Puget Sound Energy Resource Planning Advisory Group (RPAG) meeting

Meeting Summary
Wednesday, January 17, 2024 | 12:00 – 2:00 p.m.

1. Meeting purpose and topics

Below are the meeting topics of this Resource Planning Advisory Group (RPAG) meeting:

- Present feedback summary from facilitation team meetings with RPAG members
- Present resource adequacy methodology for the 2025 IRP
- Recap next steps
- Public comment opportunity

2. Agenda

Time	Agenda Item	Presenter
12:00 p.m. – 12:05 p.m. *5 min*	Introduction and agenda review • Safety moment • Introductions • Agenda review and meeting purpose	**Sophie Glass**, Triangle Associates
12:05 p.m. – 12:35 p.m. *30 min*	RPAG convening assessment overview • Facilitation team conversations with RPAG members • Review draft charter	**Sophie Glass,** Facilitator, Triangle Associates
12:35 p.m. – 1:50 p.m. *75 min*	Resource adequacy (RA) methodology • PSE's RA roadmap and timeline • Modeling overview • Probability-based models • Generic resource modeling	**Jennifer Coulson,** Manager, Operations and Gas Analysis, PSE **Arne Olson,** Senior Partner, Energy + Environmental Economics (E3) **Joe Hooker,** Director, E3
1:50 p.m. – 2:00 p.m. *10 min*	Next steps and public comment opportunity	**Sophie Glass**, Facilitator, Triangle Associates
2:00 p.m.	Adjourn	**Sophie Glass**, Facilitator, Triangle Associates

The full meeting materials, including [agenda](), and [presentation]() online under the Jan. 17, 2024 meeting heading [on the IRP website.]()

3.   Action items

Below is a summary of actions from the Jan. 17, 2024, RPAG meeting.

What	Who	When
Circle back to Jackson Prairie event with updates	PSE	Update provided in Jan. 12 feedback report
Include acronym handbook at the end of all RPAG presentations	PSE	PSE to incorporate this going forward
Post the final RPAG charter on the PSE website	PSE and Triangle	Completed

4.   Introduction and agenda review

Sophie Glass, facilitator, provided an overview of the agenda for the meeting and welcomed RPAG members (see "RPAG members in attendance" on the last page for a list of RPAG members who joined this meeting). Philip Popoff, PSE, shared some opening remarks on the recent freezing temperatures.

An RPAG member commented on the Jackson Prairie shutdown, noting that it highlighted PSE's dependence on gas during these extreme weather events. PSE responded that they are a winter peaking facility and all PSE peakers were operational during the extreme cold and they did not have to use backup fuel. PSE will circle back to the Jackson Prairie event in a future meeting.

5.   Convening assessment overview

Sophie Glass and Emilie Pilchowski, facilitation staff, shared a thematic analysis of a convening assessment they conducted. The facilitation team met with ten out of the eleven RPAG members to hear about their hopes and concerns for the group. Additionally, the facilitation team reviewed the draft RPAG charter with members and asked for their feedback.

The facilitation team relied on the "Triangle of Satisfaction" framework for their analysis. This framework looks at the three categories of content, process, and relationships.

Regarding content, RPAG members want:

- Mutual benefit for participating in the RPAG and to be able to bring information back to their respective organizations and learn from the process

Regarding process, RPAG members want:

- A diverse public perspective in public webinars with representation from named communities
- Meaningful public input
- Accountability to RPAG members where PSE explains their decisions and acknowledges feedback even if it isn't actionable
- Enough time to digest information and materials
- To lean into contentious topics
- Different levels of engagement for members based on capacity and different ways to participate
- To incorporate environmental/racial/and social justice perspectives into the IRP
- To connect the equity, technical and public perspectives

Regarding relationships, RPAG members want:

- To listen with openness
- Balanced perspectives

Sophie walked through a tracked changes version of the RPAG charter, highlighting how RPAG feedback was incorporated by PSE. PSE incorporated all of thechanges proposed by RPAG members with one exception regarding meeting materials. RPAG members suggested sending materials five days in advance of meetings. Consistent with WAC 480-100-630 PSE will continue to send materials at least three days in advance but will aspire to send materials even further in advance when possible.

There were no objections from RPAG members on the finalized version of the charter. Sophie reminded members to reach out to her if changes need to be made in the future. The facilitation team will check-in on the charter again at the end of the year.

6.   Resource adequacy (RA) methodology

For the 2023 Electric Progress Report, PSE hired independent consultants from E3 to initiate the resource adequacy analysis and leverage their RECAP model. Additionally in 2023 the Western Resource Adequacy Program (WRAP) produced forward showing metrics for their non-binding capacity sharing program. PSE initially attempted to use WRAP metrics, but they were not meant for long term planning, so PSE moved forward with the E3 analysis. In this current 2025 IRP cycle, PSE has worked with E3 to refine the RECAP model and analysis to align more closely with the WRAP methodology. To do this, E3 has implemented two main changes, they are producing a new planning standard, loss of load events (LOLEs) and zonal effective load carrying capabilities (ELCCs) for generic resources based on the WRAP zones.

Concurrently PSE supported a WRAP long-term working group for the 2027 IRP which unfortunately was postponed by the Western Power Pool indefinitely at the end of 2023 due to constraints and needing to prioritize getting the WRAP operational. Moving forward, while the direction and path for the 2027 Electric Progress Report RA metrics are not fully defined, PSE intends to follow up with WRAP members to continue working towards long-term WRAP metrics.

PSE started its resource adequacy analysis in summer 2023. Some key events moving forward include:

1. Results meeting with RPAG members on March 12, 2024
2. Draft results meeting on Sept. 12, 2024
3. Draft IRP filing date on Dec. 2, 2024
4. IRP filing date on March 31, 2025

Regarding the E3 RECAP modeling, once PSE has a reference case from Aurora, PSE will hand that over to E3 to do a backend check and ensure that the portfolio is adequate. Doing a backend check is important because resource adequacy is not an economic model. Rather, it's an extreme event capacity model and it is important to ensure PSE is truly meeting the planning reserve margin.

Joe Hooker and Arne Olson, E3, presented on E3's resource adequacy modeling conducted for the 2023 Electric Progress Report.

Resource adequacy is a measure of the ability of a portfolio of generation resources to meet load across a wide range of system conditions, accounting for supply and demand variability. Resource adequacy considers how there can be enough resources for extreme periods such as during a cold snap. Even though PSE is a winter peaking facility, E3 does both a winter and summer analysis to account for potential extreme summer events such as high temperatures and the heat dome effect. E3's analysis feeds into the IRP so that when PSE does its long-term planning there are enough resources for the system to work in all events and hours.

While there is no way to capture all resource challenges, the industry practice is to develop standards. The most common standard used throughout North America is the "one day in ten years" standard which allows for up to one loss event for one day every ten years. For PSE's 2025 IRP, E3 is looking at two different reliability standards: 5% loss of load probability (LOLP) and 0.1 % loss of load expectation (LOLE). Historically PSE has used a 5% LOLP standard that allows for up to one year with loss of load every twenty years. Meanwhile the WRAP process used a 0.1% LOLE standard that allows for up to one loss of load event every ten years and this seems to be emerging as a new industry standard.

RPAG members had several questions and comments regarding the resource adequacy methodology.

- RPAG member: To clarify for those unfamiliar with WRAP, how is this methodology different from LOLE or ELLC?
  - PSE response: PSE is going to dive into the differences later in the presentation. PSE shared the link to a previous presentation on resource adequacy as a resource.
- RPAG member: How does this analysis compare to what the Power and Conservation Council is doing?
  - John Ollis, Northwest Power and Conservation Council: I suspect this is similar to the Council's historical 5% loss of load. However, we are in the process of changing the metrics we are looking at to a 0.1% loss of load standard. We are considering moving towards a multi-metric approach but we haven't finished our process yet. John linked a reference to the Council's adequacy metrics. Additionally, the Council is having a meeting on Jan. 30, 2024 in their public advisory committee process to discuss the shift to multiple metrics.
- RPAG Member: For the loss of load probability, can there be multiple events in one year every twenty years?
  - E3 response: Yes, one year every twenty years means there can be multiple events within the 20 years. In contrast, the LOLE counts every individual event within a year.
- RPAG member: What is the definition of an event? Is there a threshold for what counts as an event?
  - E3 response: We consider an event any time there is a shortage regardless of how deep or long. This is not only about meeting instantaneous demand from customers but also meeting reserve requirements that the service must hold.
- RPAG member: How will the 5% LOLP and 0.1% LOLE be applied to the portfolio?
  - E3 response: Historically PSE has only used the LOLP. This year, the analysis is using both but in an independent manner. E3 is not looking at scenarios where they are added together.
  - PSE response: PSE is shifting the planning standard to align closer with the WRAP methodology. We are thinking of LOLE and the LOLP as scenarios.

E3 shared the two major components to the portfolio analysis model: (1) the planning reserve margin (PRM) and (2) the effective load carrying capability (ELCC). E3 runs their model to quantify a planning reserve margin that describes how many megawatts are needed in the system to satisfy a reliability target. The reserve margin then goes into PSE's model as a constraint that the model must satisfy with enough resources. The industry convention is to quantify the PRM as the amount of megawatts above the one and two peak load or median

peak load for the utility that's required to meet the reliability target. This is often shared as a percentage.

The ELCC is the equivalent "perfect" capacity that a resource provides in meeting PSE's reliability target. It describes how many megawatts can be provided by each resource and is measured as a percentage of nameplate capacity. Ultimately, in the portfolio analysis model PSE is stacking up all the resources and making sure the total megawatts across all of them match the total PRM requirement. E3 shared a graph to illustrate how the model works. In the graph, the "shortfall" bar demonstrates that PSE needs more resources, which the portfolio analysis addresses.

Planners are increasingly using probability-based models to support enhancements to resource adequacy. E3's model has three steps. The first step is to develop a representation of the loads and resources of an electric system in a loss of load probability mode. The second step is to identify the amount of perfect capacity needed to achieve the desired level of reliability. Lastly the model calculates the capacity contributions of different resources using ELCC.

E3 provided an overview of key inputs and outputs that flow into their model and how it interacts with PSE's analysis. E3 highlighted the differences between the 2025 IRP analysis and the 2023 Electric Progress Report. One major difference is the electric vehicle forecast. This was not included in the previous Electric Progress Report and is an important update as electric vehicle loads are meaningful. E3 is using an unmanaged charging profile. However, PSE will evaluate managed charging as part of their supply side resource portfolio analysis.

In terms of the market, E3 is now running the GENESYS model at a 5% LOLP for the region because their previous analysis of the region had shortages or insufficient resources. GENESYS has two key inputs: the hydro budget and PSE's wholesale purchase curtailment model (WPCM). The hydro budget is flexible as PSE has capacity at five Mid-C hydro resources. The WPCM downscales any shortfalls on the regional level to PSE's system and informs E3 when there are periods that PSE cannot import from the market because of insufficient resources at the regional level. The WPCM is also important because it provides information on resource sharing. Based on the GENESYS outputs, E3 can anticipate when PSE can import and when hydro is available for generation.

E3 models all of PSE's existing resources that are contracted or planned to come on line ahead of 2030. Some modifications from the last analysis include no longer modeling the exchange with Pacific Gas and Electric Company (PG&E), including demand response resources as part of the existing portfolio, including a new wind project of about 90 megawatts, and modeling increased hydro capability at three dams that reflects PSE latest contracting.

E3's model produces a planning reserve margin (PRM) for two years, two seasons, three climate models and two reliability targets. The model additionally produces effective load

carrying capabilities (ELCCs) that includes the interactive effects between batteries, pumped hydro, long-duration energy storage, demand response, and electric vehicle managed charging. After the portfolios are developed, E3 will circle back for a reliability check on the back end to ensure that reliability targets are being met.

Lastly, E3 shared information on their generic resource modeling by WRAP zone. E3 made several changes to their modeling to better align with the WRAP model. Most notably, one set of ELCCs will be developed per WRAP zone and resource type. Additionally, where PSE has modeled multiple resource profiles per WRAP zone, an average of the resources will be used to develop ELCCs that align with each WRAP zone. E3 shared which resource locations correspond to each of the six WRAP zones. A significant change from the last analysis is that E3 is combining the two Montana resources into a single zone and combining the two Wyoming zones together.

RPAG members had several questions and comments regarding the RA portfolio analyses model.

- RPAG member: How does energy efficiency play into this?
  - E3 response: Demand side resources like energy efficiency help meet resource adequacy needs. Each energy efficiency measure or program is different in how it helps the system. Any existing energy efficiency measure is factored into the load forecast which is then factored into E3's modeling. E3 does not integrate future energy efficiency measures into the model. Rather, future energy efficiency measures are a decision for the portfolio analysis.
- RPAG member: Do you model hybrid resources and how do they compare ELLC wise?
  - E3 response: E3 is evaluating hybrid resources. Regarding ELLCs, it depends on the configuration of hybrid resources. Hybrid resources will never be better than two resources that are independent, they are always of equal value or less value.
- RPAG member: For long term planning, how do batteries interact with procurement?
  - E3 response: E3 offered to share some of their published materials related to this topic and shared their contact information for any RPAG member who would like to reach out for additional information..
- RPAG Member: The Council attempted a similar approach to PSE with regional planning and similarly saw that when modeling hybrids, two separate resources are rarely more valuable than one together.
- RPAG member: How did you bring the GENESYS information down to the 5% LOLP?
  - E3 response: The 2023 Electric Progress Report was not at 5%; this time it is.
- RPAG member: With greater reliance on inputs that correlate with weather and climate, has anything changed with data since the 2023 Electric Progress Report?
  - E3 response: The load and market data are the same as the 2023 Electric Progress Report. On the solar and wind side it is also the same as the last

analysis. However, solar and wind are not using same weather data as the three climate models. They use a synthetic forecast based on a historical period of observation for 250 simulation years. Ideally all these models would be synced but this is a barrier we've faced since solar and wind are based on historical data which we don't have for climate change.

- RPAG member: When will E3 need final inputs to run the RECAP model for the 2025 IRP?
    - PSE response: PSE is not anticipating putting updated electric vehicle forecast into the resource adequacy models. PSE will handle that in the portfolio modeling as the electric vehicle forecast is very uncertain. The electric vehicle load forecast that E3 is using is already decided but the PRM will scale up to the final load that goes into portfolio.
- RPAG member: Does the model assume or factor in transmission systems?
    - E3 response: We do factor in transmission.

7. Next steps

- Jan. 19, 2024: feedback form closes for Jan. 12, 2024 meeting
- Jan. 24, 2024: feedback form closes for the Jan. 17, 2024 meeting

8. Public comment

The public comments shared during this meeting can be viewed online in the feedback report posted under the Jan. 17, 2024, heading on the [PSE website](#).

9. Adjourn

The meeting was adjourned at 2 p.m.

10. Attendees[1] (alphabetical by first name)

1. Chris Goelz
2. Danielle Szigeti
3. Diana Aguilar
4. Don Marsh
5. James Adcock
6. Lori Hermanson
7. Jesse Scharf
8. John Deese
9. Mike Hopkins
10. Natasha Jackson
11. Rachel Clark
12. Sally Jackson
13. Sophie Major
14. Virginia Lohr
15. Weber Quinn
17. Wesley Franks

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[1] These numbers do not include viewers on [PSE's YouTube livestream](#)

11. RPAG members in attendance

1. Aliza Seelig
2. Dan Kirschner
3. Ezra Hausman
4. Froylan Sifuentes
5. Jim Dennison
6. Joel Nightingale
7. John Ollis
8. Kate Brouns
9. Katie Chamberlin
10. Lauren McCloy
11. Fred Heutte
12. Sommer Moser
13. Stephanie Chase

12. Presenters

1. Arne Olson, E3
2. Jennifer Coulson, PSE
3. Joe Hooker, E3
4. Meredith Mathis, PSE
5. Phillip Popoff, PSE

13. Other PSE staff

1. Kara Durbin
2. Sachi Begur
3. Wendy Gerlitz

14. Facilitation staff

1. Emilie Pilchowski
2. Pauline Mogilevsky
3. Sophie Glass
4. Will Henderson