1a in PacifiCorp's 2017 IRP under Issue 1 above.

Q. Did the Commission's acknowledgement Order include conditions and limitations with respect to Action Item 1a (the wind repowering projects)?

---

[77] Page 19 of Order No. 18-138 in Docket No. LC 67.

A. The Commission's Order included the following language[78] related to its acknowledgement of this Action Item:[79]

- Given the uncertainty at this time regarding…the outcome of recent tax reform efforts on the federal level, PacifiCorp must:
  - o Update its analysis of the Energy Vision 2020 projects as part of its 2017 IRP Update, including any…changes to critical assumptions, such as availability of tax credits, corporate tax rate, then-current cost-and-performance data for repowered wind resources…
- The risk of proceeding with the Energy Vision 2020 projects remains with PacifiCorp unless and until the Commission completes a prudence review and approves cost recovery of these resources in rates. Recovery may be conditioned or limited to ensure customer benefits remain at least as favorable as IRP planning assumptions.
  - o For uncertainties that will be resolved by the time of the projects' commercial operation date (pre-COD risks), we acknowledge the projects only insofar as customers do not bear the risk of construction cost overruns, delays or other factors that impact PTC value, or

[78] Pages 7 – 8 of Order No. 18-138 in Docket No. LC 67. Commission language in Order edited here to exclude aspects not pertaining to Action Item 1a.

[79] PacifiCorp discusses Commission acknowledgement of Action Item 1a at Exhibit PAC/300 Link/8.

project costs and expected capacity factors that are less favorable than the assumptions presented in the IRP.

- o For uncertainties that may persist beyond project commercial operation date (post-COD risks), such as project performance, tax policy changes, and resource value relative to market, we will carefully scrutinize the net benefits during future…IRP Update filing, and rate recovery proceedings. We intend to ensure that customer risk exposure is mitigated appropriately, and recovery may be structured to hold PacifiCorp to the cost and benefit projections in its analysis.

Q. What economic analyses did PacifiCorp perform subsequent to the Commission's decision to acknowledge with conditions and limitations?

A. PacifiCorp completed an economic analysis of the wind repowering projects in February, 2018 and updated this analysis in August, 2018.[80] The Company's 2017 IRP Update, filed on May 1, 2018, included a summary of the February 2018 analysis,[81] representing the Company's compliance with the Commission's requirement in the Order related to Action Item 1a in the 2017 IRP.[82]

80 Exhibit PAC/300 Link/3.

81 Exhibit PAC/300 Link/8.

82 Page 19 of Order No. 18-138 in Docket No. LC 67. See also Exhibit PAC/300 Link/8.

Q. What economic analyses of the wind repowering projects did PacifiCorp include with its RAC filing in this proceeding?

A. PacifiCorp's testimony discusses an economic analysis it identifies as its February 2018 analysis and an economic analysis it identifies as its August 2018 economic analysis.[83]

Q. How did PacifiCorp make use of the February 2018 economic analysis?

A. PacifiCorp states that: "[t]hese economic analyses informed PacifiCorp's decision to move forward with the project."[84]

Q. What do you make of this statement by PacifiCorp?

A. PacifiCorp used the results of the February, 2018 economic analysis to "inform" one or more discrete "go/no go" decisions ("…decision to move forward…") made subsequent to the availability of these analyses in—presumably—February of 2018. Staff found nothing in PacifiCorp's testimony which indicates the Company could not have abandoned any or all of the individual wind repowering projects at that time; i.e., a "go/no go" decision was available to the Company in early 2018.

Q. What variables did PacifiCorp include in the February 2018 PaR simulations as stochastic variables?

---

83 Exhibit PAC/300 Link/9 – 55.

84 Exhibit PAC/300 Link/9.

A. PacifiCorp's Monte Carlo simulations drew from distributions of several stochastic variables, including load, wholesale electricity and natural gas prices, hydro generation, and thermal unit outages.[85]

Q. What key parameters and assumptions did PacifiCorp update in its February 2018 analysis?

A. PacifiCorp updated the applicable marginal Federal income tax rate to reflect changes resulting from the Tax Cuts and Jobs Act of 2017.[86] The Company incorporated updated assumptions regarding capital costs, run-rate operating costs, and energy output for both existing and repowered wind generation resources.[87]

Q. Did PacifiCorp's February 2018 economic analyses include any sensitivities?

A. PacifiCorp examined sensitivities with respect to the wholesale market price of electricity and the price of natural gas (both with "low," "medium," and "high" prices), and with respect to CO_2 price-policy assumptions ("zero," "medium," and "high" CO_2 prices) for its system-level analysis of wind repowering projects.[88]

Q. What were the key results of the February 2018 economic analysis?

85 Exhibit PAC/300 Link/11.
86 Exhibit PAC/300 Link/13.
87 Exhibit PAC/300 Link/15.
88 Exhibit PAC/300 Link 14.

A. Table 3 shows system-level results of PacifiCorp's analysis of the wind repowering projects,[89] where the timeframe of analysis was restricted to not include results beyond the 2036 horizon of the 2017 IRP.

Table 3: Wind Repowering Results ((Benefit)/Cost: 2036) in $Millions

Price-Policy Scenario	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Low Gas, Zero CO_2	($159)	($141)	($148)
Low Gas, Medium CO_2	($158)	($139)	($146)
Low Gas, High CO_2	($183)	($165)	($173)
Medium Gas, Zero CO_2	($201)	($171)	($180)
Medium Gas, Medium CO_2	($204)	($180)	($189)
Medium Gas, High CO_2	($215)	($193)	($203)
High Gas, Zero CO_2	($257)	($234)	($246)
High Gas, Medium CO_2	($260)	($248)	($260)
High Gas, High CO_2	($273)	($240)	($252)

Q. How do the results in Table 3 from PacifiCorp's February 2018 analysis compare with those from their earlier analysis?

A. PacifiCorp's results in Table 3, using the updated parameters, forecasts, and assumptions, are uniformly more favorable to customers than the earlier results shown in Table 2 from the Company's July 10, 2017 presentation to the Commission. In PacifiCorp's central price-policy scenario, which assumes medium natural gas prices and medium CO_2 prices, the range of PVRR(d) values, resulting from an analysis (or set of analyses) with wind repowering

89 Exhibit PAC/300 Link/35, where Table 3 appears as Table 6.

versus an analysis (or set of analyses) without wind repowering,[90] improved (greater customer benefit) by $174 million (PaR Risk-Adjusted) to $182 million (SO) from those in the July 10, 2017 presentation. The Company added repowering the Goodnoe Hills wind resource in the more recent analysis,[91] in addition to the changes discussed above and in PacifiCorp's testimony. Goodnoe Hills represents approximately 10 percent of the values in Table 3 for the medium natural gas price, medium CO_2 price-policy scenario, producing a net benefit to customers for repowering this wind resource (with respect to this specific scenario).

Results in the low natural gas price – zero CO_2 price – policy scenario, which included an economic cost (higher PVRR, or positive PVRR(d)) to customers from the wind powering projects in the July 10, 2017 presentation, indicate an economic benefit to customers in the February 2018 analysis. This holds for each of the other scenarios PacifiCorp analyzed.

Q. Did PacifiCorp's February 2018 analysis include a cost/benefit analysis of individual wind repowering projects?

A. PacifiCorp used two price – policy scenarios in the February 2018 analysis of individual repowering projects: one with low natural gas price and zero CO_2 price – policy and one with medium natural gas price and medium CO_2 price – policy.

---

90 Exhibit PAC/300 Link/35.

91 The PVRR(d) values for all wind repowering projects, including Goodnoe Hills, shown at Exhibit PAC/300 Link/30 are roughly equivalent in total to those shown at Exhibit PAC/300 Link/35 for the medium natural gas price – medium CO_2 price scenario.

Table 4[92] shows results of the February 2018 analysis of individual repowering projects with the time horizon constrained to 2036.

Table 4: Project-by-Project Wind Repowering Results ((Benefit)/Cost: 2036) – Medium Natural Gas Price and Medium CO_2 Price – Policy ($Millions)

Wind Facility	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Glenrock 1	($25)	($21)	($23)
Glenrock 3	($8)	($7)	($7)
Seven Mile Hill 1	($33)	($28)	($29)
Seven Mile Hill 2	($7)	($7)	($7)
High Plains	($17)	($13)	($13)
McFadden Ridge	($5)	($4)	($4)
Dunlap Ranch	($30)	($26)	($27)
Rolling Hills	($12)	($9)	($10)
Leaning Juniper	($0)	($0)	($0)
Marengo 1	($35)	($33)	($34)
Marengo 2	($15)	($14)	($15)
Goodnoe Hills	($18)	($18)	($19)
Total	($205)	($180)	($189)

As noted by PacifiCorp, the Leaning Jupiter repowering project has benefits equal to costs (PVRR(d) = 0) in this scenario. In the second scenario, with low natural gas price and zero CO_2 price – policy, costs from repowering Leaning Jupiter are slightly greater than benefits, as shown in Table 5.[93]

92 Exhibit PAC/300 Link/30, where Table 4 appears as Table 2.

93 Exhibit PAC/300 Link/31, where Table 5 appears as Table 3.

Table 5: Project-by-Project Wind Repowering Results ((Benefit)/Cost: 2036) – Low Natural Gas and Zero CO_2 Price – Policy ($Millions)

Wind Facility	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Glenrock 1	($21)	($21)	($22)
Glenrock 3	($7)	($6)	($6)
Seven Mile Hill 1	($28)	($28)	($29)
Seven Mile Hill 2	($6)	($6)	($6)
High Plains	($12)	($9)	($10)
McFadden Ridge	($4)	($3)	($3)
Dunlap Ranch	($25)	($22)	($24)
Rolling Hills	($9)	($7)	($7)
Leaning Juniper	$6	$3	$4
Marengo 1	($27)	($25)	($26)
Marengo 2	($11)	($10)	($11)
Goodnoe Hills	($13)	($15)	($15)
Total	($157)	($149)	($156)

PacifiCorp's February 2018 analysis of individual wind repowering projects included a two additional project-by-project economic analyses, where the time horizon was extended through 2050. These differ from the analyses with results represented in Tables 4 and 5 in one other way: the PVRR(d) measure incorporates PVRR values using the nominal annual revenue requirement for capital costs,[94] not PVRR values using the levelized revenue requirement for capital costs. The result of these analyses, for each of the two

[94] Exhibit PAC/300 Link/32. See PacifiCorp's discussion of the two approaches (nominal revenue requirement versus levelized cost) at Exhibit PAC/300 Link/17 – 19.

scenarios analyzed, are in Table 6.[95] The Leaning Jupiter repowering project in the scenario with medium natural gas price and medium CO_2 price – policy has a negative PVRR(d), indicating a net benefit to customers. The scenario with low natural gas price and zero CO_2 price – policy has costs equaling benefits (PVRR(d) = 0) on this basis.

Table 6: Project-by-Project Wind Repowering Results ((Benefit)/Cost: 2050) – Nominal Revenue Requirement Basis (Millions of $2017)

Wind Facility	Medium Natural-Gas and Medium CO_2	Low Natural-Gas and Zero CO_2
Glenrock 1	($33)	($33)
Glenrock 3	($11)	($6)
Seven Mile Hill 1	($41)	($40)
Seven Mile Hill 2	($10)	($6)
High Plains	($22)	($6)
McFadden Ridge	($7)	($2)
Dunlap Ranch	($39)	($23)
Rolling Hills	($15)	($5)
Leaning Juniper	($8)	($0)
Marengo 1	($50)	($22)
Marengo 2	($20)	($7)
Goodnoe Hills	($26)	($19)
Total	($282)	($170)

Q. Why did PacifiCorp perform the analyses for the time horizon through 2050 using a different methodology?

95 Exhibit PAC/300 Link/32, where Table 6 appears as Table 4.

A. Staff is unaware of PacifiCorp's reason(s) for not performing the analyses for the time horizon through 2050 using methods consistent with those for the analysis with the time horizon through 2036 and also consistent with the analyses it performed at a system level, as Staff discussed above.

Q. Did PacifiCorp explain in testimony the Company's decision to repower the Leaning Jupiter resource, given that it appears to be more marginal with respect to customer benefits than most of the other repowering projects?

A. PacifiCorp did not. The Company's testimony suggests that some variation by wind resource in PVRR(d) results is due to the relative capacities of different wind resources.[96] Staff notes that, with the time horizon through 2050, repowering Leaning Jupiter produces an expected net benefit under the Company's central medium natural gas price and medium CO_2 price – policy scenario[97] and has a PVRR(d) result that is comparable to that for McFadden Ridge.[98]

PacifiCorp notes that the CO_2 price assumptions used in the February 2018 analyses "…were inadvertently modeled in 2012 real dollars instead of nominal dollars" (i.e., CO_2 prices were generally *understated*); and the

96 Exhibit PAC/300 Link/33 – 35, including Table 5.

97 See Exhibit PAC/300 Link/39.

98 See; e.g., Table 4 at Exhibit PAC/300 Link/32.

PVRR(d) net benefits in the medium natural gas price and medium CO_2 price – policy scenario are therefore "conservative."[99]

Q. Does PacifiCorp believe its February 2018 analysis represents conservative levels of the net benefits to customers?

A. PacifiCorp states this in testimony.[100] The Company also believes its analytical results are conservative as they do not include any value associated with increased RECs produced by the repowered resources.[101]

Q. Did PacifiCorp analyze the impact of the wind repowering projects if the new Wyoming wind and associated transmission projects were undertaken?

A. The results of PacifiCorp's February 2018 analysis of this situation are in Table 7[102] for each of the two scenarios discussed above and with a time horizon of 2036.[103] The Company concluded that customer benefits of the wind repowering projects increase significantly when they are accompanied by the new wind and transmission projects in the Energy Vision 2020 umbrella.

---

99 Exhibit PAC/300 Link/35 and Link/37, with identical wording in both locations. Staff could not locate in PacifiCorp's testimony any other reference to this misstatement of CO_2 prices in the Company's economic analysis.

100 See, e.g., Exhibits PAC/300 Link/3-4, and Link/35-37.

101 See, e.g., Exhibit PAC/300 Link/41.

102 Exhibit PAC/300 Link/46, where Table 7 is identified as Table 9.

103 Exhibit PAC/300 Link/45.

Table 7: New Wind and Aeolus-to-Bridger/Anticline Sensitivity ((Benefit)/Cost: 2036) – Wind Repowering (Millions of $2017)

	Sensitivity (Repowering + New Wind & Trans.) PVRR(d)	Base Study (Repowering) PVRR(d)	Change in PVRR(d)
Medium Gas, Medium CO_2			
SO Model	($532)	($204)	($328)
PaR Stochastic Mean	($466)	($180)	($286)
PaR Risk Adjusted	($489)	($189)	($300)
Low Gas, Zero CO_2			
SO Model	($301)	($159)	($142)
PaR Stochastic Mean	($300)	($141)	($159)
PaR Risk Adjusted	($315)	($148)	($167)

Q. Did PacifiCorp update its load forecasts from those in its prior analyses?

A. The Company's 2017 IRP Update, filed May 1, 2018, incorporated an updated forecast of coincident peak, which was down an average of roughly 424 MW over the first ten years of the 2017 – 2036 planning period from the level in the 2017 IRP.[104] It is not clear to Staff whether the February 2018 analysis included this load forecast update, but Staff's expectation—based on timing—is that the August 2018 analysis discussed below did include this update.

Q. Did PacifiCorp complete another economic analysis prior to its filing in this proceeding and what was its purpose?

[104] See; e.g., page 3 of the 2017 IRP Update.

A. PacifiCorp's testimony discusses an analysis performed subsequent to the February 2018 analysis discussed above. The Company refers to this as its August 2018 analysis, and states that it was performed "…to understand how more recent changes in other modeling assumptions affect project-by-project results relative to those included in the February 2018 analysis."[105]

Q. What results did PacifiCorp obtain in its August 2018 economic analysis?

A. PacifiCorp's August 2018 analysis assumed the medium natural gas price and medium CO_2 price – policy assumptions; i.e., it was of one scenario involving these modelling inputs. The Company's testimony included a table that provided results for individual wind repowering projects for both the February 2018 and August 2018 analyses. Staff replicates this as Table 8.[106]

105 Exhibit PAC/300 Link/3.

106 Exhibit PAC/300 Link/49; PacifiCorp's Table 11 appears in Staff's testimony as Table 8.

Table 8. Project-by-Project SO Model and PaR PVRR(d) ((Benefit)/Cost: 2036) of Wind Repowering with Medium Natural-Gas and Medium CO_2 Price-Policy Assumptions (Millions of \$2017 for February 2018 and Millions of \$2018 for August 2018)[107]

Wind Facility	SO Model PVRR(d)		PaR Stochastic-Mean PVRR(d)		PaR Risk-Adjusted PVRR(d)	
	February 2018 (2017$)	August 2018 (2018$)	February 2018 (2017$)	August 2018 (2018$)	February 2018 (2017$)	August 2018 (2018$)
Glenrock 1	($25)	($29)	($21)	($24)	($23)	($31)
Glenrock 3	($8)	($10)	($7)	($8)	($7)	($11)
Seven Mile Hill 1	($33)	($40)	($28)	($31)	($29)	($39)
Seven Mile Hill 2	($7)	($9)	($7)	($8)	($7)	($9)
High Plains	($17)	($23)	($13)	($14)	($13)	($21)
McFadden Ridge	($5)	($7)	($4)	($5)	($4)	($7)
Dunlap Ranch	($30)	($37)	($26)	($28)	($27)	($37)
Rolling Hills	($12)	($16)	($9)	($11)	($10)	($16)
Leaning Juniper	($0)	($10)	($0)	($10)	($0)	($10)
Marengo 1	($35)	($44)	($33)	($33)	($34)	($43)
Marengo 2	($15)	($20)	($14)	($15)	($15)	($20)
Goodnoe Hills	($18)	($24)	($18)	($20)	($19)	($26)

As can be seen in Table 8, the PVRR(d) values improved (more negative) for outputs of the SO model, outputs of the PaR model, and for the risk-adjusted PVRR(d): with one exception. The Marengo I PVRR(d) result for the PaR model's stochastic mean remained the same between the two analyses (when expressed in millions of dollars and without adjustment for the difference between \$2017 and \$2018. Note that Leaning Jupiter, in the

[107] Table 8 is identified as Table 11 in Exhibit PAC/300 Link/49. PacifiCorp notes that its Table 11 PVRR(d) results are stated in both \$2017 (for February 2018 results) and in \$2018 (for August 2018 results). As Staff understands PacifiCorp's testimony regarding the difference between the two methods of statement, Staff considers the difference to be inconsequential, as inflation is approximately 2 percent in the relevant timeframes. See footnote 6 at Exhibit PAC/300 Link/47.

August 2018 analysis, now shows positive net benefits to customers for all three results.

Q. What do you view as the most important risks to ratepayers *prior to* commercial operation (pre-COD risks) of a repowered wind resource?

A. Staff views the most important pre-COD risks as investment cost overruns and actual in-service dates that fail to qualify the repowered wind resource for the full value PTC. PacifiCorp's requested revenue requirement in this proceeding is associated with capital investments totaling $827 million[108] and its planned in-service dates for repowered wind resources included in this proceeding range from September 2, 2019 (Seven Mile Hill I and II) to November 29, 2019 (Marengo I and II).[109] Should a repowered wind resource not be in-service by December 31, 2020, it can only qualify for full PTC treatment under the IRS' "continuous efforts" standard, which PacifiCorp alleges is a difficult standard to meet.[110]

While permitting challenges are present in many utility projects, PacifiCorp's testimony states that permitting requirements associated with the repowering projects are limited.[111]

An additional risk related to the in-service timing of the repowered wind resources is whether they are actually in-service as of the rate effective date.

Q. What has PacifiCorp done to mitigate these risks?

---

108 Corrected Exhibit PAC/401.

109 Exhibit PAC/204.

110 Exhibit PAC/200 Hemstreet/8.

111 Exhibit PAC/200 Hemstreet/26.

A. First, with respect to the wind repowering projects in-service dates, PacifiCorp executed its “safe harbor” equipment purchases in late 2016 and at a dollar level that the Company believes will qualify the repowered wind resources for the full value PTC if the repowered resources are in-service by the end of the fourth calendar year following these safe harbor purchases,[112] which is year-end 2020. As the planned in-service dates for those repowered resources included in this proceeding are 13 or more months prior to year-end 2020, PacifiCorp appears to have ample time should it experience permitting or construction delays. Staff notes that this apparently “ample time” is essentially one construction season. On the other hand, PacifiCorp’s testimony does not include results of a sensitivity analysis which assumes later in-service dates. Regarding permitting, PacifiCorp states that it has obtained all of the necessary major permits required for the repowering projects as of the date the Company filed its testimony in this proceeding.[113]

Q. Did PacifiCorp request a private letter ruling from the Internal Revenue Service (IRS) regarding its safe harbor purchases?

A. No. PacifiCorp discusses certain IRS requirements to qualify for PTC, including IRS guidance in Notice 2016-31.[114] The Company’s testimony did not include that, per Notice 2016-31, the IRS has stated that it will not issue

[112] Exhibit PAC/200 Hemstreet/7.

[113] Exhibit PAC/200 Hemstreet /26.

[114] Exhibit PAC/200 Hemstreet/7-9.

private letter rulings regarding certain timing aspects with respect to the beginning of construction relative to qualifying for PTC.

Q. How did PacifiCorp mitigate the risk of wind repowering projects' cost overruns?

There are two aspects regarding the risk of actual capital investment exceeding levels planned. First, PacifiCorp's securing of full value PTC by the "safe harbor" equipment purchases is dependent upon the total capital investment, as the safe harbor level of investment must be at least five percent of total project costs.[115] As the Company's safe harbor equipment purchases totaled $77.8 million,[116] its total capital investment for the wind repowering projects can be no more than $1,556 million. As the Company's estimated total capital investment associated with all wind repowering projects is $1.101 billion,[117] its level of safe harbor investments seems more than adequate—all else being equal. In other words, the dollar value of the Company's safe harbor purchases, at 7.1 percent of its expected total capital investment, appears conservative.

The second aspect of capital investment risk is that the investments made subsequent to the safe harbor investments will be greater than PacifiCorp's estimate of $1,023.2 million. The Company has controlled this risk by entering into a fixed price master retrofit contract with General Electric (GE), with GE

[115] Exhibit PAC/200 Hemstreet/7.

[116] Exhibit PAC/300 Link/4-5.

[117] Exhibit PAC/300 Link/15.

to "perform turn-key supply, delivery, installation, and commissioning of the repowered turbines…"[118] for those wind resources with GE equipment. For those wind resources with Vestas equipment (those located in Washington), PacifiCorp has executed fixed-price turbine supply contracts with Vestas. For these three wind resources, the Company negotiated separate contracts with wind energy construction companies for installation of the Vestas equipment associated with these repowering projects. PacifiCorp stated, in its response to Staff Data Request 18, that it considers each of the installation contracts for the Vestas equipment to be fixed price.

Q. What do you view as the most important risks to ratepayers *subsequent to* commercial operation (post-COD risks) of a repowered wind resource?

A. Staff considers the primary post-COD risk, assuming the repowering projects qualify for the full PTC (a pre-COD risk), to be a lower realized PTC dollar value than anticipated, as PTC account for 89 percent[119] of the benefits over the 2020 – 2029 timeframe This risk decomposes into quantity risk—actual generation from the repowered wind resources is less than was anticipated—and rate risk—the actual realized PTC per kWh generated is less than anticipated.

[118] Exhibit PAC/200 Hemstreet/24.

[119] Value calculated using information provided by PacifiCorp in response to Staff Data Request 10. This information was graphically communicated by the Company at the September 14, 2017 Commission workshop.

The extreme case of rate risk is probably legislative curtailment of the PTC program prior to the current 2029 end date. Staff views a more likely rate risk to be that PacifiCorp has over-estimated the rate of increase in the PTC per kWh rate over the 2020 – 2029 timeframe.

Q. What risks underlie the quantity risk?

A. The quantity risk is that actual capacity factors or generated electricity after repowering are less than PacifiCorp included in its analyses. This can result from multiple causes, including higher hours of curtailment to minimize avian impacts, wake losses[120] that are greater than forecasted, higher than expected hours of unplanned outages, and other issues that result in less generation after repowering than was forecasted.

Q. What has PacifiCorp done to mitigate the quantity risk?

A. PacifiCorp worked with consultant Black & Veatch to derive "precise estimates of the energy production expected from repowering,"[121] using the Company's extensive data history involving the wind resources to be repowered.

PacifiCorp states that the estimates of increased generation from repowering are likely conservative, as they do not include expected improvements in operational availability following repowering.[122] PacifiCorp states that it will

---

[120] PacifiCorp describes this type of loss at Exhibit PAC/200 Hemstreet/13 as "the reduction in generation at turbines downwind of other turbines due to reduced wind speed and increased turbulence in the airflow behind a turbine."

[121] Exhibit PAC/13 Hemstreet/13.

[122] Exhibit PAC/200 Hemstreet/14.

enter into service agreements with GE and Vestas that include performance guarantees and incentives “that are likely to result in more availability and generation than PacifiCorp has achieved in the past under similar wind conditions.”[123]

Q. Does Staff find the wind repowering projects PacifiCorp proposes in this proceeding to by prudent?

A. Yes. While Staff finds these projects to be prudent, they are driven by economic considerations and are not need-based, as discussed above and also in Issue 1. As such, the Commission’s Order acknowledging PacifiCorp’s wind repowering projects includes that cost recovery may be conditioned or limited to ensure customer benefits remain at least as favorable as IRP planning assumptions.[124]

Q. What recommendations do you have that ensure customers are protected from both the pre-COD and post-COD risks?

A. Staff has multiple recommendations with respect to conditions and limitations related to the wind repowering projects included in this filing. Recall the Commission’s language in Order No. 18-138 included that “[r]ecovery may be conditioned or limited to ensure customer benefits remain at least as favorable [to customers] as IRP planning assumptions.” The Commission acknowledged Action Items related to PacifiCorp’s Energy Vision 2020 projects “…only insofar as customers do not bear the risk of construction cost

[123] Exhibit PAC/200 Hemstreet/14.

[124] Page 19 of Order No. 18-138 in Docket No. LC 67.

overruns, delays or other factors that impact PTC value, or project costs and expected capacity factors that are less favorable than the assumptions presented in the IRP." The Commission's language also included that "…recovery may be structured to hold PacifiCorp to the cost and benefit projections in its analysis."[125]

1. Staff recommends the Commission require a signed affidavit from PacifiCorp's (or Pacific Power's or Rocky Mountain Power's) Chief Executive Officer attesting to each wind repowering project in this proceeding having been placed in service and in commercial operation on or prior to its respective rate effective date. Staff has recommended similar requirements in previous proceedings,[126] and doing so in this context seems warranted. If a project associated with the October 1 rate-effective date is not in-service on or prior to October 1, Staff proposes that the project could receive cost-recovery with the December 1 rate-effective date if it is in service and an attestation is filed prior to that time. For any project not in service prior to the December 1, 2019 rate-effective date, cost-recovery must occur in a future general rate case or RAC proceeding.
2. Staff recommends the dollar benefits of each repowering project in this proceeding continue to be included in PacifiCorp's annual TAM filing, with the benefits clearly and separately identified in each such filing.

[125] Page 19 of Order No. 18-138 in Docket No. LC 67.
[126] See, e.g., page 5 of Appendix A to Order No. 13-474 in Docket No. UE 263.

3. Because PacifiCorp proposed acquiring these resources on a basis other than of need, Staff recommends the Commission limit the dollar benefits of the repowering projects in this proceeding in such a way that PTC benefits, net of any applicable Wyoming wind tax (net PTC benefits), included in a TAM filing be no less than the net PTC benefits included in the Company's economic analyses supporting these wind repowering projects. In other words, Staff recommends the Commission—in order to protect ratepayers and in the context of the annual TAM filings—impute values of net PTC benefits that are no less than the Company included in its analyses.

Given the variation in actual net PTC benefits likely to be realized year-to-year, Staff recommends this be evaluated annually in the TAM proceeding and on a cumulative basis. Staff recommends this mechanism be implemented beginning with (forecasted) net PTC benefits for 2020 (in the 2020 TAM filing) and continuing through the 2029 TAM filing, or through the last year for which PacifiCorp will realize PTC as a result of the Company's wind repowering projects in this proceeding, whichever year is later.

For purposes of ratemaking in PacifiCorp's annual Power Cost Adjustment Mechanism (PCAM) proceedings, the benefits of the wind repowering projects in this proceeding will not be subject to any deadband, sharing, or earnings test restrictions.

Q. Please provide an example of how Staff's proposed third condition would work.

A. As an example of how Staff envisions this working, in the context of a hypothetical 2025 TAM filing, the sum of actual net PTC benefits realized in 2020, 20201, 2022, and 2023 plus the forecasted amounts for 2024 (in the 2024 TAM filing) and for 2025 (in the 2025 TAM filing) are compared with the cumulative net PTC benefits over the 2020 – 2025 (inclusive) timeframe from a specific PacifiCorp economic analysis described in the Company's Docket No. UE 352 filing (UE 352 net PTC benefits). If the cumulative actual plus forecasted net PTC benefits are less than the cumulative UE 352 net PTC benefits, as assessed for the hypothetical 2025 TAM filing, the 2025 TAM results are to include the 2025 UE 352 net PTC benefits for purposes of ratemaking. Should the inverse hold, where the cumulative actual plus forecasted net PTC benefits are greater than the cumulative UE 352 net PTC benefits, the 2025 TAM would operate as usual; i.e., the relevant 2025 TAM net PTC benefits are those forecasted for 2025.

Staff is willing to work with the Company and other Parties to this proceeding to identify a consensus economic analysis and specific set of annual net PTC benefit (as in the SO or one of the two PaR results, or some combination thereof) for Commission approval as the comparative metric to be used.

ISSUE 3, REVENUE REQUIREMENT

Q. What is the annual revenue requirement PacifiCorp requested to be in the Company's Schedule 202 (RAC) rates?

A. PacifiCorp's filing included two annual revenue requirement values, with the first having an October 1, 2019 rate effective date with a requested annual revenue requirement of $16.0 million and the second having a December 1, 2019 rate effective date with a requested annual revenue requirement of $20.8 million. The two annual revenue requirement values and rate effective dates result from two sets of WTG repowering projects the Company estimates will be completed by two different dates.[127] The total RAC annualized revenue requirement as of the December 1, 2019, second rate effective date is the sum of the two values, or $36.8 million.

Q. Which repowering projects pertain to each rate effective date?

A. The repowering projects having an expected completion date prior to and rate effective date of October 1, 2019 include Leaning Juniper, Seven Mile Hill I, Seven Mile Hill II, and Glenrock I. The December 1, 2019 rate effective date pertains to the Goodnoe Hills, High Plains, McFadden Ridge, Marengo I, and Marengo II repowering projects.[128]

Q. What inter-jurisdiction factors did PacifiCorp use to allocate costs to Oregon?

---

[127] See, e.g., Exhibit PAC/400 McDougal/3.

[128] Ibid.

A. PacifiCorp used its system generation (SG) factor to allocate all costs other than property taxes, franchise taxes, bad debt expense, resource supplier tax, and the PUC fee. Costs allocated using the SG factor represent over 90 percent of the requested annual revenue requirement. The Company allocated property tax using its Gross Plant System (GPS) factor and costs other than those allocated using the SG or GPS are treated as Oregon-specific.

The SG factor PacifiCorp used in its RAC filing has the same value as the SG factor used in its 2019 TAM filing.[129]

Q. Did PacifiCorp update the two annual revenue requirement values subsequent to the initial filing?

A. Yes. Staff identified an error in a worksheet PacifiCorp submitted with its initial filing that included the Company's calculation of its pretax rate of return (ROR). Staff submitted its Data Request 25 on March 6th related to this error and PacifiCorp submitted corrected versions of the exhibits and work papers impacted by the error as an errata filing on March 7th.[130]

Q. How did PacifiCorp's correction change the revenue requirement values?

A. The correction reduced the pretax ROR from 11.426 rate percent in the original filing[131] to the 9.244 percent rate calculated by Staff. This reduced the

---

[129] See, e.g., Exhibit Staff/100 Gibbens/20 in Docket No. UE 339.
[130] See also PacifiCorp's response to Staff Data Request 25.
[131] Exhibit PAC/404 McDougal/1.

value of annual revenue requirement on an Oregon-allocated basis associated with the October 1, 2019 rate effective date to $14.0 million and the value on an Oregon-allocated basis associated with the December 1, 2019 rate effective date to $18.2 million; i.e., the total RAC annualized revenue requirement, using rounded values and on an Oregon-allocated basis, was reduced by $4.5 million to $32.2 million.[132]

Q. Your Issue 2 discussion above includes an estimated wind repowering benefit included in the 2019 TAM of $7.7 million and PacifiCorp is requesting $32.2 million in annualized revenue requirement. How do these values relate to Figure 3 (above), which did not include a higher annual revenue requirement—wind repowering costs exceed benefits—versus the status quo as a result of the wind repowering projects until at least 2029?

A. This results from the two values applying to two different timeframes. The $32.2 million is a 12-month "run-rate" amount; i.e., the annualized revenue requirement after both the October and the December RAC rates are in effect. The monthly equivalent of the annual revenue requirement effective on October 1—for three months—plus the monthly equivalent of the annual revenue requirement effective on December 1st—for one month— is $5.0 million. Staff considers this later value, when compared with the $7.7 million in wind repowering benefits in the 2019 TAM, adequately

[132] Corrected Exhibit PAC/401.

validates the general result depicted in Figure 3 for calendar 2019; i.e., that wind repowering benefits exceed costs. Staff does note, however, that the $7.7 million in wind repowering benefits in the 2019 TAM assumed in-service dates for individual wind repowering projects that are different than PacifiCorp assumes in their RAC filing.[133]

Q. What are the total gross plant additions proposed by PacifiCorp in this proceeding and how are these amounts calculated?

A. The Company is proposing the following capital investments[134] to be included in customer rates:

- RAC Effective Date October 1, 2019 - $358.157 million dollars
- RAC Effective Date December 1, 2019 - $469.155 million dollars

PacifiCorp used a 13 month average of projected plant balances in calculating these amounts, covering September 2019 through September 2020 for the October 1 rate effective date and November 2019 through November 2020 for the December 1 rate effective date.

Q. Are capital additions embedded within the 13 month average for the October 1 rate effective date?

A. Yes. PacifiCorp projects an average monthly plant balance of $358.060 million from September 2019 through June 2020 escalating to $358.483 million from July 2020 through September 2020.

---

[133] See; e.g., the in-service dates in Confidential Exhibit PAC/204 Hemstreet/1 versus those in Table 2 of Exhibit AWEC/100 Mullins/8 in Docket No. UE 339.

[134] Corrected Exhibit PAC/401.

Q. Are capital additions embedded in the 13 month average for the December 1 rate effective date?

A. Yes, the Company is projecting an average monthly plant balance of $468.772 million from November 2019 through June 2020 escalating to $469.768 million from July 2020 through November 2020.

Q. Did Staff inquire regarding the nature of the projected increases in July 2020 and the Company's rationale for including them in the 13 month average?

A. PacifiCorp's response to Staff Data Request 25e stated that "[t]hese capital amounts included in July 2020 are for projected on-going capital additions associated with operation of the repowered wind projects."

PacifiCorp's response to Staff Data Request 25f stated that:

> "The company included these capital additions in rate base as part of an overall approach to reflect the average monthly net rate base during the twelve month test period. Including capital additions in rate base while concurrently reducing rate base each month by increasing amounts of accumulated depreciation deductions and calculating a 13-month average rate base is a balanced approach to determining the average investment that a rate of return should be applied to."

Q. What does Staff recommend regarding the July 2020 additions to gross plant?

A. Staff finds that these costs must be removed and rates resulting from the revised investment levels must be revised, as these investments will not be used and useful as of the rate-effective date. Staff recommends Commission approval of gross plant in the amount of $358.060 million and $468.772 million for the October 1, 2019 and December 1, 2019 rate effective dates, respectively.

Q. What impacts do these two adjustments to rate base have on annual revenue requirement?

A. The annual revenue requirement on an Oregon-allocated basis associated with the October 1, 2019 rate effective date is reduced by $3 thousand and the annual revenue requirement associated with the December 1, 2019 rate effective date is reduced by $11 thousand.

Q. You cite, in your discussion of Issue 2, PacifiCorp's stated assumption that its economic analysis of wind repowering assumes "...PacifiCorp will fully recover the unrecovered investment in the original equipment on existing wind resources and earn its authorized rate of return on the unrecovered balance over the remainder of the original 30-year depreciable life of each repowered wind facility."[135] What is the dollar value of the unrecovered investment?

A. Per PacifiCorp's confidential response to Staff Data Request 22 part e, the dollar value of the unrecovered investment is approximately **[Begin Confidential]** [redacted] **[End Confidential]** on a system basis as of December 31, 2017. Staff's estimate of the amount in PacifiCorp's rate base

[135] Page 14 of the July 28, 2017 Update in Docket No. LC 67. See also Exhibit PAC/300 Link/16 – 17. Staff discusses this in the discussion of Issue 3, Revenue Requirement.

reflecting the June 1, 2014 rate effective date of the Company's last general rate case (i.e., the amount in current rates)[136] is approximately **[Begin Confidential]** [redacted] **[End Confidential]** on a system basis, with approximately **[Begin Confidential]** [redacted] **[End Confidential]** associated with the repowered wind resources having an October 1, 2019 rate effective date and approximately **[Begin Confidential]** [redacted] **[End Confidential]** associated with the repowered wind resources having a December 1, 2019 rate effective date.

Allocating these values using the system generation (SG) factor used in PacifiCorp's last general rate case[137] results in values of approximately **[Begin Confidential]** [redacted] **[End Confidential]** and **[Begin Confidential]** [redacted] **[End Confidential]**, respectively, on an Oregon-allocated basis.

Q. Does Staff recommend a revenue requirement adjustment related to the "unrecovered balance" in the replaced equipment?

A. Yes. Staff recommends PacifiCorp's rates in Schedule 202 reflect the removal of return on plant that is no longer in service because it has been removed as part of the repowering project. Although Staff understands that this proceeding is not intended to true-up PacifiCorp's rate base, Staff finds that requiring ratepayers to pay both the return of and the return on removed plant

[136] Docket No. UE 263.

[137] Page 10.2 of Exhibit PAC/1002 in Docket No. UE 263.

to be unfair, simply because PacifiCorp's request for rate recovery is occurring in the RAC and not a general rate case.

Staff recommends the Commission adjust the revenue requirement in this proceeding downward to offset the amount of annual revenue requirement associated with PacifiCorp's return on the removed equipment that is in current base rates. Staff estimates this as approximately **[Begin Confidential]** [redacted] **[End Confidential]** in annual revenue requirement associated with the repowered wind resources having an October 1, 2019 rate effective date and approximately **[Begin Confidential]** [redacted] **[End Confidential]** in annual revenue requirement associated with the repowered wind resources having a December 1, 2019 rate effective date.

Q. What does the depreciation expense component of the requested revenue requirement in this filing represent?

A. PacifiCorp states in testimony that the depreciation expense shown in Exhibit PAC/401 represents the increased depreciation expense associated with the incremental capital investment placed in service due to repowering."[138]

Q. What depreciation rates did PacifiCorp say the Company used to calculate depreciation expense in its RAC filing?

A. PacifiCorp asserted that "[t]he depreciation expense included in the RAC has been calculated using currently approved depreciation rates."[139]

[138] Exhibit PAC/400 McDougal/6.

[139] Exhibit PAC/400 McDougal/7.

Q. Did PacifiCorp use the currently approved depreciation rates; i.e., those approved in Order No. 13-347 in Docket No. UM 1647?

A. No. PacifiCorp did not use approved depreciation rates that were derived from the survivor curve-projection life and net salvage rates by FERC accounts. The Company's revised response to Staff Data Request 1 stated that:

> "The method for calculating depreciation in this proceeding, docket UE 352, was not based on a depreciation study approach that included the items described above. Because these are new projects the depreciation for wind turbine repowering was calculated for each project as described below:
>
> (a) The initial capital cost of repowering plus estimated 2049 removal costs of $30,000 per wind turbine generator (WTG) in 2018 dollars (2018$), is depreciated straight-line over the 30-year useful life of wind facilities from the date of repowering.
>
> (b) On-going capital additions are depreciated straight-line over the remainder of the original 30-year useful life of wind facilities from the date of repowering.[140]
>
> (c) Depreciation associated with pre-repowering investments is not included."[141]

[140] See the discussion of the "on-going capital additions" below, with respect to rate effective dates of October 1, 2019 and December 1, 2019.

[141] See Exhibit Staff/102.

Q. Does Staff concur with the use of the values PacifiCorp included in its revised response to Staff Data Request 1 for purposes of this filing?

A. Staff concurs with PacifiCorp's use of a 30-year depreciable life for purposes of calculating revenue requirement in this proceeding. Staff continues to investigate the potential implications of PacifiCorp's statement that the "…estimated 2049 removal costs of $30,000 per wind turbine generator (WTG)…" are stated in 2018 dollars.

Q. What additional information did PacifiCorp provide in Corrected Exhibits PAC/401 McDougal/1, PAC/402 McDougal/1-2, and PAC/403 McDougal/1 – 2?

A. PacifiCorp included a footnote in each of these exhibits: "[a]s stated in testimony, actual depreciation expense will be adjusted by the impact of the retired assets until the next depreciation study." Staff searched the Company's filing using key words "actual depreciation" and the only locations where this term appears is apparently in the specified exhibits. This is also true for the term "retired assets."

Q. Does the depreciation expense in the revenue requirement requested in this filing reflect any adjustment for the equipment replaced in the repowering projects?

A. It does not per PacifiCorp, as the Company says that "[t]he asset value of the replaced wind plant is addressed in the 2018 Depreciation Study filed in docket UM 1968."[142] PacifiCorp's February 2018 economic analysis assumes the Company "will fully recover the unrecovered investment in the original equipment and earn its authorized rate of return on the unrecovered balance over the 30-year depreciable life of each repowered facility."[143]

Q. Do you propose any other adjustment to PacifiCorp's requested revenue requirement related to depreciation expense or reserves?

A. Not at this time. PacifiCorp filed a depreciation study on September 13, 2018 in Docket No. UM 1968. The Company's motion to hold the depreciation proceeding in abeyance and to suspend its initial procedural schedule, with Staff supporting the motion, was granted on February 15, 2019.

Q. Do you propose any other adjustment to PacifiCorp's requested revenue requirement?

A. Staff notes that the Company has assumed no salvage value for the removed equipment.[144] Staff recommends the annual revenue requirement in this proceeding be reduced to offset that associated with the ongoing net salvage accrual in current rates for the equipment removed as a result of the repowering projects. To not include such an offset in rates resulting from this proceeding means that PacifiCorp will continue accruing a net salvage value for equipment that—as of the effective dates if not sooner—is no longer in service and has already been "removed."

---

142 Exhibit PAC/400 McDougal/7.

143 Exhibit PAC/300 Link/16 – 17.

144 Exhibit PAC/200 Hemstreet/27.

Staff estimates the amounts of the (negative) offset to the annual revenue requirements resulting from this proceeding as approximately **[Begin Confidential]** [redacted] **[End Confidential]** associated with the repowered wind resources having an October 1, 2019 rate effective date and approximately **[Begin Confidential]** [redacted] **[End Confidential]** associated with the repowered wind resources having a December 1, 2019 rate effective date. As with other aspects of the current RAC revenue requirement, this will presumably be accounted for in PacifiCorp's next general rate case and the related depreciation study in Docket No. UM 1968. Table 9 identifies each proposed Staff adjustment to annual revenue requirement and its value for each of the two rate effective dates.

Table 9 shows PacifiCorp's requested annual revenue requirement values, Staff's recommended adjustments, and Staff's recommended annual revenue requirement values.

Q. Do you have a recommendation regarding PacifiCorp's proposed housekeeping edits to Schedule 202?

A. Staff recommends the Commission approve PacifiCorp's proposed housekeeping edits to Schedule 202, to remove the reference to SB 408 due to that legislation being superseded by SB 967 in 2011.

[Begin Confidential]

Table 9: Staff Adjustments to Annual Revenue Requirement

($Thousands)

	October 1, 2019 Effective Date	December 1, 2019 Effective Date
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[End Confidential]

[145] These values reflect those included in PacifiCorp's errata filing of March 7, 2019.

[146] The "Correct PUC Fee Omitted" Staff adjustments are to correct a formula error in Corrected Exhibit PAC/401, which omitted the PUC Fee amounts in the total annual revenue requirement calculations. These "adjustments" in Table 9 are otherwise not discussed in Staff's testimony.

ISSUE 4, RATE SPREAD AND RATE DESIGN

Q. Did you verify PacifiCorp's calculations regarding rate spread and rate design.

A. Staff replicated PacifiCorp's calculation results in Exhibit PAC/501, which provided the rates in the revised Schedule 202 (Renewable Adjustment Clause) having an effective date of October 1, 2019.

Q. Did PacifiCorp appropriately develop the rate spread between customer types and correctly calculate per KWh rates?

A. Yes, subject to Staff completing its assessment of PacifiCorp's claim that direct access customers receive the same RAC benefits as do the cost-of-service industrial customers, and should pay the same per kWh RAC rates as a result.[147] Staff will be in a better position to make this assessment after receipt of PacifiCorp's response to Staff data requests not received as of the date this filing was prepared.[148]

Q. What does Staff recommend regarding PacifiCorp's proposal to change the applicability of the RAC schedule to include direct access customers?

A. Staff recommends the Commission approve PacifiCorp's proposal to change the applicability of the RAC schedule to include direct access customers.

---

[147] Exhibits PAC/100 Lockey/5 and PAC/500 Ridenour/3.

[148] Staff Data Requests 26 – 28, with an April 1, 2019 response due date.

SUMMARY OF RECOMMENDATIONS

Staff's testimony includes the following recommendations. Recommendations 1 – 3 are from the discussion regarding Issue 2, Wind Repowering Costs, Benefits, and Risk; recommendations 4 – 7 are from the discussion regarding Issue 3, Revenue Requirement; and recommendation 8 is from the discussion regarding Issue 4, Rate Spread and Rate Design.

1. Staff recommends the Commission require a signed affidavit from PacifiCorp's (or Pacific Power's or Rocky Mountain Power's) Chief Executive Officer attesting to each wind repowering project in this proceeding having been placed in service and in commercial operation on or prior to its respective rate effective date. Staff has recommended similar requirements in previous proceedings,[149] and doing so in this context seems warranted. If a project associated with the October 1 rate-effective date is not in-service on or prior to October 1, Staff proposes that the project could receive cost-recovery with the December 1 rate-effective date if it is in service and an attestation is filed prior to that time. For any project not in service prior to the December 1, 2019 rate-effective date, cost-recovery must occur in a future general rate case or RAC proceeding,

[149] See, e.g., page 5 of Appendix A to Order No. 13-474 in Docket No. UE 263.

2. Staff recommends the dollar benefits of each repowering project in this proceeding continue to be included in PacifiCorp's annual TAM filing, with the benefits clearly and separately identified in each such filing.
3. Because PacifiCorp proposed acquiring these resources on a basis other than of need, Staff recommends the Commission limit the dollar benefits of the repowering projects in this proceeding in such a way that PTC benefits, net of any applicable Wyoming wind tax (net PTC benefits), included in a TAM filing be no less than the net PTC benefits included in the Company's economic analyses supporting these wind repowering projects. In other words, Staff recommends the Commission—in order to protect ratepayers and in the context of the annual TAM filings—impute values of net PTC benefits that are no less than the Company included in its analyses.

   Given the variation in actual net PTC benefits likely to be realized year-to-year, Staff recommends this be evaluated annually in the TAM proceeding and on a cumulative basis. Staff recommends this mechanism be implemented beginning with (forecasted) net PTC benefits for 2020 (in the 2020 TAM filing) and continuing through the 2029 TAM filing, or through the last year for which PacifiCorp will realize PTC as a result of the Company's wind repowering projects in this proceeding, whichever year is later.

   For purposes of ratemaking in PacifiCorp's annual Power Cost Adjustment Mechanism (PCAM) proceedings, the benefits of the wind repowering projects in this proceeding will not be subject to any deadband, sharing, or earnings test restrictions.

4. Staff recommends Commission approval of gross plant in the amount of $358.060 million and $468.772 million for the October 1, 2019 and December 1, 2019 rate effective dates, respectively, reflecting Staff's reductions for investments made subsequent to the rate effective date.

5. Staff recommends PacifiCorp's rates in Schedule 202 reflect the removal of return on plant that is no longer in service because it has been removed as part of the repowering project. Although Staff understands that this proceeding is not intended to true-up PacifiCorp's rate base, Staff finds that requiring ratepayers to pay both the return of and the return on removed plant to be unfair, simply because PacifiCorp's request for rate recovery is occurring in the RAC and not a general rate case.

6. Staff recommends the annual revenue requirement in this proceeding be reduced to offset that associated with the ongoing net salvage accrual in current rates for the equipment removed as a result of the repowering projects. To not include such an offset in rates resulting from this proceeding means that PacifiCorp will continue accruing a net salvage value for equipment that—as of the effective dates if not sooner—is no longer in service and has already been "removed."

7. Staff recommends the Commission approve PacifiCorp’s proposed housekeeping edits to Schedule 202, to remove the reference to SB 408 due to that legislation being superseded by SB 967 in 2011.

8. Staff recommends the Commission approve PacifiCorp’s proposal to change the applicability of the RAC schedule to include direct access customers.

Q. Does this conclude your testimony?

A. Yes.

CASE: UE 352
WITNESS: STEVE STORM

PUBLIC UTILITY COMMISSION
OF
OREGON

STAFF EXHIBIT 101

Witness Qualification Statement

April 2, 2019

WITNESS QUALIFICATION STATEMENT

NAME	Steve Storm
EMPLOYER	Public Utility Commission of Oregon
TITLE	Senior Economist
ADDRESS	201 High Street SE, Suite 100 Salem, OR 97301
EDUCATION	MBA; University of Oregon; Eugene, Oregon AB (Economics); Harvard University; Cambridge, Massachusetts

EXPERIENCE I have been recently employed by the Public Utility Commission of Oregon since October 2018 as a Senior Economist. I was previously employed by the Commission as a Senior Economist 2007-2008, as the Program Manager of the Economic and Policy Analysis section 2008-2012, and as an Economist 4 2012-2013. My responsibilities have included performing as well as leading a team of analysts performing economic and financial research and providing technical support on a wide range of policy issues involving electric, natural gas, and telecommunications utilities. I have testified before the Commission on policy and technical issues in multiple dockets.

I have over 35 years of professional experience performing and directing the performing of economic, financial, and other quantitative analysis.

I was employed by NW Natural as a Senior Economist in its IRP team 2013-2018, with responsibilities that included customer and industrial load forecasting; performing cost of service and related financial analysis on a variety of infrastructure projects and alternatives; and preparing quarterly economic information for executive communications.

I was a self-employed financial planner for eight years following an 18 year career in management positions responsible for pricing and cost analysis; financial analysis, planning and management; and strategic planning in the publishing and telecommunications industries. I managed the pricing and cost accounting functions for Pacific Northwest Bell's Directory department and its successor company, US WEST Direct, for five years. I managed the departmental budgeting and management reporting functions at US WEST Direct for three years and had seven years management experience in capital budgeting, financial analysis, and strategic planning functions at US WEST Communications. I managed the corporate financial planning, analysis, and management reporting functions for one year at Electric Lightwave.