

PSE IRP Feedback Report
Webinar 2: Electric Price Forecast
June 10, 2020

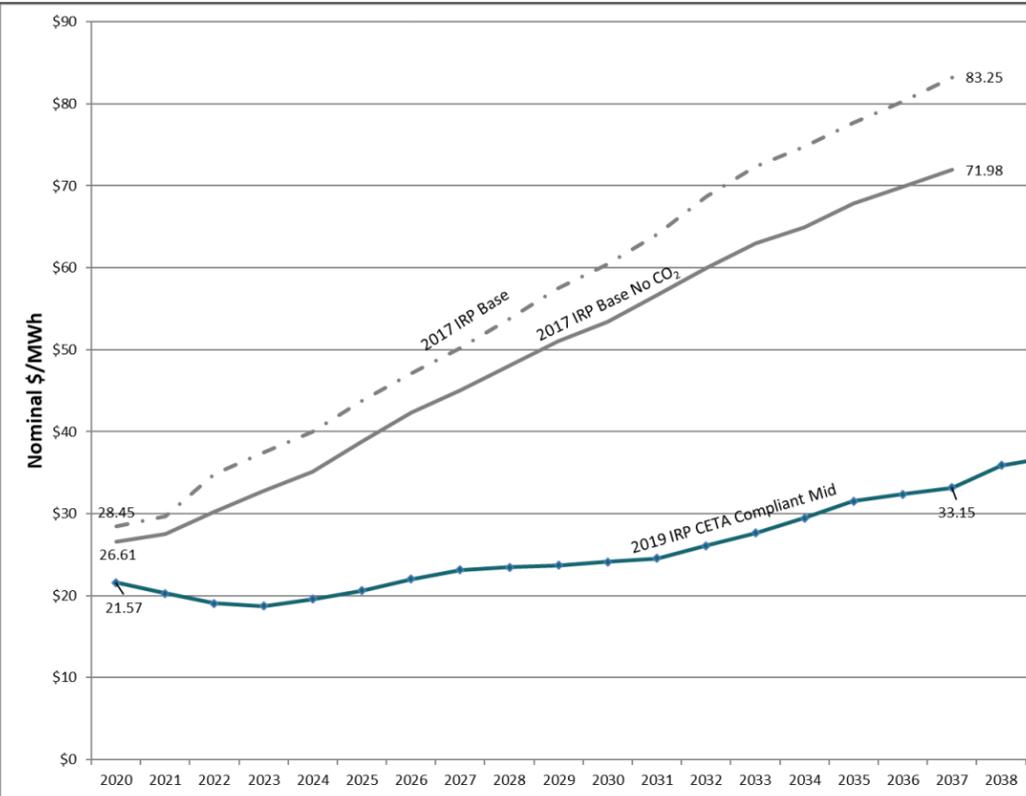
6/24/2020

The following stakeholder input was gathered through the online Feedback Form, from June 3 through June 17, 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 July 1, 2020.

2021 IRP Electric Price Forecast Workshop Feedback Report			
Feedback Form Date	Stakeholder	Comment	PSE Response
6/4/2020	James Adcock (1)	<p>June 10 IRP meeting Expressed Concern</p> <p>I am expressing a concern that the "explanation" of how PSE performs "modeling" is being presented at such a low "Kindergarten Level" as to prevent any meaningful understanding of what modeling, and how, that PSE is performing -- and this is a presentation to a "Technical" group -- and yet you are giving the explanation at only a "Kindergarten Level". By giving the presentation at a "Kindergarten Level" you are preventing meaningful participation in the PSE IRP. PSE used to give much more meaningful explanations of their modeling methods in years past -- while still being very imprecise.</p>	PSE acknowledges your concern.
6/4/2020	James Adcock (2)	<p>PSE should provide a detailed technical explanation of how exactly they are performing modeling, including an explanation of all historical data used in their modeling, and the range of historical dates, from earliest date to latest date, of each of those historical data records.</p>	Thank you for your suggestions. The 2021 IRP book will include more detail than the meeting presentations.
6/4/2020	James Adcock (3)	<p>June 10 IRP meeting Question</p> <p>Can you please enumerate in detail all of the various types of historical data used anywhere in any of your modeling efforts, including the earliest calendar year and latest calendar year from which each of those historical data types was used. For example, in IRP's years past PSE has explained that it uses: Temperature data from a large range of years, "Water" data (hydroelectric dam generation related data), "Wind" data -- data used to develop predictions of Wind Power performance in Washington State or other states, Load data -- actual historical patterns of electrical use by PSE customers, Gas prices, Econometric data -- historical measures of how weak or strong the regional economy has been.</p>	PSE will share historical data ranges for temperatures, hydro data and other data when it covers the IRP topic that references the data. The assumptions for the electric price forecast were shared in the webinar and a recording of the webinar is posted on the IRP website.
6/4/2020	James Adcock (4)	<p>June 10 IRP meeting Question Page 20 (and page 34)</p> <p>On this page you state "With stakeholder input..." as in:</p> <p>"With stakeholder input, the 2019 IRP electric price forecast assumed a renewable need of 22.9 million MWh in 2030, approximately 8,700 MW nameplate capacity of new renewable resources added in Washington state."</p> <p>What I remember of the "stakeholder input" in the [PSE canceled] 2019 IRP Process is that the "stakeholders" roundly disagreed with virtually everything PSE discussed or was proposing -- and in turn PSE simply canceled the 2019 IRP Process. In this context can you please explain what you mean by "With stakeholder input" -- given that I don't think PSE accepted, but rather rejected, any and all "stakeholder input" ??? Given that PSE canceled the 2019 IRP Process before it completed, I ask that PSE here and now retract the claim that these issues were developed with "stakeholder input."</p>	<p>PSE updated the presentation and referenced the 2019 IRP Progress Report or the 2019 IRP process instead of 2019 IRP, where appropriate.</p> <p>During the 2019 IRP process, stakeholders gave feedback on the level of new renewable resources assumed for Washington to meet the CETA requirement. PSE then took that feedback and adjusted the amount of new renewable resources assumed based on the feedback.</p>
6/4/2020	James Adcock (5)	<p>Retract the claim here and elsewhere that the "2019 IRP Process" was actually developed with "stakeholder input" -- given that PSE unilaterally decided without advanced warning and with no stakeholder input to cancel the "2019 IRP Process" before it was complete and vetted by stakeholders. Further, do not refer to the "2019 IRP" because the "2019 IRP" does not exist -- because the "2019 IRP" was unilaterally canceled by PSE before the "2019 IRP" was completed.</p>	<p>PSE updated the presentation and referenced the 2019 IRP Progress Report or the 2019 IRP process instead of 2019 IRP, where appropriate. We will make best efforts to ensure that appropriate references are used going forward.</p> <p>On October 28, 2019, the Washington Utilities and Transportation Commission Staff filed a Petition for Exemption from WAC 480-100-238 pursuant to WAC 480-07-100 until December 31, 2020. On November 7, 2019 the WUTC held an Open Meeting concerning</p>

			<p>this matter and subsequently issued Order 2, exempting PSE (and other investor owned utilities in Washington) from WAC 480-100-238.</p> <p>Pursuant to Order 2, PSE filed an IRP Progress Report on November 15, 2019. On December 10, PSE filed a Revised Progress Report, available at pse/irp.com 2019 Progress Report</p>
6/4/2020	James Adcock (6)	<p>June 10 IRP meeting Question Page 24</p> <p>On this page you state for the "2021 IRP electric price update" that the "Regional Demand from the 7th Power Plan" didn't change. Why didn't it change? Why would you not assume a downturn in demand due to the downturn in the economy due to COVID-19? Shouldn't your regional demand assumptions be updated to recognize the reality of the huge change in the regional economy, and thereby demand, caused by COVID-19? Economists are projecting that it will take a decade for the US Economy to recover from COVID-19.</p>	<p>PSE uses the regional demand forecast from the Northwest Power and Conservation Council. At the time of the presentation, PSE was not able to obtain to the regional demand from the Council. PSE has made an additional request for the 7th power plan mid-term update. There will be an update in the consultation update on whether we were able to get the updated regional demand forecast and if it can be used for the 2021 IRP.</p>
6/4/2020	James Adcock (7)	<p>PSE should reduce the expected regional demand (relative to the 7th power plan) to fully and fairly reflect based on projections from regional and national economists of the downturn in the economy based on COVID-19, and the projected decade-long recovery it will take the economy to recover from COVID-19.</p>	<p>As noted above, PSE has contacted the Council for the 7th power plan mid-term update.</p>
6/4/2020	James Adcock (8)	<p>June 10 IRP meeting Question Page 28</p> <p>You are pulling this chart "like a rabbit out of a hat" -- with no technical explanation whatsoever of how you have developed this plot, and what assumptions go into this plot. Can you please list all of the assumptions, and all of the data used, including historical range of dates from which that data was collected, in generating this plot?</p>	<p>The plot on slide 28 provides an overview of the hourly power prices over the entire time horizon (2022 through 2041) for the 2021 IRP. Each hour of the year is represented as a single green point on the plot. These data are the output of the Aurora Power Price model, which was run using the assumptions discussed throughout the presentation.</p> <p>Also provided on the plot are box and whisker charts which provide some high-level statistics about the power prices for each year (mean, median, 10th, 25th, 75th and 90th percentiles).</p> <p>The intended message of the plot is to show an increase in variability of power prices in the late years of the time horizon as more and more renewable resources are added to the WECC.</p>
6/4/2020	James Adcock (9)	<p>June 10 IRP meeting Question Page 37</p> <p>Given that the 2019 IRP was canceled before it was completed, can you please delete the "2019 IRP Base" claim -- There is no "2019 IRP" because it was never completed -- because PSE chose unilaterally without consulting with stakeholders to terminate the "2019 IRP" effort before it was completed and before stakeholders had a chance to vet it, or comment on it. Since there is not "2019 IRP" there can be no "2019 IRP Base"</p>	<p>Thank you for your input. Going forward, PSE will make best efforts not to reference the "2019 IRP" but rather the "2019 IRP process" or the "2019 IRP Progress Report" including labels on slides.</p>
6/4/2020	James Adcock (10)	<p>Delete the "2019 IRP Base" claim -- There is no "2019 IRP" because it was never completed -- because PSE chose unilaterally without consulting with stakeholders to terminate the "2019 IRP" effort before it was completed and before stakeholders had a chance to vet it, or comment on it. Since there is not "2019 IRP" there can be no "2019 IRP Base."</p>	<p>As stated above, PSE will make best efforts not to reference the "2019 IRP" but rather the "2019 IRP process" or the "2019 IRP Progress Report".</p>
6/4/2020	James Adcock (11)	<p>June 10 IRP meeting Question Page 42</p> <p>Given that CETA is now "the law of the land" why is it appropriate to develop a scenario where you assume that you do not have to meet the CETA requirements? Shouldn't the range of scenarios you consider be drawn from the "legal" list of possibilities, and not contemplate running PSE in an "illegal" manner?</p>	<p>PSE is reviewing all the suggestions and contacting some stakeholders for further discussion. PSE will have the final list of scenarios for the July 1 consultation update.</p>
6/4/2020	James Adcock (12)	<p>Draw all your "scenarios" from "legal" sets of possibilities which do not contemplate running PSE in an "illegal" manner.</p>	<p>Thank you for your feedback. PSE is developing the 2021 IRP in compliance with all legal and regulatory requirements.</p>
6/4/2020	James Adcock (13)	<p>June 10 IRP meeting Question Page 19</p> <p>On Page 19 you reference the "2019 IRP" but there is no "2019 IRP" because PSE chose to abruptly without warning terminate the "2019 IRP" before it was completed.</p>	<p>Please see our response to your comments 5 & 10.</p>

6/4/2020	James Adcock (14)	Do not reference the "2019 IRP" because there is no "2019 IRP" -- because PSE chose unilaterally with consulting stakeholders to terminate the 2019 IRP Process before it was completed.	Please see our response to your comments 5,10 & 13.
6/10/2020	Vlad Gutman-Britten, Climate Solutions	<p>Slide 17: Why are no thermal plants built in WA? Is this CETA or some other constraint? It again reads like SCC is only applied to plants in Washington and not outside of it, which isn't in keeping with the requirements of CETA or the previous UTC acknowledgement letter.</p> <p>Slide 19: There are other extant policies/commitments that should be included—Xcel has committed to 100% clean by 2050, Idaho Power and Avista have both made the same commitment. A number of CO laws also matter here: Colorado utilities must consider SCC in planning and the PUC must make progress toward 90% carbon reduction by 2050. These will impact resource choices and price forecasts.</p> <p>Slide 20: For the utilities below 80%, these are likely to somewhat overcomply with the 2030 requirement in order to address variability in hydro. It could be worth modeling actual compliance strategies as this will yield a different mix of renewables and thus impact price forecasts.</p> <p>Slide 21: Assumption shouldn't be no new renewable energy investments until 2028. Considering only state-wide RE need doesn't reflect how utilities, especially investor-owned utilities, will comply.</p> <p>Slide 22: Would like to see the 2017 with high CO2 comparison since the 2019 does have CO2 included.</p> <p>Slide 29: why did price increase on this slide when on slide 27 it appears to have declined slightly?</p> <p>Slide 34: A little confused on the difference between the two scenarios with CA/WA; shouldn't frame CA 2045 law as a "goal"; CA 2030 requirement is RPS only, not carbon-free.</p> <p>Slide 42: Scenario #3 should have a higher CO2 price, going beyond what is required by law for the "high scenario." Scenario #4 appears to be a baseline comparison, and should include CETA but not the clean energy standards.</p>	<p>Slide 17: Given that PSE is modeling the entire region as a whole, the model assumes that there is plenty of resources in the region given normal hydro conditions and mid load. This is different than the PSE portfolio model, where PSE is accounting for transmission constraints into the PSE service territory. So even though there might be enough resources in the region, it may not be delivered to load due to transmission constraints. To reflect the social cost of carbon planning adder in PSE's portfolio model, market purchases will include a wheeling cost equivalent to the SCC adder during the capacity expansion run.</p> <p>Slide 19: PSE has elected not to include corporate or non-binding policies into the Power Price model due to lack of accountability of these policies and difficulty in modeling numerous policies at the balancing authority resolution.</p> <p>Slide 20: Thank you for the suggestion, however, PSE is unable to incorporate actual clean energy adoption strategies into the modeling process due to lack of insight into the resource acquisition strategies of each Washington utility. Therefore, PSE has elected to model either the 80% clean energy implementation required by CETA or a generic more aggressive (~90%) clean energy implementation for the 2021 IRP.</p> <p>Slide 21: Thank you for the suggestion, PSE is updating the assumption and will have the updated targets for the July 1 consultation update.</p> <p>Slide 22: Below is the updated chart which includes the 2017 IRP Base power price:</p>



Slide 29: Slide 27 shows the annual, nominal power price for the 2019 IRP process and draft 2021 IRP power price. Slide 29 shows the levelized power price over the timeframe for each IRP process, which incorporates the time value of money (net present value). Each slide is an NPV over different time periods which is why they are slightly different.

Slide 34: CA SB 100, Chapter 312
 SEC. 5.

Section 454.53 is added to the Public Utilities Code, to read:
 454.53.

(a) It is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045. The achievement of this policy for California shall not increase carbon emissions elsewhere in the western grid and shall not allow resource shuffling. The commission and Energy Commission, in consultation with the State Air Resources Board, shall take steps to ensure that a transition to a zero-carbon electric system for the State of California does not cause or contribute to greenhouse gas emissions increases elsewhere in the western grid, and is undertaken in a manner consistent with clause 3 of Section 8 of Article I of the United States Constitution. The commission, the Energy Commission, the State Air Resources Board, and all other state agencies shall incorporate this policy into all relevant planning.

			<p>California law states that zero-carbon resources will supply 100% of sales by 2045, so it does not have to be met by all renewable resources, other carbon-free resources can be used.</p> <p>Slide 42: Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.</p>
6/10/2020	James Adcock (15)	<p>In these times, and with the extremely limited amount of time PSE is setting aside from their Presentations to allow actual Stakeholder Participation, telling stakeholders, who are adult professionals, how they ought to live their lives in order to reduce stress and health effects, seems particularly inappropriate. In the same spirit, let me offer PSE a few "safety suggestions" on things PSE could do to "reduce stress" (below)</p> <ol style="list-style-type: none"> 1) PSE should make sure that trench retention devices are always actually in place before an employee or contractor climbs into a trench so that person will not get killed. 2) 3) PSE should make sure that employees or subcontractors in the field are actually wearing masks, and/or maintaining 6 feet of distance from each other -- because they are not doing so. It is stressful for us to see that PSE is in practice spreading COVID-19. 4) PSE can actually substantially reduce their CO2e emissions now, in order to reduce our stress that we will not actually have a planet for our children and grandchildren to live safely and healthily upon. 	<p>It is a PSE corporate policy to include a Safety Moment in meetings with more than 5 people.</p> <p>PSE regrets that you found our Safety Moment inappropriate, it was provided with the best intentions.</p>
6/10/2020	James Adcock (16)	<p>One thing that greatly saddens me with the current choice of format -- where stakeholders have to type their input into a chat box -- is that it makes it virtually impossible to "hear" the input from other stakeholders -- in that I am trying to listen to the PSE presenter, read the PSE slide, while at the same time read stakeholder feedback in the chat box -- and while trying to type my own feedback or questions into the chat box. And doing all of these half dozen things at the same time is literally impossible. Which means in practice that I do not get to "hear" the input from the other stakeholders as the PSE presentation is being made. Again, the WAC IRP requirements are for Stakeholder Participation NOT "PSE Presents while Stakeholders Listen."</p> <p>Change the meeting format back to something more similar to previous years' IRPs where stakeholders are directly allowed to ask questions and clarification using their voices, so that other stakeholders can literally hear what they are saying -- not just hear what PSE is saying! Again, the "raised hand" followed by microphone-speech format used in PSE in previous years, and has been used recently online by both Commerce and UTC, works perfectly fine.</p>	<p>PSE agrees that having these meeting remote is challenging and acknowledge your frustrations. We are experimenting with different platforms to identify the best tool for these meetings. The May 28 meeting was conducted on GoToWebinar. The June 10 meeting was conducted on GoToMeeting. On June 17, a survey was sent to stakeholders to gather feedback on the meeting experience to date. The June 20 meeting will be conducted on Zoom. Our preference is to select the best tool for all the meetings and be consistent through the remainder of the process.</p>
6/11/2020	James Adcock (17)	<p>Draft WAC 480-100-650(2) requires that utilities adaptively manage their planning and investment activities:</p> <p>"Each utility must continuously review and update as appropriate its planning and investment activities to adapt to changing market conditions and developing technologies"</p> <p>At the June 10 2020 IRP Meeting PSE stated that they do not do so. For example, PSE uses unmodified the 7th Power Plan regional load estimates, even though those load estimates were developed starting in 2010, published in 2016, and do not include the effects of the COVID-19 Economic Crash of 2020. It is well-known from past economic crashes -- and basic econometric studies -- that economic crashes reduce electricity demand, and that electricity demand does not recover until the economy recovers. National economists estimate that it will take a decade for the economy to fully recover from the COVID-19 crash, meaning that predicted electrical load growth path will not fully recover for a decade.</p> <p>PSE must actually update their future load forecasts, including modifying their use of the 7th Power Plan estimates, to fully and fairly reflect the on-going reductions in load (relative to the no-COVID-19 crash condition) that can reasonably be expected from the COVID-19 economic crash.</p> <p>Further, PSE must update their planning to include developed and developing technologies in the Wind Power field over the last 20 years. My understanding is that PSE is still doing Wind modeling based on the assumption of a Vestas V90 Wind Turbine design. This design is now 20 years old. The Wind Industry has progressed in the last 20 years, providing higher hub heights for greater wind availability, longer blade lengths to extract more power, customized blade shapes to optimize availability to lower wind speeds as found in Washington State, and optimized higher generator power in high wind speeds, such as found in Montana.</p>	<p>As noted above, PSE has contacted the Council for the 7th power plan mid-term update demand forecast.</p> <p>As noted in the feedback report from the generic resource costs webinar, PSE is using the power curve for a GE3.03-140 as a model turbine</p>

6/17/2020	Willard Westre, Union of Concerned Scientists	<p>Question 1) Since the renewable percentage will be determined for all power delivered by PSE, how does PSE intend to control the renewable content of the portion coming from the Mid-C market?</p> <p>Question 2) What is the recent renewable percentage data of previous PSE Mid-C purchased power?</p> <p>Question 3) How is that determined?</p>	<ol style="list-style-type: none"> The assumptions on how PSE will treat unspecified system purchases to meet PSE load will be addressed in the July 21 webinar on social cost of carbon. PSE's recent renewable percentage data of unspecified market purchases based on the 2018 Washington State Electric Utility Fuel Mix Disclosure Reports is 61% renewable. Link to the 2018 Washington State Electric Utility Fuel Mix Disclosure Reports: https://www.commerce.wa.gov/wp-content/uploads/2020/04/Energy-Fuel-Mix-Disclosure-2018.pdf PSE used the Northwest Power Pool Fuel Mix percentage provided by the Department of Commerce in mid-September of 2019 to determine the allocation for unspecified market purchases. The fuel mix percentage by category is multiplied by the total unspecified purchases of 4,352,868 MWhs reported for 2018. The percent allocated MWhs for all renewables were added together and calculated as a percent of total to determine the 61% value. <p style="text-align: right;">PSE's unspecified purchases for 2018* 4,352,868</p> <table border="1" data-bbox="2004 735 2874 1421"> <thead> <tr> <th>Report Year</th> <th>Fuel Category</th> <th>Northwest Power Pool (NWPP) Fuel Category Percentage**</th> <th>Renewable MWhs</th> </tr> </thead> <tbody> <tr><td>2018</td><td>Biogas</td><td>0.23%</td><td>10,012</td></tr> <tr><td>2018</td><td>Biomass</td><td>0.74%</td><td>32,211</td></tr> <tr><td>2018</td><td>Coal</td><td>23.18%</td><td></td></tr> <tr><td>2018</td><td>Geothermal</td><td>1.01%</td><td>43,964</td></tr> <tr><td>2018</td><td>Hydro</td><td>46.30%</td><td>2,015,378</td></tr> <tr><td>2018</td><td>Natural Gas</td><td>15.43%</td><td></td></tr> <tr><td>2018</td><td>Nuclear</td><td>3.25%</td><td>141,468</td></tr> <tr><td>2018</td><td>Other Biogenic</td><td>0.05%</td><td>2,176</td></tr> <tr><td>2018</td><td>Other Non-Biogenic</td><td>0.40%</td><td>17,411</td></tr> <tr><td>2018</td><td>Petroleum</td><td>0.18%</td><td></td></tr> <tr><td>2018</td><td>Solar</td><td>1.14%</td><td>49,623</td></tr> <tr><td>2018</td><td>Waste</td><td>0.03%</td><td>1,306</td></tr> <tr><td>2018</td><td>Wind</td><td>8.06%</td><td>350,841</td></tr> <tr> <td></td> <td>Total</td> <td>100.0%</td> <td>2,664,391</td> </tr> <tr> <td></td> <td></td> <td>% of Total</td> <td>61%</td> </tr> </tbody> </table> <p>Notes: *PSE's unspecified market purchases reported in the 2018 WA Fuel Mix Report is 4,352,868 MWhs Link to the 2018 Washington State Electric Utility Fuel Mix Disclosure Reports: https://www.commerce.wa.gov/wp-content/uploads/2020/04/Energy-Fuel-Mix-Disclosure-2018.pdf The 2019 Fuel Mix Report won't be available until Q4 of 2020. **Northwest Power Pool Fuel Mix as provided by the Department of Commerce in mid-September 2019</p>	Report Year	Fuel Category	Northwest Power Pool (NWPP) Fuel Category Percentage**	Renewable MWhs	2018	Biogas	0.23%	10,012	2018	Biomass	0.74%	32,211	2018	Coal	23.18%		2018	Geothermal	1.01%	43,964	2018	Hydro	46.30%	2,015,378	2018	Natural Gas	15.43%		2018	Nuclear	3.25%	141,468	2018	Other Biogenic	0.05%	2,176	2018	Other Non-Biogenic	0.40%	17,411	2018	Petroleum	0.18%		2018	Solar	1.14%	49,623	2018	Waste	0.03%	1,306	2018	Wind	8.06%	350,841		Total	100.0%	2,664,391			% of Total	61%
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6/17/2020	Willard Westre, Union of	Slide 21 showing renewable energy needed in WA is interesting but does not define the amount of renewable energy needed by PSE. Although the Process Timeline shows "Establish Resource Need" by September, apparently, neither of the remaining topics on the	Updated meeting schedule is currently under development and will be made available by the June 30 webinar.																																																																

	Concerned Scientists	schedule does that. There is no session for Demand Forecast. When will the discussion on the real new renewable resources need be addressed?	
6/17/2020	Bill Pascoe, Absaroka Energy and Orion Renewables	I am requesting an electric price forecast scenario with a WECC-wide carbon tax equal to the social cost of carbon.	Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.
6/17/2020	Katie Ware, Renewable Northwest	Slide 34 — RNW suggests PSE should consider how Scenario 1 and Scenario 2 would affect CETA's incremental cost of compliance calculation, and based on the results, consider which scenario would have a better chance of achieving the GHG neutral standard across WA utilities. Slide 43 — Stakeholder feedback scenarios: MID/MID and HIGH/HIGH scenarios studied with the SCC applied as an adder WECC-wide during dispatch.	Slide 34: Thank you for your feedback, PSE will be using Scenario 1 for the clean energy implementation. Slide 43: Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.
6/17/2020	Kathi Scanlan, WUTC	<ol style="list-style-type: none"> 1) This feedback, dated June 17, 2020, states the informal comments, questions, and recommendations of Washington Utilities and Transportation Commission Staff. Timely feedback is offered as technical assistance and is not intended as legal advice. Staff reserves the right to amend these opinions should circumstances change or additional information be brought to our attention. Staff opinions are not binding on the commission. 2) Slide 17 – Social cost of greenhouse gas methodology as a planning adder in the electric price forecast: <ol style="list-style-type: none"> a. PSE explains this cost is added for any thermal builds in Washington (tons CO₂*SCC(\$/ton) = emission cost (\$), where the emission cost is then applied back to the fixed cost of thermal plants in Washington. Please further clarify, is this energy delivered to Washington? Are these thermal units that are built in, and physically located in, Washington? b. Please explain why this methodology is appropriate for the electric price forecast in the context of the Clean Energy Transformation Act (CETA) requirements. 3) Slides 37-38, 42 – Scenario Development and CETA. The two scenarios where the Washington renewable requirement is modeled at 80 vs. 90% creates a difference in Mid-C price during the mid-term but eventually converges, since both scenarios go to 100%. PSE seeks feedback on the higher and lower scenario: <ol style="list-style-type: none"> a. Staff generally agrees a 90% estimate could be a more reasonable (and conservative) assumption given hydro-heavy utilities in the state. b. No CETA Scenario - Staff requests more information on the assumptions that create the future conditions regarding “No CETA”. Does PSE anticipate using this scenario as the baseline for calculating the incremental cost of compliance, per RCW 19.405.060(3)? If yes, we recommend refining the name of the scenario. Although No CETA is easy shorthand, it is not accurate for describing the incremental cost baseline, as the baseline should include the other elements of CETA other than RCW 19.405.040 and 050. Further clarification on this scenario would be helpful. 4) Slide 24 – What did not change since the 2019 Progress Report? And what changed? <ol style="list-style-type: none"> a. PSE states it intends to use, “regional demand from the 7th Power Plan”. Why? b. Is PSE planning to update its regional demand inputs? The Seventh Power Plan Midterm Assessment has updated regional data, which is available, and can provide more recent inputs: https://www.nwcouncil.org/sites/default/files/7th%20Plan%20Midterm%20Assessment%20Final%20Cncl%20Doc%20%232019-3.pdf 5) Slide 25 – Gas Price Forecast: <ol style="list-style-type: none"> a. What is the date of the Fall 2019 Wood Mackenzie report that PSE is relying on for the 2021 IRP, and is this PSE’s most up-to-date Wood Mackenzie gas price forecast report? b. Given the significant unforeseen changes to the economy since March 2020, is it possible to go back to Wood MacKenzie and request a more recent update? 6) Slides 37 & 42 - California and BC Assumptions: 	<ol style="list-style-type: none"> 1. Thank you and noted. 2. Social cost of carbon as a planning adder <ol style="list-style-type: none"> a. The social cost of carbon is an adder to thermal plants physically located in Washington. Since Washington state is a part of the Mid-C market along with Oregon, Idaho and western Montana, PSE cannot separate out Washington state from the rest of the Mid-C and therefore unable to determine where the energy is being delivered to. The assumptions on how PSE will treat unspecified system purchases to meet PSE load will be addressed in the July 21 webinar on social cost of carbon. b. Instructions on how to incorporate the SCC are provided by the Clean Energy Transformation Act (CETA). The references to the SCC in CETA are provided below: <p><i>“(3) (a) An electric utility shall consider the social cost of greenhouse gas emissions, as determined by the commission for investor-owned utilities pursuant to section of this act and the department for consumer-owned utilities, when developing integrated resource plans and clean energy action plans. An electric utility must incorporate the social cost of greenhouse gas emissions as a cost adder when:</i></p> <ul style="list-style-type: none"> <i>(i) Evaluating and selecting conservation policies, programs, and targets;</i> <i>(ii) Developing integrated resource plans and clean energy action plans; and \</i> <i>(iii) Evaluating and selecting intermediate term and long-term resource options. p. 33 E2SSB 5116.S</i>

- a. Staff requests more clarification on how PSE is modeling California renewables; it is not clear regarding the ramp between 60% and 100%. Will it be at ~80 percent in 2030?
 - b. What CO2 price is applied for CA AB32 and BC?
- 7) Other questions regarding PSE's social cost of greenhouse gas emissions modeling:
- a. PSE explains the methodology will be discussed at a later July 21 webinar. Does PSE plan to model SCC applied to thermal power imports into WA?
 - b. It is staff's understanding in Aurora a "wheeling adder" can be added for imports into California, which is then used to capture the cost of carbon imports. Is this approach also appropriate for Washington to model the social cost adder of greenhouse gas emissions for imports?

(b) For the purposes of this subsection (3):

(i) Gas consisting largely of methane and other hydrocarbons derived from the decomposition of organic material in landfills, wastewater treatment facilities, and anaerobic digesters must be considered a non-emitting resource; and

(ii) Qualified biomass energy must be considered a non-emitting resource."

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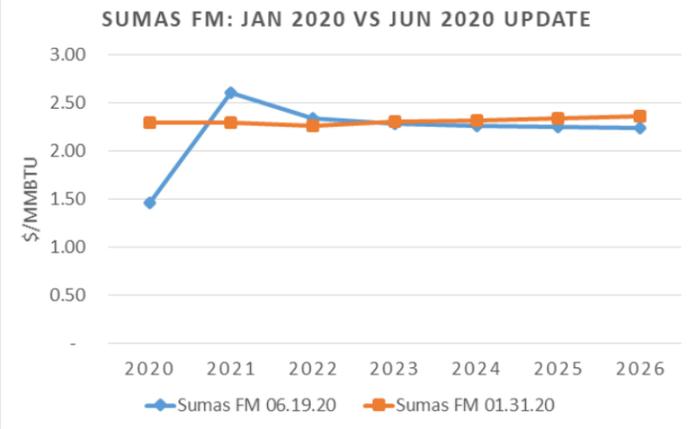
The legislation explicitly instructs utilities to use the SCC as a cost adder when evaluating conservation efforts, developing IRPs and CEAPs, and evaluating resources options. PSE understands this "cost adder" to mean that the SCC is included in planning decisions, but not in the actual cost and dispatch of any resource that it is applied to.

3.a. Thank you for your feedback, PSE will be using Scenario 1 for the clean energy implementation.

b. Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.

4. PSE has contacted the Northwest Power and Conservation Council to request for the 7th power plan mid-term update. There will be an update in the consultation update on whether we were able to get the demand forecast and if it is usable for the 2021 IRP.

5. The Wood Mackenzie gas price forecast is from fall 2019. This is the most recent forecast for Wood Mackenzie, the update forecast will not be ready for several weeks. However, PSE can update the foreword marks through 2026. The updated foreword marks (blue line) is the 3-month average ending June 30, 2020. As seen in the chart, the 2020 costs are much lower than the January 31 estimate and then the 2021 costs are higher during the current economic recovery. However the prices return back to January estimate by 2022 and continue to match closely through 2026. Since the time horizon for the 2021 IRP starts in 2022, this update will not have much of an impact.



- 6.
- a. The California SB100 requires 60% renewable resources by 2030, so PSE is modeling 60% by 2030 and then ramping into 100% by 2045.
 - b. Below is the assumed CO2 price in Aurora for the state of California:

Year	Aurora Default carbon emission price for California's carbon cap-and-trade program (2012\$)
2022	15.13
2023	15.89
2024	16.69
2025	17.52
2026	18.40
2027	19.32
2028	20.28
2029	21.30
2030	22.36
2031	22.36
2032	22.36
2033	22.36
2034	22.36
2035	22.36
2036	22.36
2037	22.36
2038	22.36
2039	22.36
2040	23.16
2041	24.06
2042	24.96
2043	25.86

2044	26.76
2045	27.66

Currently, there is no assumed CO2 price for BC. PSE will make this correction to the Aurora model.

7.

- a. PSE will discuss how the social cost of carbon is applied to PSE's portfolio model in the July 21 webinar and will be happy to answer additional questions then.
- b. This relates back to 2a. If Washington was a separate zone, PSE could apply a wheeling cost to market purchases heading into Washington. However, Washington has been combined with Oregon, Idaho, and Western Montana to create the Mid-C zone, making it difficult to separate Washington.

6/17/2020

Joni Bosh,
NWECC

Questions on Feedback session #2 Resource Costs

Slide 11 –

- Under IRP: Does the electric price forecast for economic dispatch of power plants used in modeling “to support resource acquisitions” include the Social Cost of Greenhouse gases? What is the value used for SCGHG?
- Under Avoided Cost: Please illustrate/explain how the price forecast is used to develop avoided costs for EES and PURPA.
- Resource acquisitions: Clarify what steps PSE takes and which model(s) it uses in the resource acquisition analysis.

Slide 17 –

- Emissions costs are operating costs, not fixed costs. Please explain why the SCGHG emission costs in step three of the Aurora modeling is added back to the fixed costs of thermal plants?

Slide 20 –

- Explain how elements relating to statewide renewable need on slide 20 and the outcomes on slide 21 are incorporated in the price forecast.

Slide 22 –

- Please express the results in this chart in real dollar terms as well. NWECC urges PSE to include real dollar results along with the nominal dollar results at least for summary tables and charts throughout the IRP. This will help improve comparability across different analyses and time horizons.

Slide 24 –

- By using 80 years of observational weather data as is incorporated in the Regional Demand from the 7th Power Plan (the data which is now at least five years old), future climate impacts on load are not adequately represented. PSE should review the Council's climate adjusted demand forecast when it becomes available to compare the impact on energy price forecasts.

Slides 25 and 26 –

- PSE should add a sensitivity using a high gas price that is 25% more than the baseline price, to reflect the risk from the reality of reduced gas production in North America.

Slide 29

- Please also show this chart in discounted present value levelized dollars.

Slide 34 –

Slide 11:

- a. Yes, the electric prices include SCGHG as a planning adder. PSE is using the SCGHG value identified in SB5116 and updated to include inflation as released by the Washington UTC.
- b. The price forecast is the avoided cost of energy used in the avoided costs for EES and PURPA. A complete write-up of the methodology can be found in dockets UE-190665 and UE-191062
- c. The resources acquisition process uses all the same models as the IRP. The IRP sets the power prices using the AURORA power price model and then sets the peak capacity need using the Resource Adequacy model and also does the flexibility analysis using the Plexos model. Both the RA model and Plexos model are updated with the resources bid through the acquisitions and then tested in the portfolio model.

Slide 17: See reply to Kathi Scanlan, WUTC, question number 2. The law states that the SCGHG is a “cost adder” not a dispatch cost and therefore it follows the methodology described.

Slide 20: Renewable need is forced into Capacity Expansion as a must-build resource, so the model builds enough renewable resource to meet renewable constraints, see slide 33.

Slide 22: As part of the Webinar #2: Power Price Forecast Consultation Update (to be released on 07/01/2020), PSE will provide a spreadsheet (Excel workbook) with the final 2021 IRP power price scenarios. PSE will include a conversion tool from nominal to real dollars as part of this spreadsheet.

Slide 24: The Council's updated demand forecast is not ready for release yet and PSE has reached out to the Council regarding the mid-term update.

Slide 25 and 26: Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.

Slide 29: As part of the Webinar #2: Power Price Forecast Consultation Update (to be released on 07/01/2020), PSE will provide a spreadsheet (Excel workbook) with the final 2021 IRP power price scenarios. PSE will include a conversion tool from nominal to real dollars as part of this spreadsheet.

		<ul style="list-style-type: none"> Please explain these two scenarios and the assumptions behind implementation scenarios 1 and 2. We are not able to advise on the question posed on slide 38 without a better understanding of the two scenarios. <p>Slide 38 –</p> <ul style="list-style-type: none"> We would appreciate PSE explaining the pros and cons of the options posed on this slide. The context of this question is unclear. <p>Slide 42 and 43 –</p> <ul style="list-style-type: none"> What is the purpose of including a No CETA scenario? We would like to see a low demand/high gas price scenario. 	<p>Slide 34: PSE has contacted Joni for further discussion. Since Joni is unavailable until early July, PSE will meet with Fred Huette from NWECC in her place.</p> <p>Slide 38: PSE will meet with Fred Huette to clarify the slide and help with any confusion related to the stakeholder feedback.</p> <p>Slide 42 and 43: Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.</p>
6/17/2020	Vlad Gutman-Britten, Climate Solutions	<ul style="list-style-type: none"> Social Cost of Greenhouse Gas Application (Slide 17) <ul style="list-style-type: none"> Why does this apply to the electric price forecast, rather than just in the portfolio model? If the SCGHG is applied during portfolio modeling at the end, it would appear to double count the SCGHG by also including it upfront in the electric price forecast. Because SCGHG is an adder, it will not actually impact market prices. We believe that IRP modeling should reflect reality to the extent possible, and so SCGHG should be accounted for post-economic dispatch in order to evaluate competing resource portfolios as they would function in the real world. However, if PSE does continue to apply the SCGHG in developing the electric price forecast, it is still unclear why the SCGHG is only applied to Washington resources. While we understand that this is a cost adder, the cost adder in CETA does not only apply to facilities physically located in Washington, but rather to any energy delivered to Washington customers, regardless of the point of generation. Given that PSE can model the specific cost adders of California and British Columbia, why is it not possible to apply the SCGHG adder to all electricity being delivered to Washington customers? PSE noted in the slide that there are no new thermal builds in Washington. It was unclear during the presentation whether this was a modeling constraint based on the assumption that CETA would prevent new thermal builds in Washington, or due to another underlying assumption. If it is a result of the former, this appears out of step with previous PSE model runs and projections. Renewable Resource need in WA (Slide 21) <ul style="list-style-type: none"> While CETA does not have any firm requirements until 2030, the law does require that utilities demonstrate continuous progress towards achieving the GHG neutral and 100% requirements of CETA. This slide pertains to all resource needs in Washington for compliance with the act--if utilities make progress towards the law between 2022-2030, we anticipate the glide path beginning in earlier years and potentially having an impact on the electric price forecast. Stakeholder feedback (Slide 38): <ul style="list-style-type: none"> Assumptions on WA/CA compliance: We appreciate the two end cases, reflecting various compliance scenarios for Washington and California. While both provide useful information, we can anticipate compliance will fall in between the two end cases for Washington. Washington utilities already serving load with more than 80% nonemitting and renewable resources will still be required to demonstrate progress towards achieving the GHG neutral standard, but may fall short of achieving 100% clean energy by 2030. Some utilities in Washington currently serving load with less than 80% clean energy may choose to somewhat overcomply to mitigate for hydro variability. In California, while utilities have some flexibility in how to meet the requirements of the law, we do not expect new large investments in nonemitting resources (nuclear), and the state's one remaining nuclear plant is scheduled to retire in the mid-2020s. It would be a reasonable assumption that California will continue receiving nuclear energy from other nuclear facilities, principally Palo Verde Nuclear Generating Station which represents about 3% of current load, but serve all new resource needs with 100% renewable energy, including renewable natural gas, synthetic gas, and hydropower. Consistency: We recommend consistent application of the clean energy regulation in order to compare the results. However, we do recommend running sensitivities on the end-cases in order to see how results may change. Drat scenarios (Slide 42) 	<p>Slide 17:</p> <ol style="list-style-type: none"> Thank you for your feedback. PSE agrees that the SCGHG should be accounted for post-economic dispatch and the method that PSE created does this. The social cost of carbon is an adder to thermal plants physically located in Washington. Since Washington state is a part of the Mid-C market along with Oregon, Idaho and western Montana, PSE cannot separate out Washington state from the rest of the Mid-C at this point and therefore unable to determine where the energy is being delivered to. The assumptions on how PSE will treat unspecified system purchases to meet PSE load will be addressed in the July 21 webinar on social cost of carbon. This relates back to part b of this question. Given that PSE is modeling the entire region as a whole, the model believes that there is plenty of resources in the region given normal hydro conditions and mid load. This is different than the PSE portfolio model, where PSE is accounting for transmission constraints into the PSE service territory. So even though there might be enough resources in the region, it may not be delivered to load due to transmission constraints. To reflect the social cost of carbon planning adder in PSE's portfolio model, market purchases will include a wheeling costs equivalent to the SCC adder during the capacity expansion run. <p>Slide 21: Thank you for the suggestion, PSE is updating the assumption and will have the updated targets for the July 1 consultation update.</p> <p>Slide 38: Thank you for your feedback, PSE will be using Scenario 1 (90%) for the clean energy implementation.</p> <p>Slide 42 and 43: Thank you for your feedback on the scenarios. PSE is reviewing through all the suggestions and getting in contact with some stakeholders for further discussion. PSE will have the final list of scenarios for the consultation update.</p> <p>At this point, PSE is only modeling clean energy and RPS laws and the current law is Oregon is to reach 50% by 2030.</p>

		<ul style="list-style-type: none">- The "High" scenario includes high demand and a high gas price, but does not include a higher SCGHG. While CETA requires SCGHG as a minimum cost adder, that cost may still be an underestimate and PSE should reflect the risk of a higher emissions cost in the high scenario.- The "No CETA" scenario would provide useful information for the alternative lowest reasonable cost scenario for comparison with the compliance scenario. However, the incremental cost cap is based only on compliance with the GHG neutral and 100% Clean Energy Standards. The "No CETA" scenario should be renamed "Non compliance scenario" and should incorporate other components of CETA beyond the clean energy standards into the lowest reasonable cost. - Stakeholder feedback (Slide 43)<ul style="list-style-type: none">- Additional electric price scenarios:- Low demand to reflect a recession, high gas prices to incorporate greater risks of reliance on fossil fuels, and compliance with all laws- Addition of a 100% clean electricity requirement consistent with CETA in Oregon.- Passage of a carbon price for all Washington consumed electricity starting at \$15/ton beginning in 2022.	
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