Attachment B
Utilities and Transportation Commission Comments on
Puget Sound Energy's Colstrip Study
Docket UE-120767

I. Introduction

In the Commission's Acknowledgement letter of PSE's 2011 Integrated Resource Plan (IRP), the Commission instructed PSE to examine a future without Colstrip in its resource portfolio:

> PSE should model a scenario without Colstrip that includes results showing how PSE would choose to meet its load obligations without Colstrip in its portfolio and estimates of the impact on Net Present Value (cost) of its portfolio and rates.[1]

The Commission also clearly stated that for the Company's next IRP the Company should examine fully the costs of operating Colstrip over the next 20 years:

> PSE should *conduct a broad examination* of the cost of continuing the operation of Colstrip over the 20-year planning horizon, including a range of anticipated costs associated with federal EPA regulations on coal-fired generation.[2]

After the Commission issued that Acknowledgment Letter, the Sierra Club requested in the PSE 2011 general rate case that the Commission require PSE to file, in a separate docket, a forward-looking study on the economics of continued operation of Colstrip. In part the Sierra Club described the study as requiring:

> PSE to conduct a thorough, forward-going cost and risk study of the Colstrip plant, compared to a full range of supply and demand side alternatives. The study should include a full analysis of the range of risks for future costs at Colstrip from environmental retrofits due to state and federal regulations, increasing coal prices, costs and risks associated with the rehabilitation, maintenance, expansion, and

[1] *Puget Sound Energy 2011 Electric and Gas Integrated Resource Plan*, Dockets UE-100961 and UG-100960, Attachment: Utilities and Transportation Commission Comments on Puget Sound Energy's 2011 Integrated Resource Plan, at 6 (December 28, 2011).

[2] *Id.* (emphasis added).

> continued operation of storage ponds for combustion waste, and the risks associated with future carbon emissions costs.[3]

As an alternative to ordering the study in a separate docket, Sierra Club recommended the Commission find that the prior submission of such study should be a key consideration in all future prudence reviews of the Company's rate requests for Colstrip.[4]

As a third alternative, Sierra Club offered that the study could be done as part of the IRP process.[5] PSE agreed with this alternative testifying that the Commission has already recognized Sierra Club's concerns and identified the appropriate forum for consideration of these issues in its letter accepting the Company's 2011 IRP.[6] To bolster its recommendation, PSE argued that because the analysis described in the Sierra Club's requested study will be done in PSE's IRP process, there was no need for the Commission to order further analysis as part of the PSE 2011 GRC.[7]

Concurring with PSE, the Commission determined:

> Considering the requirements set out in the Commission's letter acknowledging the Company's 2011 IRP that require PSE to thoroughly study Colstrip, we determine that it would be duplicative for the Commission to order such analysis here. Nor do we see the need at this time to establish a separate process, such as initiating an adjudicative proceeding.[8]

The Commission states here again that the broad language in the Commission's Acknowledgement Letter of PSE's 2011 IRP requiring that PSE undertake a study of the costs of continuing operation of Colstrip set expectations that encompassed the details provided by the Sierra Club in the PSE 2011 GRC. It is with these expectations that we evaluate the company's Colstrip study.

Our evaluation begins with an examination of the Colstrip study's contents and the study's results. We then discuss our findings regarding the study's four key assumptions:

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[3] *WUTC v. Puget Sound Energy, Inc.*, Dockets UE-111048 and UG-111049 (*consolidated*), Order 08 ¶ 420 (May 7, 2012) *quoting* Sierra Club Initial Brief ¶44.

[4] *Id*.

[5] *Id*. ¶ 421.

[6] *Id*. ¶ 422 *quoting* Story, Exh. No. JHS-18T at 52:10-4.

[7] *Id*. ¶ 423 *quoting* Story, Exh. No. JHS-18T at 52:10-4.

[8] *Id*. ¶ *425*.

natural gas prices, load growth, CO_2 costs, and environmental compliance costs. Finally, in the determination section we provide the Company an opportunity to file evidence in support of the prudence of either the continued operation of Colstrip or plant closure.

II. Contents of PSE's IRP

PSE uses its existing IRP models to perform the cost and risk evaluation of its portfolio with and without Colstrip. One of the Colstrip scenarios that PSE modeled removed all four units of Colstrip from PSE's resource portfolio in 2017. To determine the value of retaining only Colstrip units 3 and 4 in its portfolio, it analyzed another Colstrip scenario that removed only units 1 and 2 starting in 2017.[9] In this section, we describe some of the key cost assumptions and modeling methodologies used in the IRP.

Environmental Compliance Cost Cases

For each of these two scenarios PSE created four different environmental compliance cost cases (Environmental Compliance 1, 2, 3, and 4). Environmental Compliance 1 represents the least expensive environmental compliance costs, while Environmental Compliance 4 represents the most expensive. PSE describes the environmental compliance cost cases as follows:

> **Case 1 – Low Cost:** Estimated additional costs are based on achieving compliance using existing, installed equipment with a minimum of modifications or additions to meet the [Mercury and Air Toxics (MATS)] Rule and the . . . requirements of EPA's Regional Haze [Rule]. This case and Case 2 assume that coal combustion residuals continue to be classified as non-hazardous.
> **Case 2 – Mid Cost:** This case includes all the costs from Case 1, plus costs for adding additional equipment that may be needed to assure compliance. It is largely based on EPA estimates for equipment intended to bring Units 1 & 2 into compliance with . . . EPA's Regional Haze [Rule].
> **Case 3 – High Cost:** Case 3 assumes the Case 2 costs, plus additional costs for equipment needed to meet potential new requirements. It reflects a scenario in which (1) coal combustion residuals are defined as hazardous waste and therefore are more costly to dispose of, and (2) the Reasonable Progress requirements of the Regional Haze program require the addition of Selective Catalytic Reduction (SCR) technology on all units by 2027.

[9] See PSE 2013 IRP, page 5-47. PSE provides a graph of scenarios and Environmental Compliance cases with Units 1 and 2, and Units 3 and 4 marked as having or not having a positive net present value. PSE only provided the actual dollar figures separately for the two pairs of units when requested by Commission Staff.

> **Case 4 – Very High Cost:** Case 4 assumes all Case 2 costs, plus it accelerates the effective date for installation of SCR technology to 2022. It also increases the estimated cost of SCR technology on Units 1 & 2, and it triples the cost of hazardous waste disposal for [Coal Combustion Residuals] included in Case 3. Case 4 was examined only in the Base Scenario, as it was developed late in the IRP process.[10]

PSE identifies Environmental Compliance 2 as the most likely scenario.

The primary cost element that distinguishes Environmental Compliance 3 and 4 from Environmental Compliance 1 and 2 is the addition of the cost of off-site disposal of coal combustion residuals as a hazardous waste. EPA's pending Coal Combustion Residuals Rule will determine how coal plants will dispose of this waste. The offsite disposal of coal combustion residuals as a hazardous waste is projected to cost $8 per MWh for Environmental Compliance 3 and $24 per MWh for Environmental Compliance 4. This compares to an onsite disposal cost of $0.20 per MWh in Environmental Compliance 2, where it is assumed that EPA regulates coal combustion residuals as a non-hazardous waste.[11] However, PSE notes that it believes it may be able to store coal combustion residuals onsite even if EPA regulates it as a hazardous waste.[12]

In addition to complying with pending EPA regulations, Colstrip must comply with EPA's existing Mercury and Air Toxics Rule, and Regional Haze Rule. The costs to comply with these rules are significantly higher for units 1 and 2 in Environmental Compliance 3 and 4 than in Environmental Compliance 2. The projected capital costs of compliance with the Mercury and Air Toxics Rule for units 1 and 2 in Environmental Compliance 2 is $24 million in 2015, and $130 million in Environmental Compliance 3 and 4.[13] The projected capital costs of Regional Haze Rule compliance for units 1 and 2 in Environmental Compliance 2 is $38 million in 2017 and $65 million in Environmental Compliance 3 and 4.[14]

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[10] PSE 2013 IRP, 2-6. PSE models a range of economic assumptions, and the Base Scenario reflects a set of assumptions that PSE considers most likely to occur.

[11] PSE 2013 IRP, J-18-21.

[12] PSE 2013 IRP, 2-8.

[13] PSE 2013 IRP, J-18-21.

[14] PSE 2013 IRP, J-18-21.

Modeling Methodology

One goal of an Integrated Resource Plan is to produce a set of resources, which we call the Selected Resource Plan, which represents the most cost-effective way the company can generate a sufficient amount of electricity for its customers. PSE uses two different qualitative modeling techniques to inform this choice.

The first qualitative modeling technique uses scenarios to model different future prices (or values) for a variable that has a range of possible future prices (or values). The outcomes of these scenarios are called "deterministic results" because PSE determines the input values for certain variables. PSE uses these scenarios to gauge the impact of each possible future price (or value) of a variable on resource selection and the cost of the portfolio chosen by the model.

In this IRP, PSE created deterministic results for load growth, greenhouse gas prices, and natural gas prices, among others. PSE used a high, medium (called the "base"), and low load-growth forecasts in its analysis of Colstrip and it developed four greenhouse gas price forecasts representing a range of possible regulatory outcomes. In addition, PSE examined the impact of a variety of natural gas price forecasts on the economics of Colstrip. PSE's Plan used five natural gas prices forecasts that included a "low" levelized gas price of $4.20 per million British thermal units (MMBtu), a "medium" price of $6.05 MMBtu and a "high" of $7.81MMBtu.[15] Combined with greenhouse gas prices, the gas price assumptions were the primary drivers of the Plan's projected electric power prices shown in Figure 4-8.[16]

In addition to modeling the removal of Colstrip from its portfolio and the least-cost resource replacement, PSE ran a deterministic scenario that replaces the energy supplied from Colstrip with wind resources from Montana (to meet its energy needs) and gas-fired single cycle generators (to meet its capacity needs).

The other qualitative modeling technique produces "probabilistic results." These results show a range of cost outcomes for each resource portfolio derived from a random assignment of input values.[17] From the range of cost outcomes, PSE calculates a risk indicator. The risk indicator is the average value of all the results that are above or below

[15] PSE 2013 IRP, 4-7.

[16] PSE 2013 IRP, 4-21.

[17] This random assignment is performed by the "Monte Carlo feature" of PSE's modeling software.

90 percent of the scenario outcomes, in other words, the average value of the most extreme 10 percent of cost outcomes.

PSE also calculates the risk indicator for various deterministic scenarios that fix input variables or particular resource choices to determine the cost and risk of certain conditions or portfolios. For example, in the case of Colstrip, PSE calculated a risk indicator for the deterministic scenario that removes all four units of Colstrip from its portfolio at the end of 2017.

Costs Identified but not Quantified

PSE's analysis of the removal of Colstrip only included the costs of meeting PSE's load without Colstrip as a resource. It did not include other costs triggered or potentially stranded by discontinuing the use of Colstrip. The Plan identified the following categories of potential costs but did not attempt to quantify them:[18]

- Generation site cleanup;
- Remediation of the mine and existing coal combustion residual storage facilities;
- On-going costs of transmission contracts/ transmission ownership obligations;
- Groundwater use; and
- Unrecovered plant book value.

In supportive documents supplied to Staff, PSE states there are no incremental environmental remediation costs to continued Colstrip operation.[19] For the Colstrip study, PSE's Plan did not identify any environmental remediation cost savings resulting from removing Colstrip from its portfolio in 2017.[20]

III. Results of Colstrip Analysis

PSE states that continued operation of all four units of Colstrip is the least-cost option, and thus Colstrip is included in the Selected Resource Plan. However, the Colstrip study produces a myriad of outcomes, some showing Colstrip economical and some not, depending on the input assumptions used. In this section, we describe the results of PSE's Colstrip analysis under the Base Scenario assumptions, then various deterministic and probabilistic scenarios.

[18] PSE 2013 IRP, J-3 and J-4.

[19] PSE Response to Commission Staff Data Request No. 5.

[20] PSE 2013 IRP, J-4.

Base Scenario Results

The focus of PSE's analysis is the impact of operating Colstrip under the conditions found in the Base Scenario, which include the Base Scenario's load projection (2.2 percent annual growth), levelized cost of natural gas ($6.05 per MMBtu), and levelized cost of CO_2 ($0 per ton).[21] Under Environmental Compliance 2 and the Base Scenario, continued operation of all four units is projected to have a mean annual savings in 2018 from $119 million to $158 million.[22] This projection, like all projections that utilize the Base Scenario's assumptions, includes no appreciable cost of CO_2 through 2033. A change in the value of any one of these assumptions could render Colstrip units 1 and 2 uneconomic. In some cases changes in two or more of these assumptions could render all four units uneconomic.

Deterministic Analysis Results

PSE examined Colstrip's operation under the Base Scenario and several other deterministic scenarios. Figure 5-23, reproduced below, illustrates which Colstrip units are cost effective under four Environmental Compliance cases, five natural gas price scenarios, three load growth scenarios, and four CO_2 cost scenarios.

For example, under Environmental Compliance 2, the combination of the low gas price scenario and the low load scenario render units 1 and 2 uneconomic.[23] If the very-low gas price scenario is substituted for the low gas price scenario all four Colstrip units are uneconomic.[24]

With the high costs modeled in Environmental Compliance 4, units 1 and 2 are uneconomic at the Base Scenario's gas price, without factoring in CO_2 costs.[25]

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[21] PSE 2013 IRP, 4-7 (cost of natural gas projection); *Id.* at H-21 (load projection).

[22] PSE 2013 IRP, 5-56.

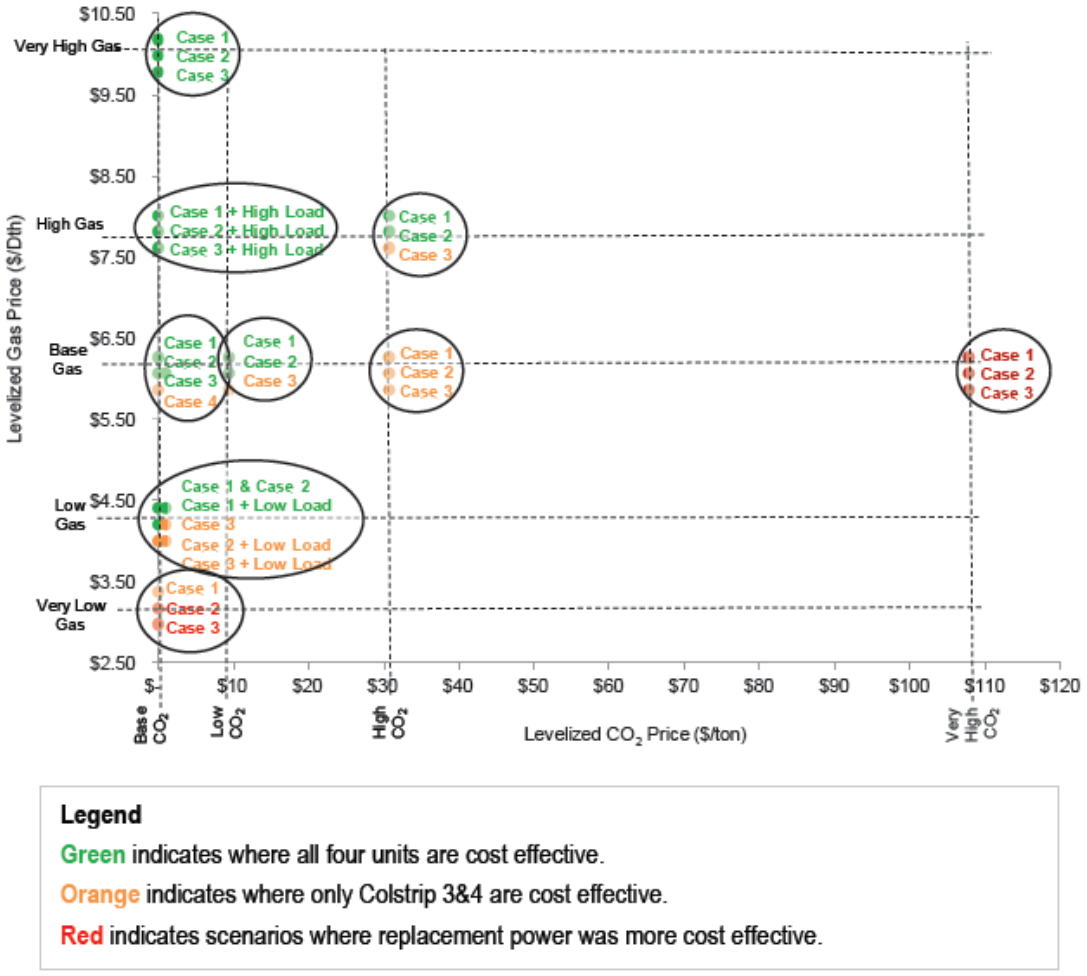
[23] *See* PSE 2013 IRP, page 5-47. Figure 5-23 at Low Gas (below $4.50 per MMBtu) and Base CO_2 (at $0 per ton), "Case 2 + Low Load" is orange, signaling that Colstrip units 1 and 2 are not cost effective, but units 3 and 4 are cost effective.

[24] *Id*. Figure 5-23 at Very Low Gas (below $3.50 per MMBtu) and Base CO_2 (at $0 per ton), "Case 2" is red, signaling that all units of Colstrip are not cost effective.

[25] *Id*. Figure 5-23 at Base Gas (at $6.05 per MMBtu) and Base CO_2 (at $0 per ton), "Case 4" is orange, signaling that Colstrip units 1 and 2 are not cost effective, but units 3 and 4 are cost effective.

Similar trends in the reduced economics of Colstrip occur with increases in CO_2 costs. As CO_2 costs are added to the Base Scenario Colstrip units 1 and 2 become uneconomic. This trend is shown to occur somewhere above $10 per ton of CO_2 but at or below $30 per ton of CO_2.[26] Because PSE did not model any CO_2 costs between the $10 and $30 range, the Commission is unable to determine exactly where in this range units 1 and 2 become uneconomic.

Figure 5-23
Gas Price and CO_2 Price interaction for Colstrip cost-effectiveness



Legend

Green indicates where all four units are cost effective.

Orange indicates where only Colstrip 3&4 are cost effective.

Red indicates scenarios where replacement power was more cost effective.

In PSE's high gas prices and high load growth scenarios, the relative economics of Colstrip are improved even with higher CO_2 prices.[27]

[26] *Id.* Figure 5-23.

[27] *Id.* Figure 5-23.

PSE performed a final deterministic analysis for replacing Colstrip's energy with wind power from Montana, using the assumptions in the Base Scenario and Environmental Compliance 2.[28] Under these scenarios, PSE assigned Montana wind a 30 or 40 percent capacity factor. In the 31 percent wind capacity scenario, PSE acquires 1,800 MW of wind capacity resulting in a rates increase of approximately 23 percent more than the least-cost replacement power. In the 40 percent wind capacity scenario, PSE acquires 1,400 MW of wind capacity and resulting in a rates increase of approximately 18 percent more than the least-cost replacement power.

Probabilistic Analysis Results

In addition to the analysis of deterministic scenarios, PSE performs a probabilistic analysis, which produces a range of cost outcomes for each scenario based on a random assignment of input values.[29] In the probabilistic analysis for Colstrip, PSE compares savings (or costs) from continued operation of Colstrip units 1 and 2 to replacement power. From the range of cost outcomes, PSE calculates a risk indicator for the continued operation of Colstrip. As described earlier, the upper risk indicator is the average value of the highest 5 percent of the results (savings) and the lower risk indicator is the average value of the lowest 5 percent of the results (costs). In other words, it is the average value of the most extreme 5 percent of cost outcomes on the low and high side.

For the Base Scenario with Environmental Compliance 2, the continued operation of Colstrip units 1 and 2 in 2018 produces a lower risk indicator with an annual savings of $19 million, and in 2033 an increased cost of $31 million.[30] The continued operation of units 1 and 2 in 2018 produces an upper risk indicator with annual savings of $92 million, and in 2033 annual savings of $120 million.[31] The lower risk indicator produces a result where the continued operation of Colstrip is more expensive than replacement power in later years.

PSE provides a visual representation comparing the trend in the 20-year total power cost revenue requirement to the trend in each scenario. Figure 2-6, replicated below, shows the relationship between the four Environmental Compliance cases in the Base Scenario,

[28] PSE 2013 IRP, 5-56 to 5-57. For the purposes of this analysis, PSE assumes that the wind provides a 10 percent capacity credit, and the remaining capacity shortfall is met with peakers.

[29] This random assignment is performed by the Monte Carlo feature of PSE's modeling software. The input variables are randomly chosen from a data set with a representative range and distribution for each variable.

[30] UE-120767 and UG-120768 PSE-2013-IRPPresentation-vFinal.pdf, at slide 35.

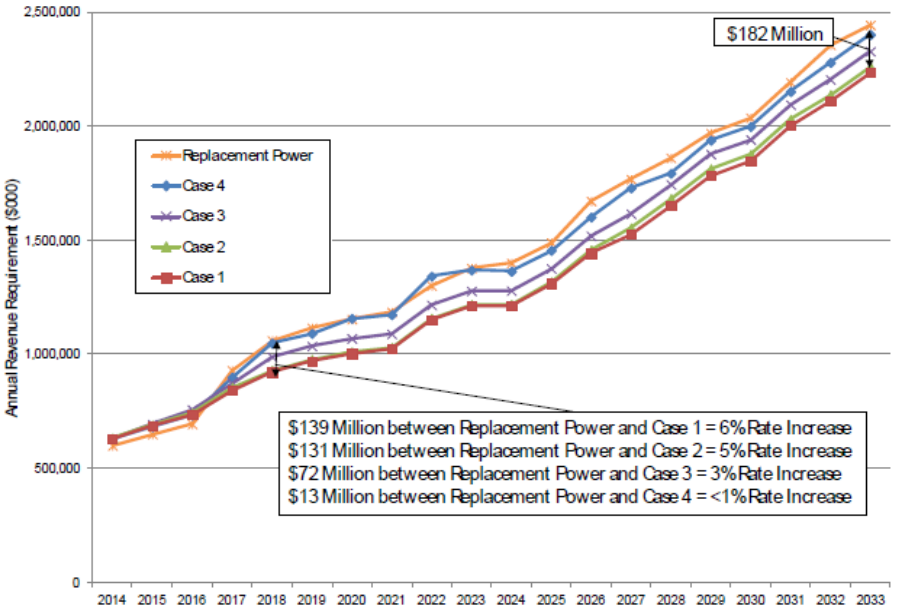
[31] *Id*.

the cost of replacement power for Colstrip, and the general trend in the power cost revenue requirement over the 20-year planning period.[32] While replacing Colstrip moves power costs approximately 5 percent above power costs for the Base Scenario with

Figure 2-6

Annual Revenue Requirement Savings in Base Scenario for Four Colstrip Cases

CCR as hazardous waste poses a bigger risk than regional haze reduction regulations.



environmental Compliance 2 costs, the Base Scenario itself shows a 50 percent increase in power costs per decade for the next two decades or a *5 percent increase per year* without considering Colstrip replacement costs.

IV. Discussion

The Commission commends PSE for its work developing the Colstrip study. With most generation resources, the end of the physical life of a plant or the expiration of a power purchase agreement signals to the IRP planning group that it must model replacement power. The Commission's requirement that PSE perform the Colstrip study necessitated an evaluation of the economics of continuing the operation of a plant that is otherwise physically able to continue operation.

While not common, such an evaluation is not unheard of. In 2013, PSE considered whether to relicense and invest in upgrading four aging but operational hydroelectric facilities, Baker, Snoqualmie, White River, and Electron. In the future, PSE will need to

[32] PSE 2013 IRP, 2-12.

decide the timing of replacing aging but otherwise operating vintage wind turbines at existing wind facilities with newer, larger, and more efficient wind turbines. Portland General Electric, PacifiCorp, and many other of PSE's peers have examined or are examining the economic viability of the continued operation of their coal generation plants.

Deciding whether to reinvest in generation facilities, or close them and acquire new resources to meet the needs of electric customers, is historically the duty of the regulated utility as part of its regulatory compact. In return, regulators must assure the utility has an opportunity to earn its allowed rate of return. Other than the size of Colstrip and the environmental impact of its operation, an evaluation of the economics of continued operation of Colstrip is a routine part of a utility fulfilling its obligation to serve its customers. The IRP planning process enables a utility to compare the long-term replacement costs based on generic resources to the utility's long-term projected costs and risks of operating an existing generation facility. It is a first step in a utility's decision making on what resources to retain or acquire to serve customer's electric needs in a prudent manner. The Commission has few concerns with the modeling methods and skills PSE employed in its Colstrip study. However, our view of the economics of continued Colstrip operation diverge from PSE's conclusions in this Plan primarily because we continue to have questions about some of PSE's assumptions that underpin the Colstrip study's results.

The Company's conclusion that Colstrip should remain in the resource plan centers on the assumptions included in the Base Scenario and Environmental Compliance 2. However, by the Company's own measure, all or some of the Colstrip generation units become uneconomic if we see lower natural gas prices, lower load growth, higher CO_2 costs and/or higher environmental compliance cost.[33] We consider each of these variables in turn.

Natural Gas Price Assumptions

Natural gas prices are the single most important assumption affecting the economics of Colstrip. In developing estimates of the savings from continued operation of Colstrip, PSE used its Base Scenario with a $6.05 per MMBtu levelized price for natural gas. The

[33] Despite repeated requests by IRP advisory group members for an analysis of the cost effectiveness of Units 1 and 2 separate from Units 3 and 4, PSE did not include this information in its IRP. Commission Staff subsequently submitted a data request for this information, and in response PSE provided the information to the Commission but designated it as confidential. Eventually, PSE released this information to the public at its IRP presentation. The Commission is concerned about the adequacy of public involvement.

Commission considers the natural gas price of $6.05 in the Base Scenario to be in the higher range of expected costs for natural gas.

Natural gas prices below the Base Scenario level undermine PSE's assumptions regarding the economics of continuing the operation and investment in Colstrip. Unfortunately, PSE's Plan contains a large analysis gap between the medium natural gas price and the low natural gas price. Natural gas prices are used in the Plan to develop forward market price curves for electricity; as can be seen in Figure 4-8, the largest gap in data is between the medium and low natural gas price scenarios. This gap is exactly the price range that would inform how incrementally lower natural gas prices would affect PSE's claimed savings from the continued operation of Colstrip.[34] Setting aside this deficiency, PSE's Plan does show that in combination with low load growth, Colstrip units 1 and 2 do not produce savings at the low gas price scenario.

With an expectation of natural gas prices below PSE's medium price forecast, the Commission views the savings from avoided natural gas and power purchases due to continued Colstrip operation to be weaker than those derived in PSE's Base Scenario.

Load Growth Assumptions

Through 2016, PSE's base load growth forecast is moderate, reflecting the continued slow economic recovery. However, this period does not affect the Colstrip analysis because the Colstrip study does not remove any of the Colstrip units from production until the end of 2017. Starting in 2017, PSE projects an increase to the rate of annual load growth to 2.2 percent before accounting for the effects of conservation.[35] The Plan explains that load growth rates are suppressed through 2016 due to reduced near-term economic growth with higher short-term unemployment and a lagging housing recovery.[36] Yet this explanation does not provide a rationale for why PSE's model assumes the economy and load start growing more rapidly in 2017 and at what level. The Commission notes that the Federal Reserve has yet to commit to a time frame to end its aggressive stimulus policies such as quantitative easing. The Plan does not discuss this or other factors used in determining its projection of increased load growth past 2016. However, load growth at the Base Scenario level is an essential contributor to the economics of continued Colstrip operation. In light of the Plan's lack of supporting evidence, the Commission is not convinced of the timing or increase of projected load growth after 2016 as assumed in the Base Scenario.

[34] PSE 2013 IRP, 4-21.

[35] PSE 2013 IRP, H-19 and H-21, *see also id.* H-1.

[36] PSE 2013 IRP, H-19.

CO_2 Cost Assumptions

PSE's Plan and Colstrip analysis included four CO_2 price forecasts, yet the Base Scenario upon which the Company relies to determine that the continued operation of Colstrip is cost-effective assumes a zero price of CO_2. In Attachment A, the Commission discussed the CO_2 prices PSE uses in the Plan, instructing the Company to use a nonzero value in the Base Scenario of its next IRP. We note there that "there is growing evidence that society and PSE ratepayers are bearing the costs" of CO_2 emissions, and note that PSE has acknowledged a cost of CO_2 in its rate design.

Regulated utilities may believe that they can recover the costs of CO_2 they incur by continued operation of plants based on projections of zero CO_2 risk over a 20 year planning period. However, the Commission clarifies here that the recovery of any CO_2 costs in the future will face the same rigorous prudency examination as any other cost recovery request. The Commission considers a zero cost for CO_2 over the 20-year planning horizon unrealistic and unreasonable. The future risk of CO_2 costs is a significant factor in the Commission's view of the economics of Colstrip.

Environmental Compliance Cost Assumptions

PSE's Colstrip study included four environmental compliance cost cases. The study identified three EPA regulations and describes their potential cost impact, from least expensive (Environmental Compliance 1) to most costly (Environmental Compliance 4). PSE identifies Environmental Compliance 2 as the most likely scenario. We agree that Environmental Compliance 1 is not a likely outcome and that Environmental Compliance 2 is a reasonable outcome. In addition, we can reasonably imagine the EPA requiring some of the more stringent pollution controls described in Environmental Compliance 3 and 4. We differ from PSE's analysis in that we view the costs described in Environmental Compliance 2 as a floor price for pollution controls that EPA will require of Colstrip in the next four years. In any future analysis PSE should assess, and to the extent possible quantify, the future risks of additional, stricter environmental regulation.

In addition to monetizing the effect of EPA regulations, the study identifies decommissioning and remediation as cost categories. At the end of the life of a generating plant, structures must be disassembled and the land must be cleansed of harmful pollutants, potentially including coal combustion residuals. PSE did not attempt to study or quantify the remediation costs that the plant will incur at the end of its life. Any incremental remediation costs that may exist will increase Colstrip's levelized power cost. As a prudently managed utility, PSE is responsible for obtaining and reviewing information reasonably available at the time of the investment.

PSE has a continuing obligation to known what to understand and quantify the costs and risks of the operation and decommissioning of all of its generation resources. In the Colstrip Proceeding, any analysis presented to the Commission should include these costs and risks.

V. Summary

Based on the information presented in the Colstrip study, we are unable to conclude that continued operation of Colstrip Units 1 and 2 should or should not be a component of the Selected Resource Plan. In many places, the inclusion of more information would provide a clearer analysis, or where adjustment to just one or two variables to a reasonable value would render an early closing date of some or all units more cost-effective for customers than continued operation. PSE identifies savings based on the assumptions it makes in its Plan, but the savings are far more modest than the industry's common perceptions about the financial advantages of coal generation. At this juncture, the Commission is not convinced that the dollar savings PSE identifies in its Plan outweigh the cumulative cost impact of the open-ended risks.

We have a number of specific concerns:

- PSE's assumption of zero CO_2 cost in the Base Scenario over the 20-year Plan is uncertain in light of state and federal action on greenhouse gases as well as CO_2 costs currently reflected in the market.
- PSE's projected gas prices in its Base Scenario, while consistent with projections PSE uses for other purposes, could turn out to overstate savings from avoided natural gas and market purchases of electricity provided by Colstrip.
- PSE's projected level of load growth that also supports the economics of Colstrip lacks sufficient explanation and justification.
- Finally, the Plan may not include costs of all the outstanding environmental risks that Colstrip faces, nor consider views of its ratepayers in how those risks are evaluated.

The IRP is intended to guide investment decisions; however, it is not the process for determining investment decisions. While PSE will not be facing a major investment decision in Colstrip in the next year, such investment decisions are likely only a few years away. Engineering work and other scope of work efforts may need to commence even sooner. To embark on investments with so much uncertainty could be harmful to PSE, its ratepayers and the broader public interest. Historically, post-investment prudence review has been used to protect ratepayers from excessively risky investment.

However, we question whether reliance on that regulatory mechanism would serve the public interest in this unique situation. Should continued investments in Colstrip later prove to be imprudent, disallowance of the expense could protect some of the economic interests of ratepayers, but would not protect them from all the environmental externalities as would a different investment decision.

In light of this and the indeterminate nature of economics of continued investment in Colstrip, the Commission suggests that PSE consult with Commission staff to consider a Colstrip Proceeding to determine the prudency of any new investment in Colstrip before it is made or, in the alternative, a closure or partial-closure plan. We expect that any further Commission deliberations, and decisions, on the economic viability of the continued operation of the Colstrip plant would be made in the context of such a Colstrip Proceeding, or a different one, but not in the context of PSE's next IRP.