

PSE IRP Feedback Report
Webinar 5: Social Cost of Carbon
July 21, 2020

8/04/2020

The following stakeholder input was gathered through the online Feedback Form, from July 14 through July 28, 2020. PSE's response to the feedback can be found in the far-right column. To understand how PSE incorporated this feedback into the 2021 IRP, read the Consultation Update, which will be released on August 11, 2020.

Feedback Form Date	Stakeholder	Comment	PSE Response
7/16/2020	Elaine Armstrong, Citizens Climate Lobby	What is PSE doing, in good faith and at all speed, to reduce their green house gas emissions, reduce reliance on fossil fuels and create a 100% green and reusable energy sources? What you are doing now is increasing reliance on natural gas. There should be no more new plants that use fossil fuels. You need to create ways to use solar, wind, geothermal etc. Entire nations are able to do this. Surely PSE can.	PSE is modeling 80% renewable resources by 2030 and 100% by 2045 to meet the Washington Clean Energy Transformation Act (CETA). PSE is also modeling portfolio sensitivities around different clean energy futures which will be discussed at the August 11, 2020 webinar on scenarios and sensitivities.
7/16/2020	Elaine Armstrong, Citizens Climate Lobby	Build no new fossil fuel plants. Create clean energy sources with the eye to be entirely green house gas emission-free by 2040. Do more to support homeowners to overcome the giant cost of installing solar on their homes.	Thank you for your comment, thoughts and suggestions.
7/20/2020	James Adcock	<p>Page 14 of 2021 IRP Webinar #5: Social Cost of Carbon Planning Assumptions & Resource Alternatives Electric Portfolio Model Using the Social Cost of Carbon, According to CETA</p> <p>I would like to have time allowed for a robust discussion of Puget's four positions expressed on this page, because they are interpretations of CETA that I, and I believe many other people, would disagree with. For example, I believe "cost adder" means logically an added cost proportional to the actual fuel being consumed, not a fixed cost that is somehow decoupled from the amount of fuel actually being used. For example, an NG plant actually dedicated to rare "reliability" concerns, such as "once in 20 years winter drought" should have very low emissions, and therefor should have very low SCC costs.</p> <p>Please allow robust time for discussion and possible disagreement, allowing stakeholders to fully understand, agree, or disagree, with PSE's four stated positions on this page, representing PSE's interpretation of CETA SCC "cost adder" requirements.</p> <p>CETA Quote:</p> <p>An electric utility must incorporate the social cost of greenhouse gas emissions as a cost adder when: (ii) Developing integrated resource plans and clean energy action plans;</p> <p>End-quote.</p> <p>Must" means "must" -- it does not mean that a utility can pick and choose when to turn on or to turn off SCC in their modeling.</p>	Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.
7/20/2020	James Adcock	<p>Page 43 of 2021 IRP Webinar #5: Social Cost of Carbon Planning Assumptions & Resource Alternatives Electric Portfolio Model</p> <p>Please explain why PSE needs to: "In order to input the SCC into AURORA models, PSE converts the final SCC numbers into 2012\$/short ton."</p>	AURORA uses US tons (short tons) instead of metric tons. PSE converts from metric tons to short tons for the model.
7/21/2020	James Adcock	Given that PSE keeps complaining that they run out of time before answering all of the questions, could we "waste" less time on the PSE "Safety Issues" -- which have nothing to do with IRPs in any case.	Thank you for your comment.
7/22/2020	Vladimir Gutman,	Please see attached memo.	Thank you for your comments and questions. PSE responses by referenced numbers in the memo:

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	Climate Solutions		<ol style="list-style-type: none"> 1. PSE will work on creating a write-up of the AURORA portfolio model to include in the 2021 IRP. 2. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.
7/22/2020	Kevin Jones, Vashon Climate Action Group	<p>During the July 21 PSE IRP meeting I posted this question:</p> <p>Could you provide your rationale for PSE plans to use the 100 vs 20-year GWP for the CO2 equivalent of various GHG's.</p> <p>To which you replied that using the 100-year GWP allows you to remain consistent with your regulatory reporting requirements.</p> <p>When I asked would you consider this as a sensitivity, you answered "no".</p> <p>The Governor's Directive 19-18 requires consideration of both the 100 and 20-year GWP, saying in part:</p> <p>I hereby direct the Department of Ecology to adopt rules by September 1, 2021, to strengthen and standardize the consideration of climate change risks, vulnerability, and impacts in environmental assessments for major projects with significant environmental impacts. Such rules should be based on the most current climate change science, consistent with the findings of recent international and national assessments and the Department's recommendations under RCW 70.235.040. The rules should be uniform and apply to all branches of government, including state agencies, political subdivisions, public and municipal corporations and counties. The rules should cover major industrial projects and major fossil fuel projects; and establish uniform methods, processes, procedures, protocols or criteria that ensure a comprehensive assessment and quantification of direct and indirect greenhouse gas emissions resulting from the project. Rules for cumulative environmental assessments and reporting should include:</p> <ul style="list-style-type: none"> • 20-year and 100-year global warming potentials for all greenhouse gases attributable to the project, as provided by the most recent international assessment <p>Given the Governor's Directive, will you reconsider your position and include GWP variation as a sensitivity in the 2021 IRP?</p> <p>If not, please provide rationale.</p>	<p>See Final Supplemental Environmental Impact Statement of the Proposed Tacoma Liquefied Natural Gas Project, pages 4-5 and Appendix B pages 5-7, 91-93.</p> <p>See PSE letter to PSCAA dated November 21, 2018, pages 22-25.</p>
7/26/2020	Virginia Lohr, Vashon Climate Action Group	Please see attached file.	Thank you for your comments. Concerning PSE's decision to present upstream emission as an "inform" level of public participation per IAP2, this is the appropriate level for an input to the 2021 IRP.
7/27/2020	Rob Briggs, Vashon Climate Action Group	<p>Methane Releases by PSE</p> <p>I asked during the webinar if the values PSE is using from the GHGenius and GREET models for methane leakage rates include leakage that occurs while the gas is in PSE's custody and downstream while the gas is the custody of PSE's customers. Keith Faretra's response was "yes they do."</p> <p>Would you please verify formally and on the record that Keith's response is correct and that PSE stands behind that answer.</p>	Yes, PSE stands behind that answer. PSE is using the GHGenius and GREET models to define upstream, midstream and downstream emission rates. This includes fugitive methane that occurs while the gas is in PSE's custody prior to delivery to a metered customer. Emissions from all the defined segments of the natural gas supply chain are included in the IRP analysis. The emission rates are itemized in the summary table on slide 34. Upstream of PSE's control includes extraction, processing, and transportation. Midstream is represented by the distribution segment. This is gas delivered to customers under PSE's control. Downstream emissions are those emissions associated with the end-use combustion of natural gas by PSE customers. The end use combustion rate is defined by EPA and is equal to 54,400 gCO2/MMBtu.
7/27/2020	Rob Briggs, Vashon	<p>Slide #32 – GHGenius upstream emission rate</p> <p>The slide indicates that you are using GHGenius V4.0a (2016).</p>	Thank you for your comments.

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	Climate Action Group	<p>When I go to the Natural Resources Canada web site and follow the GHGenius link, I find that V4.0a (2016) is not available. In September 2019 when I did a similar search to obtain GHGenius V4.0a program documentation to answer questions I had about the data sources that it uses, my effort was thwarted by this message: "The Government of Canada and S&T Squared no longer have an agreement to distribute the older versions of the model. If you need an old version please e-mail us and we can direct you to who to ask within the Government of Canada."</p> <p>I noted this problem in a letter sent to Irena Netik dated September 18, 2019.</p> <p>I am seeking the program documentation for GHGenius V4.0a (2016), so that I can examine the research documents that were used as the basis for that version of the program. During the webinar, Keith Faretra offered to provide me documentation for GHGenius V4.0a. I would appreciate being sent the GHGenius V4.0a documentation using the email address that you have on file for me. However, I am concerned that the documentation that Keith has available is not the documentation I need to answer critical questions about the underlying assumptions in the program.</p> <p>I do not believe it is appropriate for PSE to be using data from a program for which full documentation is not available. If the IRP process is to effectively protect the public interest, it must be open and transparent. That is particularly true for assumptions like upstream methane leakage with large and far-reaching impacts on IRP results.</p> <p>Research published after the 2016 that was conducted using new and more accurate measurement technologies found significantly higher levels of methane releases than those previously assumed.[1] As it currently stands, we are presented with a black box containing old data with very large impacts on IRP results and are told to simply accept its output. This is not acceptable in the context of the IRP process, in which public review is legally mandated.</p> <p>David Suzuki Foundation, New science reveals climate pollution from B.C.'s oil and gas industry is more than double what government claims, April 26, 2017, https://david Suzuki.org/press/new-science-reveals-climate-pollution-b-c-s-oil-gas-industry-double-government-claims/.</p> <p>Make available the requested documentation or Update IRP data sources to those that are current and supported.</p>	
7/27/2020	Rob Briggs, Vashon Climate Action Group	<p>Slide #30 and 34 – GREET upper sensitivity rate</p> <p>The GREET model contains multiple data sources with a range of methane leakage rates. The value shown on slide #34 as "Upper Sensitivity" does not reflect the higher end of the values contained in GREET. In fact, the most recent and most robust methane leakage research in GREET shows a leakage rate more than twice as high as that buried in the 12,121.1 g/MMBtu displayed on slide #34.</p> <p>If you go to the GREET web site at Argonne National Laboratory, and look at the GREET Manual entitled Updated Natural Gas Pathways in the GREET1_2018, you encounter this: "...we added the option to use emissions data from Alvarez et al. (2018) for GREET1_2018. The data from Alvarez et al. (2018) is referred to as EDF 2018 in GREET." [1]</p> <p>If you have any doubt about the quality of this research, consider this passage from the GREET manual:</p> <p>"From 2013 to 2018, a collaboration of the Environmental Defense Fund (EDF), universities, research institutions, and companies have completed 16 projects to collect data on methane emissions from the natural gas supply chain (EDF 2018). The EPA has incorporated data from these efforts, (e.g. updated emission factors for production, processing, transmission and distribution equipment) to improve its GHGI (Burnham et al. 2015). In 2018, EDF and many of its collaborators published an analysis synthesizing data collected across the 16 projects (Alvarez et al. 2018). The researchers, similar to Brandt et al. (2014) but with updated data, used a bottom-up analysis supplemented by a top-down analysis (covering 30% of U.S. gas production) to estimate national CH4 emissions from natural gas and oil supply chains. Their facility-based estimate of 2015 NG and oil supply chain emissions is ~60% higher than the U.S. EPA GHGI estimate. Alvarez et al. (2018) facility-based methodology uses downwind measurements which, unlike solely relying on component-based calculations as done in the GHGI, can capture emissions released during abnormal operating conditions." [2]</p>	Thank you for your comments.

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		<p>It appears that PSE has within the trusted GREET data source, ready access to improved, up-to-date data on upstream fugitive emissions rates but has chosen not to use them.</p> <p>Please tell me why PSE has chosen to use a value for methane leakage of approximately 1% of methane delivered as an upper sensitivity when the source for that data contains highly credible research showing a 2.3% rate as the national average. During the 2019 IRP process, we were told PSE was using these same suspect values because PSE was new at accounting for upstream emissions and that we should not expect PSE to get it right the first time. That line of argument no longer works.</p> <p>Please consider using the leakage values in GREET labeled “EDF 2018” in a sensitivity analysis. Andrew Burnham, Updated Natural Gas Pathways in the GREET1_2018, October 2018, p. 2, pdf available here: Modelhttps://greet.es.anl.gov/publication-update_ng_2018. Ibid.</p> <p>Please consider using the leakage values in GREET labeled “EDF 2018” in a sensitivity analysis.</p>	
7/27/2020	Rob Briggs, Vashon Climate Action Group	<p>Slide #30 - Upstream gas emission assumptions</p> <p>The Puget Sound Clean Air Agency’s report has been widely discredited, so it is disappointing to see PSE using it here as though it is capable of serving as a primary reference.</p> <p>It is highly counterproductive for PSE to be using data from 2007 (AR-4) when more up-to-date data from 2014 (AR-5) are available. Similarly, citing justification from the Kyoto Protocol adopted in 1997, while ignoring the UN IPCC Special Report [https://www.ipcc.ch/sr15/], released in October 2018, makes it clear that PSE does not intend to base the IRP on sound, up-to-date science.</p> <p>The IPCC Special Report Global Warming of 1.5 °C stated we have (now) just ten years to make massive and unprecedented changes to global energy infrastructure to limit global warming to moderate levels. “There is no documented historic precedent” for the action needed at this moment, the report says.</p> <p>In this context, it is wildly inappropriate to be using a GWP 100-year value for methane for an IRP with a 20-year analysis period, in a state that has legislatively mandated rapid decarbonization of its electric utilities, and in a global environment in which approaching two thousand governments in 30 countries have declared climate emergencies over the past two years. GWP 100-year values dramatically understate the importance of near-term climate forcing from methane by averaging those impacts into the next century. It is reckless and irresponsible to continue to use GWP100 for methane.</p> <p>The magnitude of the errors that PSE is designing into the IRP from these upstream emission rate inputs is quite large. I and others have shown that using the low values PSE proposes leads to errors in levelized cost that are larger than the \$3.56/MMBtu that PSE has been assuming as its cost of gas once those emissions are fully burdened using social cost carbon. [1] Errors of this magnitude rob the IRP analyses of any analytical value. Failure to correct the problems with these data inputs will ensure that PSE 2021 IRP is obsolete before it has even been completed.</p> <p>It is doubly disturbing that PSE refuses to discuss alternatives to using these erroneous values, even in sensitivity analyses. Sensitivity analyses are used to assess the impact of assumptions on which there is uncertainty. Given that these errors are both egregious and willful, the UTC would be justified in rejecting PSE 2021 IRP on the basis of these errors alone. September 19, 2019 TAG #8, Slide 15.</p> <p>Use the 20-year GWP for methane at the very least in a sensitivity analysis.</p>	<p>Thank you for your comment.</p> <p>See Final Supplemental Environmental Impact Statement of the Proposed Tacoma Liquefied Natural Gas Project, pages 4-5 and Appendix B pages 5-7, 91-93.</p> <p>See PSE letter to PSCAA dated November 21, 2018, pages 22-25.</p>

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7/27/2020	Virginia Lohr, Vashon Climate Action Group	<p>PSE plans to use the upstream greenhouse emissions analysis method from the Proposed Tacoma Liquefied Natural Gas Project Final Supplemental Environmental Impact Statement prepared by Ecology and Environment, Inc. for the Puget Sound Clean Air Agency (PSCAA). This analysis is found in Appendix B: PSE Tacoma LNG Project GHG Analysis Final Report and was conducted by Life Cycle Associates. My understanding is that PSE currently proposes to consider no alternatives to this method.</p> <p>Is it prudent to rely solely on a consultant's report with a prominent disclaimer with the following statement? "No warranty or representation, express or implied, is made with respect to the accuracy, completeness, and/or usefulness of information contained in this report."</p> <p>TAG members and stakeholders raised questions about PSE's proposed use of these methods for calculating upstream greenhouse gas emissions during the 2019 PSE IRP process. Questions were again raised in the 2021 IRP webinar on this topic.</p> <p>One concern with the method PSCAA and PSE have adopted is its use of out-of-date science, such as the IPCC's 4th annual assessment (AR4) from 2007. Much newer science is available, including the IPCC's 5th Assessment Report from 2014 and research showing that methane is much more damaging than previously thought.</p> <p>While some agencies still use AR4, does that mean that PSE must also use this out-dated science? If PSE must use AR4 or chooses to use out-dated science, is there any reason why PSE could not add a sensitivity based on more current science, such as AR5?</p> <p>Governor Inslee published Directive 19-18 on December 19, 2019. It requires the Department of Ecology to develop rules regarding greenhouse gas emissions based on "the most current climate change science," and to adopt the new rules by September 1, 2021. While the final rules will not be available for PSE to use in 2020, the fact that AR4 will no longer be acceptable in 2021 is clear. Is it prudent to refuse to use current science in the 2021 IRP, at least as a sensitivity, in light of this Directive?</p> <p>PSE should abandon their sole reliance on the PSCAA methods. At the very least, PSE should add a sensitivity that uses current science and addresses concerns raised in the 2019 and 2021 IRP processes, including using global warming potential values for methane from AR5 and adding a sensitivity analysis using the 20-year global warming potential for methane, which the Governor's Directive specifically mentions should be part of the new rules.</p> <p>Getting these calculations correct is critical to getting the right answer on what is reasonable, wise, and prudent for PSE to do for their investors, for rate-payers, for people living near their polluting facilities, and for the future of humanity.</p>	<p>See Final Supplemental Environmental Impact Statement of the Proposed Tacoma Liquefied Natural Gas Project, pages 4-5 and Appendix B pages 5-7, 91-93.</p> <p>See PSE letter to PSCAA dated November 21, 2018, pages 22-25.</p>
7/28/2020	Rob Briggs, Vashon Climate Action Group	<p>Slide #14 - Using the Social Cost of Carbon, According to CETA</p> <p>'PSE understands this "cost adder" to mean that the SCC is included in resource planning decisions as a part of the Fixed O&M costs of that resource.'</p> <p>The social costs of greenhouse gas emissions are a function of the quantity emitted. Therefore, the social cost of carbon must be treated as a variable cost in portfolio optimizations. Treating SCC as a fixed cost dramatically lowers the apparent marginal cost of fossil-fuel use and represents an implicit subsidy for fossil-fuel use in the planning model.</p> <p>Please explain clearly why PSE proposes to include SCC as part of the fixed costs when it properly should be treated as a variable cost. If PSE contends that their approach grows out of specific language in CETA, please cite that specific language.</p>	<p>Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.</p>
7/28/2020	Rob Briggs, Vashon Climate Action Group	<p>Treat SCC as a variable cost. Abandon all use of it as a fixed cost, which it is not.</p>	<p>Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.</p>

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7/28/2020	Rob Briggs, Vashon Climate Action Group	<p>Slide #14 – Including SCC in dispatch costs</p> <p>'The SCC is not included in resource dispatch costs.'</p> <p>My understanding is that CETA's scope covers planning and acquisition decisions by utilities but not their operations. It remains unclear to many of us stakeholders why PSE intends to include the costs of greenhouse gas emissions in some phases of the planning process but not in others. Failure to include significant cost factors in any phase of the IRP analysis process would lead to distorted results.</p> <p>a) Please explain PSE's rationale for omitting this very large cost component from the dispatch modeling, if that is in fact what is being proposed.</p> <p>b) If this remains an unresolved issue with stakeholders, I recommend PSE run the IRP analyses with SCC consistently included throughout IRP analyses and again as a sensitivity as PSE proposes.</p> <p>c) If the problem PSE has with consistently including SCC in the IRP relates to discordance with real-world dispatch decisions, would not the best solution be for PSE to include SCC in their actual real-world dispatch decisions as well? Doing so would be consistent with the intent of CETA and with its long-term mandatory decarbonization benchmarks.</p>	Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.
7/28/2020	Orijit Ghoshal, Invenergy	Please see attached	Thank you for your comments. PSE has reached out to you and Charlie Black to follow-up with you and will report progress in the Consultation Update.
7/28/2020	Orijit Ghoshal, Invenergy	<p>Invenergy encourages PSE to recognize that GHG emissions produced by its electric generating resources are environmental externalities and to treat them as such in the portfolio modeling analyses for the 2021 IRP. Invenergy encourages PSE to include the SCC in the variable dispatching costs of its GHG-emitting resources when modeling its resource portfolio for the 2021 IRP.</p> <p>As part of PSE's resource portfolio modeling, Invenergy encourages PSE to track and report environmental externality costs (i.e., quantities of GHG emissions multiplied by the SCC of its resources' GHG emissions), and to separately track and report the resource portfolio costs that actually go into its revenue requirements. Decisions about PSE's portfolio resource mix should be made on the basis of the sum of revenue requirements plus GHG externality costs. This will be a more realistic method for applying the SCC than either of PSE's proposed approaches. Reporting both of types of costs will also make PSE's analysis more transparent.</p>	Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.
7/28/2020	Doug Howell, Sierra Club	We should be assuming that there will not be an increase in overall gas use over the next 10 years. And there is no gas production in Washington. All gas comes from out of state or Canada. PSE asserts that all their gas comes from Canada. If so, they are pushing other buyers to other suppliers such as the Rocky Mountain states. Methane emissions from Canada have the same climate impact as methane emissions from the Rockies. As a result, PSE needs to analyze the total regional supply chain of gas that comes into Washington to fully account for upstream methane emissions. We request that PSE run a scenario (or at least a sensitivity) assessing the regional impacts of upstream methane from all gas fuel supplies into Washington. If PSE does not agree with running this scenario, then they have to explain how their gas supply is affecting the overall supply chain of gas into Washington.	Thank you for your comment.
7/28/2020	Doug Howell, Sierra Club	Run a scenario on upstream leakage rates of methane from all gas supplies into Washington.	Thank you for your comment.
7/28/2020	Joni Bosh, NW Energy Coalition	<p>NWEC comments and suggestions.</p> <p>Evidently, four supporting documents will have to be submitted separately. Those follow this submission.</p>	Thank you for your comment.
7/28/2020	Joni Bosh, NW Energy Coalition	See Four supporting documents.	Thank you for the four supporting documents. All four documents are provided as part of the Webinar 5 Feedback Form upload package on pse.com.
7/28/2020	Doug Howell, Sierra Club	We do not agree that the social cost of carbon (SCC) should be treated as a "cost adder" or as "fixed" cost. Climate impacts have long been an environmental externality and now with CETA we can internalize this damage in the planning and acquisition processes. As such, PSE needs to treat this externality for what it is: a variable cost. As a variable cost, it needs to be included in PSE dispatch modeling. We do not agree that PSE should characterize this as a carbon tax. Just because you are treating SCC as a variable cost for dispatch modeling, does not make it a tax. It would be tax if it showed up in your annual revenue requirement, which it will not.	Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.

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7/28/2020	Doug Howell, Sierra Club	Incorporate SCC in the dispatch model. Explain why you are not treating this as a variable cost. Explain the calculations for Slide 20, and provide all the data inputs that lead to the results on Slide 20.	Thank you for your comment. PSE will run several sensitivities and scenarios, requested by stakeholders, around the different ways to model the social cost of carbon. Further discussion will occur at the August 11 stakeholder meeting.
7/28/2020	Kyle Frankiewicz, WUTC Staff	<p>Questions and comments from presentation:</p> <ul style="list-style-type: none"> Slide 18: It seems that the iterative / cyclical / recursive approach to SCC-as-adder might hobble the ability of the portfolio optimizer to 'see' and avoid these costs. I think I'm mostly confused about how the company iterates its carbon emissions estimates to get the \$/kw-yr fixed costs correct, and how or whether a thermal plant's run rate is fixed or able to be optimized somewhat by the model. At some point, dispatch must be affected, either through the SCC-in-dispatch or through gas resources becoming too expensive in an after-the-model-run adjustment. Slide 21: How do SCC-as-adder costs get figured into an optimized retirement plan for existing thermal plants? Are existing plants added as selectable, with increasing kW-yr SCC O&M costs for each iteration of a plant to be retired in, say, 2030 vs 2035 vs 2045? Or, is the fact that the O&M is paid for within the model on a year-to-year basis means that the model can see the SCC-related difference between retiring sooner vs later? Slide 35: Does the assumption that all gas used for electric generation is from BC align with PSE's historical purchasing patterns for its existing plants? 	<p>PSE responses referenced slide numbers:</p> <p>Slide 18: The plants dispatch to gas and electric prices. Using SCC as a fixed cost adder does not affect dispatch since we are not changing gas or electric prices. Running the cyclical process will not change dispatch of the thermal plants.</p> <p>Slide 21: PSE will work on creating a write-up of the AURORA portfolio model to include in the 2021 IRP.</p> <p>Slide 35: PSE's assumption that all gas used for electric generation is from BC does align with historical purchasing. The natural gas for power generation portfolio does not have pipeline capacity from the (US) Rockies.</p>
7/28/2020	Kyle Frankiewicz, WUTC Staff	<p>Recommendations:</p> <ol style="list-style-type: none"> SCC as dispatch cost: I appreciate the discussion around whether SCC should be included outside of dispatch or within dispatch. I agree with Mr. Adcock's question about whether excluding SCC as a 'carbon tax' means PSE is ignoring carbon costs imposed by CETA starting in 2030. Elizabeth stated that the company is modeling CA's carbon tax, and can constrain its fleet by emissions or energy. I also understood that the 80% renewables requirement starting in 2030 is implemented in the model as an RPS standard modeling constraint, rather than the administrative penalty for emitting resources. Please provide some additional explanation on how (or whether) PSE's modeling tools optimize around these constraints. I worry that the constraints may have unintended impacts, and may nudge the optimization in a direction that is, well, suboptimal. I am glad to hear that PSE will be doing some extra test runs to understand the impacts of each approach. WUTC and SCC: Staff recommends using the updated figures on the Commission's website; the table should be updated by the end of July (for its calculation, staff uses BEA GDP Table 1.1.4 Annual Price Indexes Line 1, last revised May 28, 2020). SCC and existing plants – modeling for optimized retirement date: Suggestion more than recommendation – I would encourage PSE to review how plant closures are modeled. I am not sure if I have it right, but I understood from Elizabeth's explanation that PSE's portfolio generation tools will optimize for the closure dates of existing thermal resources. The optimization will solve to the lowest-cost portfolio, and SCC is included in a \$/k-yr fixed cost that changes each year based on the forecasted capacity factor of a thermal plant. This means the optimizer will 'see' costs in each year, and can choose to avoid those costs by closing the plant. Upstream gas emissions – AR4 vs AR5: PSE stated that PSCAA's study and the company's reporting requirements both use 100-yr GWP factors and inputs/assumptions contained in the IPCC's Fourth Assessment Report (AR4), published in 2007, and that the company intends to use these assumptions and inputs for the IRP analysis of upstream emissions. The IPCC released AR5 in 2014, and other scientific studies on this topic have been published in the last few years. The company must support all modeling decisions, including the decision to use either AR4 or AR5 to estimate upstream emissions. Staff recommends a sensitivity comparing estimates calculated using AR4 with those calculated using AR5, so the company and stakeholders can better understand the impacts of this modeling decision. Renewable natural gas / hydrogen – selectable option in model: These resources are clearly not as commonplace as mature products like reciprocating engines or even batteries, but it's been demonstrated by other utilities (NextEra, NW Natural) that the technology is proven enough to be explored in both integrated planning and through pilots. NW Natural's last IRP (pg 6.30) should provide a good starting point. I see that the company heard feedback from stakeholders on this issue during its first IRP meeting. I look forward to continued discussion when we reach the portfolio modeling phase. 	<p>PSE responses by referenced numbers:</p> <ol style="list-style-type: none"> PSE will be running sensitivities around SCC and possible dispatch limits around plant emissions. Further discussion will occur at the August 11 stakeholder meeting. When the updated numbers are available, PSE will update to the new price index. Yes, the model runs simulations using perfect foresight. Knowing what costs will be in the future, the model looks at the economics of retiring a plant earlier and replacing it so that it does not incur more costs in the future versus maintaining the plant for a higher cost. PSE will include a sensitivity for AR5. Further discussion will occur at the August 11 stakeholder meeting. PSE is researching RNG and hydrogen as a fuel source. The complete list of scenarios and sensitivities will be available for the August 11 webinar and will be revised with stakeholder feedback. PSE will run several sensitivities and scenarios around the different ways to model the social cost of carbon. PSE filed comments with the Washington Utilities and Transportation Commission (WUTC) under UE-191203, https://www.utc.wa.gov/docs/Pages/DocketLookup.aspx?FilingID=191023. Comments on the social cost of carbon begin on page 17, question 9. A discussion of the SCC modeling will also be included in the IRP book.

Feedback Form Date	Stakeholder	Comment	PSE Response
		<p>6. Catalogue of scenarios and sensitivities: This might already be part of the company's plan, but if not, Staff recommends that the IRP contain a narrative description of scenarios and sensitivities the utility used, including those informed by the public participation process.</p> <p>7. Written rationale on SCC modeling decision: Not a recommendation, but a suggestion to invest the time necessary to fully explain, either in the consultation update or the IRP itself, why the company is using the SCC-as-adder approach. A useful write-up would include an analysis the pros and cons for the company's implementation of SCC as a fixed cost rather than as a dispatch cost, for example, and would clearly specify how, in the company's view, this implementation meets CETA's requirements for resource planning and conservation. This explanation would be augmented by a comparison of the company's main model outputs with the SCC-at-dispatch scenario, which should show the relative impact of this modeling decision. If the company plans on compiling the list of scenarios and sensitivities, I hope this explanation and comparison of the two model runs would be a manageable lift.</p>	