

PSE IRP Consultation Update

Webinar 11: Flexibility Analysis and Portfolio Draft Results

December 15, 2020

01/19/2021

The following consultation update is the result of stakeholder suggestions gathered through an online Feedback Form, collected between December 8 and December 28, 2020 and summarized in the January 11 Feedback Report. The report themes have been summarized and along with a response to the suggestions that have been implemented. If a suggestion was not implemented, the reason is provided.

Stakeholder questions and suggestions spanned a wide variety of topics and not all are included in this Consultation Update. As always, line-by-line responses to each stakeholder comment are provided in the Feedback Report¹. Similarly, many stakeholder questions received from the December 15th Webinar have been answered in the Draft IRP, which is now available for review on the IRP website². PSE encourages stakeholders to review these materials in concert with this Consultation Update.

As referenced in the Feedback Report, PSE has contacted the following stakeholders to clarify their comments:

- Katie Ware, Renewable Northwest, was contacted on January 15, 2021 to clarify her request for an additional sensitivity which only allows non-emitting resources. This sensitivity is similar to sensitivity P: Must Take Battery or Pumped Hydro, where no new peaker plants are allowed until 2030 and the portfolio model optimization allows the solution to meet peak needs without peaker plants. The lowest cost option optimized to 2-hour lithium ion batteries. PSE also ran a sensitivity P2 with pumped storage hydro. This request is to add a P3 with 4-hour Lithium Ion batteries.
- Kyle Frankiewich, WUTC, was contacted on January 15, 2021 to clarify his inquiry on the difference in portfolio cost (either net present value or levelized cost) for the Mid portfolio with and without DERs. PSE will add a No DSR portfolio to the portfolio sensitivities to test.

Alternative Compliance Cost

PSE received feedback from James Adcock and Kyle Frankiewich (WUTC) concerning the use of the California carbon price as a cost forecast for alternative compliance costs. PSE solicited stakeholder feedback on alternative compliance costs during the September 1 webinar and received a single response from the Northwest Renewable Energy Coalition (NREC):

“In response to the question posed on prioritizing options for the 20% alternative compliance actions that might be addressed in the 2021 IRP, NREC would urge PSE to model an aggressive amount of conservation and demand response. Beyond the required conservation and demand response required in sections .040 and .050 of CETA, additional innovative conservation, efficiency, storage and demand response should be considered for Energy Transformation Projects. Exploring those has the double impact of further reducing/managing load and achieving additional GHG reductions.”

PSE acted upon NREC's suggestions by creating Sensitivities V (Balanced Portfolio) and W (Balanced Portfolio with Alternative Fuel for Peaking Capacity) which increase quantities of demand response, storage and distributed resources. PSE still required an alternative compliance price to model and decided the California carbon price is a suitable, real-world example of carbon pricing and therefore a sound starting point. PSE is open to feedback on possible alternative compliance cost sensitivities to include in future models.

Flexibility Analysis

PSE received feedback from a Katie Ware (Renewable Northwest) and Kyle Frankiewich (WUTC) regarding PSE's initial approach for the flexibility analysis.

Renewable Northwest has suggested that PSE incorporate four dimensions of flexibility into the flexibility assessment: absolute power output capacity, speed of power output change, duration of energy levels and carbon intensity. This suggestion will be taken under advisement.

Renewable Northwest further suggests that the flexibility value of the reciprocating peaker plant (\$417.25/kW-yr) may be artificially inflated due to the facilities small nameplate capacity. PSE has adjusted the nameplate capacity of the reciprocating peaker to 216 MW which has changed the flexibility benefit to \$35/kW-yr.

Both the WUTC and Renewable Northwest suggest that PSE examine the flexibility benefit and assessment approaches of the CAISO Energy Imbalance Market (EIM).

PSE thanks stakeholders for their thoughtful review and suggestions.

ELCC Values

PSE received feedback from Katie Ware (Renewable Northwest) and Kyle Frankiewich (WUTC) that the effective load carrying capability (ELCC) of storage resources may be low. PSE would direct stakeholders to Chapter 7 of the 2021 Draft IRP for a full discussion on PSE's ELCC methodology and results. In brief, storage resources are energy limited resources which are assessed with a different set of resource adequacy metrics (expected unserved energy, instead of loss of load probability). Therefore, long-term (i.e. multi-day) peak events which are common in winter months may not be

¹ December 15, 2020 Webinar Feedback Report:

https://oohpseirp.blob.core.windows.net/media/Default/2021/meetings/December_15_Webinar/Webinar%2011%20-%20Feedback%20Report.pdf

² PSE 2021 Draft IRP: <https://pse-irp.participate.online/2021-irp/reports>

well served by short-duration storage resources. Kyle Frankiewich suggested that saturation curves for storage resources may reveal increased ELCC with added capacity. PSE will attempt incorporate this suggestion into future IRP cycles.

Portfolio Draft Results

Katie Ware (Renewable Northwest), James Adock, Elyette Weinstein, Nathan Sandvig (Rye Development LLC) and Kyle Frankiewich (WUTC Staff) provided feedback of concerns regarding PSE’s portfolio draft results.

Katie Ware and Nate Sandvig requested PSE model a sensitivity which prevent additions of new emitting resources. The Final IRP will include Sensitivities N: 100% renewable by 2030, O: Gas Generation Out by 2045 and P: Must Take Battery or Pumped Hydro Storage which limit new peaking capacity builds and relying on energy storage resources such as batteries and pumped storage hydro. PSE will also add a portfolio sensitivity that evaluates Montana Wind plus pumped storage hydro and a hybrid resource in 2026.

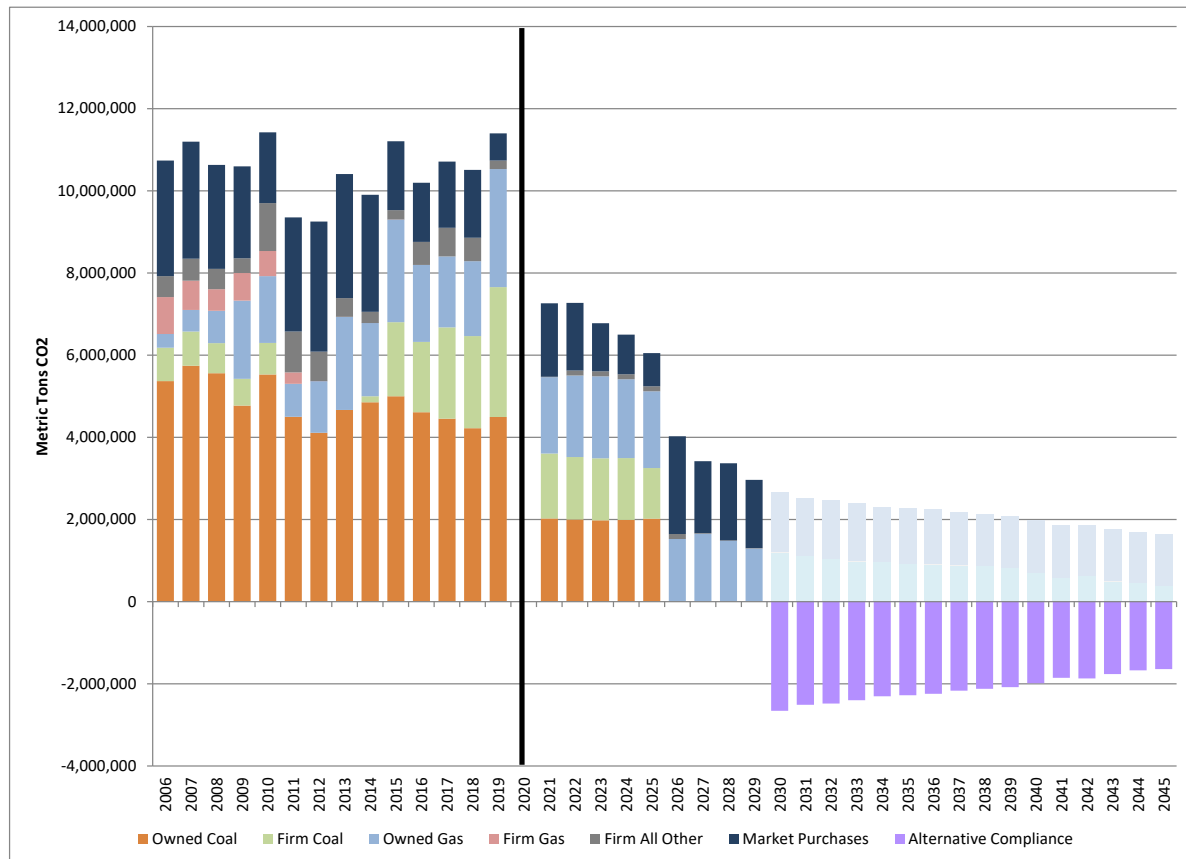
PSE feels these sensitivities adequately reflect possible zero-emission portfolios and can therefore assess the viability of including peaking capacity resources into the preferred portfolio.

Further work as part of Clean Energy Action Plan and Clean Energy Implementation Plan will further assess non-energy benefits and burdens of including peaking capacity resources into PSE’s clean energy future.

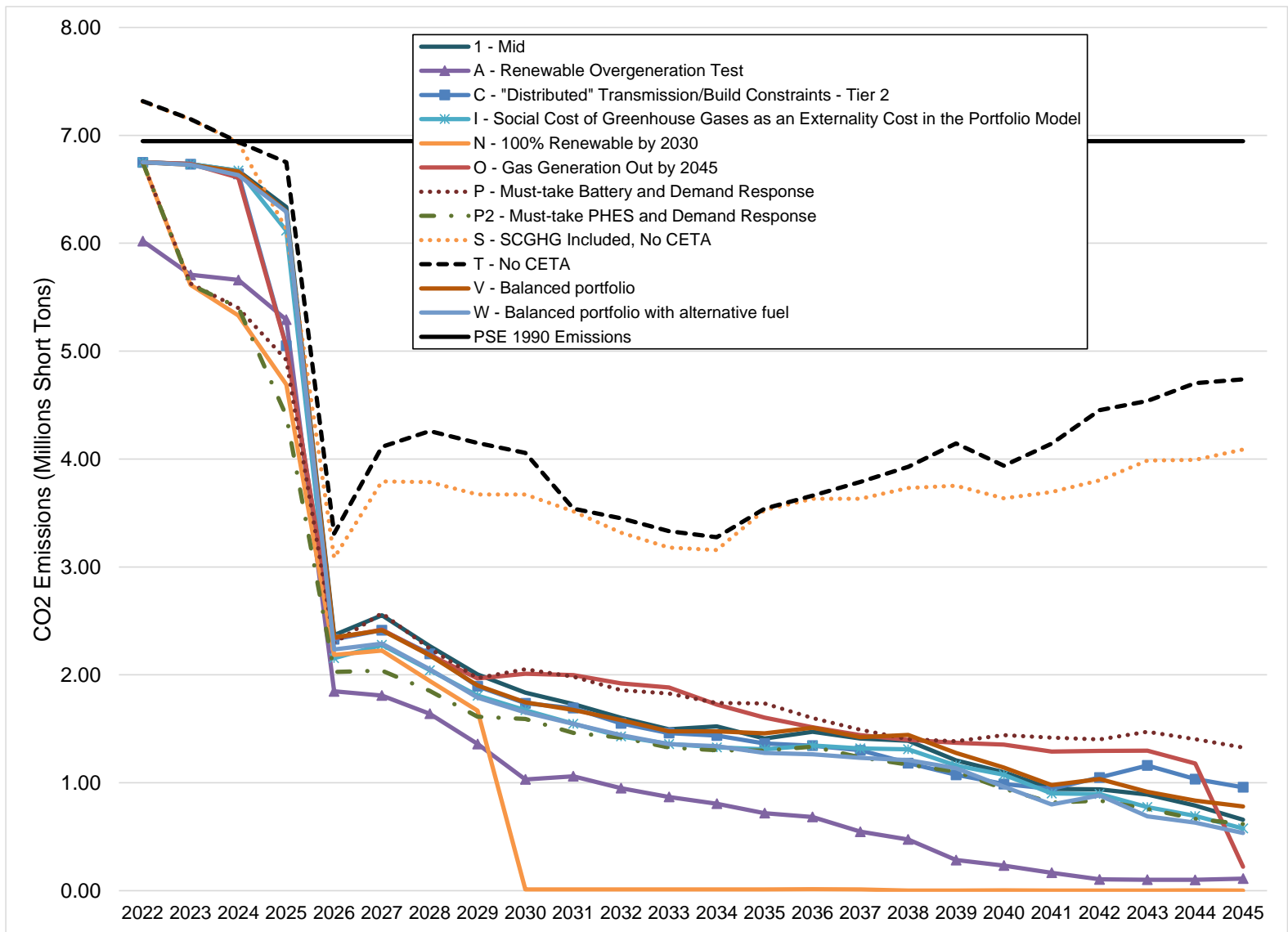
Other Updates

The following items have been updated after the Webinar 11:

1. Willard Westre (Union of Concerned Scientists) asked for clarification on the emissions chart on Slide 17. In the Feedback Report, PSE released a revised version of the chart which addresses Willard’s questions. PSE would note that the reduction in greenhouse gas emissions from 2019 to 2029 is 75%.



2. Kyle Frankiewich (WUTC) requested a chart comparing the greenhouse gas emissions for each sensitivity portfolio. PSE has produced this chart as part of Chapter 8 in the Draft IRP. The figure is also provided below on the next page.



3. Kyle Frankiewicz (WUTC) requested a table comparing the 4-yr (2022-2025), 9-yr (2022-2030), 20-yr (2022-2041) and 24-yr (2022-2045) portfolio levels costs for the scenarios and sensitivities presented in during the webinar. The table is provided on the next page.

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(in Billion Dollars, 2022)	Portfolio	4-Yr Levelized Costs (2022-2025)				9-Yr Levelized Costs (2022-2030)				20-Yr Levelized Costs (2022-2041)				24-Yr Levelized Costs (2022-2045)			
		Revenue Requirement	SCGHG Costs	Total	Change from Mid	Revenue Requirement	SCGHG Costs	Total	Change from Mid	Revenue Requirement	SCGHG Costs	Total	Change from Mid	Revenue Requirement	SCGHG Costs	Total	Change from Mid
1	Mid	\$2.50	\$2.06	\$4.56		\$5.60	\$3.26	\$8.86		\$11.63	\$4.72	\$16.35		\$13.63	\$5.04	\$18.68	
A	Renewable Overgeneration Test	\$2.62	\$1.85	\$4.47	(\$0.10)	\$5.83	\$2.89	\$8.72	(\$0.14)	\$12.82	\$4.00	\$16.82	\$0.47	\$15.32	\$4.24	\$19.57	\$0.89
C	"Distributed" Transmission/Build Constraints - Tier 2	\$2.58	\$2.00	\$4.58	\$0.01	\$5.56	\$3.20	\$8.76	(\$0.14)	\$11.72	\$4.70	\$16.42	\$0.07	\$14.53	\$5.06	\$19.59	\$0.91
I	Social Cost of Greenhouse Gases as an Externality Cost in the Portfolio Model	\$2.58	\$2.03	\$4.61	\$0.04	\$5.62	\$3.06	\$8.69	(\$0.14)	\$11.54	\$4.47	\$16.01	(\$0.34)	\$13.65	\$4.78	\$18.42	(\$0.25)
N	100% Renewable by 2030	\$2.67	\$1.80	\$4.47	(\$0.10)	\$9.03	\$2.62	\$11.65	(\$0.14)	\$26.29	\$3.23	\$29.51	\$13.16	\$31.14	\$3.42	\$34.56	\$15.89
O	Gas Generation Out by 2045	\$2.28	\$2.04	\$4.32	(\$0.24)	\$4.98	\$3.36	\$8.33	(\$0.14)	\$21.19	\$5.65	\$26.84	\$10.49	\$33.90	\$6.24	\$40.14	\$21.46
P	Must-take Battery	\$2.54	\$1.87	\$4.40	(\$0.16)	\$10.90	\$3.34	\$14.23	(\$0.14)	\$25.62	\$5.53	\$31.15	\$14.79	\$29.09	\$6.06	\$35.15	\$16.47
P2	Must-take PHES	\$2.68	\$1.82	\$4.51	(\$0.05)	\$8.94	\$2.66	\$11.61	(\$0.14)	\$19.36	\$4.03	\$23.40	\$7.04	\$22.35	\$4.36	\$26.71	\$8.04
S	SCGHG Included, No CETA	\$2.19	\$2.14	\$4.34	(\$0.23)	\$4.46	\$4.07	\$8.53	(\$0.14)	\$8.73	\$7.76	\$16.49	\$0.14	\$10.06	\$9.01	\$19.08	\$0.40
T	No CETA	\$2.09	\$0.00	\$2.09	(\$2.48)	\$4.10	\$0.00	\$4.10	(\$0.14)	\$8.04	\$0.00	\$8.04	(\$8.31)	\$9.40	\$0.00	\$9.40	(\$9.28)
V	Balanced Portfolio	\$2.53	\$2.05	\$4.58	\$0.01	\$5.65	\$3.25	\$8.90	(\$0.14)	\$12.16	\$4.71	\$16.87	\$0.51	\$14.37	\$5.06	\$19.43	\$0.75
W	Balanced Portfolio with alternative fuel for peakers	\$2.60	\$2.04	\$4.64	\$0.07	\$5.81	\$3.19	\$9.00	(\$0.14)	\$12.36	\$4.56	\$16.92	\$0.57	\$14.43	\$4.86	\$19.30	\$0.62

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Summary of all updates

PSE appreciates the feedback provided by stakeholders. In summary, the following changes will be implemented:

- PSE updated the emissions chart and provided table comparing the 4-yr (2022-2025), 9-yr (2022-2030), 20-yr (2022-2041) and 24-yr (2022-2045) portfolio levels costs for the scenarios and sensitivities presented in during the webinar in this Consultation Update based on stakeholder inquiries.
- PSE has updated the nameplate capacity of reciprocating peakers from 18 MW to 216 MW to obtain a more reasonable flexibility benefit.
- PSE is open to incorporating a range of possible carbon prices to better understand costs of alternative compliance.
- PSE will add the following sensitivities to the list - P3: Must Take Battery or Pumped Hydro with 4-hour lithium Ion battery, X: No DSR, and Y: include MT Wind + Pumped Storage Hydro in 2026.