

# Feedback report

RPAG Meeting

## Meeting details

- Tuesday, March 12, 2024, 12:00 p.m. - 3:00 p.m.
- Virtual webinar hosted by PSE and facilitated by Triangle Associates
- Links to:
  - [Presentation](#)
  - [Meeting recording](#)

## Feedback report

The following table records participant questions and PSE responses from the public comment opportunity and comments submitted via online [feedback form](#) or [irp@pse.com](mailto:irp@pse.com). Meeting materials are available on the IRP [website](#).

Note: PSE aims to provide clarity in responses but subsequent follow-up may be required at times. Please direct any follow-up clarifications to [irp@pse.com](mailto:irp@pse.com).

No.	Date	Interested party	Submitted via	Question or comment	PSE response
1	3/7/2024	Meghan Anderson	irp@pse.com	<p>Greetings members:</p> <p>Upgrading power lines, “reconductoring,” is a straightforward way to boost the capacity of the electrical grid by enabling it to transmit more power and leak less of it. TS Conductor<sup>1</sup> CEO Jason Huang and researcher Emilia Chojkiewicz speak in a podcast<sup>2</sup> to the great potential of reconductoring.</p>	<p>Thank you for your comments.</p> <p>Reconductoring is one of the options PSE considers to increase transmission capacity. Modern transmission conductors advancements like the carbon fiber core type TS conductor offers can help increase capacity in some cases.</p>

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				<p>Some highlights:</p> <p>Pros</p> <ul style="list-style-type: none"> <li>• Existing power lines design from early 1900s, more 'modern' from 1970s</li> <li>• Reconductoring could double (or triple?) grid capacity replacing traditional lines with carbon fiber.</li> <li>• Thermal expansion is virtually zero, less sagging</li> <li>• No retrofitting of structures</li> <li>• Existing employees, same tooling</li> <li>• Reduces line loss by as much as half</li> <li>• Fewer, shorter, lighter towers per mile</li> <li>• Smart line potential</li> <li>• 10 year payback period, no cost to rate payer</li> </ul> <p>Cons</p> <ul style="list-style-type: none"> <li>• Upfront costs more</li> <li>• Need updated substations</li> </ul> <p>Jason Huang is the CEO of TS Conductor, which makes a new conductor that replaces the steel core of traditional lines with carbon fiber. Emilia Chojkiewicz is a research affiliate at UC Berkeley and co-authored a paper on the large-scale potential of reconductoring.<sup>3</sup></p> <p>I hope this information is useful as you proceed to transition to clean energy sources.</p>	
2	3/12/2024	RPAG member	In meeting	Regarding demand response for the 2025 IRP, where did the megawatt nameplate calculation come from? How did you select 149 megawatts for the summer nameplate and 119 megawatts for the winter nameplate?	The megawatt nameplate calculations for the winter and summer came from existing demand response programs and forecasting programs selected by PSE as part of our RFP process.
3	3/12/2024	RPAG member	In meeting	Are the charts for the change in timing of loss-of-load events to scale?	Yes, the y-axis of those charts are on the same scale. The area under the curve is the expected unserved energy (EUE) which is in MWh. A LOLE tuned system can have

No.	Date	Interested party	Submitted via	Question or comment	PSE response
					different EUEs, which is why the areas for the 2023 Electric Progress Report and 2025 IRP are different. For winter in particular, the loss-of-load events in morning were much larger in magnitude in the 2023 Electric Progress Report than the ones we see for the 2025 IRP.
4	3/12/2024	Don Marsh	Public comment	<p>I'm Don Marsh, speaking on behalf of the Washington Clean Energy Coalition. On slide 17 we saw that PSE anticipates increased load due to EV charging of approximately 1,000 megawatts – about 30% of PSE's capacity shortfall. That's significant enough to merit close attention, especially because it also decreases the ELCC percentage of summer solar. A footnote on the slide says PSE will include managed charging in its portfolio analysis and we assume that will help, but it seems to use that there are much bigger opportunities than managed charging. Vehicle to grid technology can change the calculus from EVs having an adverse impact on loads to being neutral or even an asset. PSE says the technology is still in its infancy and standards are still evolving. While this is true it would be negligent to ignore the potential of this technology reaching practical application in the 20-year timeframe covered by the 2025 IRP. It's not a risky bet compared to say small modular nuclear reactors which may run into technical difficulties or cost challenges in the same time frame. PSE needs to be more specific about the opportunities and challenges presented by vehicle to grid in the 2025 IRP. We're asking the company to show some leadership in this area given the high penetration of EVs in the Puget Sound region and with our focus on environmental stewardship we can be a national leader. PSE can facilitate that with better modeling and details on how EVs can provide grid services, especially during peak demand events. We are also very interested in recent developments in geothermal generation which looks less risky and less costly than a small nuclear plant and would provide benefits in terms of resource</p>	<p>PSE is developing a strategy to conduct Vehicle-to-Everything ("V2X") technology demonstrations, which it will deploy in consultation with Commission Staff under Electric Schedule 557 no later than 2025. The desired outcomes of such demonstrations are to identify and evaluate the technical feasibility, operational requirements, and interconnection protocols, as well as to engage with customers and interested parties to assess the benefits, barriers, and market readiness for V2X. As V2X technology is still relatively nascent, and the bi-directional interoperability standards between the EV, EVSE, and EVSP networks are rapidly evolving, many vehicles and chargers on the market today are not technically capable of V2G. Given these factors, PSE believes that 2027 would be a more appropriate timeframe to begin modeling V2G programs in the IRP.</p>

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				adequacy and reduction of greenhouse gases. I hope we will hear PSE's thoughts on this resource soon.	
5	3/12/2024	James Adcock	Public comment	<p>A decade ago Puget said coal would never go away. Today Puget says social cost of greenhouse gas will never be a real part of dispatch costs. I disagree. Puget needs to actually account for social cost of greenhouse has as dispatch. This correctly models the real damages to human society from Puget's choice of behaviors. If the human race is to survive these costs must actually be accounted for, not shoved under the rug. Current Puget yearly operations are killing thousands of people per year due to these emissions as demonstrated in the Morality of Costs of Carbon peer-review scientific paper. But by not modeling these actual costs Puget builds more new natural gas generating plants leading to more stranded costs in the future, which Puget then expects ratepayers to pay accelerated depreciation. Further, carbon allowances are not free to Puget, rather Puget is required to model the auction values of those allowances and to sell those allowances back at auction. If doing so results in lower cost to ratepayers. Again, allowances are not free and must be modeled in dispatch, but Puget always falsely ends of up removing carbon costs in their final modeling of dispatch. ELCC concerns in general demonstrates the importance of diversity of generation and storage capacity as too much dependence on of any one resource then ELCC goes down due to saturation effects. Yet Puget continues to refuse to acquire than diversity, refusing to buy in any reasonable quantity solar, battery storage, and demand response. One word on electric vehicles – you provide time of day pricing and then the EV problem goes away. California utilities are already doing this. I don't know what Puget doesn't understand.</p>	<p>PSE intends to continue to model SCGHG in two ways, as an externality cost and in dispatch.</p> <p>In terms of the Climate Commitment Act, the Department of Ecology provides no cost allowances to electric utilities necessary to meet load.</p> <p>ELCC saturation curves help to encourage diversity and these saturation curves are reflected in the IRP analysis and acquisition analysis.</p> <p>PSE addressed our Time of Use (TOU) pilots in feedback reports from the <a href="#">October 16, 2023</a> public webinar and <a href="#">November 15, 2023</a> public webinar.</p>
6	3/12/2024	Claire Richards	Public comment	I am an interested ratepayer, and I'm also a nurse. That isn't meant to be my logo but I am not speaking for the Alliances of Nurse for Healthy Environments. I did arrive	Thank you for your comments. Please see our response to #8.

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				late but I want to say that we know that climate change is accelerating and the amount of warming is shocking climate scientists right now and recent sciences showing that the Arctic will be missing most ice within 10 years. We know that we need a transition off fossil fuels to renewable energy, and so any modeling result that ultimately results in the long-term use of fossil fuels is obviously wrong. It makes me wonder if any kind of option shows that there's fossil fuels, whether what's wrong with that model. If the models also consider or include whether it promotes a faster pathway off of carbon or whether or not it maintains dependence on fossil fuels. I also want to note that you know both of the options shown include fossil fuels like hydrogen can be blue and so that's still dependent on fossil fuels. I wonder if Puget Sound Energy is considering the health impacts of these peaker plants in these models and also health equity. So whether or not these peaker plants are still affecting populations that are environmentally burdened and how you can all consider or prioritize the ending of peaker plants.	
7	3/12/2024	Thomas Kraemer	Public comment	I'm an interested ratepayer as well as an environmental engineer. The social cost of greenhouse gas in decision-making models should be carried through from capital and operations to dispatch costs. They should be treated as real cost in all aspects of modeling alternatives including dispatch and system cost, even if they don't results result in economic cost to PSE at the dispatch stage. The whole point of including social cost of greenhouse gas in decision making is to include impacts from emissions that don't impose economic costs on PSE. Emissions only occur when the facilities are dispatched, therefore it makes sense to consider actually operating the dispatch taking social costs of greenhouse gas into consideration if possible. It was surprising to see on slide 41 that the economic model shows greater cost in cases where greenhouse gas emissions are lower or even zero. It doesn't seem to make sense that the levelized cost could result in a	Thank you for your comments. Please see our response to #5. PSE intends to continue to model SCGHG in two ways, as an externality cost and in dispatch.

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				model that will favor fossil fueled peakers over demand response or battery storage, etc, since demand response and battery storage are zero emissions and peakers are fossil fuel, whether you're talking about system cost versus dispatch.	
8	3/12/2024	Claire Richards	Feedback form	I am surprised to see that in both of the options modeled for social cost of carbon, it includes either fossil fuels plus hydrogen or biofuels, both of which when burned result in air pollution and disproportionately affect environmentally burdened communities; also not clear to me whether there is any consideration for the pollution generated during extraction, processing and transportation of such fuels.	<p>As required by state law we model all potential resources including carbon emitting, non-emitting and clean. For more information on hydrogen please review the <a href="#">materials</a> and <a href="#">video</a> from our Dec. 7, 2023 meeting on hydrogen.</p> <p>The SCGHG cited in the Clean Energy Transformation Act (CETA) comes from the <a href="#">Interagency Working Group on Social Cost of Greenhouse Gases, Technical Support Document, August 2016 update</a>. It projects a 2.5 percent discount rate, starting with \$62 per metric ton (in 2007 dollars) in 2020.</p> <p>The upstream emission rate represents the carbon dioxide, methane, and nitrous oxide releases associated with natural gas extraction, processing, and transport along the supply chain. We converted these gases to carbon dioxide equivalents (CO2e) using the <a href="#">Intergovernmental Panel on Climate Change Fourth Assessment (AR4)</a> 100-year global warming potentials (GWP) protocols.</p> <p>The upstream segment is then applied to the emission rate of natural gas plants for the SCGHG emissions.</p> <p>Further explanation is included in the 2023 Electric Progress Report, <a href="#">Chapter 5: Key Analytical Assumptions</a>, starting on page 5.6</p>

No.	Date	Interested party	Submitted via	Question or comment	PSE response
9	3/12/2024	Meghan Anderson	Feedback form	Thanks to PSE, for the pilot program to fuel switch gas customers currently in progress. I look forward to seeing comprehensive plans to decarbonize the gas utility. PSE has a duty to meet the climate commitment act milestones. Arguably the most important milestone happens in 6 years with 45% emissions reductions required by 2030. Thank you for your important work.	Thank you for your comments.
10	3/12/2024	Pete Stoppani	Feedback form	The ELCC slides were very informative, thank you. In future presentations around ELCC I think it is critical to include variations on hybrid systems rather than providing ELCC for each individual source (solar, wind, storage). I find it hard to see what the real world ELCC is given that it only makes sense, to me, to always use a hybrid system, especially here in the NW. This applies to all modeling for the IRP; always show hybrids and not individual sources. Pete PSE Customer and global warming activist :)	PSE will model resources both independently and as hybrids to capture the various scenarios that might occur in the future. Hybrid resources, which include storage on the generation side, will not be the only way PSE actually acquires resources. A hybrid approach can be helpful to capture over generation at an intermittent generation site that does not have enough transmission to export the full capacity of the energy and to firm-up the energy coming from that location. Energy storage on PSE's system may be able to help solve local transmission and distribution issues. That is, PSE will be acquiring more intermittent resources and more energy storage that may be built separately, but together will operate as a complete portfolio.
11	3/12/2024	Thomas Kraemer	irp@pse.com	<p>SCGHG costs in decision-making models should be carried through from capital and operations to dispatch costs. They should be treated as "real" costs in all aspects of modeling alternatives, including dispatch and system costs, even if they don't result in economic costs to PSE.</p> <p>The whole point of including SCGHG in decision-making is to include impacts from emissions that don't impose economic costs on PSE. Emissions only occur when the</p>	Thank you for your comments. Please see our response to #5.

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				<p>facilities are dispatched. Therefore it makes sense to consider actually operating dispatch taking SCGHG into consideration, if possible.</p> <p>It's surprising that the economic model shows greater costs due to SCGHG in cases where GHG emissions are lower, or zero. It doesn't seem to make sense that, per slide 41, levelized costs with SCGHG could result in "a model that will favor peakers over DR, BESS, etc," since DR (demand response) and BESS (battery storage) are zero emissions and peakers are fossil-fueled, whether you're talking about system costs vs. dispatch.</p>	
12	3/12/2024	James Adcock	Feedback form	Quite frustrating that the PSE-invited Organization-experts were not prepared to discuss SCGHG in dispatch modeling, but individual environmental experts were prepared for that discussion -- and yet PSE doesn't not allow such experts to actively participate -- even though the meeting had extra unused time. Shame on PSE!	Thanks for your feedback.
13	3/19/2024	Joel Nightingale (RPAG member) on behalf of Washington Utilities and Transportation Commission Staff	irp@pse.com	<p>Resource Adequacy results</p> <ol style="list-style-type: none"> <li>1. The high saturation of WA wind on PSE's system (slide 25) seems to highlight the importance of transmission (to benefit from geographic diversity of variable renewable resources). Staff is interested to know how PSE plans to address transmission constraints in the 2025 IRP. What assumptions does PSE plan to make about the cost and/or availability of transmission to deliver the modeled resources, and what sources of information are those assumptions based on? How does PSE plan to assess the risk of deliverability constraints for the generic resources it includes in its portfolio modeling?</li> <li>2. When did PSE make the decision to allow the PG&amp;E exchange expire, and what considerations went into that decision?</li> </ol>	<ol style="list-style-type: none"> <li>1. This topic was discussed in the March 25, 2024 RPAG meeting.</li> <li>2. PSE recently determined the agreement, which provided for winter and summer exchanges, was no longer beneficial because of increasing PSE resource needs in the summer.</li> <li>3. We agree that DR is an important resource to consider in the IRP and that there are many different types of DR that could contribute to meeting system needs. Along with the 3 and 4-hour shed DR resource, we do plan to model managed EV charging like you suggested. E3 will produce an ELCC for managed charging, which is forthcoming</li> </ol>



No.	Date	Interested party	Submitted via	Question or comment	PSE response
				<p>3. The charts on Slide 17 highlight the impact of EV load in E3’s resource adequacy analysis, and – as others highlighted during this RPAG meeting – the importance of PSE running effective programs to mitigate this impact. As we expressed during the RPAG meeting, Staff hopes that the simplified demand response (DR) generic resources do not miss significant value that could be realized by including more nuanced program types that may be less time- and call limit-constrained. For example, while a smart thermostat direct load control (DLC) DR program may be reasonably limited to 3 or 4 hours and only several times per season (due to customer comfort), a water heater DLC program may have a negligible customer comfort “cost” and therefore be better suited to significantly higher call limits, if limits are needed at all. Similarly, an EVSE DLC or time-of-use program may enable significant peak shaving nearly every day with almost no inconvenience to the participant. Staff notes that other generic resources (like wind and solar) have many more permutations – 6 for wind, and 4 for solar, per slide 22 – to describe the various contributions these resources would have if installed in different regions, and while we understand why E3/PSE cannot model every type of DR program, Staff believes there may be significant value in including more than just two.</p> <p>4. Did E3 and PSE consider the Operational Program portion of the WRAP in their loss of load assumptions and, if so, how was that modeled? Are the planning, forward showing, and operations phases of WRAP participation considered differently in any way or do they all have the same practical impact on PSE/E3’s resource adequacy analysis for the purposes of the 2025 IRP? Does PSE plan to change its resource adequacy requirement from 5%</p>	<p>pending completion of the Conservation Potential Assessment (CPA).</p> <p>Other DR programs could also prove valuable to the system. If these programs were to be included and the capacity expansion model were to select them, we would expect these DR programs to offset a portion of the generic storage or demand response builds, as all these resources help meet system needs for shorter durations. We can’t include all DR program options in the capacity expansion model due to added complexity, so a portion of the generic storage or DR resources could be seen as a proxy for these other DR programs. Regardless of the granularity captured in the IRP, PSE will ensure that all DR program options are evaluated through future all-source RFPs and learning from customer programs and pilots. In addition, PSE could explore additional DR options in future IRP cycles.</p> <p>4. No, the WRAP operational program was not directly included in E3’s RA analysis. PSE must have adequate resources to participate in the WRAP program to begin with; i.e., the WRAP is not a stand-alone capacity market. PSE does plan to transition from 5% LOLP to 1-in-10 LOLE consistent with the WRAP, given results are so close. PSE has not yet decided whether to fully move to a long-term forecast of WRAP metrics, rather than PSE’s stand-alone analysis. We will present detailed results of how a long-term forecast of WRAP compares with PSE’s stand-alone metrics from E3 to</p>

No.	Date	Interested party	Submitted via	Question or comment	PSE response
				<p>LOLP (used in 2021 IRP and 2023 IRP Progress Report) to align with WRAP's LOLE (see WAC 480-100-620(8))?</p> <p>SCGHG Modeling</p> <p>5. Staff appreciates PSE bringing this item up during the RPAG meeting to begin discussion of the best modeling approach for SCGHG in the 2025 IRP context. To support this discussion, Staff offers some guidance from past Commission orders that we believe should inform the direction PSE goes.</p> <ul style="list-style-type: none"> <li>• The Commission's <a href="#">General Order R-601</a> in Docket UE-191023 (adopting rules after the passage of the Clean Energy Transformation Act (CETA))</li> <li>• The Commission's <a href="#">Order 08</a> in Docket UE-210795 (approving PSE's 2021 CEIP, with conditions)</li> </ul> <p>6. Staff looks forward to more discussion on this topic including hearing PSE's responses to other parties' questions (for example, Ezra Hausman's question regarding whether day-ahead market participation will affect whether PSE can include SCGHGs in dispatch).</p>	<p>the RPAG to get feedback on such a change for this IRP cycle.</p> <p>5. Thank you for your feedback.</p> <p>6. Thank you for your feedback.</p>