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BEFORE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF ROCKY MOUNTAIN POWER'S FILING FOR ACKNOWLEDGEMENT OF ITS 2021 INTEGRATED RESOURCE PLAN	CASE NO. PAC-E-21-19 JOINT COMMENTS OF SIERRA CLUB AND IDAHO CONSERVATION LEAGUE

Public Version

March 15, 2022

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Attachment 2	Confidential Attachment "3112 Capacity Requirements P02-MMR (CO) Intl UTWY 2031 6-17-21" to PacifiCorp Response to SC 6.1
Attachment 3	Email from Carla Scarcella, PacifiCorp to Rose Monahan, Sierra Club (Jan. 26, 2022)
Attachment 4	Confidential Attachment to PacifiCorp Response to Sierra Club Data Request 4.2 in LC 77 (included in "Attach 2-2 CONF")
Attachment 5	UE 390, Surrebuttal Testimony of Dana M. Ralston on Behalf of PacifiCorp (PAC/1200) (excerpt)
Attachment 6	Confidential PacifiCorp Response to ALJ Bench Request 1 in LC 77
Attachment 7	Confidential Attachments "OR LC-77 Attach ALJ Bench Request 1-4 CONF" to PacifiCorp Response to ALJ Bench Request 1
Attachment 8	Confidential Attachment "OR LC-77 Attach ALJ Bench Request 1-1 CONF" to PacifiCorp Response to ALJ Bench Request 1

BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF ROCKY MOUNTAIN POWER'S FILING FOR ACKNOWLEDGEMENT OF ITS 2021 INTEGRATED RESOURCE PLAN	CASE NO. PAC-E-21-19 JOINT COMMENTS OF SIERRA CLUB AND IDAHO CONSERVATION LEAGUE

JOINT COMMENTS OF SIERRA CLUB AND IDAHO CONSERVATION LEAGUE [PUBLIC VERSION]

I. Introduction and Recommendations

Sierra Club and Idaho Conservation League ("ICL") appreciate the opportunity to comment on PacifiCorp's 2021 Integrated Resource Plan ("IRP").[1] These comments were prepared with the assistance of Strategen Consulting, and they are based on a review of PacifiCorp's input assumptions and analytical approach. These comments are further informed by Sierra Club and Idaho Conservation League's active participation in PacifiCorp's 2021 IRP public input meetings and all previous PacifiCorp IRP processes going back to 2011.

As a preliminary matter, it is PacifiCorp's responsibility to demonstrate that its plans and actions are in the public interest by balancing costs and risks to customers. Unfortunately, the Company did not meet this requirement with the 2021 IRP. As our comments show, not only has the Company modeled costs, such as the take-or-pay coal contracts, in a manner that unduly favors its coal fleet, but the Company has also omitted critical information supporting its assumptions and modeling choices that are essential for stakeholders and the Commission to

[1] While Sierra Club is the primary author of these comments, ICL adopts and supports all of Sierra Club's analysis and recommendations herein.

adequately evaluate PacifiCorp's analyses and the resulting portfolios. These process and selection errors result in a resource plan that will cost customers more money and expose them to more risk inevitable carbon regulations.

As our comments show that not only has the Company modeled costs, such as the take-or-pay coal contracts, in a manner that unduly favors its coal fleet, but the Company has also omitted critical information supporting its assumptions and modeling choices that are essential for stakeholders and the Commission to adequately evaluate PacifiCorp's analyses and the resulting portfolios. These process and selection errors result in a resource plan that will cost customers more money and expose them to more risk due to inevitable carbon regulations.

The omissions throughout the IRP are significant and represent an unacceptable risk for Idaho customers. For example, (which is further described in Section II(C) below), the Company included a second nuclear plant in the P02h variant case that examines early retirement of Bridger units 3 and 4,[2] thereby adding a significant cost to that portfolio. Despite touting its "extensive public-input process," Sierra Club only learned in November 2021, through informal conversations with the Company, that the second nuclear plant was not economically selected but rather was manually forced in to the variant case to meet a reliability need; yet, neither the IRP nor any of the Company's written analyses explain the number of hours, the time of year, or the shortfall of this purported reliability need. This information was only disclosed as a result of Sierra Club's data requests. Compounding this lack of transparency, the IRP does not describe which resources the Company considered when manually filling this unquantified reliability gap

[2] Jim Bridger Units 3 and 4 Early Retirement Variant (P02h-JB3-4 Retire). PacifiCorp, *2021 Integrated Resource Plan*, Vol. I at 287-289 (Sept. 1, 2021), *available at* https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2021-irp/Volume%20I%20-%209.15.2021%20Final.pdf [hereinafter "PacifiCorp 2021 IRP Vol. I"].

or why it determined a second nuclear plant was the best fit. Sierra Club highlights this one example to demonstrate the pervasive shortcomings of this IRP, particularly its lack of transparency concerning critical assumptions and subjective decision-making that went into the analysis and undoubtedly had significant implications for each portfolio, including the preferred portfolio.

Furthermore, this IRP cannot be separated from the historic moment in which it was developed. The Intergovernmental Panel on Climate Change ("IPCC") has made clear that humanity's window to address and slow global climate change is rapidly closing. Within the next decade, society must act aggressively and decisively to eliminate its reliance on fossil fuels, and yet, PacifiCorp's customers must pay for one of the most carbon-intensive energy mixes in the country. The IPCC has stated that human-caused emissions of carbon dioxide need to fall by 45 percent from 2010 levels by 2030, reaching "net zero" emissions by 2050 in order to have a realistic chance of limiting global warming to 1.5 degrees Celsius.[3] Indeed, even PacifiCorp implicitly recognizes this necessity by modeling nonexistent "non-emitting peaker" resources; yet, the Company continues to unduly favor its coal fleet and undervalue clean, renewable resources. Unlike utilities, such as Idaho Power Company, strategically transitioning away from coal and committing to 100 percent clean energy,[4] PacifiCorp continues to describe its coal fleet as playing "a pivotal role"[5] and is one of the only major utilities to lack a climate action plan. A business-as-usual approach to electric sector energy planning will ultimately result in millions of

[3] IPCC, *Summary for Policymakers of IPCC Special Report on Global Warming of 1.5C approved by governments* (Oct. 8, 2018), *available at* https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/.
[4] *See, e.g.,* Idaho Power Company, *Clean Today, Cleaner Tomorrow*, *available at* https://www.idahopower.com/energy-environment/energy/clean-today-cleaner-tomorrow/ (last accessed Mar. 14, 2022) (Idaho Power Company initiative pledging to provide 100 percent clean energy no later than 2045).
[5] PacifiCorp 2021 IRP Vol. I at 15, 299.

Americans losing their homes and communities to what President Biden has described as a "merciless march of ever-worsening droughts and floods, more intense fires and hurricanes, longer heatwaves and rising seas."[6] In just the past few years, Idaho has experienced many of these catastrophes, including droughts, heatwaves, and mega-fires. In 2021 alone, the wildfires in the western U.S. burned an area larger than Delaware and Rhode Island combined, impacting air quality in states as far away as Vermont and Maine.[7] The recently completed Idaho Climate-Economy Impacts Assessment by the University of Idaho McClure Center examined the evidence and concluded that "[p]rojected changes to Idaho's climate suggest very high confidence in warming trends, limited changes in total annual precipitation albeit a significant reduction in the proportion of precipitation falling as snow, and high potential for increased frequency of certain types of droughts."[8] By failing to account for the impacts of coal pollution to Idaho's economy, and the availability of lower cost, cleaner options today, PacifiCorp's 2021 IRP places undue risks that Idahoans will face ever rising electricity costs along with negative climatic impacts.

The need and urgency for action cannot be overstated. The Commission can and must require meaningful action from PacifiCorp to reduce emissions and transition Idaho to a clean, sustainable energy future. Sierra Club urges the Commission to closely scrutinize PacifiCorp's 2021 IRP and implement the recommendations below.

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[6] White House, *Remarks by President Biden Before the 76th Session of the United Nations General Assembly* (Sept. 21, 2021), *available at* https://www.whitehouse.gov/briefing-room/speeches-remarks/2021/09/21/remarks-by-president-biden-before-the-76th-session-of-the-united-nations-general-assembly/.

[7] Aya Elamroussi, *Wildfires have burned a combined area the size of Delaware and Rhode Island – and then some*, CNN (July 28, 2021), *available at* https://www.cnn.com/2021/07/28/weather/western-wildfires-wednesday/index.html.

[8] John T. Abatzoglou et al., *Idaho Climate-Economy Impacts Assessment: Observed and Projected Changes in Idaho's Climate*, University of Idaho, at 19 (Dec. 2021), *available at* https://www.uidaho.edu/president/direct-reports/mcclure-center/iceia/climate.

A. Key Conclusions and Observations of PacifiCorp's 2021 IRP

These comments are organized into the following five key subject matters:

1. PacifiCorp's methodological choices related to reliability
2. Coal unit economics and plant retirements
3. The proposed Natrium nuclear power plant
4. The proposed conversion of Jim Bridger 1 and 2 to burn natural gas
5. Barriers to future clean energy deployment

Based on the analysis it has conducted to date on PacifiCorp's IRP, Sierra Club has developed the following set of key conclusions and observations:

Topic 1: Concerns over methodological choices related to reliability

- There are inconsistencies between PacifiCorp's capacity contribution study and the Preferred Portfolio with respect to the capacity value of solar plus storage. This differential may be leading to overbuild of coal replacement resources.
- PacifiCorp's application of a 13 percent hourly reserve margin was not fully justified and may be overly conservative.
- PacifiCorp's portfolio development process included a non-transparent post-modeling "reliability adjustment." This step lacked adequate supporting data or analysis.

Topic 2: Coal unit economics and plant retirements

- PacifiCorp failed to include a unit-by-unit coal analysis as it had done in 2019. This essential step provides a check on the reasonableness of retirements included in its portfolio-wide analysis.
- PacifiCorp inappropriately assumes a significant share of its future coal fuel expenditures are "sunk costs" in the form of future take-or-pay contracts. This

assumption significantly hampers any coal retirement analysis since these costs would never materialize if the plants retired early.

- PacifiCorp's coal fuel pricing tier assumptions lack any clear explanation or justification.
- The P02h variant, which retires Jim Bridger Units 3 and 4 before 2030, is lower in cost than PacifiCorp's Preferred Portfolio. This is true despite questionable assumptions that needlessly inflate the costs of the P02h case.
- The IRP did not fully assess the risks associated with Idaho Power's early exit from the Jim Bridger plant.
- PacifiCorp did not adequately assess the risk of a scenario in which selective catalytic reduction ("SCR") installations are required at coal units in both Utah and Wyoming.
- PacifiCorp's P03 Early Coal Retirement Case paints a misleading picture of increased costs (relative to the Preferred Portfolio), since these increases are partly driven by deficiencies and subjective choices in the Company's modeling methodology.

Topic 3: Risks related to the Natrium nuclear plant

- PacifiCorp's expectation that it will receive power from a novel nuclear technology by 2028 may be unrealistic and introduces substantial cost and execution risks that are not adequately addressed in the IRP.

Topic 4: Risks related to the Jim Bridger gas conversion

- PacifiCorp's planned coal-to-gas conversion of Jim Bridger Units 1 and 2 by 2024 carries significant fuel cost risk that is borne almost exclusively by ratepayers.

- The recent rise in natural gas prices has already outpaced PacifiCorp's forecast for prices in 2034, further indicating that customers may be at significant risk of higher fuel costs than what PacifiCorp has anticipated.

- If recent price trends continue, PacifiCorp's plan to burn natural gas at Jim Bridger 1 and 2 (rather than retire the units) could subject customers to additional costs on the order of $230 million present-value revenue requirement ("PVRR").

- PacifiCorp does not discuss the lack of any contractual arrangements with co-owner Idaho Power to allocate costs and liabilities arising from different exit dates from both coal burning units and the gas conversion.

Topic 5: Barriers to clean energy development

- PacifiCorp's long-term resource cost assumptions are not fully informed by the recent all-source RFP results

B. Summary of Recommendations

Based on Sierra Club's analysis of these five topics, we make the following recommendations:

Topic 1: Concerns over methodological choices related to reliability

- *Recommendation 1:* The Commission should direct PacifiCorp to provide more detail on the capacity value of solar plus storage assumed in each year of its model, and justify the decline in capacity value after 2030. This detail and explanation should be provided in all future IRPs.

- *Recommendation 2:* The Commission should direct PacifiCorp to define a specific reliability metric for evaluating its resource portfolios along with a specific

performance target as well as clearly identifying transmission constraints impacting load area's ability to meet planning reserve margins.

- *Recommendation 3*: The Commission should direct PacifiCorp to provide the hourly results of its reliability analysis, prior to making any reliability-related cost adjustments or other portfolio refinements. The Commission should also direct PacifiCorp to identify which resources in each portfolio were added manually as part of the "portfolio refinement" step and provide a detailed justification for why that specific resource type was selected and what alternatives were considered.

Topic 2: Coal unit economics and plant retirements

- *Recommendation 4*: The Commission should direct PacifiCorp to continue conducting a unit-by-unit coal retirement analysis as performed in 2019 (but not in 2021) for the 2021 IRP and in all future IRPs.
- *Recommendation 5*: "No Minimum Scenario," where PacifiCorp removed minimum take requirements at Jim Bridger, should be considered for the preferred portfolio, as it reduced the PVRR by $156 million when compared to the top performing case P02-MM.
    - Recommendation 5(a): Replacement energy for Jim Bridger under the No Minimum Scenario, estimated by Sierra Club to be on the order of 1,000 MW of new wind, should be considered in the upcoming all-source request for proposals ("RFP").
    - Recommendation 5(b): The Commission should provide guidance to PacifiCorp that no additional investments in either the Black Butte or Bridger Coal Company mines will be authorized prior to a thorough prudency review

of an updated long-term fuel supply plan for Jim Bridger. The updated plan should evaluate the feasibility of closing the Bridger mine in the 2026 timeframe (or sooner) and fueling the Jim Bridger plant from stockpiled coal for the remainder of its life.

- *Recommendation 6*: The Commission should require that the dispatch of coal resources modeled in future IRPs is based upon the total or "average" fuel costs over a period of 1 or more years (rather than some lower incremental value within each year).
- *Recommendation 7*: If the No Minimum Scenario is not considered for the preferred portfolio, the Commission should direct PacifiCorp to evaluate whether the P02h variant portfolio, where Bridger units 3 and 4 retire in 2026 and 2029 respectively, is a superior replacement for the Preferred Portfolio, which is designed to comply with the Washington Clean Energy Transition Act ("CETA").
- *Recommendation 8*: The Commission should direct PacifiCorp to model a variant of its Preferred Portfolio that includes PacifiCorp absorbing Idaho Power's share of Jim Bridger plant costs from 2028-2037. PacifiCorp should also be required to compare this variant to retiring the plant by 2028.
- *Recommendation 9*: The Commission should direct PacifiCorp to model a variant of the Preferred Portfolio with SCRs installed on all relevant facilities in Utah and Wyoming. This variant should be compared to early retirement at these facilities before 2030.

Topic 3: Proposed Natrium nuclear power plant

- *Recommendation 10*: The Commission should require PacifiCorp to provide a detailed risk assessment for Natrium to be completed on time and within budget. This should include the nine items detailed in the bulleted list at the end of Section IV below. The Commission should not acknowledge the Natrium plant as part of this IRP until such an assessment is available and evaluated.

- *Recommendation 11*: The Commission should require PacifiCorp to reconcile why the variant analysis with Natrium removed leads to higher costs, even though the plant must be forced into the Preferred Portfolio.

Topic 4: Proposed conversion of Jim Bridger 1 and 2 to burn natural gas

- *Recommendation 12*: The Commission should require PacifiCorp to provide updated risk assessment of gas fuel that reflects recent price trends. This assessment should be provided before any further consideration of Jim Bridger conversions by this Commission.

- *Recommendation 13:* The Commission should require PacifiCorp to reconcile the allocation of costs and liabilities arising from the different exit date plans with co-owner Idaho Power.

- **Topic 5: Barriers to Clean Energy Deployment**

- *Recommendation 14*: The Commission should require PacifiCorp to revise its long-term resource cost assumptions, particularly for battery storage (standalone or paired with other resources), to better reflect the results of its 2019 all-source RFP.

II. PacifiCorp's Methodological Choices for Reliability and Resource Adequacy Raise Significant Concern.

Specific methodological choices PacifiCorp made in *all* of its IRP analyses may ultimately have led to a biased resource selection process and therefore raise significant concerns regarding the accuracy of each portfolio.

Sierra Club understands that certain discretionary methodological choices were made by PacifiCorp in an attempt to address purported reliability concerns. To be clear, Sierra Club understands that maintaining grid reliability is paramount and, in many cases, it is important to err on the side of caution. However, these choices are not transparent, lack supporting data and analysis, and only receive cursory explanations in the IRP documentation. It is not clear that these adjustments are necessary or the least-cost approach to meeting reliability needs.

This section details several of these reliability-related issues that warrant further investigation in this IRP, including:

- The assumed capacity contribution of solar plus storage resources;
- The application of an hourly 13 percent reserve margin at the load area level; and
- The "reliability adjustments" made to initial resource cost assumptions (i.e., post-modeling).

A. There Are Inconsistencies Between PacifiCorp's Capacity Contribution Study and the Preferred Portfolio with Respect to the Capacity Value of Solar Plus Storage, Potentially Leading to Overbuild of Coal Replacement Resources.

PacifiCorp provided a detailed capacity contribution study in Appendix K, which provided the percentage of a resource's nameplate capacity that is considered reliable for meeting system demand. This analysis relied upon the capacity factor approximation method, which the National Renewable Energy Laboratory ("NREL") determined to be the most

dependable capacity contribution approximation technique. This method was applied to a portfolio similar to the Preferred Portfolio in 2030, and thus contemplates a significant amount of renewable resource penetration. The results of this study for solar plus storage are especially noteworthy since they found the capacity contribution to be on the order of 79-82 percent in the summer and 91-95 percent in the winter.[9] These values are comparable to many traditional thermal resources after accounting for forced outage rates.

PacifiCorp's capacity contribution study shows, then, that solar plus storage is a perfectly viable replacement option for retiring coal resources in lieu of proposed new thermal additions such as the Jim Bridger gas conversions or higher-cost, unproven technologies like the Natrium nuclear plant and non-emitting peaker plants. Both the speculative Natrium nuclear plant and the hydrogen fueled non-emitting peakers suffer from the same flaws—lack of commercially available examples, lack of known permitting timelines, and lack of available fuel sources. However, PacifiCorp significantly discounted solar plus storage as a viable capacity resource option in lieu of those thermal alternatives, particularly in the later years of the planning period. For instance, in the P02a-JB 1-2 No GC variant case (i.e., no gas conversion at Jim Bridger), a significant amount of costly non-emitting peakers are added starting in 2031 instead of simply adding more solar plus storage, which is cost effective. A similar result is seen in the P02e-No NUC variant case (i.e., removing the Natrium plant), which favored non-emitting peakers in the later years, rather than solar plus storage additions. In the P02h-JB3-4 Retire variant case (i.e., retire Jim Bridger 3 and 4 by 2030), an additional nuclear unit is added in 2030 instead of increasing solar plus storage deployment.

[9] PacifiCorp, *2021 Integrated Resource Plan*, Vol. II, App. K at 221 (Sept. 1, 2021), *available at* https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2021-irp/Volume%20II%20-%209.15.2021%20Final.pdf [hereinafter "PacifiCorp 2021 IRP Vol. II"]

Given the relatively high cost, and vast uncertainty of the availability and performance of the nuclear and non-emitting peakers, it is unclear why these would be deployed in lieu of solar plus storage which has a relatively comparable capacity contribution according to PacifiCorp's own study. Sierra Club acknowledges that most resources tend to have a declining capacity contribution at higher levels of penetration, which would also be true of solar plus storage. However, PacifiCorp has provided no evidence on what those declines would be for specific resources, or evidence that such declines would be large enough to erode the value of solar plus storage as a viable alternative to thermal resources.

Finally, PacifiCorp may have used entirely different capacity contribution values than those included in its own study in Appendix K. For example, Table 9.17 shows that the installed capacity of the Preferred Portfolio includes 4,781 MW of battery storage collocated with solar by 2040.[10] Meanwhile, Table 9.18 shows a solar plus storage summer capacity contribution of only 1,811 MW (1,228 MW east, 583 MW west),[11] or a capacity contribution of approximately 38 percent as a percentage of nameplate. This is substantially lower than the 79-82 percent range from PacifiCorp's own study. Even for the year 2030, the total solar plus storage summer capacity contribution is 1,125 MW (350 MW east, 775 MW west), or approximately 66 percent of the 1696 MW of installed capacity. This capacity value of 66 percent is still far lower than the 79-82 percent range that PacifiCorp's study would suggest.

To summarize, PacifiCorp's analysis assumed capacity contributions from solar plus storage that are much lower than their own study presented in Appendix K. Even accepting the lower capacity contributions, there is a significant decline in the capacity value of this resource

[10] PacifiCorp 2021 IRP Vol. I at 307.
[11] *Id.* at 309-10.

(i.e., from 66 percent to 38 percent) that it did not fully explain, nor did it provide any supporting analysis in the IRP. Sierra Club understands that capacity values decline with increasing resource penetration. However, it is not clear why such a large discrepancy exists between the values in Appendix K and Tables 9.17 & 9.18, especially in light of the fact that the analysis in Appendix K "was performed using a portfolio that is similar to the 2021 IRP preferred portfolio"[12] and thus should have already accounted for significant solar penetration.

The assumed decline in capacity value has a significant influence on the overall resource selection process and warrants further documentation. If PacifiCorp is in fact undervaluing the capacity contribution of solar plus storage, as the analysis presented above shows, then the Company may be overbuilding capacity resources. This is especially relevant for the P03 early coal retirement cases since they include a more acute capacity replacement need. As such, any assumptions that underestimate the capacity value of solar plus storage (or any other resource) will also exacerbate the cost differential between the P02 and P03 cases. Sierra Club recommends that the Commission require PacifiCorp to provide much more detail on its assumptions for capacity contribution in the resource selection process, including any assumed decline in capacity value over time.

B. PacifiCorp's Application of a 13 Percent Hourly Reserve Margin to Individual Load Areas Is Not Fully Justified.

The 2021 IRP employed a brand-new approach to resource adequacy that differs from past practices and also differs substantially from what utilities have traditionally done. Rather than set a planning reserve margin targeted towards ensuring sufficient resources are available on the whole system during the highest peak load hour, PacifiCorp has established an *hourly* reserve

[12] PacifiCorp 2021 IRP Vol. II, App. K at 218.

margin of 13 percent that is applied to each of 15 load areas in its system topology. In addition to resource additions driven by the 13 percent margin, PacifiCorp also adds other resources in subsequent steps of its analysis to ensure resource adequacy (this is addressed in more detail in Section II(C) below).

Moving towards an approach that examines a more granular timescale for the reserve margin may be sensible; as more variable wind and solar resources are added to the system, it is important to consider not only the peak load hour.

However, because this is still such a novel approach, Sierra Club believes there are many outstanding questions related to PacifiCorp's new method that were not adequately addressed in PacifiCorp's IRP. In particular, Sierra Club believes there are two main issues that should be addressed on this subject, discussed below, and Sierra Club recommends that the Commission require updated information prior to an acknowledgment decision:

1. *Reliability metrics*

First it is not clear what specific reliability criteria PacifiCorp is using to determine whether the preferred portfolio (or any of the variants and sensitivities studied) are sufficiently reliable.

Standard industry practice would use metrics such as loss of load expectation ("LOLE"), loss of load probability ("LOLP"), or expected unserved energy ("EUE") as benchmarks for reliability performance. For example, one of the most common standards used is an LOLE of 0.1/yr, which equates to an expected loss of load of one day every ten years.

However, PacifiCorp's IRP has not provided any information on how this resource selection process, and the subsequent portfolios, perform with respect to the reliability metrics mentioned above. For each portfolio, PacifiCorp did provide values for the Energy Not Served

("ENS") expressed as "Average Annual ENS, 2021-2040 % of Average Load." However, PacifiCorp did not specify what threshold for the ENS values it considered acceptable or reliable.

Going forward, Sierra Club recommends that the Commission require PacifiCorp to define a specific reliability metric for evaluating its resource portfolios along with a specific performance target. For example, a reasonable approach could be to define any portfolio with a LOLE value <0.1/yr as being reliable.

2. Binding transmission limits

Second, while it was not initially clear from PacifiCorp's IRP, Sierra Club's understanding is that PacifiCorp allows for capacity resources in each of PacifiCorp's 15 load areas to contribute towards the 13 percent reserve margin in other load areas, if there is sufficient transmission available. While Sierra Club supports this approach, PacifiCorp has not provided much transparency around when and where these transmission limits may become binding when attempting to meet the 13 percent reserve margin target. This information is important for several reasons. First, disclosure of transmission limits would allow stakeholders to assess the reasonableness of PacifiCorp's assumptions within its own system. Second, this information would assist project developers in identifying the locations with the greatest need and opportunity for development. Going forward, Sierra Club recommends that PacifiCorp provide greater detail on when and where transmission constraints become binding (or close to binding) as the Long Term ("LT") capacity expansion model selects resources to fulfill the 13 percent reserve margin requirement.

C. PacifiCorp's Portfolio Development Process Included a Non-Transparent Post-Modeling "Reliability Adjustment" that Lacked Adequate Supporting Data or Analysis.

As part of its core resource selection process, PacifiCorp applied a pre-modeling "granularity adjustment" and post-modeling "reliability adjustment." In essence, these adjustments were made to steer the resource selection process toward a certain outcome that would not otherwise be captured by the LT model (i.e., capacity expansion) due to its inherent limitations. The granularity adjustment approach may be necessary for the model to ensure the full value of resources, such as battery storage, are appropriately captured. However, in the case of the post-modeling reliability adjustment, the lack of transparency regarding what specific resource adjustments were actually made and why should raise red flags.

During an informal meeting between PacifiCorp and Sierra Club on November 30, 2021 PacifiCorp expressed that it made changes to the initial resource cost inputs used in the LT model based on reliability considerations. However, after reviewing subsequent discovery responses from the Company, it is Sierra Club's more recent understanding that PacifiCorp did not actually adjust resource costs to account for reliability. Instead, PacifiCorp hand-picked additional resources on an *ad hoc* basis in an attempt to address any remnant reliability issues after the initial LT model run was conducted. One example of this occurs in the P02h variant case where Jim Bridger was retired by 2030. There, PacifiCorp manually forced in a new nuclear plant (after Natrium) in 2030 as a "portfolio refinement" step meant to address purported reliability concerns that the Company has not substantiated. This is a fundamental and costly change to the portfolio that PacifiCorp made outside of the core portfolio optimization step. Moreover, according to a discussion with PacifiCorp representatives on November 30, 2021, PacifiCorp did not reoptimize the portfolio after taking this step. Since this additional nuclear

resource was not added in other portfolios, and there is no supporting analysis that it will be needed or even available, PacifiCorp may be overstating the cost of early Jim Bridger retirement.

Sierra Club is concerned that these adjustments represent an opportunity for PacifiCorp to "put its thumb on the scale" and steer resource selection towards a desired outcome. This risk is further exacerbated by the fact that PacifiCorp did not reoptimize the portfolio in the LT model after making these hand-picked reliability-based adjustments.

To Sierra Club's knowledge, PacifiCorp did not provide any data or information on the reliability-related resource additions or corresponding analysis of the hourly resource shortfalls in its IRP filing. However, Sierra Club did receive some of this information through follow-up data requests. Specifically, Sierra Club requested that PacifiCorp provide any LT and Short Term ("ST") model workpapers as well as supporting reliability assessment workpapers for any preliminary resource portfolios that PacifiCorp developed for the 2021 IRP, prior to applying the granularity and reliability adjustments or any other subsequent portfolio refinements.[13] In response, PacifiCorp provided two Long Term portfolios that were run *without* adjustments and used to develop the granularity and reliability adjustments:

- PLEXOS study number 3112 (P02-MMR (CO,NG) Intentional)
- PLEXOS study number 2993 (P02-MMR (CO,NG) Intl UTWY)

These preliminary portfolios were primarily used to evaluate the difference in resource value between the LT and ST models in order to understand which resource options could produce reliable portfolios. Although the difference between the two studies is not clearly explained,

[13] PacifiCorp Response to Sierra Club Data Request 6.1 in LC 77 (included in "Attach Sierra Club 2-1") (all public responses to Idaho and Oregon data requests referenced in these comments are provided as Sierra Club/ICL Attach. 1).

PacifiCorp produced a set of workpapers for both studies. Each set included a workpaper for each year from 2025 to 2040,[14] detailing the hourly data of unserved energy. For the PLEXOS 3112 study, unserved energy was [redacted] for half of those years while for the rest it ranged from [redacted] MW on an annual basis. For example, in year 2031, there are two hours of projected unserved energy:[15]

- [redacted]
- [redacted]

Both shortages occur in [redacted]. It is thus possible that additional energy could be available in the system, but may be constrained in the model; however, such details are not available in the workpapers. Results for other years are similar with [redacted] being the highest amount of unserved energy experienced in one of the system areas in the 3112 run up until 2032. The workpapers also reveal shortages in the system's regulation reserves during some summer days. Sierra Club subsequently confirmed with PacifiCorp that the same hourly data files were relied upon for assessing reliability of the P02h variant case.[16]

PacifiCorp stated that "the same hourly data files already provided in response SC 6.1 for the P02-MM case were relied upon for assessing reliability of the P02h case." However, given the [redacted], it is far from clear how PacifiCorp concluded that a 500 MW nuclear addition was

[14] The Confidential Attachments to PacifiCorp Response to Sierra Club Data Request 6.1 (provided in "Attach 2-2 CONF") include workpapers for years 2026-2040 for study 2993, and 2025-2040 for study 3112.
[15] Confidential Attach. "3112 Capacity Requirements P02-MMR (CO) Intl UTWY 2031 6-17-21" to PacifiCorp Response to Sierra Club Data Request 6.1 (included in "Attach 2-2 CONF") (provided as Sierra Club/ICL Attach. 2).
[16] Email from Carla Scarcella, PacifiCorp Senior Regulatory Attorney to Rose Monahan, Sierra Club (Jan. 26, 2022) (provided as Sierra Club/ICL Attach. 3)

needed in the P02h case. Sierra Club acknowledges that this [redacted] level of unserved energy could increase with the earlier retirement of Jim Bridger 3 and 4, as contemplated in the P02h variant case. However, PacifiCorp has not produced sufficient hourly generation data to show when Jim Bridger will be operating in 2031, nor has it provided evidence that the unserved energy would reach such high levels that a nuclear plant was the only viable replacement resource. Without having additional information on the unserved energy if Jim Bridger 3 and 4 retired in 2030, any resource additions seem subjective and not the result of proper analysis.

In sum, although PacifiCorp has indicated that the nuclear resources were the best fit for replacing Jim Bridger, because they are long duration resources that can "run around the clock[,]"[17] PacifiCorp has not provided any evidence that an extremely high cost and unproven resource was the best fit for replacing Jim Bridger in 2030, as compared to other options such as longer-duration batteries (e.g. 6-8 hrs) paired with renewables. In fact, it appears that PacifiCorp limited the model's resource selection to just nuclear or non-emitting peakers once a reliability gap reached a certain threshold. There is no evidence that longer or larger reliability gaps can and should be filled with—and only with—nuclear or non-emitting peakers.

Therefore, without more details, these adjustments may simply amount to a tool for PacifiCorp to "put its thumb on the scale" and steer resource selection towards its preferred outcome. If this is not the case, it is unclear why PacifiCorp did not provide a more thorough and detailed explanation of this critical step in its application and accompanying workpapers. Specifically, PacifiCorp should have provided:

[17] *In the Matter of PacifiCorp, d/b/a Pacific Power, 2021 Integrated Resource Plan,* Docket No. LC 77, PacifiCorp Reply Comments at 17 (Ore. P.U.C. Dec. 23, 2021), *available at* https://edocs.puc.state.or.us/efdocs/HAC/lc77hac144535.pdf [hereinafter "LC 77 PacifiCorp Reply Comments"].

1. A characterization of the reliability risks these adjustments are attempting to address (i.e. timing, duration, extent and frequency of reliability risks);
2. An evaluation of the ability of all resources under consideration to address these reliability needs; and,
3. Data on the specific resource adjustments that were made in each portfolio as part of this "reliability adjustment" step.

Sierra Club recommends that the Commission direct PacifiCorp to provide this information for the 2021 IRP and all future IRPs.

III. Coal Unit Economics and Plant Retirements

A. PacifiCorp Failed to Include a Unit-By-Unit Coal Analysis Consistent with the 2019 IRP.

The economics of coal generation, relative to other options, has plunged in recent years. PacifiCorp has analyzed and disclosed the economics of coal plant retirements in previous IRP cycles, a practice which the Company somewhat continued in the 2021 IRP cycle; but unfortunately, it omitted important useful analyses conducted in 2019 from the 2021 IRP, particularly the unit-by-unit analysis included in Appendix R of the 2019 IRP.[18] PacifiCorp was required to pursue this unit-by-unit analysis in 2019, but absent a clear mandate, the Company unilaterally chose not to perform a similar analysis in 2021.

That 2019 unit-by-unit analysis was not only informative, but was a necessary component of a portfolio-wide approach to the modeling of coal retirements. The unit-by-unit approach provides additional information on the relative value of certain retirement decisions and also can help serve as a "check" on the soundness of the portfolio-wide results. Given the importance of a

[18] PacifiCorp, *2019 Integrated Resource Plan*, Vol. II, App. R (Oct. 18, 2019), *available at* https://www.pacificorp.com/energy/integrated-resource-plan html [hereinafter "PacifiCorp 2019 IRP"].

unit-by-unit analysis, it is unclear why PacifiCorp chose not to continue with this practice in this current IRP cycle, but the 2021 IRP is less informative as a result.

Instead, for the 2021 IRP, PacifiCorp's analysis only identified the most economic coal retirement dates through "endogenous" portfolio-wide modeling. The results of this endogenous selection process are similar to those in the 2019 IRP with the retirement dates left the same, or accelerated by a couple of years. The results also show that it is most economic to retire many of the Company's coal units prior to 2030, which is what PacifiCorp proposes in its Preferred Portfolio. Importantly, however, there are a handful of coal units that do not follow this pattern and instead remain in PacifiCorp's Preferred Portfolio through the late 2030s and early 2040s. These late retirements include the coal units at the Hunter, Huntington, Jim Bridger, and Wyodak plants.

This result is both concerning and counter-intuitive because some of the units with post-2030 retirement dates are among the costliest coal units on PacifiCorp's system on a going-forward basis. For example, the table below shows the estimated Levelized Cost of Electricity ("LCOE") to continue operating each of PacifiCorp's coal units as estimated in the 2018 Coal Valuation Study, conducted by Energy Strategies.[19] The units are ranked from highest to lowest cost and presented alongside the 2021 IRP proposed retirement dates, with the post-2030 dates highlighted in red.

[19] Energy Strategies, *PacifiCorp Coal Unit Valuation Study: A Unit-by-Unit Cost Analysis of PacifiCorp's Coal-Fired Generation* Fleet, (Sierra Club June 20, 2018), *available* at https://www.sierraclub.org/sites/www.sierraclub.org/files/PacifiCorp-Coal-Valuation-Study.pdf [hereinafter "PacifiCorp Coal Unit Valuation Study"].

Table 1. Comparison of PacifiCorp's Coal Unit Costs and Proposed Retirement Dates

Unit	Estimated LCOE ($/MWh)[20]	Cost Rank (Highest to Lowest)	Proposed Retirement Date (2021 IRP, w/ post-2030 highlighted)[21]	Proposed Retirement (2019 IRP)[22]
Jim Bridger 2	$ 50.43	1	2037	2028
Hayden 2	$ 49.75	2	2027	2030
Jim Bridger 1	$ 48.31	3	2037	2023
Jim Bridger 3	$ 47.60	4	2037	2037
Jim Bridger 4	$ 47.55	5	2037	2037
Hayden 1	$ 47.07	6	2028	2030
Colstrip 4	$ 42.71	7	2025	2027
Huntington 2	$ 41.54	8	2036	2036
Huntington 1	$ 41.10	9	2036	2036
Colstrip 3	$ 39.71	10	2025	2027
Hunter 1	$ 39.24	11	2042	2042
Naughton 1	$ 38.76	12	2025	2025
Naughton 2	$ 38.17	13	2025	2025
Hunter 3	$ 35.17	14	2042	2042
Hunter 2	$ 35.07	15	2042	2042
Craig 1	$ 34.77	16	2025	2025
Craig 2	$ 33.37	17	2028	2026
Wyodak	$ 31.64	18	2039	2039
Dave Johnston 4	$ 28.81	19	2027	2027
Dave Johnston 3	$ 28.80	20	2027	2027
Dave Johnston 1	$ 27.20	21	2027	2027
Dave Johnston 2	$ 26.72	22	2027	2027

In particular, the Jim Bridger and Huntington plants stand out as having prolonged retirement dates that do not correspond to their high going-forward costs. This discrepancy holds true for the Jim Bridger 3 and 4 units, even though PacifiCorp plans to convert Jim Bridger 1 and 2 to burn gas.[23] A more logical result from PacifiCorp's IRP analysis would have been for these costlier units to retire sooner, presuming their costs were accurately represented in PacifiCorp's planning model.

[20] *Id.* at 23, Table 8.5.
[21] PacifiCorp 2021 IRP Vol. I at 137, Table 6.2.
[22] *Id.* at 299.
[23] *Id.* at 15.

Sierra Club recognizes that an optimal portfolio may not show a perfect correlation between LCOE and retirement date due to the complexities of modeling a large power system like PacifiCorp's. However, even when PacifiCorp did undertake a more comprehensive modeling approach to studying coal retirements, as it did in its 2019 IRP, the Company reached a very clear conclusion that early retirement of the Jim Bridger units would be beneficial to customers. In fact, the company found "there are potential customer benefits from accelerating the retirement of certain coal units, where the greatest customer benefits are associated with the potential accelerated retirement of units at the Naughton and Jim Bridger plants located in Wyoming."[24] The four Jim Bridger units ranked 1, 2, 5, and 6 out of all 22 coal units in terms of potential customer benefits were they to retire early.[25] The results of PacifiCorp's 2019 IRP coal retirement analysis from System Optimizer are shown in the table copied below.[26]

[24] PacifiCorp 2019 IRP, Vol. II, App. R at 613.
[25] *Id*., Vol. II, App. R at 594.
[26] *Id*., Vol. II, App. R at 598.

Table 2. System Optimizer Results from PacifiCorp's 2019 IRP Coal Retirement Analysis

Table R.4 – SO Model Medium Gas, Medium CO_2 PVRR by Unit

Study	PVRR ($m)	PVRR(d) (Benefit)/Cost of 2022 Retirement
C-01 (Benchmark)	$21,897	n/a
C-02 (Colstrip 3)	$21,906	$9
C-03 (Colstrip 4)	$21,902	$5
C-04 (Craig 1)	$21,897	($0)
C-05 (Craig 2)	$21,875	($22)
C-06 (Dave Johnston 1)	$21,903	$6
C-07 (Dave Johnston 2)	$21,905	$8
C-08 (Dave Johnston 3)	$21,895	($2)
C-09 (Dave Johnston 4)	$21,916	$19
C-10 (Hayden 1)	$21,885	($12)
C-11 (Hayden 2)	$21,893	($4)
C-12 (Hunter 1)	$21,816	($81)
C-13 (Hunter 2)	$21,878	($19)
C-14 (Hunter 3)	$21,853	($44)
C-15 (Huntington 1)	$21,808	($89)
C-16 (Huntington 2)	$21,794	($103)
C-17 (Jim Bridger 1)	$21,690	($207)
C-18 (Jim Bridger 2)	$21,761	($136)
C-19 (Jim Bridger 3)	$21,800	($97)
C-20 (Jim Bridger 4)	$21,797	($100)
C-21 (Naughton 1)	$21,794	($102)
C-22 (Naughton 2)	$21,801	($96)
C-23 (Wyodak)	$21,880	($17)

Given the 2019 result, the prolonged retirement dates of Jim Bridger 3 and 4 (as well as Huntington 1 and 2) in the 2021 IRP Preferred Portfolio may in fact be the result of certain operating costs at these coal units not being accurately represented in the 2021 IRP modeling, as well as other subjective choices in PacifiCorp's portfolio selection process.

B. PacifiCorp Inappropriately Assumes a Significant Share of Its Future Coal Fuel Expenditures Are "Sunk Costs" in the Form of Future Take-Or-Pay Contracts. This Assumption Significantly Constrains Any Coal Retirement Analysis Since These Costs Would Never Materialize if the Plants Retired Early.

Several critical flaws are evident in the model input assumptions PacifiCorp developed for future coal fuel supply at coal units and the associated pricing. Chief among these flaws is the fact that PacifiCorp inappropriately assumed significant take-or-pay volumes associated with

supplying coal to the Jim Bridger and Huntington units well into the future. Additionally, PacifiCorp assumed incremental fuel pricing for some plants that further distorted their true cost.

1. PacifiCorp Inappropriately Assumed that Jim Bridger and Huntington are Subject to Minimum Take Requirements

PacifiCorp assumed in the PLEXOS model that a certain minimum volume of coal fuel must be purchased in each year for each plant by either using the fuel or by paying a penalty price for not using the fuel. This means that PacifiCorp treats the minimum take quantity as a "sunk cost," even though the cost would never be incurred if the plant retired. Take-or-pay assumptions have a significant influence on both how often to run a plant and when to retire it because the existence of a take-or -pay penalty would substantially reduce—if not eliminate—the economic benefits of reducing fuel consumption (e.g., from retirement) at that plant.

The take or pay volumes for the Huntington and Jim Bridger plants are summarized in the table below for years after 2022, which was developed based on the information contained in the confidential data disk accompanying PacifiCorp's 2021 IRP.[27]

[27] PacifiCorp Confidential Master Assumptions BaseCase Workpaper PacifiCorp's 2021 IRP "Scenario Master_BaseCase 20210519_CONF.xlsx," tab "10 – Coal Cost Incrementl by Vol" (details of the take-or-pay quantities and prices) [hereinafter "Confidential Scenario Master_BaseCase Workpaper"].

Confidential Table 3. Take-or-Pay Volumes (in Millions of Tons) Assumed by PacifiCorp in PLEXOS for Future Years at the Huntington and Jim Bridger Plants

The large amount of assumed take-or-pay quantities is particularly problematic for the Jim Bridger fuel sources because there is currently no contract in effect that establishes any take-or-pay volumes after [redacted].[28] PacifiCorp has yet to sign a contract for the Black Butte coal supply for 2022[29] and there is no take-or-pay penalty associated with coal from Bridger Coal Company, which is PacifiCorp's affiliate mine. PacifiCorp has inappropriately assumed that future coal supply agreements to supply Jim Bridger would be required through [redacted] and that these agreements would contain provisions corresponding to its assumed minimum take volumes, without providing any supporting information.

[28] Confidential Attach. to PacifiCorp Response to Sierra Club Data Request 4.2 in LC 77 (included in "Attach 2-2 CONF") (provided as Sierra Club/ICL Attach. 4).
[29] *In the Matter of the Application of PacifiCorp (U 901 E) for Approval of its 2022 Energy Cost Adjustment Clause and Greenhouse Gas-Related Forecast and Reconciliation of Costs and Revenue*, Proceeding No. A.21-08-004, PacifiCorp (U 901 E) Brief Summary of Dates that Existing Coal Supply Agreements Are Scheduled for Renewal (Nov. 10, 2021), *available at* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M425/K516/425516818.PDF.

Sierra Club understands that for the Jim Bridger plant, PacifiCorp did not assume that it would incur any take-or-pay penalties after the plant retired. In other words, if Jim Bridger was retired in 2030, it would not incur take-or-pay penalties after that date. While this is an appropriate assumption, PacifiCorp has provided no justification for nevertheless assuming that it would have minimum take requirements for each year that Jim Bridger operates prior to retirement. By assuming that Jim Bridger will be subject to minimum-take requirements in the years before it is retired, PacifiCorp skewed the model toward (1) projecting artificially high capacity factors at Jim Bridger and (2) potentially delaying the identified optimal retirement date.

PacifiCorp asserts that it is appropriate to assume that minimum take requirements will apply if Jim Bridger is operating because the "IRP modeling is intended to reasonably represent the constraints and operating parameters faced by each resource" and take-or-pay contracts are "consistent with many of the Company's existing obligations and comparable structures are likely in future coal supply procurement."[30] PacifiCorp ignores, however, that as the owner and operator of the Bridger mine, which primarily supplies the Jim Bridger plant, the Company has *complete control* over production levels at the mine. Accordingly, any "minimum take" at the Bridger mine is set by PacifiCorp itself. Even assuming that the Bridger mine requires some base level of production to justify continued operations, PacifiCorp admitted during a public workshop with the Oregon Public Utilities Commission that *it did not evaluate an optimal supply from the Bridger mine because the Company "didn't have time to address all that."*[31] Instead, the Company used a single supply scenario from the Bridger mine without evaluating any lower production.

[30] LC 77 PacifiCorp Reply Comments at 22-23.
[31] LC 77, Ore. Pub. Util. Comm'n, PAC 2021 IRP Commission workshop video recording at 2:43:51-2:44:26 (MacNeil, PacifiCorp) (Jan. 13, 2022), *available at* https://www.oregon.gov/puc/news-events/Pages/default.aspx.

Not only are PacifiCorp's assumptions entirely inappropriate, but they are also at odds with its own position in recent fuel-cost recovery proceedings. For instance, in PacifiCorp's most recent fuel cost proceeding in Oregon, the Company said that the volume of coal can and should be evaluated and adjusted over a multiyear period within the IRP process. Specifically, "[c]hanges in BCC mine plans and staffing levels need to be evaluated in multiyear evaluations such as PacifiCorp's IRP and not in a one-year filing like the [Oregon fuel proceeding]."[32] Instead, PacifiCorp has taken the same approach in the IRP as its fuel proceeding modeling: the Company assumes minimum coal consumption levels throughout the planning period.

Even if one were to presume that new Coal Supply Agreements ("CSA") should be executed in the future, the volumes PacifiCorp has assumed do not have any clear rationale or justification in the IRP. For example, the Jim Bridger Black Butte take or pay volume is assumed to increase from [redacted] tons in 2023-2030 to [redacted] tons in 2031-2037, even as Jim Bridger's coal-fired output will decline.

In sum, PacifiCorp treats a large share of the coal fuel costs at Jim Bridger as a "sunk cost" in its modeling for all years the plant is online, even though these costs have not yet been incurred and might never be incurred. This means that PacifiCorp's analysis ignored a substantial portion of the fuel cost savings that would arise from dispatching Jim Bridger at lower capacity factors and may also have skewed the findings of the optimal plant retirement date. By skewing the output of Jim Bridger to be higher than necessary, PacifiCorp is also reducing the model's selection of other resource additions that could provide energy at a lower cost. Importantly, customers pay for PacifiCorp's self-dealing with the mine it owns and controls.

[32] *In the Matter of PacifiCorp, dba Pacific Power, 2022 Transition Adjustment Mechanism*, Dkt No. UE 390, Surrebuttal Testimony of Dana M. Ralston on Behalf of PacifiCorp (PAC/1200) at Ralston/32:15-16 (Ore. P.U.C. Aug. 2021) [hereinafter "PAC/1200"] (excerpt provided as Sierra Club/ICL Attach. 5).

2. PacifiCorp's Coal Fuel Pricing Tier Assumptions Lack Any Clear Explanation or Justification

In addition to assuming that a large volume of PacifiCorp's coal fuel supply is subject to take-or-pay agreements, PacifiCorp also makes additional assumptions regarding the incremental pricing (i.e., marginal cost) for volumes of coal fuel above the take-or-pay minimum volumes. In doing so, PacifiCorp developed a set of tiered coal prices at each plant. However, the tier volumes and their corresponding prices are not explained or justified in the IRP.

In most instances, the incremental fuel costs at the Jim Bridger and Huntington plants appear to be substantially lower than the average cost of the take-or-pay volume tier. For example, at Jim Bridger from [redacted], any coal consumed just above the take-or-pay minimum is assumed to cost [redacted] percent less in $/MMBtu than the take-or-pay volume tier.[33]

The steep drop-off in the assumed price of coal for volumes above the take-or-pay threshold (in conjunction with the take-or-pay penalties) is an inappropriate assumption that is causing PacifiCorp's model to overvalue coal at the expense of other resources. In other words, if PacifiCorp set the incremental cost of coal fuel artificially low, and it set the cost substantially lower than the average cost of coal fuel, then the planning model is likely to dispatch coal excessively over time. This will have the consequence of crowding out other resource additions which might otherwise be economically selected—particularly those with high energy value, such as high-capacity factor wind resources.

In other proceedings, PacifiCorp has indicated that it would not use incremental pricing in its IRP because the average cost of coal fuel should be used to govern long-term planning decisions, rather than some lower incremental price assumptions. For instance, in the Company's

[33] Calculation based on Confidential Scenario Master_BaseCase Workpaper.

2021 ECAC (which is the California fuel cost recovery proceeding), the Company testified that: "The Company's IRP uses a 20-year planning horizon and considers the *average coal fuel cost* in its dispatch commitment."[34] Based on that testimony, Sierra Club was surprised to learn that PacifiCorp is using an incremental pricing approach in the 2021 IRP with incremental fuel costs that are significantly lower than the average cost.

C. A Sensitivity Model Run Removing Minimum Take Requirements at Jim Bridger Yielded Significant Benefits and Should be Considered in Place of the Preferred Portfolio

In PacifiCorp's 2021 IRP filing in Oregon, PacifiCorp agreed to produce a new sensitivity model run on behalf of Oregon Staff removing minimum take requirements at Jim Bridger and allowing PLEXOS to consider retirement dates for Jim Bridger every two years.[35] In anticipation of these modeling results, Oregon Administrative Law Judges ("ALJs") issued several bench requests.[36] On March 3, 2022, PacifiCorp produced the results of this "No Minimum Scenario" as well as its responses to the ALJs' bench requests pertaining to that modeling.[37]

The results are striking: compared to PacifiCorp's preferred portfolio, annual generation at Jim Bridger Units 3 and 4 is reduced by [redacted] percent, on average, between 2022 and 2037. After 2030, there is [redacted] output from the plant. If adopted, the No Minimum Scenario

[34] *In the Matter of the Application of PacifiCorp (U 901-E) for Approval of its 2021 Energy Cost Adjustment Clause and Greenhouse Gas-Related Forecast and Reconciliation of Costs and Revenue*, Docket No. A.20-08-002, Rebuttal Testimony of David G. Webb on Behalf of PacifiCorp (PAC/800) at Webb/9:16-17 (May 2021), *available at* https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2008002/3651/385112433.pdf (emphasis added).
[35] LC-77 PacifiCorp Reply Comments at 61-62.
[36] *In the Matter of PacifiCorp, d/b/a Pacific Power, 2021 Integrated Resource Plan,* Docket. No. LC-77, Bench Request (Ore. P.U.C. Feb. 17, 2022), *available at* https://edocs.puc.state.or.us/efdocs/HDA/lc77hda13425.pdf.
[37] *In the Matter of PacifiCorp, d/b/a Pacific Power, 2021 Integrated Resource Plan,* Docket. No. LC-77, PacifiCorp Response to ALJ Bench Requests 1 through 7 (Ore. P.U.C. Mar. 3, 2022), *available at* https://edocs.puc.state.or.us/efdocs/HAC/lc77hac15285.pdf.

would be substantially better for PacifiCorp customers than the IRP preferred portfolio, reducing the PVRR by $156 million.

The significant difference in generation between the No Minimum Scenario and PacifiCorp's IRP Preferred Portfolio are illustrated in the confidential chart below.

Confidential Figure 1. Jim Bridger Units 3 and 4 Generation Under the Preferred Portfolio and the No Minimum Scenario

1. The No Minimum Scenario Indicates that Jim Bridger Could Potentially be Fueled Exclusively by the Bridger Mine

In its response to the Oregon ALJs' Bench Request, PacifiCorp claims that the $156 million (PVRR) benefit would be offset by the need to retrofit the plant to process coal from the Powder River Basin ("PBR"), to the tune of $ (PVRR).[38] PacifiCorp's claim that this PRB coal processing facility is needed rests on the idea that PacifiCorp would need to resort to PRB coal fuel in the event that take or pay provisions were not executed with its current

[38] Confidential PacifiCorp Response to ALJ Bench Request 1 (included in "Attach Sierra Club 3-2 CONF") (provided as Sierra Club/ICL Attach. 6).

suppliers (i.e., Black Butte, and BCC).[39] The Company claims that it would be "unrealistic" for its current suppliers to deliver significantly lower volumes of coal absent such take or pay provision.[40] The Commission should be highly skeptical of these claims for the reasons explained below.

To begin, it is not evident that any long-term coal supply agreements with minimum take obligations are actually necessary to meet the fueling requirements of Jim Bridger under the No Minimum Scenario. Based on the results provided in the confidential attachment to ALJ Bench Request 1-1, Sierra Club estimates that only [redacted] MMBtu (or [redacted] tons) of coal are needed *in total* to supply Jim Bridger units 3 and 4 from 2022 through 2037. This is approximately what PacifiCorp projected to mine from BCC *alone* over [redacted].[41] Thus, it is conceivable that PacifiCorp could continue BCC mine production for [redacted] at current production levels and produce enough coal to operate Jim Bridger through 2037 under the No Minimum Scenario. This would avoid the need to enter any long-term contracts with minimum take obligations.

While Sierra Club has had insufficient time to fully probe PacifiCorp's ability to stockpile [redacted] tons of coal between both the BCC and Jim Bridger facilities, in response to a data request submitted in the Oregon 2021 IRP proceeding, PacifiCorp indicated that "BCC's maximum live stockpiled coal storage is 675,000 tons and the maximum seals stockpiled coal

[39] *In the Matter of PacifiCorp, d/b/a Pacific Power, 2021 Integrated Resource Plan,* Docket. No. LC-77, PacifiCorp Response to ALJ Bench Requests 1 (Ore. P.U.C. Mar. 3, 2022), *available at* https://edocs.puc.state.or.us/efdocs/HAC/lc77hac15285.pdf.
[40] *Id.*
[41] *PacifiCorp Will Close Jim Bridger Longwall Mine in November*, Coal Age (Sept. 23, 2021), *available at* https://www.coalage.com/breaking-news/pacificorp-will-close-jim-bridger-longwall-mine-in-november/ (noting that the BCC surface mine produced 1.5 million tons in 2020 and the underground mine produced 1.4 million within the first nine months of 2021).

storage is 1,900,000 tons."[42] At the Jim Bridger plant, "coal stockpile inventory [is limited] to a maximum of 1.5 million tons of coal at any one time."[43] This means total capacity between the BCC mine and the Jim Bridger plant is currently just over four million tons. PacifiCorp further indicated that, in principle, the stockpile capacity could be increased at both locations, although PacifiCorp would need to seek modified air quality permits.[44] Thus, it is possible that PacifiCorp could mine coal from BCC for [redacted] years, holding the coal in stockpile. Even if the maximum storage capability is no higher than approximately four million tons, PacifiCorp could conceivably stop BCC mining after [redacted] and still have enough coal to meet the fueling requirements of the No Minimum Scenario. Neither of these scenarios would rely upon any future coal from Black Butte.

As is apparent, these findings also call into question the need for PacifiCorp to execute a new contract with the Black Butte mine—particularly one with a minimum take provision. Moreover, the ability for BCC alone to meet Jim Bridger's needs through 2037 also suggests that the PRB coal processing investment is not necessary and should not be viewed as an offsetting factor in the $156 million PVRR benefit of the No Minimum Scenario.

2. The No Minimum Scenario Supports Retirement of Jim Bridger Units 3 and 4 Prior to 2037

The No Minimum Scenario supports retirement of Jim Bridger Units 3 and 4 no later than [redacted], and potentially as early as [redacted].

First, it is readily apparent from the results provided in the confidential attachment to ALJ Bench Request 1-1 that the Jim Bridger plant provides [redacted] energy value in any year

[42] Sierra Club/ICL Attach. 1 PacifiCorp Response to Sierra Club Data Request 9.1 in LC 77.
[43] *Id.*
[44] *Id.*

after 2030. In fact, the hourly dispatch results provided in confidential attachment ALJ Bench Request 1-4 show that Jim Bridger 3 is [redacted] Meanwhile, Jim Bridger 4 [redacted].[45]

Second, generation patterns for the two units as presented in the workpapers also raise additional questions about the model results relative to the units' technical constraints.[46] For example, the finding that Jim Bridger Unit 3 operates for only [redacted] hours in 2037 does not seem to match the PLEXOS inputs provided in the Company's original filing which included a minimum uptime significantly longer than [redacted] hours.[47] A similar mismatch occurs for Jim Bridger 4. This suggests that perhaps different modeling assumptions were applied in the 2037 timeframe simply to justify PacifiCorp's preferred plant retirement date.

Third, the results of the No Minimum Scenario show that the long-term ("LT") model, which PacifiCorp uses for making resource retirement decisions, assumed a [redacted] level of dispatch from Jim Bridger than did the more temporally granular short-term ("ST") PLEXOS model which includes hourly dispatch. In fact, the LT model for the No Minimum Scenario assumes that Jim Bridger dispatch would actually [redacted] while the ST model shows [redacted]

[45] "Attach ALJ Bench Request 1-4 CONF.zip\JB34 Hourly Reserve Provision ST 48540 CONF" to PacifiCorp Response to ALJ Bench Request 1 (included in "Attach Sierra Club 3-2 CONF") (the two confidential Bench Request Attachments 1-4 are provided as Sierra Club/ICL Attach. 7).
[46] Sierra Club/ICL Attach. 7, "Attach ALJ Bench Request 1-4 CONF.zip\JB34 Hourly Generation ST 48540 CONF."
[47] Confidential Plexos Inputs Workpaper accompanying PacifiCorp's 2021 IRP "Plexos Inputs - 2021 IRP 091021_CONF.xlsx."

[redacted].[48] This suggests that the LT model is likely [redacted] in PacifiCorp's portfolio. Because the LT model is where resource retirement decisions are made, it is possible that this LT model run may contain systemic biases that inflate Jim Bridger's value thereby delaying Jim Bridger's retirement relative to the value demonstrated in the more granular ST model. Indeed, the No Minimum Scenario results suggest that the minimum take constraints may not have been removed from the LT model, but rather only removed from the ST model. Because of the limited time between receiving the modeling results and submitting these comments, Sierra Club was unable to confirm this hypothesis; however, it is supported by the fact that when comparing the annual generation output from the LT model of the No Minimum Scenario to the LT model of PacifiCorp's Preferred Portfolio, the two scenarios are virtually identical as shown in the table below:

[48] Confidential Attach. "OR LC-77 Attach ALJ Bench Request 1-1 CONF" to PacifiCorp Response to ALJ Bench Request 1 (included in Attach Sierra Club 3-2 CONF) (provided as Sierra Club/ICL Attach. 8).

Confidential Table 4. Jim Bridger Generation Output from the LT Model

	No Minimum	P02-MM-CETA
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		

If the minimum take constraints were not actually removed from the LT model, then the Commission should be highly skeptical of PacifiCorp's assertion that PLEXOS continues to select Jim Bridger Units 3 and 4 to run on coal through 2037.[49]

[49] PacifiCorp Response to ALJ Bench Request 1 ("PLEXOS LT optimization of the P02-MM study continues to select Jim Bridger Unit 3 and Jim Bridger Unit 4 to run on coal and generate energy through the existing end-of-life in 2037").

Sierra Club recommends that in future IRPs, the Company fully explain any discrepancies between the LT and ST models, including potential implications for coal retirement dates.

Finally, the fact that Jim Bridger [redacted] raises significant questions about the plant's reliability value and the need to keep this resource online for reliability purposes. PacifiCorp's results suggest that Jim Bridger provides some incremental reliability value in 2037. However, this is challenged by the fact that Jim Bridger Unit 3 is projected to [redacted]. This finding also challenges the notion that a 500 MW nuclear resource would be needed as a replacement, which is what PacifiCorp has recommended in both its preferred case and the P02h variant, discussed below.

Accordingly, in contrast to PacifiCorp's assertions that the No Minimum Scenario supports operating Jim Bridger 3 and 4 through 2037, a more reasonable interpretation of the sensitivity is that Jim Bridger 3 and 4 should retire no later than [redacted], and potentially as early as [redacted].

3. The No Minimum Scenario–If Selected–Would Impact the Near-Term Action Plan and Upcoming All Source RFP

The No Minimum Scenario shows substantially reduced output at Units 3 and 4 in all years beginning [redacted]. As the chart above shows, the discrepancy between Jim Bridger generation in the preferred portfolio and the No Minimum Scenario becomes most pronounced beginning in [redacted], meaning that if the No Minimum Scenario were to become the preferred portfolio, the near-term action plan and the upcoming All Source RFP would be significantly impacted. While the Idaho Commission does not have a formal process for RFPs like some of

PacifiCorp's other jurisdictions, PacifiCorp's RFP will impact available resources for Idaho in the coming years.

PacifiCorp's response to the Oregon ALJs' Bench Request did not provide details on specific resource additions in the No Minimum Scenario. However, Sierra Club estimates that reducing Jim Bridger's output under this scenario could equate to replacement energy on the order of over [redacted] MW of new wind in the 2025-2030 timeframe. Thus, a significant amount of additional new renewable resources would likely be needed under the No Minimum Scenario but would not otherwise be procured if PacifiCorp's preferred portfolio is pursued instead. Sierra Club recommends that such incremental resources be considered within the upcoming All Source RFP.

D. A Sensitivity Model Run Removing Huntington's Minimum Take Assumptions Was Not Preformed, but Should be Required in Future IRPs

Just as take-or-pay assumptions for the Jim Bridger plant have a significant impact on the final portfolio, Huntington's assumed minimum take (through 2029) is also likely to have a significant impact. Using the information from PacifiCorp's input data files, Sierra Club estimates that the costs associated with the Huntington take-or-pay costs between 2023 and 2037 amount to $[redacted] (PVRR).[50] In other words, there is a significant amount of fuel cost savings PacifiCorp's model could potentially realize if these future take-or-pay provisions could be avoided and output at Huntington was reduced, either due to early retirement or lower dispatch.

Although PacifiCorp's current CSA at Huntington extends through 2029, PacifiCorp's analysis presumes that no events have transpired, or will transpire, that could trigger a reopener

[50] Calculation based on Confidential Scenario Master_BaseCase Workpaper.

clause in the Huntington CSA. However, the Huntington CSA contains a "environmental regulations" provision[51] under which the Company can avoid minimum take requirements if changes in environmental laws implicating the Huntington plant make continued operations uneconomic.[52] Stakeholders in Oregon, such as the Oregon Citizens Utility Board and the Oregon Commission Staff, have already questioned whether current environmental laws and regulations would be enough to trigger this provision, although PacifiCorp has disagreed.[53] However, environmental controls required under the Clean Air Act's Regional Haze requirements would undoubtedly constitute the type of "environmental regulations" contemplated by the Huntington coal contract. Currently, an SCR requirement at the Huntington plant remains under Clean Air Act litigation and could foreseeably be reimposed. Huntington may also be subject to additional environmental controls under the Regional Haze program's "Round 2" rulemaking, as the plant currently has no pollution controls whatsoever for nitrogen oxide ("NOx"). Utah's state implementation plan ("SIP") for Regional Haze "Round 2" is expected in July 2022, with EPA acting upon that SIP shortly thereafter. Environmental controls required under the Regional Haze rulemaking are further discussed in Section III(E). Regardless of any environmental regulatory changes, the Oregon Public Utilities Commission has already directed PacifiCorp to "thoroughly explore the costs and benefits of contract termination or renegotiation . . . ."[54] Accordingly, PacifiCorp should have modeled a sensitivity case where the current CSA at Huntington was either nullified or renegotiated.

[51] Sierra Club/ICL Attach. 5, UE 390, PAC/1200 at Ralston/12:14-13:11 (describing Huntington CSA environmental regulations provision).
[52] *Id.*
[53] *Id.*
[54] *In the Matter of PacifiCorp, dba Pacific Power, 2022 Transition Adjustment Mechanism*, Docket No. UE 390, Order No. 21-397 at 23 (Nov. 1, 2021), *available at* https://apps.puc.state.or.us/orders/2021ords/21-379.pdf.

In conclusion, Sierra Club recommends that the Commission direct PacifiCorp to produce the No Minimum Scenario sensitivity and provide an opportunity for stakeholder comment prior to any acknowledgment decision. This modeling should become standard practice in all future IRPs and further also remove minimum take requirements at Huntington after a certain date (e.g., 2025).

E. The P02h Variant Case (Jim Bridger Units 3 and 4 Early Retirement) Is Lower in Cost than PacifiCorp's Preferred Portfolio (P02-MM-CETA). This Is True Despite Questionable Assumptions that Needlessly Inflate the Cost of the P02h Variant Case.

As shown above, Sierra Club has significant concerns over the late retirement dates of some of PacifiCorp's coal units, particularly Jim Bridger. This concern is underscored by not only the No Minimum Scenario discussed above but also PacifiCorp's own analysis of the P02h variant case, which shows a risk-adjusted PVRR of $26,240 million under the MM price-policy scenario.[55] This compares favorably to PacifiCorp's Preferred Portfolio which has a PVRR of $26,343 million,[56] or about $103 million more costly than the P02h-MM case

Sierra Club recognizes that PacifiCorp made certain adjustments to the initial P02-MM-MM portfolio to ensure that the final Preferred Portfolio (P02-MM-CETA) was compliant with Washington's CETA requirements. These changes added approximately $164 million in (PVRR) costs relative to the initial P02-MM-MM portfolio.[57] However, it is not clear whether the exact same changes would also be necessary for the P02h variant to become CETA compliant. For instance, the P02h portfolio already includes 200 MW of incremental solar plus storage relative to P02-MM-MM, beginning in 2027.[58] This is roughly equal to the 160 MW of renewable plus

[55] PacifiCorp 2021 IRP Vol. I at 289, Table 9.14.
[56] *Id.* at 291, Table 9.15.
[57] *Id.* at 261, Table 9.1; 291, Table 9.15.
[58] *Id.* at 287.

storage resources that were added to create the P02-MM-CETA portfolio.[59] Thus, the P02h variant may already be largely, if not entirely, CETA compliant. Sierra Club recommends that PacifiCorp determine what shortfall, if any, there may be in this regard. Furthermore, Sierra Club recommends that PacifiCorp assess whether the P02h case should be considered preferable to its Preferred Portfolio.

From a pure least-cost planning standpoint, early retirement of Jim Bridger would lead to a more optimal portfolio and would be in PacifiCorp customers' interest. This conclusion would be bolstered were the take-or-pay provisions described above correctly modeled, thereby allowing even greater fuel cost savings from an early retirement. Additionally, the P02h variant includes a second nuclear unit (beyond Natrium) in the 2030 timeframe. According to a discussion with PacifiCorp's analytical team on November 30, 2021, this nuclear unit was not economically selected in the initial stage of modeling, and was later added when PacifiCorp decided it was necessary to address reliability issues. As discussed above, from the reliability data provided to Sierra Club that led to its decision to add the second nuclear unit, it appears that PacifiCorp evaluated an extremely narrow range of alternatives and it is far from clear that a nuclear plant was the best fit to meet the identified reliability gap. If a less costly set of resources could address the same reliability needs this nuclear addition was meant to cover, then it is conceivable the early retirement of Jim Bridger would be even more cost effective, potentially on the order of hundreds of millions of dollars (in PVRR terms), than what PacifiCorp reported in the IRP. PacifiCorp's *ad hoc* approach to addressing reliability concerns by adding resources through post-modeling "portfolio refinements," such as this nuclear unit addition, is discussed more thoroughly above in Section II(C).

[59] *Id.* at 290.

F. PacifiCorp's IRP Did Not Fully Assess the Risks Associated with the Early Exit of its Coal Plant Co-Owners.

One important consideration regarding PacifiCorp's continued operation of certain coal plants is how its actions align with the actions of facility co-owners. PacifiCorp has accelerated its exit of Colstrip Units 3 and 4, which is consistent with Sierra Club's understanding of the intentions of other Pacific Northwest co-owners of the plant (e.g., Puget Sound Energy, Avista, and Portland General Electric). However, PacifiCorp has not aligned itself with co-owners of other plants. In particular, in an application before this Commission filed in June 2021, Idaho Power stated its intention to exit its 33 percent share of the Jim Bridger plant by 2030 and adjust the depreciation accounting accordingly.[60] Importantly, Idaho Power's depreciation application *did not* contemplate the gas conversions PacifiCorp proposed in its IRP filing.

Since June, Idaho Power filed the 2021 IRP in which the Company plans to participate in the gas conversions but will exit from the gas units by 2034, three years earlier than PacifiCorp's planned retirement in 2037.[61] Additionally, Idaho Power now plans to exit Jim Bridger Units 3 and 4 earlier than previously stated: by 2025 and 2028.[62] Whether Idaho Power's interest in Jim Bridger Units 1 and 2 continues past 2034 or in Units 3 and 4 continues past 2028 has significant implications for PacifiCorp's assumptions in the 2021 IRP regarding the cost to continue operating the plant long term. Some of the considerations are:

1. PacifiCorp should be clear on who would ultimately take ownership of Idaho Power's share of the Jim Bridger Units 1 and 2 capacity and its associated output from 2034-

[60] *In the Matter of the Application of Idaho Power Company for Authority to Increase its Rates for Electric Service Costs Associated with the Jim Bridger Power Plant*, Docket No. IPC-E-21-17, Application at 5 (June 3, 2021), *available at* https://puc.idaho.gov/Fileroom/PublicFiles/ELEC/IPC/IPCE2117/CaseFiles/20210603Application.pdf [hereinafter "IPC Application"].
[61] Idaho Power Company, *2021 Integrated Resource Plan* at 152-153 (December, 2021) *available at* https://puc.idaho.gov/Case/Details/6793 [hereinafter "Idaho Power 2021 IRP"].
[62] *Id*. (indicating that all gas will come off Idaho Power's system by 2034 and all coal by 2028).

2037 and Units 3 and 4 capacity and associated output from 2025-2037. If PacifiCorp were to ultimately acquire or otherwise maintain control of Idaho Power's portion of the Jim Bridger plant, the Company should provide these acquisition costs and any sensitivities around them in the IRP.

2. If there are no parties interested in acquiring Idaho Power's ownership share, then PacifiCorp would still need to find a way to cover the associated operating and maintenance costs as well as incremental capital costs for major overhauls expected in 2032, 2033, 2034, and 2035. These additional costs are not adequately assessed in the IRP.
3. PacifiCorp would also be responsible for all decommissioning and remediation costs incurred after Idaho Power's exit in the 2028-2034 timeframe. PacifiCorp has not included those additional costs in its analysis.

The IRP does not address these major developments with Idaho Power and what they would mean for continued operation of Jim Bridger past 2028. In response to a discovery request asking whether PacifiCorp expects a third-party to assume ownership of Idaho Power's share, the Company simply stated: "PacifiCorp has not made any assumptions regarding whether or how Idaho Power Company (IPC) will handle its property."[63] At the very least, the Company could, and should, have explored sensitivities regarding whether PacifiCorp or a third party would assume ownership of Idaho Power's share of the plant.

[63] Sierra Club/ICL Attach.1, PacifiCorp Response to Sierra Club Data Request 3.2(a) in LC 77 (included in "Attach Sierra Club 2-1").

G. PacifiCorp's IRP Failed to Evaluate a Feasible Scenario in Which EPA Requires SCR Installations to Comply with the Clean Air Act.

As PacifiCorp's 2021 IRP described in great detail, the Company's coal plants must meet certain requirements to comply with the EPA's Regional Haze Rule. This matter is especially relevant for PacifiCorp's Utah coal plants, Hunter and Huntington.

In recent years the regional haze requirements in Utah have been hotly contested. In June 2016, EPA issued a final rule ("2016 FIP") requiring PacifiCorp to retrofit Hunter Units 1 and 2 and Huntington Units 1 and 2 with SCRs by August 4, 2021. The Trump administration withdrew the 2016 FIP and replaced it with a FIP that required no controls whatsoever at the four BART units. In response, Sierra Club and other organizations filed a petition in the Court of Appeals for the Tenth Circuit challenging the Trump FIP. That appeal is pending.

Outside of Utah, other plants are subject to SCR requirements to meet regional haze requirements, including Jim Bridger Units 1 and 2 and Wyodak. SCR installation was required at Jim Bridger Unit 2 by the end of 2021, and is required at Unit 1 by the end of 2022. Although Wyoming's Governor issued an emergency order to allow Unit 2 to operate in violation of the Clean Air Act through April 2022, the federal EPA has recently announced that it intends to maintain the SCR requirements on both units.[64] Despite PacifiCorp having to comply with the Clean Air Act's regional haze rule at some point, it steadfastly refuses to take this risk seriously, and chose to omit this very real possibility in its IRP analysis, even as a sensitivity case. PacifiCorp's malfeasance not only threatens significant harm to the reliability of the grid, to workers at the Jim Bridger plant, and public health in Idaho and other states but violates this

[64] 87 Fed. Reg. 2571 (Jan. 18, 2022), *available at* https://www.govinfo.gov/content/pkg/FR-2022-01-18/pdf/2022-00777.pdf. Since the federal EPA issued this notice, PacifiCorp and the State of Wyoming entered into a consent decree which would allow PacifiCorp to avoid installation of SCRs at Jim Bridger units 1 and 2. However, the EPA was not a party to this consent decree and has not acquiesced to its terms. Accordingly, the private agreement between PacifiCorp and Wyoming has no impact on federal requirements.

Commission's IRP guidelines, which require consideration of the effects of "known or potential changes to existing resources" and recognition of "contingencies for upgrading . . . resources . . . as future events unfold".[65]

To put the potential impact in perspective, Strategen considered the cost of installing SCRs at each of the coal plants mentioned above. Based on the values reported in Energy Strategies' 2018 PacifiCorp Coal Unit Valuation Study,[66] the incremental cost of these environmental controls could be on the order of $753 million in NPV terms as shown in the following table.

Table 5. Net Present Value for Coal Plants With and Without SCRs

Plant - Unit	**Net Present Value (millions, $)**		
	Without SCR	*With SCR*	*Difference*
Hunter 1	$ 1,263	$ 1,402	$ 139
Hunter 2	$ 849	$ 913	$ 64
Huntington 1	$ 1,510	$ 1,470	$ 149
Huntington 2	$ 1,321	$ 1,386	$145
Jim Bridger 1	$ 1,241	$ 791	$ 80
Jim Bridger 2	$ 711	$ 912	$ 88
Wyodak	$ 824	$ 910	$ 88
Total			$ 753

For comparison, the difference between the P02-MM Preferred Portfolio and the P03-MM Early Retirement Portfolio, which retired all of PacifiCorp's coal plants by 2030, is $1,697 million (risk adjusted),[67] meaning that a $753 million increase in the PVRR equates to more than 44 percent of this difference. In other words, if SCR-related costs are ultimately required but PacifiCorp could avoid these costs through early retirement, then the difference in costs between

[65] *See In the Matter of the Investigation by the Idaho Public Utilities Commission into Idaho Electric Utility Conservation Standards and Practices*, Docket U-1500-165, Order No. 22299, (1989).
[66] PacifiCorp Coal Unit Valuation Study.
[67] PacifiCorp 2021 IRP Vol. I at 261, Table 9.1.

the P02 and P03 cases becomes much smaller in magnitude. In fact, using PacifiCorp's own IRP analysis as a starting point, Sierra Club estimates the impact of early coal retirement in terms of total PVRR increase could be as little as three percent (versus six percent if SCRs are not considered). Under the high gas price scenario (HH), this difference declines even further and could be as little as <1 percent, meaning the cost difference between the P02 case if SCRs are required and the P03 case could be almost negligible. This is especially relevant in light of the recent and dramatic increase in gas prices, which shows that the HH scenario may be closer to reality than the MM scenario.

In summary, SCR requirements will at some point be required under the Clean Air Act. At that time, the early retirement case becomes roughly equivalent from an economic standpoint to the current preferred case, depending on the price-policy scenario.

H. PacifiCorp's P03 Early Coal Retirement Case Is Misleading on Increased Costs (Relative to the Preferred Portfolio), as These Increases Are Partly Driven by Deficiencies and Subjective Choices in the Company's Modeling Methodology.

To assess the potential for early retirement of the entire coal fleet, PacifiCorp created the "P03" cases that optimize coal unit retirement by 2030.[68] Overall, PacifiCorp's IRP analysis finds that the P03 early coal retirement cases are costlier than the P02 cases. One exception occurs when the true social cost of carbon is applied. Under that price-policy assumption, the P03 case is the least cost option from a PVRR perspective.[69]

Importantly, even when a social cost of carbon is not applied, PacifiCorp's analysis could be exaggerating or overestimating how early retirements under the P03 cases would drive higher costs relative to the P02 cases. Instead of early retirements being the key driver of these costs, a

[68] PacifiCorp 2021 IRP Vol. I at 248.
[69] *Id.* at 262.

large portion of the higher P03 costs may simply arise from methodological choices PacifiCorp has made that bias replacement resource selection towards a costlier portfolio than necessary.

One such methodological choice was PacifiCorp's overly restrictive decision on the types of potential replacement resource options it considered in the IRP selection process. For example, the main difference in incremental capacity between the P02-MM and P03-MM cases through 2030 is two resources: 1) solar plus storage and 2) non-emitting peakers. It is evident from the model assumptions and model results that the non-emitting peakers are a relatively expensive resource to build and operate (i.e., ~$374/MWh levelized cost using PacifiCorp's assumptions)[70] and their inclusion may be one of the driving factors of the higher P03 costs. Since gas additions are excluded (aside from the Bridger conversions), it appears that the primary options for resources with high capacity value are limited mainly to the non-emitting peaker and nuclear additions, both of which are expensive. Indeed, both nuclear and non-emitting peaker additions feature prominently in the variant analyses and are often the main drivers of cost differences between the variants and the base case.

Through informal discussions, PacifiCorp indicated that it views resources like the non-emitting peakers as "placeholders" for resources that will be needed far into the future. However, they are still assigned a cost that is included in the PVRR calculation and is evaluated on an equal footing with nearer term resource additions. Thus, inclusion of non-emitting peakers and nuclear plants, even as indicative "placeholders" for the distant future, can still substantially skew the PVRR results and lead to misleading conclusions about the relative cost of portfolios like P03-MM.

[70] *Id.* at 183, Table 7.2.

If PacifiCorp had instead included more resource options with high capacity value beyond those two choices, then the results would differ substantially, and the cost differential of the P03 cases versus the P02 cases would not be as dramatic. Some of these additional resource options might include: 1) advanced load response measures with fewer operating limits than traditional demand response; 2) managed EV charging and Vehicle-to-Grid flexibility 3) offshore wind; 4) longer duration storage resources; or 5) alternative configurations for hybrid resources (e.g., solar plus battery storage with five- or six-hour durations, versus PacifiCorp's identified four-hour duration).

IV. PacifiCorp's Expectation that it Will Receive Power from the Natrium Plant, a Novel Nuclear Technology, by 2028 Introduces Substantial Cost and Execution Risks that Were Not Adequately Addressed in the IRP.

PacifiCorp's analysis of the Natrium advanced nuclear reactor raises numerous concerns. First, and most significantly, PacifiCorp has stated on numerous occasions that the Natrium nuclear plant was "exogenously" included in the model, a fancy way of saying that it was not economically selected by the model. By definition, this means that removing the Natrium unit should lead to a lower overall portfolio cost. However, the variant case where Natrium was excluded (P02e) leads to an *increase* in portfolio costs. This presents a logical inconsistency that would only make sense if PacifiCorp were applying other changes to the variant case. Given these discrepancies, PacifiCorp should provide a more detailed explanation of how Natrium can be both economic and non-economic.

Second, PacifiCorp has failed to meaningfully evaluate the various risks surrounding an untested, highly controversial energy source, including Natrium's permitting, regulatory, financial, operational, environmental, and technical risks. PacifiCorp has either downplayed or failed to acknowledge each of these. This lack of information and the absence of rigorous

analysis for a new, untested technology should cause the Commission significant pause, and ultimately result in a non-acknowledgement.

To begin, the Natrium project faces significant regulatory hurdles. The Company acknowledged that Natrium is "a first of a kind sodium fast reactor" and that there may be Nuclear Regulatory Review "challenges."[71] Yet, when asked about the project's permitting requirements, PacifiCorp implied that some portion of these risk factors would essentially be outsourced to its partner (TerraPower), saying that the Company and TerraPower "will comply with all federal, state and local permitting requirements[,]" but "it is premature to provide an exhaustive list of permitting requirements or timelines at this time."[72] Additionally, PacifiCorp does not appear to have a current plan for disposal of nuclear waste. When asked about the construction or availability of federally licensed storage facilities for nuclear waste that would be generated from Natrium, PacifiCorp responded that it "has no further information on this topic" but expects some, unidentified independent storage to be federally approved at some unidentified, later date.[73] The IRP omitted any potential regulatory delay or denial; instead it assumed the Natrium plant will smoothly proceed through the regulatory process. This assumption imposes significant risk on the entire Preferred Portfolio, as certain resource planning decisions in the 2020s appear to hinge upon Natrium's completion.

Next, PacifiCorp's modeling assumes that the federal government will ultimately fund a significant portion of total costs. Sierra Club acknowledges that the U.S. Department of Energy has already awarded TerraPower $80 million through its advanced reactor demonstration

[71] Sierra Club/ICL Attach. 1 PacifiCorp Response to Oregon Citizens' Utility Board ("CUB") Data Request 3 in LC 77.
[72] Sierra Club/ICL Attach.1, PacifiCorp Response to Sierra Club Data Request 4.5 (included in "Attach Sierra Club 2-1").
[73] Sierra Club/ICL Attach.1, PacifiCorp Response to CUB Data Request 6 in LC 77.

program,[74] and over the next seven years, the Department plans to invest a total of $3.2 billion in this program, with industry partners providing matching funds.[75] While these are significant sums, neither PacifiCorp nor TerraPower can guarantee that additional federal funding, in any amount, will materialize. Federal policy can change quickly, and it is difficult to forecast whether the Biden administration's (or future administrations') support for nuclear power will remain, particularly as Russia's war on Ukraine has already created serious and dangerous conditions at the Chernobyl nuclear plant[76] and raised concerns about attacks on other nuclear facilities. The IRP does not contain any analysis of potential cost overruns, despite the fact that nearly all nuclear projects in the U.S. have been plagued by astronomical cost overruns,[77] or any contingency plan in the event that the federal funding is not awarded. While there have been assurances that TerraPower will assume the risk of cost overruns and delays,[78] to date, PacifiCorp has not presented any agreements with TerraPower to this effect or otherwise provided any evidence that customers will be protected.

Connected, Natrium's technical design itself raises cost concerns. Unlike past nuclear projects, Natrium requires a highly enriched uranium, known as "high-assay low-enriched uranium" ("HALEU"). PacifiCorp is assuming it will obtain a domestic supply for HALEU;[79]

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[74] *U.S. Department of Energy Awards TerraPower $80 Million to Demonstrate Advanced Nuclear Technology*, TerraPower (Oct. 13, 2020), *available at* https://www.terrapower.com/doe-natrium-demonstration-award/.
[75] Office of Nuclear Energy, *U.S. Department of Energy Announces $160 Million in First Awards under Advanced Reactor Demonstration Program*, Energy (Oct. 13, 2020), *available at* https://www.energy.gov/ne/articles/us-department-energy-announces-160-million-first-awards-under-advanced-reactor.
[76] Henry Fountain, *How the loss of power at Chernobyl could affect the nuclear disaster site*, New York Times (Mar. 9, 2022), *available at* https://www nytimes.com/live/2022/03/09/world/ukraine-russia-war#how-losing-power-at-chernobyl-affects-operations-at-the-former-plant.
[77] *See, e.g.,* Timothy Gardner and Nichola Groom, *Some U.S. Cities Turn Against First Planned Small-Scale Nuclear Plant*, Reuters (Sept. 2, 2020), *available at* https://www.reuters.com/article/us-usa-nuclearpower-nuscale/some-u-s-cities-turn-against-first-planned-small-scale-nuclear-plant-idUSKBN25T30E (noting that the NuScale nuclear project's projected cost of $6.1 billion has risen from $3.1 billion in 2017).
[78] *Project Details*, Wyoming Advanced Energy, *available at* https://wyomingadvancedenergy.com/project-details/ (last visited Mar. 3, 2022).
[79] Sierra Club/ICL Attach.1, PacifiCorp Response to CUB Data Request 4 in LC 77.

however, such fuel is currently only produced for commercial purposes in Russia.[80] In light of the ongoing war and humanitarian crisis in the Ukraine, increasing the United States' energy reliance on Russia should raise obvious concerns. Some trade press estimate that it will take at least seven years to develop a U.S. based market.[81]

Fuel availability further raises questions on impacts to local, fenceline communities. For example, the White Mesa mine in southwestern Utah, which is the only operating conventional uranium mine in the U.S., has caused documented environmental damage to the surrounding indigenous communities. Further development of uranium production in the U.S. to fuel plants such as Natrium could similarly result in harmful consequences for nearby, local communities. Yet, PacifiCorp has not considered and disclosed these issues.

Finally, operating any nuclear plant comes with significant operational risks. In addition to having minimal information on its waste management strategy, PacifiCorp does not appear to have begun planning to operate the plant. For example, regarding training personnel, PacifiCorp has only indicated that it is "currently evaluating the overall strategy for operations and maintenance."[82] Notably, the IRP does not contain any analysis evaluating the risk that the plant—a first of its kind demonstration project that has never operated on a commercial scale—may suffer from operational difficulties during its early years.

Sierra Club recommends first that the Commission not acknowledge any IRP planning assumptions that rely on PacifiCorp's unsupported assertion and the timeline, cost, and performance of the Natrium plant. Non-acknowledgement will make clear that PacifiCorp's

[80] Matthew Bandyk, *Nuclear reactors of the future have a fuel problem*, Utility Dive (Aug. 30, 2021), *available at* https://www.utilitydive.com/news/nuclear-reactors-of-the-future-have-a-fuel-problem/604707/.
[81] *Id.*
[82] Sierra Club/ICL Attach. 1, PacifiCorp Response to CUB Data Request 9 in LC 77.

pursuit of this unproven, risky, and expensive technology is a risk to be borne by shareholders, not ratepayers. Additionally, the Commission should require significantly more information from PacifiCorp concerning its nuclear plant, including:

1. A detailed explanation of how Natrium can be both non-economic (and thus requiring hardwiring into PLEXOS) and economic (removing the Natrium plant from the model increasing costs to the system) is essential to understanding this resource;
2. A detailed explanation of anticipated radioactive waste storage options;
3. A detailed explanation of anticipated federal, state, and local permitting requirements, with key milestones with anticipated dates; this should also explain who is responsible (i.e., PacifiCorp or Terrapower) for achieving licensing and permitting milestones;
4. A detailed accounting of estimated costs, including various scenarios forecasting potential cost overruns and lack of federal funding support;
5. Greater explanation on the plant's anticipated fuel supply, with contingency plans if a domestic market is not available by 2028;
6. A detailed explanation of PacifiCorp's operating plans, including safety, worker training, and worker transition;
7. A clarification of whether this project would be a purchase power agreement ("PPA") arrangement or a PacifiCorp-owned resource. If it is a PPA, PacifiCorp should provide a detailed explanation for what protections will be in place for its customers regarding any project denials, delays or cost overruns;
8. A contingency plan for meeting resource needs if the plant is still in the planning or construction phase in 2028; and,

9. A detailed explanation, with documentation, on how PacifiCorp will protect itself and ratepayers from unforeseen cost overruns and delays.

V. Risks Related to the Jim Bridger Gas Conversion

A. Overview of PacifiCorp's Proposed Coal-to-Gas Conversion of Jim Bridger Units 1 and 2

PacifiCorp's planned coal-to-gas conversion at Jim Bridger Units 1 and 2 by 2024[83] carries significant risk that is borne almost exclusively by ratepayers. Specifically, the Company's overly optimistic fuel cost forecasts combined with its artificial limitation on the types of capacity resource alternatives explains why the Company found the conversion to be economical. In reality, the Company has not adequately explained the details of the conversion. The Company's analysis of the conversion's impact on the preferred portfolio is examined in its variant run that excluded the gas conversion.[84] In its analysis, the Company concluded that the portfolio without the conversion is $305 million on a risk adjusted basis more than the preferred portfolio.[85] The Company claims that the project is cost-effective primarily because it has low capital costs relative to the alternative resource. But this claim does not account for the increased fuel price risk to be borne by customers nor the lack of any approval by state and federal regulators of the gas supply lines and air quality permits.

B. PacifiCorp's Proposed Gas Conversion Comes with Significant Price Risk.

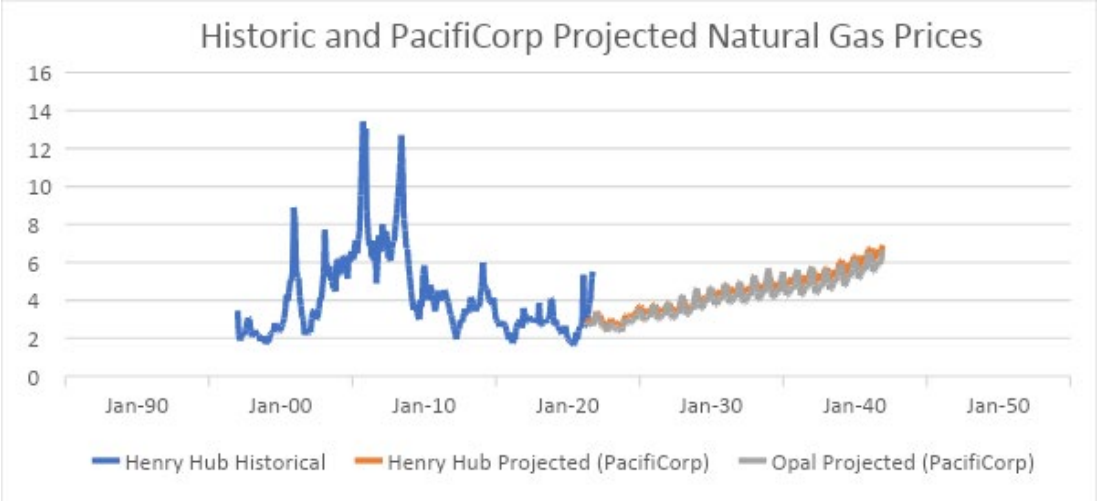
Historically, the price of natural gas has been linked to crude oil prices, where both commodities' prices rose and fell together.[86] However, beginning in 2011, gas prices dropped,

[83] PacifiCorp 2021 IRP Vol. I at 24.
[84] *Id.* at 269-270, Variant P02a-JB1-2 GC.
[85] *Id.* at 270, Table 9.7 and 291, Table 9.15 (comparing the P02a-MM no conversion portfolio to P02-MM-CETA portfolio).
[86] Peter Hartley et al., *The Relationship Between Crude Oil and Natural Gas Prices*, James A. Baker III Inst. for Pub. Policy at 8 (Nov. 2007), *available at* https://www.bakerinstitute.org/media/files/Research/c4d76454/ng_relationship-nov07.pdf.

primarily due to the domestic shale fracking, and became relatively stable. A low, stable gas price was the norm for a decade. Consequently, we saw a dramatic shift in the electric sector as generation shifted from coal to fracked gas and then renewables.

PacifiCorp's IRP forecast expects these low prices to continue for the entire planning horizon. As shown in Figure 1, PacifiCorp's forecast for Henry Hub natural gas prices begins in April 2021 at just under $3/MMBtu, slowly rise to $4 in 2029, $5 in 2034, and ultimately top off at just under $7/MMBtu by 2041.[87]

Figure 2. Historic Henry Hub Prices and PacifiCorp's IRP Natural Gas Price Forecast



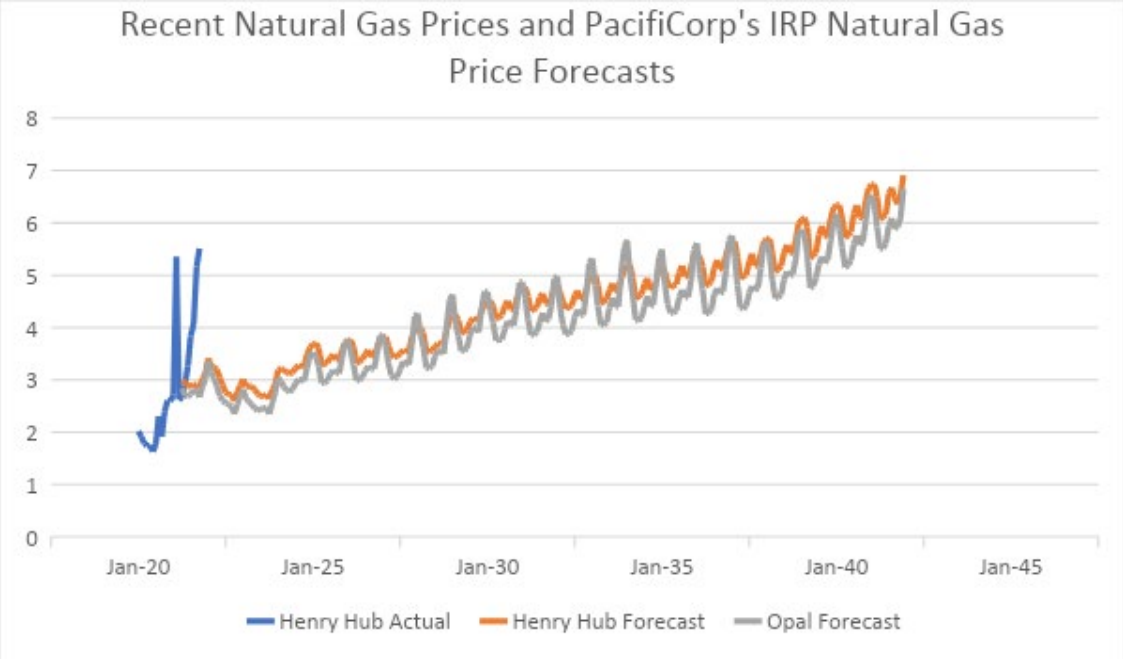
However, gas prices have nearly doubled in the past year alone.[88] Prices rose sharply in February 2021 after the Texas winter storm, dropped quickly, but then immediately started a persistent climb in March 2021 until today. Because PacifiCorp had to lock in its gas price forecast as an input for its IRP in early 2021, we can track the Company's forecast to actual gas

[87] The most likely natural gas hub for the Jim Bridger plant is Opal, which closely mirrors Henry Hub but is usually 5-10 percent cheaper.

[88] Talmon Joseph Smith, *Winter Heating Bills Loom as the Next Inflation Threat*, The New York Times (Nov. 8, 2021), *available at* https://www nytimes.com/2021/11/08/business/economy/home-heating-prices-winter html?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%202021-11-08%20Utility%20Dive%20Newsletter%20%5Bissue:37856%5D&utm_term=Utility%20Dive.

prices. Since April 2021, actual gas prices have significantly increased relative to the Company's forecast. In October 2021, the Henry Hub price for gas was $5.51/MMBtu, nearly double the Company's forecast of $2.84/MMBtu.

Figure 3. Henry Hub Prices Since January 2020, and PacifiCorp's Gas Price Forecast



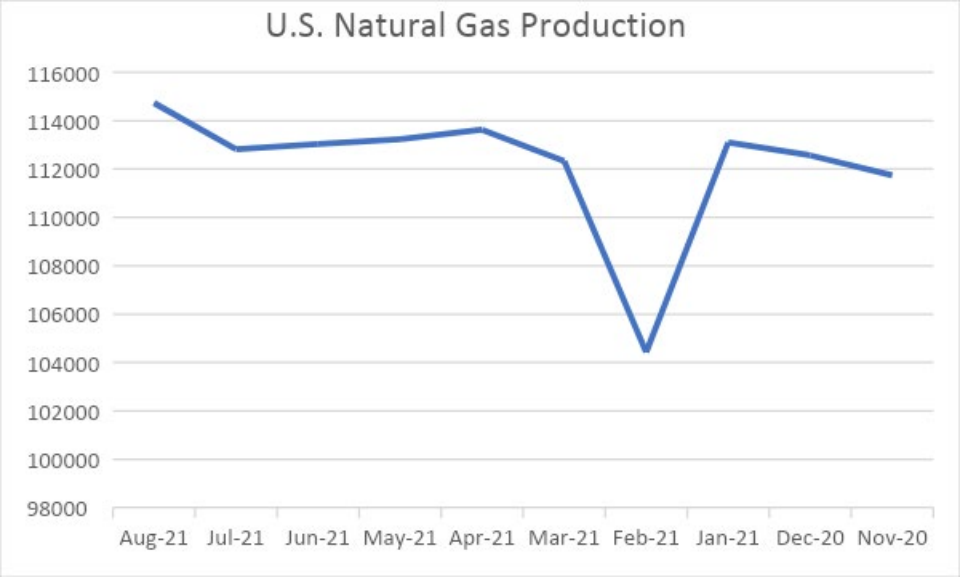
Despite this dramatic increase in gas prices in 2021 PacifiCorp is optimistic that prices will revert to their historic low. According to the IRP, as of June 30, 2021, gas futures show a high price of $3.17/MMBtu, which is a "signal-to-drill" and will incent drillers to chase production efficiency and continue to drive down prices.[89] PacifiCorp continued that "[t]he North American natural gas supply curve continues to flatten as production efficiencies expose an ever-increasing resilient, flexible, and low-cost resource base."[90]

However, there is also a real chance high prices could persist as a "new normal." Even as gas prices reached and then exceeded $3.17/MMBtu in 2021, rather than incentivizing drillers to

[89] PacifiCorp 2021 IRP Vol. I at 44.
[90] *Id.* at 46.

chase production as PacifiCorp predicted, domestic fracked gas production has remained relatively flat since November 2020.[91] While gas prices remain high, and demand responds to seasonal needs, overall U.S. gas supply has remained flat through March 2022.[92]

Figure 4. U.S. Natural Gas Production



The domestic and international gas markets continue to evolve. European and Asian gas prices are higher than normal as demand outpaces supplies.[93] The United States is not immune to this global dynamic and, in fact, has much more international exposure now due to LNG expansion.[94] The cost of financing new fossil fuel projects, like fracked gas wells, and the distribution system for carrying that gas, is increasingly costly relative to alternative opportunities, like renewable

[91] *Monthly Crude Oil and Natural Gas Production*, U.S. Energy Info. Admin. (Nov. 30, 2021), *available at* https://www.eia.gov/petroleum/production/#ng-tab. The drop in February 2021 was caused by the Texas Winter Storm.
[92] *Natural Gas Weekly Update,* U.S. Energy Info. Admin. (March 3, 2022), *available at* https://www.eia.gov/naturalgas/weekly/#tabs-supply-3.
[93] Frederico Carita, LevelTen Energy, *A Perfect Storm: Understanding the European Energy Crisis* (Oct. 28, 2021), *available at* https://www.leveltenenergy.com/post/europe-energy-crisis.
[94] Victoria Zaretskaya, *U.S. liquefied natural gas exports grew to records highs in the first half of 2021*, U.S. Energy Info. Admin., (July 27, 2021), *available at* https://www.eia.gov/todayinenergy/detail.php?id=48876.

generation.[95] Fossil fuel company shareholders are demanding higher returns after a decade of relatively low growth of returns.[96]

Based on our initial analysis, if gas prices held at $5/MMBtu in 2021 and increased at 3 percent annually until 2037,[97] PacifiCorp customers would spend an incremental $230 million on fuel costs during the plant's operation horizon from 2024-2037.

The purported economic benefits of the coal-to-gas conversion is further diminished upon closer scrutiny of PacifiCorp's other variant assumptions, as we will address in subsection (D).

Sierra Club does not purport to know future gas prices. However, we are well aware of the risks associated with investing in a long-term resource with an unknown long-term fuel cost relative to an alternative resource, such as renewables paired with storage, which has no fuel cost risks whatsoever. If the recent prices become "the new normal" then we are currently experiencing natural gas prices that PacifiCorp did not anticipate until 2034.

C. The Risk of Fuel Cost Volatility Is Borne by Customers, Not Shareholders.

As demonstrated above, there is significant risk associated with relying on a fossil fuel resource with variable, uncertain fuel costs, and that risk falls squarely on customers. In Idaho, fuel costs are initially set through rate cases, with "true-ups" approved through the Energy Cost Adjustment Mechanism ("ECAM"). Idaho customers pay 90 percent of the difference between base fuel costs set in the rate case and adjustments through the ECAM, meaning that PacifiCorp has some, but a relatively small, incentive to ensure that projected fuel costs established in a rate

[95] Tim Quinson, *Cost of Capital Spikes for Fossil-Fuel Producers*, Bloomberg Green (Nov. 9, 2021), *available at* https://www.bloomberg.com/news/articles/2021-11-09/cost-of-capital-widens-for-fossil-fuel-producers-green-insight.
[96] Matt Egan, *US oil companies are in no rush to solve Biden's gas price problem*, CNN Business (Nov. 10, 2021), *available at* https://www.cnn.com/2021/11/10/energy/oil-gas-prices-joe-biden/index html?.
[97] PacifiCorp's forecast for Opal, the most likely gas hub for the Jim Bridger plant, increases 3.89 percent on average between 2024-2037.

case track actual fuel costs. In other words, PacifiCorp can largely adjust its forecast annually in the ECAM, and thus can track the upward trajectory of costs, thereby limiting the Company's risk exposure when considering a long-term investment decision like the gas conversion. Meanwhile, customers have no ability to mitigate this risk but must pay for higher than assumed gas prices through the annual ECAM. It is unlikely that PacifiCorp would assume that type of asymmetrical risk for its shareholders, and would rather insist on assigning that risk to its customers. Meanwhile, there is an abundant choice of alternative, clean capacity resources that do not carry this inherent fuel cost risk. For example, PacifiCorp modeled an alternative to the gas conversions which revealed fixed-cost solar and storage would maintain reliability while mitigating the price risk carried by customers.[98].

D. PacifiCorp's IRP Contains Unresolved Questions about the Coal-to-Gas Conversion Analysis.

In addition to the concerns raised above, the IRP does not provide a description of the plant nor the capital projects that the Company plans to undertake in order to convert Jim Bridger Units 1 and 2 to gas. The Company's action item for the conversion consists of five, broad steps that provide little meaningful detailed information.[99] The Company does not provide any explanation in the IRP on the expected fuel source, the type of permitting that must be completed, or if the converted units would be classified as a new or existing source for purposes of environmental compliance. Nor does the Company explain how they will address the fact that Idaho Power's plan would exit the gas converted units years before PacifiCorp intends.[100]

[98] PacifiCorp 2021 IRP Vol. I at 269.
[99] *See Id.* at 24.
[100] *See* Idaho Power 2021 IRP at 152 (exiting the gas conversions in 2034 instead of PacifiCorp's intended date of 2037).

The Company also refers to the converted units as "peakers," but does not explain if the plant will operate as combustion turbines or will maintain and use the existing boilers. The Company's workpapers only compound the confusion by including multiple, disparate heat rates, which suggests two very different technologies. In one confidential workpaper, the Company appears to use heat rates of [redacted] and [redacted] Btu/kWh for Jim Bridger 1 and 2 respectively,[101] and in another workpaper the heat rates are listed as [redacted] and [redacted].[102] Which heat rate, or rates, the Company uses as an input in its models has a tremendous impact on the outcome of the model run. But the IRP fails to provide any of this critical information.

Finally, as discussed in Section III(F), the results of the No Gas Conversion variant, that finds the conversion economical, may be a result of PacifiCorp's overly restrictive number of potential replacement options in its IRP selection process. The No Gas Conversion variant includes over 600 MW of non-emitting peakers from 2031-2037, a future resource that is still speculative. But the Company limited its IRP capacity resource options to non-emitting peakers and nuclear additions, both of which are expensive, thus driving up the cost of replacing the gas conversion. The Company then used the results of the variant, based on the speculative costs of speculative resources, as justification for converting Jim Bridger Units 1 and 2 to gas. As discussed in Section III(F), if PacifiCorp had included more resource options with high-capacity value beyond nuclear and non-emitting peakers, then the variant results could differ substantially.

[101] Confidential Plexos Inputs Workpaper accompanying the PacifiCorp 2021 IRP Application "Plexos Inputs – 2021 IRP 091021_CONF.xlsx."
[102] Confidential Jim Bridger Gas Conversation Master Assumptions Workpaper accompanying the PacifiCorp 2021 IRP Application "JB1+2_NGCv20210519 CONF.xlsx" tab "15 - Refuel CapEx."

E. PacifiCorp and Idaho Power Do Not Appear to be Aligned on the Gas Conversion Proposal.

As noted above, PacifiCorp does not appear to be appropriately coordinating with its co-owner of the Jim Bridger facility, Idaho Power. Idaho Power has publicly set a company goal to be 100-percent clean energy by 2045, and, as noted, has taken steps to accelerate the Jim Bridger depreciation schedule no later than December 31 2030.[103] However, just a few months after making its depreciation filing, Idaho Power and Idaho Commission Staff filed a joint motion requesting a suspension of the procedural schedule and discovery "to allow Movants the opportunity to assess this case in light of new developments that may impact the operation of the Jim Bridger Power Plant."[104] Those "new developments" turned out to be (1) continued regulatory uncertainty regarding Regional Haze requirements at the plant and (2) PacifiCorp's announced gas conversions for Units 1 and 2. Idaho Power's filing indicates that PacifiCorp may not be coordinating its plans with its co-owner.[105] A prime example is Idaho Power's testimony that the "Co-owners have not yet developed contractual terms that would be necessary to allow for the potential earlier exit of a Bridger unit by one Co-Owner, and not both Co-Owners."[106] Meanwhile Idaho Power plans to exit each of the Bridger units earlier than PacifiCorp. This

[103] IPC Application at 1.
[104] *In the Matter of Idaho Power Company's Application for Authority to Increase its Rates for Electric Service to Recover Costs Associated with the Jim Bridger Power Plant*, Case No. IPC-E-21-17, Joint Motion to Suspend Procedural Schedule at 1 (Oct. 1, 2021), *available at* https://puc.idaho.gov/Fileroom/PublicFiles/ELEC/IPC/IPCE2117/Company/20211001Joint%20Motion%20to%20Suspend%20Procedural%20Schedule.pdf.
[105] *In the Matter of Idaho Power Company's Application for Authority to Increase its Rates for Electric Service to Recover Costs Associated with the Jim Bridger Power Plant,* Case No. IPC-E-21-17, Amended Application and Motion to Set Schedule (Feb. 16, 2022), *available at* https://puc.idaho.gov/Fileroom/PublicFiles/ELEC/IPC/IPCE2117/CaseFiles/20220216Amended%20Application%20and%20Motion%20to%20Set%20Schedule.pdf.
[106] *In the Matter of Idaho Power Company's Application for Authority to Increase its Rates for Electric Service to Recover Costs Associated with the Jim Bridger Power Plant*, Case No. IPC-E-21-17 Matt Larkin Supplemental Direct Testimony at 9:12-15 (Feb. 16, 2022), *available at* https://puc.idaho.gov/Fileroom/PublicFiles/ELEC/IPC/IPCE2117/Company/20220216Larkin%20Supplemental%20Direct.pdf.

misalignment and lack of contractual arrangements highlights the uncertainty of the true cost and viability of the gas conversions.

The questions raised above regarding cost and liability assumptions are especially concerning as PacifiCorp's conversion plan is fast-paced. The Company states that it intends to initiate the conversion process by finalizing an employee transition plan by the end of Q2 2022 and finalize close-out existing permits, contracts, and other agreements by the end of 2023.[107] However, PacifiCorp does not explain the timeline for permitting and building the gas supply lines necessary to fuel the converted plants. These plans appear aggressive, incomplete, and document PacifiCorp's lack of transparent communications and coordination with Idaho Power.

VI. Barriers to Clean Energy

A. PacifiCorp's Long-Term Resource Cost Assumptions Are Not Fully Informed by the Recent All-Source RFP Results.

PacifiCorp's assumptions regarding the cost of new clean energy resources are a key driver of its IRP portfolio results—particularly over the long term after it constructs the 2019 RFP finalist projects. While many of PacifiCorp's cost and performance assumptions are consistent with other recent public data, some assumptions, as described in this section, are unsupported.

PacifiCorp retained Burns & McDonnell Engineering Company ("BMcD") to evaluate various renewable energy resources in support of the development of the 2021 IRP and associated resource acquisition portfolios and/or products. According to the Company, the resulting 2020 Renewable Resources Assessment and Summary Tables[108] provide a high-level

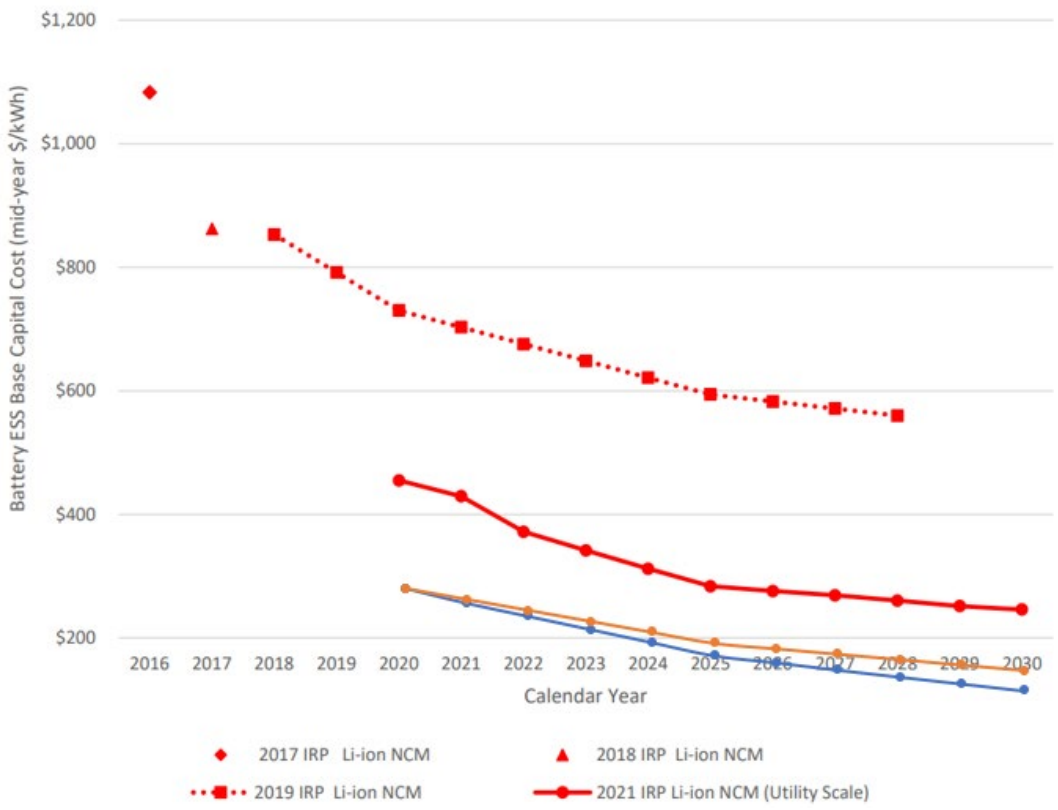
[107] PacifiCorp 2021 IRP Vol. I at 322.
[108] PacifiCorp 2021 IRP Vol. II, App. M.

comparison of technical capabilities, capital costs, and O&M costs that are representative of renewable energy and storage technologies. PacifiCorp made additional adjustments on some of the cost and performance parameters to reflect the Company's own experience and assessment.

PacifiCorp's assessment is fairly comparable with the most recent (2021) Annual Technology Baseline ("ATB") report by the National Renewable Energy Lab ("NREL") with the exception of battery storage cost estimates, which differ significantly. For example, PacifiCorp assumed that a 4-hour Li-Ion battery, that is available in 2021 and has a commercial operation year of 2023, has a capital cost of $1,820/kW, while NREL's ATB predicts $1,281-1,351/kW for 2021 installations and $1,070-1,275/kW for 2023 installations.[109] Similarly, PacifiCorp assumed a capital cost of $4,622/kW for an 8-hour battery, while NREL's ATB projects the cost to be $2,318-2,444/kW in 2021 and $1,937-2,307/kW in 2023. The 2021 IRP's Figure 7.5 (provided in Volume I) shows the forecast of storage costs that informed the Company's modeling. The below figure provides the IRP's cost curves with the NREL's moderate and advanced cost assumptions, identified by the orange and blue lines respectively.

[109] NREL ATB estimates are expressed in $2019, but were adjusted to $2020 for a consistent comparison (using a 2.5% inflation assumption).

Figure 5. Figure 7.5 from PacifiCorp 2021 IRP Volume I Compared to NREL Cost Assumptions



PacifiCorp's higher cost assumption combined with other flawed assumptions and modeling choices, such as the capacity contribution of hybrid solar plus storage assets (as discussed above in Section II(A)) and the low gas prices (as discussed above in Section V), caused underinvestment in clean energy and storage technologies in the Company's optimized portfolios.

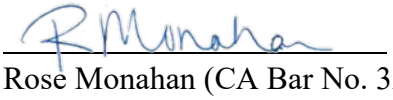
Regardless of how PacifiCorp developed its technology cost assumptions, it is problematic that these assumptions may not match the reality of actual project costs as informed by the recent all-source RFP bids. When PacifiCorp delayed its IRP filing from April to September, one of the justifications it provided was that the additional time would allow the

Company to utilize the results of its all-source RFP for the modeling. That way, the most up-to-date market data could be reflected in the supply side resource cost assumptions and modeling. PacifiCorp included cost information for the specific projects resulting from the 2019 RFP to be deployed in the 2021-2024 timeframe, but did not necessarily use that information to inform its forecasts going further into the future, and instead reverted back to the BMcD forecast.

PacifiCorp confidentially provided some information on the 2019 project bids,[110] but it is still possible to develop a high-level comparison of the recent project cost data to PacifiCorp's future forecast. Focusing on the workpaper for the Dominguez I project (a 200MW/4hr battery energy storage system with a projected commercial operation date of mid-2024), the estimate for "All Fixed Costs With Network Upgrades" is [redacted]/kW for the first full year of operation (2025) escalating at [redacted] per year. In contrast, in Table 7.2 Total Resource Cost for Supply-Side Resource Options 21 IRP, PacifiCorp assumes a total fixed cost of $223.65/kW for 50MW/4hr Li-Ion battery.[111] This confirms that there is a significant discrepancy between PacifiCorp's model assumptions going forward and real-world project cost data it has recently received. Sierra Club recommends that PacifiCorp revise its long-term resource cost assumptions, particularly for battery storage (stand alone or paired with other resources), to better reflect the results of its RFP as it had promised in requesting a delay.

Dated: March 15, 2022

Respectfully submitted,



Rose Monahan (CA Bar No. 329861)
Sierra Club

[110] Unfortunately, values in the project-specific workpapers were hard coded and it is not fully transparent how their values were used to inform the final selection of resources.
[111] PacifiCorp 2021 IRP Vol. I at 177 in reference to this workpaper "3_0003_Dominguez_BSA_200MW_200_4H_UT_15YR_2024_2_A_B+F_IRPDataFix CONF.xlsx".

Benjamin Otto (ID Bar No. 8292)
Idaho Conservation League

Attachment 1

Selected PacifiCorp Public Data Responses

Sierra Club/ICL Attachment 1

Selected Public Responses to Sierra Club Data Requests

1 LC 77 - PacifiCorp Response to Sierra Club Data Request 3.2

2 LC 77 - PacifiCorp Response to Sierra Club Data Request 4.5

3 LC 77 - PacifiCorp Response to Sierra Club Data Request 6.1

4 LC 77 - PacifiCorp Response to Sierra Club Data Request 9.1

5 LC 77 - PacifiCorp Response to CUB Data Request 3

6 LC 77 - PacifiCorp Response to CUB Data Request 4

7 LC 77 - PacifiCorp Response to CUB Data Request 6

8 LC 77 - PacifiCorp Response to CUB Data Request 9

LC 77 / PacifiCorp
October 14, 2021
Sierra Club Data Request 3.2

Sierra Club Data Request 3.2

In response to SC 1.9, the Company responded that it does not include any incremental costs to operate the Jim Bridger plant after Idaho Power exits the plant in 2030. PacifiCorp intends to run Units 3 & 4 until 2037.

(a) Does PacifiCorp anticipate a third-party will assume all of Idaho Power's share and costs?

(b) Please provide all contracts and materials that describe how PacifiCorp and Idaho Power share common costs, O&M costs, and decommissioning and remediation costs of the joint units.

(c) Please provide all contracts and other materials that describe any agreement between PacifiCorp and Idaho Power regarding Idaho Power's planned exit from Jim Bridger in 2030.

Response to Sierra Club Data Request 3.2

(a) PacifiCorp has not made any assumptions regarding whether or how Idaho Power Company (IPC) will handle its property.

(b) Two agreements govern PacifiCorp and IPC's relationship at the Jim Bridger plant. First, the Agreement for the Ownership and Operation of the Jim Bridger Project between IPC and PacifiCorp Power and Light Company (PP&L), executed September 22, 1969, subsequently amended (O&O Agreement) and second, the Agreement for the Operation of the Jim Bridger Project between IPC and PP&L, executed September 22, 1969, subsequently amended. Please refer to Confidential Attachment SC 3.2, which provides excerpts governing cost sharing.

(c) Please refer to the Company's response to subpart (b) above.

Confidential information is designated as Protected Information under the protective order in this proceeding and may only be disclosed to qualified persons as defined in that order.

LC 77 / PacifiCorp
November 12, 2021
Sierra Club Data Request 4.5

Sierra Club Data Request 4.5

Please identify all anticipated federal, state, and local permit approvals, including required waivers or exceptions to federal, state, and/or local law that will be required for the proposed Natrium^{TM} plant.

(a) For each permit requirement identified, indicate the current status of the permitting process (e.g., yet to apply, pending, permit received, etc.);

(b) For each permit requirement identified, please indicate the anticipated timeframe for obtaining said permit.

Response to Sierra Club Data Request 4.5

TerraPower and PacifiCorp will comply with all federal, state and local permitting requirements. It is premature to provide an exhaustive list of permitting requirements or timelines at this time. Please refer to the Company's response to CUB Data Request 5.

LC 77 / PacifiCorp
December 22, 2021
Sierra Club Data Request 6.1

Sierra Club Data Request 6.1

Please provide any LT model work papers, ST model work papers and supporting reliability assessment work papers, for any preliminary resource portfolios PacifiCorp developed for the 2021 IRP prior to applying the Granularity and Reliability Adjustments or any subsequent portfolio refinements.

Response to Sierra Club Data Request 6.1

PacifiCorp's planning process must ensure that portfolios produced are reliable. The preliminary portfolios listed below were primarily used to evaluate the difference in resource value between the Long-Term (LT) model and the Short-Term (ST) model in order to understand which options could be counted on to produce reliable portfolios.

The following LT portfolios (with PLEXOS study numbers) were run without adjustments and used to develop the Granularity and Reliability adjustments:

- PLEXOS study number 3112 (P02-MMR (CO,NG) Intentional)
- PLEXOS study number 2993 (P02-MMR (CO,NG) Intl UTWY)

Please refer to Confidential Attachment SC 6.1, which provides the LT work papers and the ST hourly capacity requirements.

Confidential information is designated as Protected Information under the protective order in this proceeding and may only be disclosed to qualified persons as defined in that order.

LC 77 / PacifiCorp
March 15, 2022
Sierra Club Data Request 9.1

Sierra Club Data Request 9.1

What is the maximum amount of coal that can be currently stockpiled at both the BCC mine and at the Jim Bridger plant?

(a) Could the maximum stockpile capacity identified in response to the question above be expanded? If not, why not?

Response to Sierra Club Data Request 9.1

Bridger Coal Company's (BCC) existing air quality permit is changing and the new air quality permit has an effective date of April 1, 2022. The new permit has lower fugitive dust emissions than the existing permit and was adjusted to reflect changes associated with the underground mine closure. Effective April 1, 2022, BCC's maximum live stockpiled coal storage is 675,000 tons and the maximum sealed stockpiled coal storage is 1,900,000 tons.

The Jim Bridger Plant's existing air quality permit limits coal stockpile inventory to a maximum of 1.5 million tons of coal at any one time, with the plant annual average tonnage no more than 1.331 million tons.

(a) In principle, BCC could petition the Wyoming Department of Environmental Quality (DEQ) to expand the stockpiled coal storage capacity via an air quality permit revision. An increase in capacity and/or emissions would be considered a "major revision", requiring extensive modeling, studies, a public comment period and ultimately Wyoming DEQ approval.

Like BCC, an increase of the Jim Bridger plant's coal stockpile limits would trigger an air permitting action. An increase of the coal stockpile inventory would require an evaluation of air emission increases resulting from the project. If the emission increases were determined to be significant, air modeling would be required to determine impacts to National Ambient Air Quality Standards (NAAQS). The project would also require an evaluation of best available control technologies to control emissions from the Jim Bridger stockpiles.

LC 77 / PacifiCorp
November 9, 2021
CUB Data Request 3

CUB Data Request 3

Natrium™ Advanced Nuclear Demonstration Project
Please provide a narrative on the potential risks of this project as perceived by PacifiCorp and explain how the Company plans to address these risks.

Response to CUB Data Request 3

Identified risks include:

- Fuel Supply – specifically high-assay low-enriched uranium (HALEU) supply.

- Regulatory – specifically this is a first of a kind sodium fast reactor (SFR). There is expected design and Nuclear Regulatory Commission (NRC) review challenges that will need to be addressed.

- Project Management - unforeseen delays related to the design, construction, and commissioning of a "first of a kind" demonstration reactor.

PacifiCorp will work closely with TerraPower to identify, minimize, address, and provide solutions to the risks that come up throughout the project. Further, PacifiCorp intends to negotiate terms and conditions in future definitive agreements with TerraPower to minimize these risks for our retail customers.

LC 77 / PacifiCorp
November 9, 2021
CUB Data Request 4

CUB Data Request 4

Natrium™ Advanced Nuclear Demonstration Project
Please provide a narrative explanation of the fuel that the Natrium™ plant will use and the status of supply sources of this fuel.

Response to CUB Data Request 4

The initial fuel for the demonstration program will be sodium bonded metallic uranium fuel encased lead. This extensively tested type of fuel is used at the Fast Flux Test Facility in Hanford, WA, and Experimental Breeder Reactor-2 at the Idaho National Laboratory in Idaho Falls, ID. The fuel is expected to be sourced domestically from U.S-based facilities. Additional information on Natrium™ fuel is available on the U.S. Nuclear Regulatory Commission (NRC) website at the link provided below.

Natrium | NRC.gov

LC 77 / PacifiCorp
November 9, 2021
CUB Data Request 6

CUB Data Request 6

Natrium™ Advanced Nuclear Demonstration Project
Please provide an update on the construction or availability of federally licensed storage facilities for nuclear wastes that would be generated from this plant.

Response to CUB Data Request 6

PacifiCorp currently has no further information on this topic. However, it is expected that independent storage of spent nuclear fuel and high-level radioactive waste will be licensed under Title 10 of the Code of Federal Regulations (CFR) Part 72.

LC 77 / PacifiCorp
November 9, 2021
CUB Data Request 9

CUB Data Request 9

Natrium™ Advanced Nuclear Demonstration Project
Please describe the steps PacifiCorp is taking towards training its personnel to operate the plant.

Response to CUB Data Request 9

PacifiCorp is currently evaluating the overall strategy for operations and maintenance, including training requirements.

Attachment 2

Confidential Attachment "3112 Capacity Requirements P02-MMR (CO) Intl UTWY 2031 6-17-21" to PacifiCorp Response to SC 6.1

Sierra Club/ICL Attachment 2 contains confidential information subject to the protective agreement in Case No. PAC-E-21-19 and has been served upon the Commission and parties on the service list eligible to receive confidential information.

Attachment 3

Email from Carla Scarcella, PacifiCorp to Rose Monahan, Sierra Club
(Jan. 26, 2022)

Rose Monahan <rose.monahan@sierraclub.org>

LC-77 - Sierra Club's 6th Set of Data Requests

Scarsella, Carla (PacifiCorp) <Carla.Scarsella@pacificorp.com> Wed, Jan 26, 2022 at 10:37 AM
To: "Monahan, Rose" <rose.monahan@sierraclub.org>, Edward Burgess <eburgess@strategen.com>
Cc: Gloria Smith <gloria.smith@sierraclub.org>, "Baker, Randy (PacifiCorp)" <Randy.Baker@pacificorp.com>

Rose-

You are correct that there are no additional hourly data files for the P02h variant case, and that the same hourly data files already provided in response SC 6.1 for the P02-MM case were relied upon for assessing reliability of the P02h case.

[Quoted text hidden]

Attachment 4

Confidential Attachment to PacifiCorp Response to Sierra Club Data Request 4.2 in LC 77

Sierra Club/ICL Attachment 4 contains confidential information subject to the protective agreement in Case No. PAC-E-21-19 and has been served upon the Commission and parties on the service list eligible to receive confidential information.

Attachment 5

UE 390, Surrebuttal Testimony of Dana M. Ralston on Behalf of PacifiCorp (PAC/1200) (excerpt)

REDACTED
Docket No. UE 390
Exhibit PAC/1200
Witness: Dana M. Ralston

BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

PACIFICORP

REDACTED
Surrebuttal Testimony of Dana M. Ralston

August 2021

unfairness of Staff's recommendation to apply its newly articulated prudence standard to CSAs that were executed last year.

Q. Did Staff provide any evidence specific to the new Hunter CSAs to suggest that the minimum take levels are excessive?

A. No.

Huntington

Q. Has Staff modified its position on the Huntington CSA?

A. Yes. Staff no longer believes that the CSA is imprudent.[15] But Staff agrees with CUB's recommendation that the Company "conduct analysis to determine whether contract provisions in the CSA result in uneconomic dispatch of the plant, and if yes, whether that uneconomic dispatch is related to environmental laws and regulations."[16]

Q. How do you respond to Staff's new recommendation?

A. The Company agrees that it has an obligation to prudently manage the CSA, including determining whether there are reasonable grounds to invoke the termination provision in the agreement. But the Company does not agree that additional analysis or reporting is required at this time.

The Company regularly assesses the economics of the plant. If it becomes apparent that the plant is consistently unable to economically accept delivery of the minimum volumes, then the Company will then proceed to determine whether the consistent inability to economically accept coal deliveries at the plant is the result of an environmental regulation(s), *i.e.*, whether the plant would be economic but for the

[15] Staff/1400, Anderson/12.
[16] Staff/1400, Anderson/15.

environmental regulation(s).

Currently, even if the plant were to require alternate dispatch in order to reach the minimum take level, there is no evidence that the alternate dispatch is caused by environmental regulations. The examples cited by CUB, which are primarily state renewable generation mandates,[17] are too attenuated to justify invoking the termination provision in the CSA. No party has identified, and the Company is unaware of, any existing environmental regulation that is sufficiently tied to the Huntington plant to allow the invocation of the CSA's termination provision. It is unclear what additional analysis Staff envisions, but from the Company's perspective it has already conducted the analysis that Staff requested and concluded that there is no reasonable basis to terminate the CSA.

Q. Will the Company continue to monitor the plant to determine if there is a basis to terminate the CSA?

A. Absolutely. The Company is always committed to prudently managing all its contracts. The Company's interests are firmly aligned with customers and the Company has no incentive to continue to burn coal at Huntington if it is uneconomic. As market conditions and the regulatory environment change, the Company will continue to monitor Huntington to ensure that the Company reasonably exercises its ability to terminate the contract if doing so is prudent. The Company's annual TAM filings provide a reasonable forum for the Commission and stakeholders to assess the economics of the plant to ensure that the Company continues to prudently manage its obligations under the CSA.

[17] *See, e.g.,* CUB/200, Jenks/19.

(1) management employee severance costs and union severance and benefit costs as required in the working agreement with the International Brotherhood of Electrical Workers triggered by his significant reduction in labor costs, (2) final reclamation contributions ($[redacted]) required to comply with federal and state legal obligations, (3) depreciation expenses incurred for capital investments between April 1, 2021 and December 31, 2022 ($[redacted]), (4) additional coal inventory and deferred longwall expenses incurred between April 1, 2021 and December 31, 2022 ($[redacted]), (5) embedded fixed costs in material and supply costs as discussed in response to Sierra Club 2.5, and (6) federal and state royalties associated with increased costs noted above. In summary, Mr. Burgess' analysis contains substantial flaws and should be rejected in its entirety.

Q As discussed above, Mr. Burgess reduced BCC labor and benefit costs in his flawed analysis by [redacted] in Confidential Table 3 and described those costs as "variable". Do you agree?

A. No. Changes in BCC mine plans and staffing levels need to be evaluated in multi-year evaluations such as PacifiCorp's IRP and not in a one-year filing like the TAM. A [redacted] reduction in labor and benefit costs would result in an approximate reduction of [redacted] employees. Not only would it be imprudent to incur costs to terminate and then later hire [redacted] employees in one year, it is highly unlikely the skills of those terminated employees could be replaced and would need to be developed over an extended period of time. Additional costs would be incurred to train new hires and offset the unfavorable impact of reduced productivity rates.

Attachment 6

Confidential PacifiCorp Response to ALJ Bench Request 1 in LC 77

Sierra Club/ICL Attachment 6 contains confidential information subject to the protective agreement in Case No. PAC-E-21-19 and has been served upon the Commission and parties on the service list eligible to receive confidential information.

Attachment 7

Confidential Attachments "OR LC-77 Attach ALJ Bench Request 1-4 CONF" to PacifiCorp Response to ALJ Bench Request 1

Sierra Club/ICL Attachment 7 contains confidential information subject to the protective agreement in Case No. PAC-E-21-19 and has been served upon the Commission and parties on the service list eligible to receive confidential information.

Attachment 8

Confidential Attachment "OR LC-77 Attach ALJ Bench Request 1-1 CONF" to PacifiCorp Response to ALJ Bench Request 1

Sierra Club/ICL Attachment 8 contains confidential information subject to the protective agreement in Case No. PAC-E-21-19 and has been served upon the Commission and parties on the service list eligible to receive confidential information.

CERTIFICATE OF SERVICE

I hereby certify that on this 15th day of March 2022, I delivered true and correct copies of the foregoing **JOINT COMMENTS AND ATTACHMENTS OF SIERRA CLUB AND IDAHO CONVERSATION LEAGUE** to the following persons via the method of service indicated below. The confidential version of these comments was served on eligible parties via encrypted password protected.zip folders with the exception of Attachment 2 which is being provided via Federal Express overnight mail.

/s/ Ana Boyd
Ana Boyd
Sierra Club

Electronic mail only (see Order 35058) and FedEx

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