

# PacifiCorp - Stakeholder Feedback Form

## 2019 Integrated Resource Plan

PacifiCorp (the Company) requests that stakeholders provide feedback to the Company upon the conclusion of each public input meeting and/or stakeholder conference calls, as scheduled. PacifiCorp values the input of its active and engaged stakeholder group, and stakeholder feedback is critical to the IRP public input process. PacifiCorp requests that stakeholders provide comments using this form, which will allow the Company to more easily review and summarize comments by topic and to readily identify specific recommendations, if any, being provided. Information collected will be used to better inform issues included in the 2019 IRP, including, but not limited to the process, assumptions, and analysis. In order to maintain open communication and provide the broader Stakeholder community with useful information, the Company will generally post all appropriate feedback on the IRP website unless you request otherwise, below.

Date of Submittal 7/23/2019

\*Name: Rose Anderson

Title: Utility Analyst

\*E-mail: Rose.anderson@state.or.us

Phone: 503.378.8718

\*Organization: Oregon Public Utility Commission

Address: Click here to enter text.

City: Click here to enter text. State: Click here to enter text. Zip: Click here to enter text.

Public Meeting Date comments address: 6/21/2022  Check here if not related to specific meeting

List additional organization attendees at cited meeting: Click here to enter text.

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**\*IRP Topic(s) and/or Agenda Items:** List the specific topics that are being addressed in your comments.  
Coal, transmission, storage.

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Check here if any of the following information being submitted is copyrighted or confidential.

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Check here if you do **not** want your Stakeholder feedback and accompanying materials posted to the IRP website.

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**\*Respondent Comment:** Please provide your feedback for each IRP topic listed above.

Since PacifiCorp's June 20-21 IRP meeting, Oregon Staff have conducted a detailed review of the company's presentation. Oregon Staff appreciates the significant effort of the company's IRP team and its consistent engagement with stakeholders. Nonetheless, Oregon Staff requests the company use this additional time prior to filing the IRP in October to restore stakeholder confidence in the modeling process and to address what staff has identified as deficiencies in the modeling provided to date through additional portfolio analysis on coal retirements, transmission options, and storage.

### Part 1. Coal Study Analysis

PacifiCorp should follow a proper sequence in building its portfolios to allow stakeholders to see that the coal study informs the IRP portfolios, as presented in PacifiCorp's December 2018 portfolio matrix.

1. OPUC Staff refers to PacifiCorp's LC 70 Compliance Filing from October 2, 2018  
<https://edocs.puc.state.or.us/efdocs/HAD/lc70had154010.pdf>

\* Required fields

as well as PacifiCorp's September 28, 2018 Portfolio Development Matrix.

[http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Integrated\\_Resource\\_Plan/2019\\_IRP/2019\\_IRP\\_Portfolio\\_Dev\\_Matrix.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2019_IRP/2019_IRP_Portfolio_Dev_Matrix.pdf)

These documents show that PacifiCorp was to identify economic early retirements, and that, "results from the coal study will be used to develop additional retirement scenarios that consider Regional Haze compliance alternatives in the subsequent portfolio development process in the 2019 IRP." This spring, OPUC Staff believed that PacifiCorp was in the process of building portfolios following the sequence described in PacifiCorp's December 2018 portfolio matrix. However, in May, PacifiCorp deviated from its portfolio development matrix, stating on page 3 of its presentation that "portfolios that capture regional haze compliance scenarios and alternative economic retirement assumptions relative to those assumed in Case C-42 from the coal studies may provide greater benefits for PacifiCorp's customers."

[http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Integrated\\_Resource\\_Plan/2019\\_IRP/2019\\_IRP\\_Portfolio\\_Dev\\_Matrix.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2019_IRP/2019_IRP_Portfolio_Dev_Matrix.pdf)

What resulted were portfolios with Gadsby units retiring and Naughton 3 converting to natural gas, options that added additional variables and complexity to the modeling. This added complexity is one reason Staff is requesting additional portfolio analysis in the 2019 IRP.

Additionally, PacifiCorp did not systematically apply the top ranked coal study portfolio (C-35 in the June presentation) to a Regional Haze (RH) reference case, a Regional Haze intertemporal case (such as the 2017 IRP Update preferred portfolio), a Naughton small gas conversion, and a Naughton large gas conversion, as contemplated in the December 2018 portfolio development matrix. The portfolio tree that PacifiCorp based on one stacked portfolio from the coal study, C-42, did not consider the possibility of retiring only one Jim Bridger unit, an outcome which PacifiCorp retroactively found to be a characteristic of the most cost-effective coal portfolio after correcting certain errors in the analysis.

- OPUC Staff requests that PacifiCorp present portfolio analysis in the sequence that was described in the December 2018 Portfolio Development Matrix. If PacifiCorp cannot sequence its IPR portfolios so that they begin with the top-performing coal study, then it should at least thoroughly explain why a family tree begins with a given "parent", and how that parent compares to the top portfolio from the coal study and increases the benefits identified in the coal study.

#### **PacifiCorp Response:**

The referenced statement on slide three of the May 20-21, 2019 public-input meeting presentation (May 2019 Presentation) does not indicate that PacifiCorp deviated from its plan as summarized in the October 2, 2018 LC 70 compliance filing (October 2018 Compliance Filing) and the September 28, 2018 portfolio-development matrix (September 2018 Matrix). The referenced statement on slide three of the May 2019 Presentation is a summary statement to highlight findings based on the portfolio-development results that were available at that time. Those portfolio-development results were discussed in more detail later in the presentation and were produced in a way that is consistent with the October 2018 Compliance Filing and the September 2018 Matrix.

The October 2018 Compliance Filing addresses how the coal studies were to inform the portfolio-development process. This is schematically summarized in slide four of the October 4, 2018 workshop presentation (October 2018 Workshop Presentation), which was attached to the October 2018 Compliance Filing. The left side of this

schematic shows that early closure assumptions from the coal studies would be evaluated along with alternative regional haze compliance scenarios and other coal unit retirement assumptions. The right side of this schematic shows that coal retirement scenarios considering regional haze compliance and other retirement assumptions would then be analyzed among a range of other planning uncertainties (*i.e.*, carbon dioxide (CO<sub>2</sub>) policy assumptions, market prices, Energy Gateway transmission, etc.). Note, that this slide also states that once initial model results are available, that additional portfolios may be developed. This statement is intended to recognize that the initial model results may tell us something that merits further analysis and that there may be other cases that the company or other stakeholders would like to see evaluated.

The September 2018 Matrix sets forth modeling cases that are consistent with the schematic shown on slide four of the October 2018 Workshop Presentation. For instance, cases P-01 through P-04, P-06, and P-08 in the September 2018 Matrix focus on regional haze compliance alternatives. Cases P-05, P-07, and P-09 in the September 2018 Matrix overlay regional haze compliance scenarios with findings from the coal studies. Case P-10 in the September 2018 Matrix represents a retirement case, focused on Colstrip 3&4, which addresses a request to analyze early retirement dates for these assets as requested by the Washington Utilities and Transportation Commission in its 2017 Integrated Resource Plan (IRP) acknowledgement letter. This structure is consistent with the schematic on slide four of the October 2018 Workshop Presentation.

The May 2019 Presentation summarizes the portfolio-development cases on slides 18 through 20. While there are additional portfolio-development cases summarized in these slides, PacifiCorp developed cases that are consistent with those summarized in the September 2018 Matrix. The table below summarizes the relationship between cases in the May 2019 Presentation and the September 2018 Matrix.

<b>Description from September 2018 Matrix</b>	<b>September 2018 Matrix Case Number</b>	<b>May 2019 Presentation Case Number</b>
Regional Haze Reference <sup>1</sup>	P-01	P-02
Regional Haze Intertemporal <sup>1,2</sup>	P-02	P-03
Naughton 3 Small Gas Conversion	P-03	P-08
Naughton 3 Large Gas Conversion	P-04	P-09
Economic Retirement 1	P-05	P-10
Cholla 4 Retirement	P-06	P-11
Economic Retirement 2 <sup>3</sup>	P-07	P-10
Bridger 1&2 SCR	P-08	P-13
Economic Retirement 3 <sup>4</sup>	P-09	n/a
Colstrip 3&4 Early Retirement <sup>5</sup>	P-10	n/a
Economic Retirement 3 <sup>5</sup>	P-11	n/a
Retire All Coal by 2030	P-12	P-15
No CO <sub>2</sub>	P-13	P-16
High CO <sub>2</sub>	P-14	P-17
Social Cost of Carbon	P-15	P-18
Low Gas	P-16	P-19
High Gas	P-17	P-20
Limited FOTs	P-18	P-21
Energy Gateway 1	P-19	P-22
Energy Gateway 2	P-20	P-23
Energy Gateway 3	P-21	P-24
Energy Gateway 4	P-22	P-25
Bundled EE by Capacity	P-23	P-27
Other	P-XX	P-01 P-04 P-05 P-06 P-07 P-12 P-26

\* Required fields

		P-28 P-29
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<sup>1</sup> Colstrip 3&4 were anticipated to be modeled assuming a 2046 retirement date in the September 2018 Matrix; however, considering the ownership structure of these assets and the ultimate passage of SB 5116 in Washington, it was increasingly unlikely that these generating units would operate through 2046. Consequently, the early retirement date assumed in the May 2019 Presentation was accelerated to 2027. Similarly, based on on-going discussion with joint owners of the Craig plant, PacifiCorp accelerated the assumed retirement date of Craig 2 from 2034 to 2026.

<sup>2</sup> In the May 2019 Presentation, Cholla 4 is assumed to retire in 2025 instead of 2020, as was assumed when preliminarily defining this case in the September 2018 Matrix. This update was implemented to maintain consistency with the Regional Haze reference case, recognizing that an alternative case that assumes Cholla 4 would retire in 2020 would be studied in a different case (Case P-11 from the May 2019 Presentation).

<sup>3</sup> Case P-07 from the September 2018 Matrix, contemplated applying coal retirement assumptions from the coal study (*i.e.*, early closure of Naughton 1&2 and Jim Bridger 1&2 in 2022) among the least-cost case among those cases that considered alternative retirement dates for Cholla 4 (2020 vs. 2025). Based on modeled results from the May 2019 Presentation, Case P-11 (2020 retirement for Cholla 4) was lower cost than Case P-09, suggesting that the coal study assumptions should include an assumption that Cholla retires in 2020. This combination was already captured in Case P-10, which assumes Cholla 4 retires in 2020.

<sup>4</sup> When the September 2018 Matrix was developed, PacifiCorp did not have coal study results or results from any of the other portfolio-development cases. With an assumed early retirement of Jim Bridger 1&2 from the coal study results known by May 2019, it was not necessary to apply an assumed 2022 retirement for Jim Bridger 1&2 to a case that includes installation of selective-catalytic reduction equipment on these units.

<sup>5</sup> As explained in footnote 1 above, PacifiCorp accelerated its assumed retirement date for Colstrip 3&4 from 2046 to 2027, and therefore had already satisfied the Washington Utilities and Transportation Commission’s request to perform a study reflecting a 2027 early closure date making this additional case moot for the May 2019 Presentation.

In the May 2019 Presentation, PacifiCorp added Case P-01, which is identical with regard to coal retirement assumptions as the benchmark case used in the coal studies (Case C-01). This was done so that stakeholders could compare results from the portfolio-development phase in a way that is consistent with how economic results from the coal studies were presented. Importantly, the benchmark case does not represent PacifiCorp’s “baseline” plan as it relates to assumed retirement dates for its fleet of coal resources. The benchmark case was administratively established during the 2017 IRP acknowledgement process that set forth the requirement to produce coal studies and present those findings to stakeholders and the commission by the end of June 2018.

In addition to the benchmark case, PacifiCorp also added Case P-04, which is identical with regard to coal retirement assumptions as the most economic retirement scenario from the coal studies (Case C-42), based on data known and available to PacifiCorp at that time. This was done so that stakeholders could directly see how that case compares to other cases being developed for the 2019 IRP.

PacifiCorp also added Case P-05, P-06, P-07, and P-12 to explore whether there might be economic benefits associated with retiring Gadsby 1-3. This concept arose through internal discussions to test whether a Naughton 3 gas conversion could leverage economies of scale relative to the operating costs of similar units (Gadsby 1-3) if Naughton 1-2 continued to operate beyond 2022. This assumption was tested among several different sets of coal retirement assumptions.

Case P-26 was added when the company realized it did not include a standalone Boardman-to-Hemmingway transmission case in the original September 2018 Matrix. P-28 was added to test an even earlier closure date for Colstrip 3&4, and Case P-29 was added to evaluate portfolio cost and risk impacts if new natural gas resources were not allowed, consistent with stakeholder feedback received in earlier public-input meetings. Additional cases were developed based on results of on-going modeling work and in response to stakeholder feedback at the May 2019 public-input meeting. These cases were presented and summarized at the June 2019 public-input meeting.

Please note that the May 2019 Presentation only included model results for cases P-01 through P-13. The statement on slide of this presentation was simply noting that the model results completed through that point in time indicated that Case P-11 was lower cost than other cases, including cases that incorporated coal study results and cases that considered early retirement of Gadsby.

At the time of the May 2019 public-input meeting, PacifiCorp had not yet completed its reconciliation process to explain differences in Cases P-01 and P-04 relative to the parallel cases from the coal studies (Cases C-01 and C-42). By the June 2019 public-input meeting, PacifiCorp completed a reconciliation to explain why results from Cases P-01 and P-04 varied from the results presented for Cases C-01 and C-42 at the April 2019 public-input meeting, where updated stacked-retirement cases from the coal study were discussed with stakeholders. The result of this reconciliation indicated that Case C-35 may have been approximately \$3 million lower cost than Case C-42. The difference between potential benefits from Cases C-35 and C-42 from the coal studies, after accounting for adjustments resulting from the reconciliation process, are small in relation to the differences between cases P-04, which contains the same coal retirement assumptions as were in Case C-42 from the coal studies, and other coal-retirement cases discussed with stakeholders in the May and June 2019 public-input meetings.

Results summarized in the June 20-21, 2019 public-input meeting presentation materials (June 2019 Presentation) show three primary starting points for coal retirement assumptions—Case P-03 (Intertemporal Regional Haze), Case P-04 (Stacked Case C-42 from the coal studies), and Case P-06 (alternative retirement assumptions that include Gadsby 1-3). As shown on slide eight of the June 2019 Presentation, the difference between Case P-03 and P-04 is quite narrow, where Case P-03 is slightly higher cost, by approximately \$6m than Case P-04. If Case P-04 were instead modeled to replicate Case C-35 from the coal studies, the reconciliation process discussed above would indicate that Case P-03 would be approximately \$9m higher cost—not significantly different than \$6m. The difference between Case P-04 and P-06 is larger, whereby Case P-04 is approximately \$80m higher cost than Case P-06. Again, if Case P-04 were instead modeled to replicate Case C-35 from the coal studies, the reconciliation process would indicate that Case P-04 would be about \$77m higher cost—also not significantly different than the \$80m result shown in the June 2019 Presentation.

Initially, it would appear that Case P-06 shows promise relative to Case P-03 and Case P-04. However, Case P-06 includes an assumption that Naughton 3 is converted to natural gas, while Cases P-03 and P-04 assume that Naughton 3 is retired this year. Consequently, PacifiCorp analyzed the Naughton 3 gas conversion as variants of *both* Case P-03 (see Case P-09) and Case P-04 (see Case P-10). With a consistent application of Naughton 3 gas conversion assumptions, Case P-09 is lower cost than Case P-10 (by approximately \$182m) and Case P-06 (by approximately \$67m). Note, an approximately \$3m reduction in the cost of Case P-10 (a variant of P-04) would not materially change the conclusion that Case P-09 is lower cost. Importantly, a key contributor to this outcome is that Case P-10 (and Case P-04) assume Naughton 1-2 retires in 2022, which significantly increases the run-rate operating cost of Naughton 3 when converted to natural gas. This would be the same if Case P-04 were recast using the retirement assumptions from Case C-35.

Based on these sizeable differences in customer benefits, PacifiCorp further explored variants off of Case P-09. This includes alternative retirement assumptions for Cholla 4 (Case P-11), where the value improved further if Cholla 4 is assumed to retire in 2020 instead of 2025. While the “parent” of Case P-11 is ultimately tied to intertemporal regional haze retirement assumptions, additional variations were modeled based on findings from the coal study, which generally indicated that early retirement of Naughton 1&2 and Jim Bridger 1&2 could provide incremental customer benefits. Consequently additional cases were developed off of Case P-11 to explore alternative combinations, again, as generally informed by findings from the coal study. Case P-30 assumes Naughton 1&2 retire in 2022. To evaluate alternative timing for Naughton, Case P-31 assumes Naughton 1-2 retire in 2025, which improves the economies of scale for the Naughton 3 gas conversion and boosts overall customer benefits. Case P-33 evaluates early closure of Jim Bridger 1&2 in 2022. Case P-34 layers in an assumed early retirement of Gadsby 1-3, and Case P-35 explicitly analyzes Jim Bridger 3&4 early closure assumptions.

\* Required fields

The most promising among each of these was Case P-31, and therefore, additional Energy Gateway studies were performed as variants of this case. Nonetheless, other Energy Gateway South Cases, which showed the most benefit among the Energy Gateway transmission cases analyzed, were evaluated as variants of other coal retirement cases to test how coal retirements might influence the value of this potential transmission investment (*i.e.*, see Cases P-36, P-43, P-23, P-37, P-38, and P-44).

- PacifiCorp should also provide an explanation of how benefits from the coal study are a foundational building block for IRP portfolios.

**PacifiCorp Response:**

Please refer to PacifiCorp’s response above. The coal studies provided a data set that sets forth the costs and benefits of potential early closure scenarios. This data set suggested that early retirement of Naughton 1&2 and Bridger 1&2, as early as 2022, could potentially provide incremental benefits for customers. This specific cases was evaluated as Case P-04, and the general conclusions of the coal study, were tested in a number of other cases with alternative early closure assumptions not bound by the rigid framework of the coal study analysis (*i.e.*, the coal studies focused on 2022 retirements, did not factor in regional haze compliance alternatives, including alternative retirement dates for Jim Bridger 1&2, gas conversion of Naughton 3, and potential alternative closure dates for Cholla 4). At minimum, the following cases, as summarized on slide eight of the June 2019 Presentation, have been informed by the general findings from the coal studies: P-04, P-05, P-10, P-16, P-19, P-37, P-32, P-14, P-30, P-31, P-33, P-34, P-35, P-22, P-24, P-25, P-26, P-42, and P-44.

- OPUC Staff requests that PAC run new unit-by-unit 2022 retirement analysis for Jim Bridger 1, Naughton 1, Hayden 1, Hunter 1, and Craig 1 in order to provide a spot-check demonstrating the impact of all of the modeling changes and updates to the original unit-by-unit analysis.

**PacifiCorp Response:**

PacifiCorp will consider this request should time permit and notes the file date extension to October was not based on time to run additional requests but rather to correct runs that had already been completed. Should PacifiCorp not have time to complete this requested spot check before the October 18, 2019 filing date, PacifiCorp is open to working with Staff to provide supplemental information after filing the IRP.

2. PacifiCorp should provide more visibility into the supply curve for replacement resources over time such that stakeholders can better understand the point at which the cost to fill additional capacity need may outweigh the benefit of retiring resources.
  - Oregon Staff requests that PacifiCorp identify the magnitude in MWs economic early retirements that it can accomplish in the action plan window, and provide an explanation of why this is the limit of economic retirements achievable in the near-term without moving up the supply curve to more expensive replacement resources. This “tipping point” analysis would convey the relationship between magnitude and timing of least-cost retirements with incremental costs of replacement resources

**PacifiCorp Response:**

PacifiCorp does not develop resource portfolio using supply curves for new resources. Inputs to the system optimizer model (SO model) include cost and performance data for new supply-side and demand-side resources (*i.e.*, for thermal units, this includes capital costs, run-rate operations-and-maintenance costs, fuel pricing, heat rates, and emissions costs, as applicable). The SO model evaluates these costs, net of energy and capacity benefits

each resource option would bring to the system when choosing the type, timing, and location of new proxy resource additions in any given portfolio. The analysis of resource costs relative to net system benefits is performed within the model simulation and is not an external input to the analysis.

Nonetheless, PacifiCorp has discussed trends related to the level of coal retirements that generally lead to higher costs relative to other cases at the June 2019 public-input meeting when reviewing slides 11-16 of the June 2019 Presentation. Specifically, when discussing the data presented on slide 11, PacifiCorp noted that the cases where coal retirements begin to approach and exceed 2,000 megawatts (MWs) of coal retirements through 2027 tend to accelerate the timing for storage capacity (slide 12), accelerate the timing for new Class 1 demand-side management resources (slide 13), accelerate the timing for new natural gas resources (slide 14), and increase reliance on front office transactions (FOTs) within this same period. The company further explained that when these resources are accelerated, the present value of system costs are higher relative to other cases that can defer substantial investment in new resources to periods beyond 2027. Those cases that have increased coal retirements approaching or exceeding 2,000 MW through 2027 are generally among the higher cost cases summarized on slide eight. Further, and as noted on slide 14 of the June 2019 Presentation, cases that include new gas capacity as early as 2023 (Cases P-04, P-05, P-14, P-30, and P-37) are likely overstating benefits, recognizing that it is not feasible to procure new gas-fired capacity in that time frame.

3. PacifiCorp should provide clear explanations and additional analysis of Jim Bridger's (units 1&2) regional haze assumptions and the impact on optimal retirement date.

Before the coal study began, OPUC Staff understood from the 2017 IRP Update (page 74-75)

[http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Integrated\\_Resource\\_Plan/2017%20IRP%20Update/2017\\_IRP\\_Update.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2017%20IRP%20Update/2017_IRP_Update.pdf)

that there is an approx. \$83 million cost of SCR installation for Jim Bridger 1 and 2 in 2021/2022 and running the plants to 2037, compared to 2028/2032 retirements for these units with no SCR. Stakeholders disputed the feasibility of no SCR, 2028/2032 early retirement dates in PacifiCorp's 2017 Utah IRP proceeding,

<https://pscdocs.utah.gov/electric/17docs/1703516/3005351703516rao3-2-2018.pdf>

and in the OPUC's proceeding on Idaho Power's 2017 IRP (OPUC declined to acknowledge 2028/2032 for Idaho Power in Order No. 18-176). <https://apps.puc.state.or.us/orders/2018ords/18-176.pdf>

Thus, OPUC Staff has closely watched the coal study results on Jim Bridger 1 and 2, to learn whether there are cost savings achievable through retirement dates for the Jim Bridger units other than 2028/2032 (units 1 and 2) and 2037 (units 3 and 4.)

- With OPUC Order No. 18-176 in mind, OPUC Staff requests a narrative explanation of how the company will support its Regional Haze assumptions for Jim Bridger 1 and 2. What is PacifiCorp's justification for assuming a 2021 SCR installation requirement could be avoided with a 2028/2032 retirement plan?

#### **PacifiCorp Response:**

PacifiCorp has supported a variety of intertemporal Regional Haze compliance alternatives for several of its coal-fueled units in its IRP since the 2011 time frame. In short, the basis for such intertemporal Regional Haze compliance alternatives, whether assessed for Jim Bridger 1 & 2 or other PacifiCorp-owned units, has been PacifiCorp's direct experience in negotiating similar Regional Haze alternative compliance outcomes for its

Naughton 3, Cholla 4, Craig 1, and Dave Johnston 3 facilities, or as influenced by broader industry experience delivering similar Regional Haze alternative compliance outcomes for coal fueled units like Boardman and several other examples across the United States.

With respect to PacifiCorp's most recently informed planning assumptions for Jim Bridger 1 & 2, the best example of support of potential Regional Haze compliance alternatives to selective catalytic reduction system (SCR) installation on those units is the State of Wyoming, Department of Environmental Quality, Division of Air Quality's recently published proposal to approve PacifiCorp's application to implement plant-wide operational constraints at Jim Bridger in lieu of the currently prescribed SCR installations in 2021 and 2022 (PDF provided in attachment to this response). The State of Wyoming's public input period on their proposed approval of this Regional Haze compliance alternative will close with a public hearing on August 23, 2019. If approved at the state level, the proposal will be submitted to the U.S. Environmental Protection Agency for subsequent review and approval. While this compliance alternative for Jim Bridger 1 & 2 does not contemplate retirement of the units in 2028 and 2032 in lieu of SCR for environmental compliance, PacifiCorp has continued to incorporate several potential accelerated retirement dates for Jim Bridger Units 1 and 2 in its ongoing 2019 IRP coal unit economic analyses.

For background purposes, the concept behind evaluating intertemporal flexible compliance alternatives most directly originated after the 2013 IRP (LC 57), where PacifiCorp analyzed SCR requirements on Jim Bridger 3 & 4. In Order 14-252, the Public Utility Commission of Oregon (Commission) summarized parties' concerns with the coal analysis performed in LC 57, including Staff's recommendation that future studies include inter-temporal analysis. In Order 14-252, the Commission directed participants to schedule several workshops to determine the parameters of coal analyses in future IRPs. Four workshops were scheduled between June 12, 2014 and August 16, 2014 (2014 Workshops). The Commission attended the final workshop.

The 2014 Workshops focused on investment decisions falling within the 2015 IRP action plan window, which included Wyodak, Naughton 3, Dave Johnston 3, and Cholla 4. While these workshops did not establish specific scenarios for Jim Bridger 1 & 2, a critical theme among the parties was that future analyses should consider inter-temporal scenario analysis, whereby it should be assumed that near term investment decisions for capital-intensive projects like SCRs can be avoided by assuming early retirement after the deadline for installation of emission control equipment as would otherwise be required under the Regional Haze Rule and approved state and federal implementation plans.

PacifiCorp carried the concept of evaluating intertemporal tradeoff analyses for Jim Bridger 1 & 2 in the 2017 IRP (LC 67). In the 2017 IRP, PacifiCorp analyzed a range of Regional Haze alternative compliance scenarios that included the following assumptions for Jim Bridger 1 & 2:

- Jim Bridger 1 retirement in 2037 with SCR installation in 2022; Jim Bridger 2 retirement in 2037 with SCR installation in 2021
- Jim Bridger 1 retirement in 2032 (no SCR), Jim Bridger 2 retirement in 2035 (no SCR)
- Jim Bridger 1 retirement in 2024 (no SCR), Jim Bridger 2 retirement in 2028 (no SCR)
- Jim Bridger 1 retirement in 2028 (no SCR), Jim Bridger 2 retirement in 2032 (no SCR)
- Jim Bridger 1 retirement in 2032 with installation of lower cost NO<sub>x</sub> emission control equipment in 2022); Jim Bridger 2 retirement in 2037 with installation of SCR in 2021.

Analysis in the 2017 IRP showed that the intertemporal compliance alternative whereby Jim Bridger 1 & 2 was assumed to retire in 2028 and 2032 without installation of SCR was lower cost than the other scenarios evaluated.

PacifiCorp developed a bookended range of potential compliance outcomes for Jim Bridger 1 & 2 in the 2017 IRP recognizing that any given outcome assuming intertemporal tradeoffs would ultimately be determined by environmental rulemaking and negotiations with state and federal agencies, partner plant owners, and other vested



stakeholders. PacifiCorp’s economic analysis efforts in the ongoing 2019 IRP carry those principles forward, with the caveat being that the previously assessed Regional Haze compliance alternatives to SCR for Jim Bridger 1 & 2 may no longer be the driver to establishing potentially accelerated retirement dates, with unit economic analyses becoming the key driver to that decision-making process.

- PacifiCorp should put further effort into finding cost-effective portfolios using alternate retirement dates for JB 1 & 2. This should include analysis of reasonable alternate sets of JB 1 & 2 retirement dates in the 2019 IRP. For example, a portfolio with JB 1 retiring in 2024 and JB 2 retiring in 2028. This could take the form of P-03, except:
  - Cholla retires in 2020
  - Naughton 3 Large gas conversion
  - JB 1 retires in 2024, no SCR
  - Naughton 1 & 2 retire in 2025
  - JB 2 retires in 2028, no SCR

**PacifiCorp Response:**

PacifiCorp has and will continue evaluating a range of potential early retirement cases for Jim Bridger units as part of the 2019 IRP. Cases evaluated and presented to stakeholders to date (through the June 2019 public-input meeting) include early retirement scenarios for Jim Bridger units as set forth in the following table.

Cases	JB1	JB2	JB3	JB4
P-01, P-02, P-13	RET 2037 SCR 2022	RET 2037 SCR 2021	RET 2037	RET 2037
P-03, P-07, P-08, P-09, P-11, P-22, P-23, P-24, P-25, P-26, P-28, P-30, P-31, P-32, P-38	RET 2028 No SCR	RET 2032 No SCR	RET 2037	RET 2037
P-04, P-05, P-10, P-33, P-34, P-37	RET 2022 No SCR	RET 2022 No SCR	RET 2037	RET 2037
P-06, P-12, P-36, P-43	RET 2022 No SCR	RET 2032 No SCR	RET 2037	RET 2037
P-35	RET 2028 No SCR	RET 2032 No SCR	RET 2022	RET 2022
P-14	RET 2022 No SCR	RET 2022 No SCR	RET 2022	RET 2022

In addition to the cases summarized above, PacifiCorp is already planning to analyze additional cases in response to stakeholder feedback following the June 2019 public-input meeting. These cases will include the following assumptions. Each of these are planned as variants of Case P-31. Note, that the case in the first row of the table below is identical to the recommended case with the exception that it assumes Jim Bridger 1 would retire year-end 2023 instead of year-end 2024.

Cases	JB1	JB2	JB3	JB4
P-XX	RET 2023 No SCR	RET 2028 No SCR	RET 2037	RET 2037
P-XX	RET 2028 No SCR	RET 2032 No SCR	RET 2025	RET 2025
P-XX	RET 2025 No SCR	RET 2025 No SCR	RET 2028	RET 2032

\* Required fields

- Additionally, PacifiCorp should analyze a portfolio that prioritizes JB 3 & 4 retirements, since these units were also among the most cost effective to retire early in the coal study. This analysis could take the form of P-03, except:
  - Cholla retires in 2020
  - Naughton 3 Large gas conversion
  - JB 3 retires in 2024
  - Naughton 1 & 2 retire in 2025
  - JB 4 retires in 2028

**PacifiCorp Response:**

Please see the response to the question above. The case in the second row of the second table evaluates an early closure alternative for Jim Bridger 3 & 4. PacifiCorp further notes that nitrogen oxides (NO<sub>x</sub>) emissions from the Jim Bridger facility would be notably higher if Jim Bridger 3 & 4 were targeted for early closure in lieu of Jim Bridger 1 & 2 because Jim Bridger 3 & 4 already have SCRs installed.

- Staff notes that the Hunter units have some of the higher costs of PacifiCorp's coal units, in terms of average fuel cost.<sup>1</sup> PacifiCorp should consider at least one coal retirement scenario that includes early Hunter 1 retirement, or else explain why Hunter early retirement is not a cost-effective option.

**PacifiCorp Response:**

Please refer to the response above regarding the request to evaluate additional unit-by-unit studies. Further, PacifiCorp does not agree with Staff's conclusion that Hunter units have higher costs in terms of average fuel costs, as seen on Federal Energy Regulatory Commission (FERC) Form 1. These data (summarized in second PDF attachment to this response) show that Hunter in in the mid-range as it relates to fuel cost relative to other units in PacifiCorp's fleet.

- Additionally, If C-35 is still the coal portfolio with the greatest benefits after all relevant updates and corrections have been applied, Staff requests an additional portfolio with analysis of early retirement of Naughton 1 and 2 and only one Jim Bridger unit. Staff notes this could be achieved by running P-03 except:
  - Cholla retires in 2020
  - Naughton 3 Large gas conversion
  - JB 2 Retires in 2024
  - Naughton 1 and 2 retire 2025

**PacifiCorp Response:**

See the responses above. PacifiCorp plans to run a case that accelerates retirement of Jim Bridger 1 to 2023 while maintaining an early closure date that is five years later for Jim Bridger 2.

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<sup>1</sup> PacifiCorp 2016 FERC Form 1.

\* Required fields

- Explanation around the costs and benefits modeled for the Jim Bridger units is also requested, including quantification of grid services provided by the units, costs of replacement resources, and total annual energy provided by the units.

**PacifiCorp Response:**

Data showing grid services being provided by Jim Bridger units are available in the deterministic studies used to evaluate reliability for any given case. These modeled outputs will show when Jim Bridger units are providing energy, spinning reserves, non-spinning reserves, and regulation reserves for any given hour for any given case. Replacement resources can also be summarized by showing the change in the resource portfolio between any two cases. The data to prepare these results will be included on the data disks when the 2019 IRP is filed, and the company is happy to work with staff to help prepare these types of reports as the updated modeling is being finalized in advance of the October 18, 2019 filing date.

Because Jim Bridger unit retirements before 2028 showed some of the greatest potential benefits in the coal study, these alternate JB retirement portfolios would prioritize early retirement of JB units. PacifiCorp should look closely for optimal Jim Bridger unit retirement scenarios by analyzing the portfolios suggested above and any others that may increase benefits through alternate JB retirement dates.

**Part 2. Transmission Analysis**

PacifiCorp should remove any special model adjustments for Energy Gateway South, and add B2H as an option in each portfolio, to allow all transmission options to be evaluated on a comparable basis.

1. OPUC Staff is concerned that PacifiCorp has limited the transmission options available to the model such that the model may not be able to choose the optimal portfolio. PacifiCorp should add B2H to the “Transmission Integration Cost by Location and Capacity Increment” list of transmission options available to the model. The SO model should be able to select either B2H or Gateway South endogenously in any year starting with 2024 (as a surrogate for year-end 2023).
  - OPUC Staff asks that PacifiCorp remove the 2028 restriction on Gateway South, and add B2H as a transmission option, in all portfolios. On page 8 of the June public input presentation, row 5 of the blue family tree contains several different portfolios with Gateway South in different years (2023 and 2028), and OPUC Staff believes the proper approach is for the model to be able to select B2H or Gateway South in 2024 or any year thereafter.

**PacifiCorp Response:**

PacifiCorp has received this feedback and plans to endogenously model Gateway South in its updated portfolio analysis. The SO model can select endogenously from the transmission upgrade options made available to it however, certain transmission segments may include benefits to other transmission segments, such as increased transfer capability on other paths that cannot be incorporated into the modeling logic. Per the April and November 2018 public-input meeting materials and discussion, performance and topology limitations restrict the number and type of endogenous options that can be modeled. Endogenous transmission modeling has on average tripled SO model run times. Endogenous modeling can incorporate new or expanded transmission capacity between two transmission bubbles, but not between three or more bubbles. Incremental capacity that is “intra-bubble” also cannot be modeled. Some potential options have secondary impacts such as on Path-C constraints or may require three or more bubbles (this is the case with the Boardman-to-Hemingway (B2H) transmission project). Consequently, the B2H line cannot be adequately included as endogenous transmission options for model

\* Required fields

selection as the benefits and functionality of the line would be underrepresented. The net benefits and/or costs of these options are therefore assessed in separate portfolios that force the segment in the model in order for them to be fully represented.

- PacifiCorp should make visible the impact of utilizing all freed-up transmission from retired units or from reduced operations at coal units for each portfolio. At a minimum, demonstration of this modeling effect should be made available for the top portfolios.

**PacifiCorp Response:**

PacifiCorp can identify when existing transmission is being used to accommodate new resource among the top portfolios.

- OPUC Staff requests that PacifiCorp specifically demonstrate that the model is recognizing the freed-up transmission capacity at retired coal sites in the top coal study portfolios, and that those low cost replacement resources are also present in the top IRP portfolios.

**PacifiCorp Response:**

See response above.

- Please explain how the model is able to use freed-up transmission from reduced operating minimums. For example, on page 3 of the April 25, 2019 IRP Presentation, PacifiCorp states that it will conduct additional analysis for existing coal units including reduced operating minimums. Did PacifiCorp conduct this analysis and did PacifiCorp make that freed-up transmission capacity available for replacement renewable resources?

**PacifiCorp Response:**

A minimum operating limit for existing units does not free up transmission for interconnection purposes. PacifiCorp has not received updates to operating minimums for its fleet, and as such, no additional analysis reflecting alternative operating minimums has been performed.

### Part 3. Storage

PacifiCorp should run its top portfolio with a focus on near term pumped storage instead of near term battery.

1. A feedback form submitted by National Grid on February 5, 2019 suggested that PacifiCorp's method of calculating capacity factors of storage resources may be undervaluing long-duration storage such as pumped hydro.
  - To test whether long-duration storage could make PacifiCorp's portfolios more cost effective, PacifiCorp should re-run its preferred portfolio (once the preferred portfolio is determined) in PaR, except replace 100-200 MW of near-term battery storage with long-duration pumped hydro. If this results in a cost-effective reliability improvement, then PacifiCorp should develop a new portfolio around this change.

**PacifiCorp Response:**

PacifiCorp will consider evaluating this type of case. If such a case cannot be completed in advance of filing the 2019 IRP, the company will consider providing a supplemental analysis, after filing, to address this type of sensitivity.

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**Data Support:** If applicable, provide any documents, hyper-links, etc. in support of comments. (i.e. gas forecast is too high - this forecast from EIA is more appropriate). If electronic attachments are provided with your comments, please list those attachment names here.

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**Recommendations:** Provide any additional recommendations if not included above - specificity is greatly appreciated.

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Please submit your completed Stakeholder Feedback Form via email to [IRP@PacifiCorp.com](mailto:IRP@PacifiCorp.com)

Thank you for participating.