Application No. 18-04-002
Exhibit PAC/1800
Witness: Rick T. Link

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

REDACTED

Rebuttal Testimony of Rick T. Link

Economic Analysis

Installation of Selective Catalytic Reduction Systems

November 2018

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Q. Are you the same Rick T. Link who previously provided direct testimony in this case on behalf of PacifiCorp d/b/a Pacific Power (PacifiCorp)?

A. Yes.

I. PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your rebuttal testimony?

A. I respond to adjustments proposed by Sierra Club in the direct testimony of Dr. Jeremy Fisher. I provide more detail about the company's process for developing its integrated resource plan (IRP); explain how that process has evolved to address stakeholder feedback and changes in energy markets, policies, and regulations related to coal generation; and demonstrate how the IRP supports the prudence of continued operation of the company's coal resources through the target retirement dates set in the IRP. I also show that, in 2013, PacifiCorp made a prudent and reasonable decision to install selective catalytic reduction (SCR) emission-reduction systems at Jim Bridger Units 3 and 4 based on the information available at that time.

Q. Please summarize your rebuttal testimony.

A. My rebuttal testimony addresses Sierra Club's claim that the company does not use its IRP to assess whether continued operation of its coal resources is in the best interests of customers. My rebuttal testimony demonstrates that:

- PacifiCorp analyzes the cost-effectiveness of continued operation of its coal fleet in its IRP, and the results of these analyses are explicitly considered in the company's selection of a least-cost, least-risk resource plan.

- PacifiCorp's IRP is sophisticated, robust, and has evolved to respond to stakeholder feedback and changes in energy markets, policies, and regulations.
- Since PacifiCorp began developing analysis that is specifically focused on its coal units during the 2011 IRP cycle, the company has produced hundreds upon hundreds of studies to assess whether continued operation of coal resources are in the best interest of its customers.

My rebuttal testimony also shows that Sierra Club's recommendation to disallow ongoing capital costs for specific coal units is meritless. My rebuttal testimony shows that:

- The studies that Sierra Club relies on to support its recommendation are incomplete and/or mischaracterized.
- There is not a single study supporting Sierra Club's claim that nearly [redacted] of the company's coal fleet should be economically retired by 2023.
- Sierra Club does not explain how it can rely on a study that models potential early plant retirements by 2023 as the basis for disallowing costs in 2019.

Finally, my rebuttal testimony addresses Sierra Club's claims that the company acted imprudently when it installed SCRs at Jim Bridger Units 3 and 4. My rebuttal testimony demonstrates that:

- Sierra Club did not file any economic analysis, market data, or workpapers that support its adjustment to the Jim Bridger SCRs.

- While Sierra Club relies on testimony filed with the Washington Utilities and Transportation Commission (Washington commission), and exhibits it filed with the Washington commission, it has not included any of this evidence in the record in this case.
- Sierra Club cites to an analysis it filed with the Washington commission that was superseded in a subsequent filing where Sierra Club admitted that its original analysis overstated the impact of proposed changes to PacifiCorp's calculations.
- Sierra Club's recitation of the Washington order omits the critical fact that the Washington commission *rejected* Sierra Club's analysis because Sierra Club improperly used post-decision information.
- Sierra Club's Washington analysis also included material errors that, when corrected, eliminated the alleged decrease in the economic case for the SCR investment.

II. RESPONSE TO SIERRA CLUB'S CLAIMS ABOUT PACIFICORP'S PLANNING PROCESS

Q. How does Sierra Club address PacifiCorp's resource-planning process in its rate case testimony?

A. Sierra Club raises the company's IRP process in two ways. First, Sierra Club alleges the company does not analyze the ongoing, cost-effective operation of its coal units in its IRP. Sierra Club relies on this claim to support its specific adjustments for environmental compliance projects at the Jim Bridger, Naughton, Craig, and Hayden plants. Second, Sierra Club points to PacifiCorp's studies of coal plants in its IRP and claims these support an adjustment to remove ongoing capital investments at certain PacifiCorp coal units. Neither claim is accurate. And Sierra Club's second argument—that PacifiCorp's IRP coal studies support removal of coal costs from rates—conflicts with its first argument that PacifiCorp does not analyze the costs of ongoing operation of coal plants in its IRP.

Q. Did Sierra Club also challenge PacifiCorp's IRP process in the Order Instituting Investigation (OII) docket, consolidated with this case?

A. Yes. One of the sub-issues in the OII docket is whether PacifiCorp does resource planning on a system or control-area basis. The company's direct testimony confirmed that its resource planning is system based. Sierra Club responded, claiming that PacifiCorp does not engage in least-cost resource planning on any basis. Sierra Club made many inaccurate and irrelevant claims about the IRP in its OII testimony, which the company corrected in the rebuttal testimony of Ms. Shayleah LaBray. In its rate case testimony, Sierra Club appears to have ignored Ms. LaBray's OII rebuttal testimony and repeats many of the same inaccurate statements about the company's IRP. I am adopting the direct and rebuttal testimony of Ms. LaBray in the OII docket.

Q. How do you respond to Sierra Club's testimony on the company's IRP?

A. In this section of my testimony, I rebut Sierra Club's claim that the company does not use its IRP to assess whether continued operation of its coal resources is in the best interests of customers. In the next section of my testimony, I rebut Sierra Club's claim that PacifiCorp's IRP analysis supports removal of ongoing capital costs for certain PacifiCorp coal units. On both issues, I rely by reference on the OII testimony of Ms. LaBray, which has already refuted many of Sierra Club's claims about PacifiCorp's IRP.

Q. Please provide an overview of the company's resource-planning process.

A. PacifiCorp's resource-planning process uses thorough analysis and modeling that measures cost and risk to develop its IRP, which presents the company's plans to provide reliable and reasonably priced service to its customers. The primary objective of the resource-planning process is to identify the least-cost, least-risk portfolio of resources to serve customers in the future. The least-cost, least-risk resource portfolio—defined as the "preferred portfolio"—is the portfolio that can be delivered through specific action items at a reasonable cost and with manageable risks, while considering customer demand for clean energy and ensuring compliance with state and federal regulatory obligations.

The company completes an IRP cycle every two years, which includes preparation of a full IRP every two years and preparation of an update to the full IRP in the off years. The company files both its IRP and IRP update with each of the six regulatory commissions in the states where the company provides retail service, including California.

Each IRP is developed through an open and public process, with input from an active and diverse group of stakeholders, including staff of state regulatory commissions, staff of state consumer-advocacy departments, customer-sponsored advocacy groups, environmental-advocacy groups, resource-advocacy groups, independent-power producers and project developers, staff of other utilities, and customers. During the public-input process, which typically spans at least nine to ten months, PacifiCorp holds regular meetings with stakeholders to get feedback on the company's planning assumptions and preliminary model results.

Q. Please explain how California has treated the company's IRP filings.

A. PacifiCorp files its IRP in California in two separate proceedings. First, it is filed to meet California's requirements for a renewable portfolio standard (RPS) procurement plan. Second, it is filed to meet California's new requirement for load-serving entities to prepare an IRP.

California's RPS procurement requirements allow multi-jurisdictional utilities like PacifiCorp to use an IRP prepared for regulatory agencies in other states to satisfy California's annual requirement to file an RPS procurement plan, as long as the IRP complies with the requirements specified in California Public Utilities Code § 399.17(d). As required by Decision (D.) 08-05-029, PacifiCorp files its IRP in Rulemaking (R.) 06-05-027 or its successor proceeding at the same time it files with the jurisdictions requiring the IRP. An IRP on-year supplement is filed within 30 days of filing the IRP. In accordance with D.11-04-030, PacifiCorp files an IRP off-year supplement on July 15 in years in which it does not file an IRP in lieu of an RPS procurement plan. PacifiCorp filed its IRP off-year supplement on July 16, 2018 (because July 15 fell on a Sunday).

In Rulemaking 16-02-007, the California Public Utilities Commission (Commission) is developing an IRP process for California. In February 2018, the Commission issued D.18-02-018 which set the requirements for load-serving entities in California to file an IRP. The decision allows PacifiCorp to file an IRP submitted to another public regulatory entity within the previous calendar year along with an explanation of how it has considered disadvantaged communities. PacifiCorp filed its IRP in California on August 1, 2018.

Q. Does PacifiCorp analyze the cost-effectiveness of continued operation of its coal fleet in its IRP?

A. Yes. The IRP examines PacifiCorp's existing coal plants as part of determining the least-cost, least-risk portfolio of resources to serve customers. This examination includes analyzing the early retirement of coal plants while appropriately considering the potential avoidance of incremental environmental compliance costs, which represents a potentially significant benefit in early closure scenarios.

Q. Has the company's approach to analyzing its coal resources evolved over the last several IRPs to respond to stakeholder feedback and changes in energy markets, policies, and regulations?

A. Yes. The company's planning process has become more sophisticated over time to respond to stakeholder feedback and the increasing complexities presented by changing energy markets, including lower prices for natural gas and the declining cost of renewable energy resources; the proliferation of clean energy policies, including state laws promoting renewable energy, controlling energy emissions, and promoting energy efficiency; and application of environmental regulations, especially those designed to regulate clean air and greenhouse gas (GHG) emissions.

Q. When did PacifiCorp begin developing economic analyses focused on its coal fleet within the IRP?

A. PacifiCorp began developing modeling scenarios focused on the company's coal fleet during the 2011 IRP cycle. At that time, PacifiCorp developed proof-of-concept studies to evaluate how carbon dioxide (CO_2) prices and natural gas prices affected a potential transition from coal generation to natural gas resources. After completing the 2011 IRP, Sierra Club and other stakeholders filed comments with the Public Utility Commission of Oregon (Oregon commission) recommending, among other things, that PacifiCorp provide a thorough accounting of environmental compliance costs, and develop an economic analysis to determine whether customers would benefit if coal facilities having environmental compliance obligations were retired or curtailed.[1] Sierra Club's comments document its advocacy for coal studies that consider coal retirement triggered by known or reasonably foreseeable environmental compliance costs.

Q. How did PacifiCorp respond to this stakeholder feedback?

A. PacifiCorp produced a supplemental coal analysis in September 2011. The supplemental coal analysis updated and documented environmental compliance cost assumptions for PacifiCorp's coal fleet and broadened the scope of potential replacement resources alternatives in potential early retirement scenarios.

Q. What were the key findings from the 2011 supplemental coal analysis?

A. The 2011 supplemental coal analysis showed that continued operation of PacifiCorp's coal units, inclusive of costs for known and reasonably foreseeable environmental compliance obligations, was lower cost than early retirement.

Q. Did PacifiCorp perform other coal analyses during the 2011 IRP cycle?

A. Yes. PacifiCorp worked with stakeholders, including Sierra Club, to evaluate

[1] *In the Matter of PacifiCorp's 2011 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 52, Sierra Club's Preliminary Comments (Aug. 25, 2011).

whether potential flexibility in emerging environmental regulations could be leveraged to avoid near-term compliance costs by committing to retire specific coal units before the end of their useful lives. PacifiCorp developed a spreadsheet-based coal-screening model to prioritize specific coal units to analyze further. To support this effort, PacifiCorp held technical workshops with stakeholders, including Sierra Club, to describe and discuss input assumptions, methodology, and results. High-priority coal units identified for further analysis were then further evaluated in an updated coal-replacement study that was included in PacifiCorp's 2011 IRP update. The high-priority coal units included Naughton Unit 3, Jim Bridger Units 3 and 4, Hunter Unit 1, Craig Units 1 and 2, and Hayden Units 1 and 2.

The updated coal-replacement study considered a broader spectrum of natural gas price and CO_2 price scenarios and broadened the scope of potential replacement resources to include wind resources, brownfield natural-gas conversion alternatives, and demand-side management alternatives. The updated analysis also accounted for potential flexibility in environmental compliance obligations and eliminated all incremental environmental compliance costs in the years preceding early retirement or conversion to natural gas.

Q. What were the key findings from the updated coal-replacement study that was included in PacifiCorp's 2011 IRP update?

A. The study showed that installation of equipment required to achieve environmental compliance was lower cost than early retirement or conversion to natural gas for Jim Bridger Units 3 and 4 and for Hunter Unit 1. For Naughton Unit 3, the analysis showed that conversion to natural gas was the least-cost compliance alternative. For the Craig and Hayden units, the analysis showed that early retirement might be lower cost than proceeding with environmental compliance projects. However, the study highlighted that the analysis of these coal units is unique for two reasons. First, PacifiCorp's ownership share of these units is relatively small such that the unit-by-unit studies did not capture the potential cumulative impacts of retiring more than one unit. Second, and as discussed by Mr. Chad Teply, PacifiCorp does not operate the Craig and Hayden units and does not have unilateral rights to alter the compliance plan for these assets.

Q. Did Sierra Club provide comments on PacifiCorp's updated coal-replacement study included in the 2011 IRP update?

A. Yes. Sierra Club stated the updated coal-replacement study was an improvement on the previous study, and that PacifiCorp should do more by continually updating cost assumptions and by broadening the scope of the analysis to consider compliance alternatives for other coal units.[2]

Q. Did Sierra Club propose that PacifiCorp perform coal studies in the 2011 IRP cycle to evaluate possible early retirement outcomes regardless of environmental triggers?

A. No.

Q. How did PacifiCorp apply findings from the coal studies developed during the 2011 IRP cycle in the 2013 IRP cycle?

A. Beyond updating its modeling assumptions to account for changes in energy markets,

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[2] *In the Matter of PacifiCorp's 2011 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 52, Sierra Club's Reply Comments (Nov. 3, 2011).

policies, and regulations related to coal generation, PacifiCorp continued to advance its analysis of coal units in the 2013 IRP cycle in several ways. First, rather than performing stand-alone studies, the company began to consider coal unit retirements and gas-conversion alternatives within the portfolio-development process of the IRP. Consistent with Sierra Club's comments on PacifiCorp's updated coal-replacement study, this advancement inherently expanded the scope of the company's modeling to consider early retirement and gas-conversion alternatives over a wide range of coal units using the most up-to-date cost assumptions. Second, PacifiCorp continued to analyze specific coal units with near-term compliance time lines (within two to four years) to quantify the economic benefits of compliance outcomes identified during the portfolio-development process. Third, PacifiCorp further expanded the scope of its coal analyses by preparing hypothetical intertemporal trade-off analysis for Jim Bridger Units 3 and 4.

Q. Please explain what you mean by "hypothetical intertemporal trade-off analysis".

A. This type of analysis assumes that legally binding compliance deadlines under regional haze can be delayed in exchange for a firm commitment to retire a unit before the end of its useful life. In its 2013 IRP, PacifiCorp evaluated these alternatives for Jim Bridger Units 3 and 4 whereby it was assumed that Jim Bridger Units 3 and 4 could avoid the cost of SCR equipment by 2015 and 2016, respectively, if these units were retired at the end of 2020 and 2021, respectively.

Q. What were the key findings related to coal units in PacifiCorp's 2013 IRP?

A. Modeling prepared for the 2013 IRP continued to show the gas-conversion as the preferred compliance alternative for Naughton Unit 3. The analysis presented in the 2013 IRP for Jim Bridger Units 3 and 4 includes the same analysis presented in my direct testimony, which supports the installation of SCRs on these two units.

Q. Did the hypothetical inter-temporal analysis for Jim Bridger Units 3 and 4 support PacifiCorp's plans to install SCRs on these two units?

A. Yes. This analysis, intended to explore potential flexible compliance alternatives to the installation of SCR by committing to an early retirement at the end of 2020 for Jim Bridger Unit 3 and by the end of 2021 for Jim Bridger Unit 4, was significantly higher cost than proceeding with the installation of SCRs.

Q. Considering results for Craig and Hayden from the 2011 IRP update, did PacifiCorp address these coal units in the 2013 IRP?

A. Yes. PacifiCorp summarized legal considerations associated with compliance obligations for Craig and Hayden units. These considerations addressed compliance with Colorado law and PacifiCorp's contractual rights under the respective participation agreements that govern the relationship between joint owners at the Craig and Hayden facilities. Consistent with Mr. Teply's testimony, the 2013 IRP concluded that environmental compliance obligations at the Craig and Hayden facilities are driven by these considerations.

Q. Did Sierra Club propose that PacifiCorp perform coal studies in the 2013 IRP cycle to evaluate possible early retirement outcomes regardless of environmental triggers?

A. No.

Q. How did PacifiCorp advance its coal resource modeling in the 2015 IRP cycle?

A. During the 2013 IRP cycle, PacifiCorp received stakeholder feedback to continue to advance and broaden the scope of the company's analysis of coal resources within the IRP. The Oregon commission directed stakeholders to schedule several workshops to determine specific parameters for coal analyses in future IRPs. PacifiCorp worked with Oregon stakeholders, including Sierra Club, before initiating the 2015 IRP cycle to establish these specific parameters.

Q. What was the result of these workshops?

A. After Oregon IRP stakeholders participated in four workshops, Oregon commission staff made specific recommendations for an expanded coal analysis that included intertemporal trade-off analysis and fleet trade-off analysis for specific units. The Oregon commission adopted these recommendations in Order No. 14-296.

Q. Please explain what you mean by "fleet trade-off analysis".

A. Fleet trade-off analysis considers potential flexible compliance alternatives that combine alternative retirement dates and/or compliance obligations for a specific coal unit that might be used to negotiate a lower cost compliance obligation at another coal unit.

Q. What were the key findings from this specific analysis performed during the 2015 IRP cycle?

A. PacifiCorp found that a compliance strategy that avoids installation of SCR equipment at Wyodak, Cholla Unit 4, and Dave Johnston Unit 3 is lower cost. The analysis continued to support gas-conversion for Naughton Unit 3. The preferred portfolio from the 2015 IRP assumed that approximately 2,800 megawatts (MW) of existing coal capacity will either retire or convert to natural gas by the end of the 20-year study period.

Q. How did PacifiCorp advance its coal resource modeling in the 2017 IRP cycle?

A. PacifiCorp continued to evaluate a range of potential compliance alternatives, taking into consideration a broader range of intertemporal and fleet trade-off compliance outcomes on more coal units.

Q. What were the key findings from these updated and expanded studies performed during the 2017 IRP cycle?

A. The 2017 IRP preferred portfolio continues to reflect a compliance strategy that avoids incremental SCR equipment and assumes that approximately 3,650 MW of existing coal capacity will be retired by the end of the 20-year study period.

Q. How do you respond to Sierra Club's claim that the company does not use its IRP to assess whether continued operation of its coal resources in is the best interests of customers?

A. Sierra Club's claim is not consistent with the facts. Since PacifiCorp began developing analysis that is specifically focused on its coal units during the 2011 IRP cycle, the company has produced hundreds upon hundreds of studies to assess whether continued operation of coal resources are in the best interest of its customers.

Q. In this case, Sierra Club challenges investments at the Naughton, Jim Bridger, Craig, and Hayden plants. When were these investment decisions made?

A. The decisions were made between 2006 and 2013 (Naughton in 2006–2009; Jim Bridger in 2013; Craig Unit 2 in 2013; Hayden in 2012).

Q. Does Sierra Club's criticism of the company's IRP and its capital investment decisions in its coal plants improperly apply current planning approaches, standards, and insights to decisions made many years ago?

A. Yes, Sierra Club's criticisms are based on hindsight rather than examining the information known at the time. For example, Sierra Club testifies that utilities started to change their mindsets about the cost-effectiveness of continued operation of coal plants by late 2016.[3] This is several years *after* the investment decisions challenged in this case—all of which preceded publication of the Clean Power Plan in 2015.

Q. Sierra Club accuses PacifiCorp of bias in its IRP, claiming that PacifiCorp "continues to look for reasons to keep the coal units online." Please respond.[4]

A. This statement is untrue and is completely at odds with the results of PacifiCorp's most recent IRPs (the 2017 IRP and 2017 IRP update) which "presents a cost-conscious plan to transition to a cleaner energy future with near-term investments in both existing and new renewable resources, new transmission infrastructure, and energy efficiency programs."[5] The key findings of the 2017 IRP, as summarized and updated in the 2017 IRP update, include PacifiCorp's plan to significantly reduce its existing coal capacity, rely exclusively on incremental efficiency and renewable energy to meet load, and make no new SCR investments:[6]

- Through the end of 2036, the company's updated preferred portfolio includes over 2,700 MW of new wind resources, 1,860 MW of new solar resources, 1,877 MW

[3] Fisher Direct at 7.
[4] Fisher Direct at 62.
[5] *In the Matter of PacifiCorp d/b/a Pacific Power, 2017 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 67, 2017 Integrated Resource Plan at 1 (April 4, 2017).
[6] *In the Matter of PacifiCorp d/b/a Pacific Power, 2017 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 67, 2017 IRP Update at 1-2 (May 1, 2018).

of incremental energy efficiency resources, and approximately 268 MW of direct-load-control resources.

- The updated preferred portfolio assumes existing owned coal capacity will be reduced by 3,650 MW through the end of 2036.
- With reduced loads and lower renewable resource costs, the updated preferred portfolio contains no new natural gas resources through the 20-year planning horizon. This is the first time an IRP has not included new fossil-fueled generation as a least-cost, least-risk resource for PacifiCorp
- Based on unit-specific coal studies, the 2017 IRP update assumes no incremental SCR investments are needed to satisfy compliance obligations under regional haze regulations.

Q. In addition to planning its own transition to a cleaner energy future, has the company helped facilitate the region's transition by starting the Energy Imbalance Market (EIM) with the California Independent System Operator Corporation (CAISO)?

A. Yes. PacifiCorp and the CAISO launched the EIM on November 1, 2014. The EIM is a voluntary market and the first western energy market outside of California. The EIM provides for more efficient dispatch of participating resources in real-time through an automated system that dispatches generation across the EIM footprint. As noted in the rebuttal testimony of company witness Mr. Joseph Hoerner in the OII docket, PacifiCorp's participation in the EIM has contributed to California's decline in total GHG emissions to serve California load due to PacifiCorp's increased ability to avoid curtailment of its renewable resources and exports of hydro and renewable generation. The benefits of more efficient dispatch, reduced renewable curtailment, and reduced flexibility reserves have significantly increased as many other utilities have joined the EIM.[7]

Q. Sierra Club claims that PacifiCorp "has strictly constrained its review of its coal plant economics" to only instances where a capital investment was required and that "there is no record of PacifiCorp ever reviewing the economics of its existing coal fleet without a capital trigger."[8] Please respond.

A. Sierra Club's allegations are misguided. Due to the magnitude of the investments necessary to maintain compliance with environmental regulations, potential early retirement of existing coal units is typically assessed as an alternative to such investments. As stated earlier in my testimony, Sierra Club did not advocate for coal analysis without a capital trigger in the 2011 IRP and the 2013 IRP—the IRP planning cycles preceding the investment decisions that Sierra Club opposes in this proceeding. In fact, Sierra Club's comments during the 2011 IRP recommended that PacifiCorp produce economic analysis to determine whether customers would benefit if coal facilities having environmental compliance obligations were retired or curtailed. Further, as demonstrated by the treatment of Cholla Unit 4 in the 2017 IRP, PacifiCorp also analyzes early retirement relative to continued operation. While

[7] The EIM currently includes PacifiCorp, NV Energy, Puget Sound Energy, Arizona Public Service, Portland General Electric, Idaho Power Company, Powerex, and the CAISO balancing authority areas. Entities scheduled to join the EIM include the Balancing Authority of Northern California (April 2019), Seattle City Light (April 2020), Los Angeles Dept.of Water and Power (April 2020), and Salt River Project (April 2020). CENACE Baja California is investigating future entry into the market.
[8] Fisher Direct at 7.

Cholla Unit 4 may continue operations until 2025 under regional haze rules, the company's preferred portfolio includes a 2020 retirement date for that unit.

Q. Sierra Club claims that the company never "establish[ed] whether the continued operation of its coal plants was in the best interests of customers."[9] Is this true?

A. No. PacifiCorp's biennial IRPs have demonstrated the value to customers of the ongoing operation of the company's coal resources through the selection of the least-cost, least-risk resource portfolio, which has included an analysis that determines whether the preferred portfolio should include continued operation of the company's coal resources.

Q. Does Sierra Club's testimony contradict its claim that PacifiCorp does not review ongoing coal plant operation in its IRP?

A. Yes. Sierra Club correctly states that the company's 2013 IRP included studies that analyzed whether early retirement of individual coal units was more cost-effective than continued operation, after considering the need for additional capital investments.[10] The company has performed comparable analysis in the 2015 and 2017 IRP.

Q. Sierra Club also claims that PacifiCorp's resource planning does not consider the emission-performance standards that have been adopted by California and Oregon.[11] Is this true?

A. No. The company's IRPs include extensive modeling that evaluates the impact of GHG emissions on the economics of its resources, and the modeling is designed to

[9] Fisher Direct at 45.
[10] Fisher Direct at 46.
[11] Fisher Direct at 12.

ensure that PacifiCorp meets or exceeds all applicable emission-performance standards and that the potential regulatory cost associated with emission regulation is appropriately considered in all resource selections. None of the new resource alternatives evaluated in the IRP exceed the emission-performance standards adopted by California, Oregon, and Washington.

Q. Does every one of the company's generation resources meet the applicable emission-performance standards?

A. Yes, as explained by company witness Ms. Mary Wiencke in her direct testimony in the OII docket.

III. RESPONSE TO SIERRA CLUB'S CHALLENGE TO PRUDENCE OF PACIFICORP'S ONGOING CAPITAL COSTS IN SPECIFIC COAL UNITS

Q. Sierra Club recommends that the Commission disallow ongoing capital costs at [redacted] from January 2018 through December 2019[12] and beyond 2019 until the units are shown to be in the interests of California customers.[13] How do you respond?

A. This adjustment is meritless. Sierra Club bases its proposed disallowance on the results of a 2017 study by Synapse and PacifiCorp's preliminary coal analysis for its 2019 IRP (2018 Coal Analysis). As described below, however, neither study is designed to comprehensively evaluate the economics of retiring individual coal units in 2018 (the date used in the Synapse study) or 2023 (the date assumed in the

[12] Fisher Direct at 4, 63.
[13] Fisher Direct at 4-5.

preliminary 2018 Coal Analysis). Thus, Sierra Club has not justified its proposed disallowance.

Q. Is it appropriate to consider decisions about early coal-plant retirement through the IRP process instead of through a disallowance in a rate case?

A. Yes. The IRP process allows a collaborative, long-term, multi-state approach to PacifiCorp's resource planning. This planning process, rather than rate case litigation, is best suited to produce sustainable and well-supported resource decisions.

Q. Does Sierra Club's adjustment account for the benefits provided by the coal units?

A. No. Sierra Club's adjustment fails to account for the net-power-cost benefits that have been provided to customers by the coal plants that it claims should have been retired.

Q. Sierra Club claims that the company's last three IRPs "have strongly indicated that the continuation of capital costs at multiple coal units is not in the best interests of ratepayers."[14] How do you respond?

A. An examination of each of those three IRPs shows that Sierra Club's claim is untrue. For example, Sierra Club cites to the 2013 IRP and claims that the company's analysis in that plan showed that when gas price forecasts were low and carbon dioxide prices were modest, the IRP showed that "PacifiCorp's entire coal fleet was rendered non-economic and selected for retirement by 2022."[15] As PacifiCorp explained at the time, however, portfolios with early coal-unit retirements occur in

[14] Fisher Direct at 9.
[15] Fisher Direct at 46.

those cases where commodity prices (and CO_2 price assumptions) favor alternatives to environmental investments. For instance, portfolios with low natural-gas price inputs, high CO_2 prices, and high coal costs produced portfolios with significant early coal-unit retirements. When evaluated during the portfolio selection process, however, those portfolios were high risk and high cost, and were not chosen as the preferred portfolio.

Q. Sierra Club claims that PacifiCorp "was not responsive to stakeholder concerns" raised in the 2013 IRP related to coal-plant modeling.[16] Do you agree?

A. No. In response to Sierra Club's concerns that the 2013 IRP modeling could be more refined, and to provide more transparency on model inputs and outputs and scenarios, PacifiCorp proposed in the Oregon IRP review proceeding a separate process to develop parameters for analyzing coal investments and allow the company to seek acknowledgment of emissions-control investments or alternatives for specific units.[17]

In its order acknowledging the 2013 IRP, the Oregon commission "recognize[d] the additional coal analysis that PacifiCorp provided in this proceeding and PacifiCorp's willingness to establish a separate proceeding to address coal investments."[18] As I discussed earlier, to further refine the coal fleet analysis, the Oregon commission directed Oregon IRP stakeholders to schedule several workshops to determine the parameters of coal analyses in future IRPs. Following those

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[16] Fisher Direct at 48.
[17] *In the Matter of PacifiCorp d/b/a Pacific Power 2013 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 57, Order No. 14-252 at 5 (Jul. 8, 2014).
[18] *In the Matter of PacifiCorp d/b/a Pacific Power 2013 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 57, Order No. 14-252 at 5 (Jul. 8, 2014).

workshops, the Oregon commission adopted its staff's recommendation for future coal analysis that would be used in PacifiCorp's 2015 IRP.[19]

Q. Did PacifiCorp provide the coal analysis requested by staff of the Oregon commission in the 2015 IRP?

A. Yes. In the 2015 IRP, PacifiCorp implemented the modeling refinements that grew out of the 2013 IRP, and the Oregon commission found that PacifiCorp complied with its "requests and directives" from the 2013 IRP and acknowledged the four action items related to coal resources.[20]

Q. Sierra Club claims that the company's Clean Power Plan modeling in the 2015 IRP did not assess "whether compliance could be more readily achieved through the retirement of an existing fossil unit."[21] Is this true?

A. No. PacifiCorp evaluated a broad range of potential compliance alternatives in its modeling of the Clean Power Plan. These compliance alternatives included strategies to, in varying combinations, achieve incremental energy efficiency savings, procure incremental renewable resources, and re-dispatch natural-gas and coal resources. The Clean Power Plan compliance strategies were evaluated among four different sets of regional haze compliance scenarios, each with varying levels of early retirement assumptions that ranged between 899 MW and 3,269 MW of coal-fired capacity. This modeling structure allowed PacifiCorp to explicitly evaluate how the cost of achieving compliance with the Clean Power Plan was affected by alternative coal

[19] *In the Matter of PacifiCorp d/b/a Pacific Power 2013 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 57, Order No. 14-296 (Aug. 19, 2014).
[20] *In the Matter of PacifiCorp d/b/a Pacific Power 2015 Integrated Resource Plan*, Public Utility Commission of Oregon, Docket No. LC 57, Order No. 16-071 at 2-3, 7-8 (Feb 29, 2016).
[21] Fisher Direct at 10.

retirement scenarios, which directly informed PacifiCorp's assessment of costs and risks when selecting the 2015 IRP preferred portfolio.

Q. Sierra Club also refers to an alternative study performed by Synapse in 2015 that purportedly showed that the near-term retirement of several coal units was "optimal."[22] Was that Synapse study reasonable?

A. No. In fact, Sierra Club concedes that the Synapse study that called for early retirement was higher cost than the preferred portfolio selected in the 2015 IRP. This fact alone shows that the Synapse study did not prove that near-term retirement was optimal.

Q. Sierra Club claims that the only reason that its preferred early retirement scenarios were higher cost was because the company assumed there would be "few or no environmental obligations."[23] Is this accurate?

A. No. Once again, Sierra Club mispresents the company's IRP modeling. In fact, the company's preferred portfolio from the 2015 IRP included all the necessary investments to comply with known and reasonably foreseeable environmental regulations, including prospective GHG regulations and regional haze obligations that appropriately account for flexibility to achieve compliance through intertemporal and fleet trade-off outcomes. As I discussed earlier in my testimony, PacifiCorp worked with Oregon IRP stakeholders in advance of the 2015 IRP to define specific scenarios that were explicitly designed to evaluate potential compliance-cost savings through intertemporal and fleet trade-off compliance strategies.

[22] Fisher Direct at 10-11; 48.
[23] Fisher Direct at 50.

Q. Sierra Club claims that the company's 2017 IRP "repeated the 2015 IRP process and failed to assess the value of the existing coal fleet or the customer value in early retirement."[24] How do you respond?

A. PacifiCorp's 2017 IRP includes the same type of modeling approach to consider intertemporal and fleet trade-off compliance strategies that was used in the 2015 IRP, which has been supported by the Oregon commission and the Utah Public Service Commission (Utah commission). As in past IRPs, the 2017 IRP studied a range of regional haze compliance scenarios, reflecting potential bookend alternatives that consider early retirement outcomes as a means to avoid installation of expensive emissions-control equipment. Based on this analysis, by the end of the planning horizon, PacifiCorp assumes 3,650 MW of existing coal capacity will be retired.

Q. Did the 2017 IRP specifically study early retirement of certain coal units as part of the preferred portfolio?

A. Yes. PacifiCorp's 2017 IRP considered the economic retirement of coal resources, which appropriately considers run-rate operating costs and potential resource-replacement costs on a present-value revenue-requirement (PVRR) basis. In addition to a reference case and five other regional haze scenarios developed and modified with input from stakeholders, PacifiCorp also modeled an endogenous-retirement case specifically in response to a request from Sierra Club (Regional Haze Case 6, or RH-6) that allowed PacifiCorp's capacity-expansion model to choose early retirement or SCR equipment installation. This study selected one plant for early retirement and installed SCR equipment on the remaining plants, demonstrating that installation of

[24] Fisher Direct at 50.

SCR equipment is lower cost than retiring these coal units early absent application of intertemporal and fleet trade-off compliance strategies. This scenario, and all regional haze scenarios and supporting assumptions, are detailed in the presentation materials for the public-input meeting[25] and were discussed at the public-input meetings by the company's senior vice president of strategy and development (Mr. Teply), who also responded to stakeholder questions regarding the assumptions and how they were initially developed.

Q. Did the outcome of the endogenous-retirement case RH-6 show that early retirement of coal plants was least-cost on a system-wide basis?

A. No. The overall portfolio of resources in case RH-6 had higher net costs relative to the other regional haze compliance cases that reflected a range of potential negotiated compliance alternatives. And PacifiCorp's analysis of alternative regional haze compliance outcomes, accounting for intertemporal and fleet trade-off scenarios, demonstrated that customers would benefit from potential negotiated environmental compliance alternatives. Under these alternatives, costly SCR equipment can be avoided by retiring certain units before the end of their depreciable life, but later than the currently established regional haze compliance deadlines for SCR installation. Consequently, the least-cost combination of resources that was ultimately selected in the 2017 IRP preferred portfolio includes early retirement of five of PacifiCorp's coal plants over the 20-year study period and did not include any incremental SCR equipment installations.

[25] All public input meeting presentations are available at: http://www.pacificorp.com/es/irp.html. PacifiCorp discussed regional haze compliance and scenarios at its July 20, August 25–26, and September 22–23, 2016 public input meetings. Detailed portfolio results for the regional haze compliance cases were presented at the January 26–27, 2017 public input meeting.

Q. Did any other state commission address the company's coal-plant modeling in the 2017 IRP?

A. Yes. In response to Sierra Club's arguments, the Utah commission found that PacifiCorp's approach to modeling coal resources was reasonable for the 2017 IRP because PacifiCorp refined its analytical approach beyond that used in the 2015 IRP. In addition, the Utah commission found that PacifiCorp presented regional haze obligations and incorporated stakeholder feedback in developing its regional haze cases during the public-input process, used reasonable legal assumptions related to future compliance requirements, and increased the number of modeled scenarios.[26]

Q. Sierra Club claims that in the 2017 IRP docket in Oregon, the Oregon commission "ordered PacifiCorp to analyze as part of its fundamental planning process the viability of each individual coal unit and to prove that continued operation is in the customers' interest."[27] Do you agree with this characterization of the Oregon process?

A. No. In response to stakeholder requests, PacifiCorp agreed to provide additional unit-by-unit coal analysis using simplified assumptions and modeling. Specifically, stakeholders requested that PacifiCorp use one of its IRP models (the system optimizer, or SO, model) to conduct 25 individual analyses, one for each of the company's 24 coal units and a base case. In agreeing to perform the analysis, the company highlighted that the study could inform further modeling in the 2019 IRP cycle, but that on a stand-alone basis, the model would have limited value in

[26] *PacifiCorp's 2017 Integrated Resource Plan*, Public Service Commission of Utah Docket No. 17-035-16, Report and Order at 28 (March 2, 2018) (https://pscdocs.utah.gov/electric/17docs/1703516/3005351703516rao3-2-2018.pdf).
[27] Fisher Direct at 54.

establishing potential economic benefits or costs associated with the early retirement of specific coal units.

The analysis was structured to first calculate the forecasted total-system costs to serve customers (represented in the analysis as a PVRR) under a benchmark regional haze modeling scenario from the 2017 IRP (benchmark case). Next, PacifiCorp calculated the PVRR assuming that each individual coal unit was retired by the end of 2022 (early retirement case). PacifiCorp cautioned that this simplified assessment of its coal units would not provide a complete, portfolio-level view of the economics of PacifiCorp's coal units, would not capture system cost impacts that would result with early retirements at more than one facility, and would not assess whether system reliability might be compromised. While the coal study on its own provides limited insight into a least-cost, least-risk resource portfolio, the company indicated that it will inform further work with stakeholders in the 2019 IRP process regarding PacifiCorp's economic modeling of its coal fleet. PacifiCorp completed this preliminary coal study and provided it to IRP stakeholders in June 2018.

Q. Sierra Club claims that the preliminary 2018 Coal Analysis shows that nearly [redacted] of PacifiCorp's coal fleet should be economically retired by 2023.[28] How do you respond?

A. Sierra Club's characterization of the preliminary 2018 Coal Analysis is incorrect. This preliminary analysis did not include any scenario that assumes [redacted] of PacifiCorp's coal fleet is retired, and so it is misleading for Sierra Club to characterize the preliminary results in this way. As PacifiCorp explained when it

[28] Fisher Direct at 56.

agreed to perform the additional studies, the 2018 Coal Analysis is preliminary and incomplete. Most importantly, as noted above, the simplified assumptions do not consider the economic impact of retiring more than one unit, let alone [redacted] of PacifiCorp's coal fleet. Each study assumed that only the particular unit being studied was retired early, while all other remained in operation until their retirement date as assumed in the benchmark case. Consequently, this analysis provides no basis to conclude that [redacted] units could economically be retired early.

Retiring [redacted] of the company's coal capacity could also have significant impacts on the company's transmission system and could present reliability challenges that could require incremental investment to remedy. None of these issues were studied in the preliminary 2018 Coal Analysis.

Q. Has the company continued to refine the preliminary 2018 Coal Analysis for purposes of the 2019 IRP?

A. Yes. The company expects to complete an update to this analysis in December 2018. While that update will consider system impacts of the retirement of individual coal units, additional analysis will be required to layer in consideration of regional haze compliance alternatives. The company expects to complete this analysis in time to inform the preferred portfolio for the company's 2019 IRP, which is scheduled to be finalized in March 2019.

Q. Does Sierra Club explain how it can rely on a study that models potential early plant retirements by 2023 as the basis for disallowing costs in 2019?

A. No.

Q. Sierra Club criticizes the company's preliminary 2018 Coal Analysis for including an "intra-hour dispatch credit" in the analysis.[29] How do you respond?

A. PacifiCorp included an intra-hour flexible resource dispatch credit in the preliminary 2018 Coal Analysis to ensure it was accounting for the potential loss of financial benefits that these resources provide within the EIM. The ability of coal resources to increase or decrease output within the hour in response to changes in system conditions across the EIM footprint results in quantifiable incremental revenues and/or reduced costs that would be lost if the assets enabling these benefits are retired.

In response to stakeholder feedback in the on-going public-input process of the 2019 IRP, PacifiCorp has decided to eliminate this credit in the 2019 IRP modeling, including elimination of this credit in the updated coal analysis expected to be completed in December 2018. Nonetheless, PacifiCorp will calculate—as an out-of-model adjustment—the potential impact of this intra-hour dispatch credit, as applicable to a broad range of flexible resource capacity, on model results from the 2019 IRP. The estimated impact of the intra-hour flexible resource credit will be reported separately. This will enable PacifiCorp and IRP stakeholders to better understand the potential impact of changes to intra-hour EIM benefits associated with flexible resources without having it directly affect modeled outcomes.

[29] Fisher Direct at 60.

Q. Sierra Club also relies on its own study, prepared by Synapse in 2017, to corroborate its claims about the results of the preliminary 2018 Coal Analysis.[30] Was the 2017 Synapse study reasonable?

A. No. The Synapse analysis suffers from the same flaws and limitations as the preliminary 2018 Coal Analysis. Sierra Club had Synapse perform a unit-by-unit analysis to determine whether each individual unit is economic without examining how the retirement of individual unit(s) impacts the system as a whole. In other words, each analysis implicitly assumes that the coal unit being studied is the only one that would be retired. Proper analysis, however, would need to assess the economic impact of each unit that is retired on the next unit analyzed. In addition, Sierra Club's analysis fails to consider the operational impacts of retiring so many coal units to ensure that system reliability can be maintained (and it cannot), to account for the incremental costs required to remedy potential reliability issues.

Moreover, the Synapse study is based on a static view of the future from a single point in time and it does not appropriately consider resource-replacement costs, which could be substantial if [redacted] of the company's coal capacity was retired early. In short, a cursory review of the structure of the analysis reveals that it cannot be viewed as a credible critique of PacifiCorp's least-cost, least-risk system-wide planning.

[30] Fisher Direct at 51–53.

IV. RESPONSE TO SIERRA CLUB CHALLENGE TO SCR INVESTMENTS AT JIM BRIDGER UNITS 3 AND 4

Q. Please describe Sierra Club's adjustment related to the SCR investment at Jim Bridger Units 3 and 4.

A. Sierra Club claims that the company acted imprudently when it installed SCRs at Jim Bridger Units 3 and 4. Specifically, Sierra Club argues that before the company issued its Full Notice to Proceed (FNTP) on December 1, 2013, changes in both natural gas and coal prices had rendered the SCRs less economic than converting the units to natural gas. Sierra Club claims the company did not update its economic analysis in the six-month period between the company's initial decision to proceed with the SCRs and the FNTP. Sierra Club contends that if the analysis had been refreshed, it would have shown that the SCRs were no longer the least-cost, least-risk resource choice.

Q. Is Sierra Club's position that the company should have conducted an additional, comprehensive economic analysis at the last minute inconsistent with its other positions in this case?

A. Yes. Sierra Club contends elsewhere that the company should make irrevocable plans now to close coal plants in the next several years—even though market conditions could change.

Q. Has Sierra Club provided any evidence substantiating its claim that the Jim Bridger SCR investment was imprudent?

A. No. Sierra Club did not file any economic analysis, market data, or workpapers that support its adjustment to the Jim Bridger SCRs. Instead, to support its key factual and analytical allegations, Sierra Club points only to an order issued by the

Washington commission that allowed full recovery of the company's Jim Bridger SCR investment, but disallowed a return on the investment. There are several reasons why this is insufficient to support Sierra Club's adjustment.

First, the Washington commission's decision is one of three commission decisions on the Jim Bridger SCRs. The other two decisions (from the Utah commission and the Public Service Commission of Wyoming) allowed full recovery of the investment. Mr. Teply provides more background on the Washington order and explains why this Commission should act consistently with the two commissions that allowed full recovery of the Jim Bridger SCRs, not the one commission that partially disallowed recovery.

Second, while Sierra Club appears to be relying on the testimony and exhibits it filed with the Washington commission, it has not included any of this evidence in the record in this case. In fact, as noted by Mr. Teply, Sierra Club cites only to the sections of the Washington order where that commission described Sierra Club's evidence, it does not rely on the Washington commission's findings and conclusions. Sierra Club cannot establish facts in this case through an order describing the evidence it presented in a different case before a different commission.

Third, the analysis that Sierra Club cites to in this case is its original analysis submitted to the Washington commission. Sierra Club filed superseding analysis at the Washington commission, admitting that its original analysis overstated the changes to PacifiCorp's calculations of its present-value revenue-requirement differential (PVRR(d)). Sierra Club does not explain why it cites—but does not provide—its admittedly erroneous analysis in this case instead of its corrected analysis.

Fourth, Sierra Club's recitation of the Washington order omits the critical fact that the Washington commission *rejected* Sierra Club's analysis because Sierra Club improperly used post-decision information. Thus, even if this Commission could look to the Washington order for the evidence underlying Sierra Club's adjustment in this case, the Washington commission expressly found that Sierra Club's evidence was insufficient to support its proposed disallowance.

Q. Assuming Sierra Club had actually filed the same analysis it relied upon before the Washington commission, would its claims have merit?

A. No. Sierra Club alleges that the benefits of the SCRs were overstated because coal costs increased and natural gas prices decreased. Sierra Club's Washington analysis supporting this claim used information that became available only after the company decided to move forward with the Jim Bridger Units 3 and 4 SCRs. This is improper evidence for a prudence challenge, which requires the Washington commission to examine what the company knew or should have known at the time the decision was made.

Sierra Club's Washington analysis also included material errors that, when corrected, eliminated the alleged decrease in the economic case for the SCR investment. As explained in the rebuttal testimony of Mr. Dana Ralston, Sierra Club's errors overstated the reduction in SCR benefits due to changes in coal costs by $112 million. Sierra Club mischaracterized assumptions underlying the natural-gas price forecast available to the company in fall 2013, and ignored uncertainty in natural-gas prices in its comparative natural-gas-price analysis. These errors invalidated Sierra Club's proposed adjustment related to the natural-gas price forecast, which purportedly reduced SCR benefits by $146 million.

In summary, even if Sierra Club had filed its Washington analysis in this case, that analysis does not demonstrate that the Jim Bridger SCRs are imprudent.

Coal Costs

Q. What was the basis for Sierra Club's coal-cost adjustment before the Washington commission?

A. Sierra Club compared Jim Bridger coal-cost assumptions used in the company's SCR analysis with Jim Bridger coal-cost assumptions used in the company's 2015 IRP.[31]

Q. Was it appropriate to make this comparison?

A. No. The Jim Bridger coal-cost assumptions used in the 2015 IRP were not available to the company before December 1, 2013, when the company issued the FNTP to the contractor.

Q. Does Sierra Club justify its use of coal-cost forecasts from the 2015 IRP in its comparative analysis of coal-cost assumptions used in the company's Jim Bridger SCR analysis?

A. No. In fact, Sierra Club's testimony in this case never even explains how it calculated its $143 million reduction in coal costs. Instead, Sierra Club just points to the Washington order describing Sierra Club's testimony in that case.[32] Notably, the Washington commission gave no weight to Sierra Club's analysis because it relied on

[31] Order 12 n. 116.
[32] Fisher Direct at 26, 29.

"information not available to the company at the time of its decision to execute the FNTP."[33]

Q. In its Washington testimony, did Sierra Club concede that its $143 million adjustment relied on coal-cost data that was unavailable when the company issued its FNTP on December 1, 2013?

A. Yes. Sierra Club admitted that its adjustment was based on data from July 2014—more than six months after the company issued the FNTP.[34]

Q. Aside from Sierra Club's reliance on post-FNTP data, were the calculations performed by Sierra Club in its Washington testimony accurate?

A. No. As Mr. Ralston explains, Sierra Club's comparative analysis was incomplete. Sierra Club only considered changes in cash costs when it compared coal-cost assumptions used in the company's Jim Bridger SCR analysis with those used in the 2015 IRP. Sierra Club's analysis omitted the change in Bridger Coal Company's forecasted capital expenses. Had Sierra Club performed an accurate comparative coal-cost analysis that included future mine capital expenses, the differential in coal costs used in the 2015 IRP—which were not available in fall 2013—and the coal costs used in the company's analysis would have reduced this change in benefits to only $31 million. Sierra Club's coal-cost adjustment (when corrected) does not support its conclusion that gas conversion would be lower cost than installation of SCRs on Jim Bridger Units 3 and 4.

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[33] Order 12 ¶ 111; *id.* n. 158.
[34] *In the Matter of Pacific Power and Light Co. Petition for a Rate Increase Based on a Modified Commission Basis Report, Two-Year Rate Plan, and Decoupling Mechanism*, Docket No. UE-152253, Supplemental Cross-Answering Testimony of Jeremy I. Fisher, PhD (Redacted) at 16 (May 13, 2016).

Natural-Gas Prices

Q. At the time it made the decision to proceed with the Jim Bridger SCRs and issue the FNTP, did the company evaluate how projections of natural-gas prices affected its base case analysis of the Jim Bridger SCRs?

A. Yes. The economic analysis of the Jim Bridger SCRs used base-case natural-gas prices from the company's September 2012 official forward price curve (OFPC), which yielded a nominal levelized price at Opal over the 2016-through-2030 time frame of $5.72 per mmBtu. The most current OFPC when the FNTP was issued on December 1, 2013, was the September 2013 OFPC, which yielded a nominal levelized price at Opal of $5.35 per mmBtu over the 2016-through-2030 time frame. This is above the break-even levelized Opal natural-gas price for the SCRs at $4.86/mmBtu, referenced in my direct testimony at Exhibit PAC/507. As described in my direct testimony, the company estimated that the Jim Bridger SCRs remained approximately $130 million lower cost than the gas-conversion alternative when applying natural-gas price assumptions from the September 2013 OFPC.

Q. Please describe Sierra Club's claims about the natural-gas price assumptions used in the SCR economic analysis.

A. Sierra Club again points to evidence it presented to the Washington commission in 2015, where it used the December 2013 OFPC to make an adjustment to the company's analysis.[35] Using the December 2013 OFPC, Sierra Club reduced the company's base-case analysis developed using the September 2012 OFPC showing a

[35] Fisher Direct at 30–31.

$183 million benefit from the Jim Bridger SCRs by $146 million.[36] This equates to a $93 million reduction from the company's analysis showing a $130 million benefit from the Jim Bridger SCRs when applying the September 2013 OFPC.

Q. Was the December 2013 OFPC completed at the time the FNTP was issued to the contractor?

A. No. The December 2013 OFPC was completed approximately one full month after the FNTP was issued to the contractor. The company has a long and well-documented history of finalizing its OFPC on the last trading day of each calendar quarter. The December 2013 OFPC was produced on December 31, 2013. The FNTP was issued to the contractor on December 1, 2013.

Q. Did the Washington commission rely on Sierra Club's adjustment to natural-gas prices based on the December 2013 OFPC?

A. No. The Washington commission found that Sierra Club improperly relied on data that was unavailable to the company when it issued its FNTP.[37]

Q. What fundamentals-based long-term natural-gas price forecasts were available to the company during the development of the December 2013 OFPC?

A. PacifiCorp received an updated long-term natural-gas price forecast from three different third-party experts after it finalized its September 2013 OFPC—an updated forecast from [redacted] dated October 22, 2013; an updated forecast from [redacted] dated November 20, 2013; and an updated forecast from [redacted] dated December 11, 2013. The [redacted] long-term price forecast for Opal showed

[36] *Id*., 25, 31.
[37] Exhibit JIF-11, Redacted Order 12 ¶ 111; *id.* n. 158.

a nominal levelized price of [redacted]/mmBtu over the 2016-through-2030 time frame, which was higher than the September 2013 OFPC and a decrease of only [redacted], between May and October 2013. Over this same forecast period, the [redacted] and [redacted] long-term forecasts for Opal showed a nominal levelized price of [redacted]/mmBtu and [redacted]/mmBtu, respectively. Nominal levelized prices for two of these three price forecasts were well above the break-even levelized Opal natural-gas price of $4.86/mmBtu.

Q. Sierra Club claims that "[e]ven from September 2013 to December 1, 2013 . . . gas price forwards continued to fall."[38] Is this true?

A. No. As noted above, the nominal levelized natural-gas price in the September 2013 OFPC was $5.35 per MMBtu. Two of the company's three third-party forecasts *increased* after September 2013. And the only consultant forecast that was less than the break-even point showed a [redacted] relative to the same consultant's August forecast—undermining Sierra Club's claim that natural-gas prices were in free fall after September 2013.

Q. How do you respond to Sierra Club's representation of short-term market forwards available before December 1, 2013?[39]

A. Sierra Club claims that short-term market forwards available before December 1, 2013, indicated declining natural gas prices.[40] The company's long-term resource planning decisions are based on long-term price forecasts, because these are the prices that have the most influence on the economic analysis for long-term resource

[38] Fisher Direct at 30.
[39] Fisher Direct at 30.
[40] Fisher Direct at 30.

decisions. While short-term market forwards may have been declining in late 2013, the long-term forecasts were still above the company's break-even point when it provided the FNTP to the contractor.

Q. Were there any other SCR-related costs that changed before the company issued its FNTP?

A. Yes. As described in the rebuttal testimony of Mr. Teply, by the December 2013 time frame, when the company issued its FNTP to the contractor, the company was aware that its share of the SCR cost was reduced by approximately [redacted]. When issuing the FNTP, the company was aware that these reduced costs would partially offset lower natural-gas prices, while recognizing that there was uncertainty in how future natural-gas prices might compare to then-current forecasts.

Economic Assessment before Issuing FNTP

Q. Sierra Club claims that no one in the planning or coal teams at PacifiCorp alerted the management team that changing coal costs and gas prices "had likely collapsed any benefit" associated with the Jim Bridger SCRs.[41] Please respond.

A. First, as discussed above, this testimony wrongly assumes that changes in coal costs and gas prices made the SCR investments non-beneficial. Second, the testimony also wrongly implies that the company did not consider potential changes to its calculation of economic benefits related to the Jim Bridger SCRs before it issued the FNTP.

[41] Fisher Direct at 31.

Q. Did the company's scenario analysis allow it to readily consider the impact of changing market conditions on its Jim Bridger SCR analysis before issuing the FNTP on December 1, 2013?

A. Yes. PacifiCorp's economic analysis of compliance alternatives for Jim Bridger Units 3 and 4 was designed to allow for rapid re-assessment of the PVRR(d) between the SCR and natural-gas conversion alternatives with changing market conditions, complementing flexibility provisions that the company negotiated in the SCR engineer, procure, and construct (EPC) contract. PacifiCorp used this analysis when choosing installation of SCRs as the best regional haze compliance alternative in May 2013 *and* to assess how changes in market conditions affected the customer benefits before issuing the FNTP in December 2013.

Q. What types of changes in market conditions did the company consider before issuing the FNTP?

A. As described in the direct and rebuttal testimony of Mr. Teply, PacifiCorp considered all factors material to its SCR analysis, recognizing that the base-case natural-gas price forecast had fallen, the estimated cost for the EPC contract had been reduced, Bridger Coal Company mine costs had been updated, and there was no reason to change CO_2 price assumptions.

Q. Please explain how PacifiCorp considered the impact of a reduced natural-gas price forecast on the SCR benefits before issuing the FNTP.

A. As I stated above, the company performed comprehensive analysis of the compliance alternatives for Jim Bridger Units 3 and 4 under the regional haze regulations. As part of this analysis, the company produced natural-gas price sensitivities that show a strong linear relationship between natural-gas price inputs and the PVRR(d) between the SCR and natural-gas-conversion compliance alternatives. I present this relationship in my direct testimony as Exhibit PAC/507.[42]

Based upon this relationship, PacifiCorp's comprehensive analysis was used to establish how the SCR benefits are affected by natural-gas price assumptions. Before issuing the FNTP, the company reviewed its most recent OFPC and, using the relationship shown in Exhibit PAC/507, readily determined that the base-case PVRR(d) continued to show significant SCR benefits ($130 million).[43]

When evaluating natural-gas prices before issuing the FNTP, the company also considered that there is uncertainty in long-term natural-gas price forecasts. The company was aware that natural-gas prices had fallen and considered this in making the decision to issue the FNTP. PacifiCorp was also aware that there is volatility in long-term price forecasts, that natural-gas prices cannot trend downward indefinitely, and that there was a reasonable possibility that actual natural-gas prices could be higher than then-current base-case projections.

Q. Please explain how PacifiCorp considered the impact of reduced EPC contract costs on the SCR benefits before issuing the FNTP.

A. PacifiCorp was aware, before issuing the FNTP, that EPC costs for the Jim Bridger SCRs had been reduced by [redacted].[44] The reduced EPC cost contributes approximately [redacted] in additional benefits to the SCR compliance alternative. These incremental benefits, tied to fixed costs for the SCRs, are easily calculated, and

[42] PAC/500, Link/18.
[43] *Id.* at 24.
[44] *See* PAC/1600, Teply/10.

no model runs are required to understand how reduced EPC costs improve benefits for the SCR compliance alternative. Before issuing the FNTP, PacifiCorp knew that these EPC cost reductions would only add to the already substantial benefits of the SCR compliance alternative even after accounting for reduced base-case natural-gas price assumptions. Moreover, as Mr. Teply testifies, there would be increased costs and risks of natural-gas conversion under a hypothetical post-FNTP cancellation.

Q. Please explain how PacifiCorp considered the impact of updated Bridger Coal Company mine costs before issuing the FNTP.

A. As described in Mr. Ralston's testimony, in October 2013, PacifiCorp updated its Bridger Coal Company mine costs. At the time the FNTP was issued, the company was aware that the base case SCR compliance alternative was approximately [redacted] ($130 million PVRR(d) based on the September 2013 OFPC plus [redacted] for EPC cost savings) lower cost than the natural-gas conversion alternative. While PacifiCorp was aware that its Bridger Coal Company mine costs had been updated before issuing the FNTP, there was nothing in the updated mine costs—an interim step to developing a new long-term fueling plan for the Jim Bridger generating plant, which was completed in November 2014 and used in the 2015 IRP—to suggest delivered coal costs were increasing to a level that would eliminate the substantial SCR benefits. In fact, this observation was later substantiated when the long-term fueling plan for the Jim Bridger generating plant used in the 2015 IRP was completed. As noted above, when coal costs for the Jim Bridger generating plant used in the company's SCR analysis are compared to coal costs used in the 2015 IRP, SCR benefits would be reduced by only $31 million.[45]

Q. Does this conclude your rebuttal testimony?

A. Yes.

[45] *See* PAC/1700, Ralston/6.