PUGET SOUND ENERGY

2019 Integrated Resource Plan Technical Advisory Group Meeting #4
Hilton Bellevue
King County Room
300 NE 112 Avenue Southeast, Bellevue, WA 98004
January 9, 2019
9:30 a.m. – 4:15 p.m.

Attendees

Members

- Larry Becker, Northwest Power Consulting
- Charlie Black, Invenergy
- Joni Bosh, NW Energy Coalition
- Rob Briggs, Vashon Climate Action Group
- Rachel Brombaugh, King County
- Brad Cebulko, Washington Utilities and Transportation Commission (WUTC)
- Carla Colamonici, Public Counsel
- Nancy Esteb, Renewable Energy Coalition*
- Brian Grunkemeyer, FlexCharging, Inc.*
- Kelly Hall, Climate Solutions
- Warren Halverson, Coalition of Eastside Neighborhoods for Sensible Energy (CENSE)
- Norm Hansen, Bridle Trails Neighborhood
- Aimee Higby, WUTC
- Mike Hopkins, FortisBC*
- Fred Heutte, NW Energy Coalition
- David Howarth, National Grid
- Steven Johnson, WUTC
- Kevin Jones, Vashon Climate Action Group
- Virginia Lohr, Citizens' Climate Lobby
- Don Marsh, Coalition of Eastside Neighborhoods for Sensible Energy (CENSE)
- Kate Maracas, Western Grid Group*
- Nicholas Matz, City of Bellevue
- David Nightingale, WUTC
- Court Olson, Optimum Building Consultants
- Bill Pascoe, Orion Renewable Energy Group and Absaroka Energy*
- Andrew Rector, WUTC
- Deborah Reynolds, WUTC
- Noah Roselander, Vashon Climate Action Group
- Mark Sellers-Vaugh, Cascade Natural Gas*
- Kathi Scanlan, WUTC
- David Tomlinson, Solar Horizon
- Elyette Weinstein, League of Women's Voters Thurston County*
- Bill Westre, Union of Concerned Scientists
- Amy Wheeless, NW Energy Coalition*

Public Observers

- Susan Christensen, Modern Grid Solution
- Lori Elworth
- David Morton
- David Perk, 350 Seattle
- Michele Wylen, Bellevue Resident/Master Electronic
- Robert Young, Economists.com

Project Team

- Diane Adams, EnviroIssues
- Nate Davern, Puget Sound Energy (PSE)
- Kara Durbin, PSE
- Alice Hackbart, PSE

- Nate Hill, PSE
- Elizabeth Hossner, PSE
- Allison Jacobs, PSE
- Elise Johnson, EnviroIssues
- Cathy Koch, PSE
- Michele Kvam, PSE
- Lorin Molander, PSE
- Irena Netik, PSE
- Jens Nedrud, PSE
- Phillip Popoff, PSE
- Stephanie Price, PSE
- Angie Thomson, EnviroIssues
- Allan Vann, EnviroIssues

* Indicates remote attendance

Meeting objectives

- PSE presents the proposed portfolio sensitivities to be modeled in the 2019 Integrated Resource Plan (IRP).
- PSE explains the load forecast methodology and results.
- PSE presents the status and progress for system planning commitments in the 2019 IRP and changes PSE is making to incorporate non-wire alternatives and distributed energy resources into the baseline process.

Welcome and introductions

Irena Netik, PSE director of energy supply planning and analytics, opened the meeting at 9:30 a.m. by welcoming attendees and providing safety information. Irena announced a change in the facilitation team for the Technical Advisory Group (TAG) and introduced the new team. Members of the TAG and PSE project team introduced themselves.

Facilitator Diane Adams of EnviroIssues and Irena reviewed the agenda, meeting objectives, and guidelines for the comment period following the TAG meeting. One TAG member expressed disappointment with the meeting objectives, noting the objectives all involved PSE providing information and they would prefer objectives which also included seeking input from the TAG. Diane proposed an agenda modification to move the public comment period from 4:45 p.m. to 4:25 p.m. based on feedback from TAG members to facilitate people to stay to observe the comment period. This proposed change had no objections.

Irena gave updates on action items from previous IRP meetings. For details, refer to the *Open action items from previous IRPAG and TAG meetings* document as distributed in the meeting packet (also available on slides 5 to 7 of the meeting materials posted at www.pse.com/irp). The TAG discussed the action item list, making the following key points:

- A TAG member noted PSE's planned action for Action Item #1 of including a listening session in March does not identify a contact for PSE's carbon reduction goals.
- TAG members noted Action Items #2 (include carbon impact in scenarios or sensitives), 3 (investigate converting the gas emission rate to a percentage) and Action Item #8 (consider a stakeholders request to post and redistribute questions and answers PSE receives) were listed as "Complete" when PSE had not yet completed the planned future action of including specified information in the IRP. PSE noted this and will list the action items as "In progress" going forward until they are completely closed out when the IRP is published.
- Some TAG members expressed concern regarding Action Item #3 (investigate converting the gas emission rate to a percentage), noting they requested PSE provide a methane leakage rate as a percentage of methane delivered rather than a gas emission rate as a general percentage, and that PSE's assumed leakage value appears to be too low by a large amount, potentially

invalidating modeling results. PSE noted this concern and reminded the TAG they will include the requested value, citations for its basis, as well as the gas emission rate methodology in the IRP as a write-up. PSE will consider distributing the write-up to the TAG in advance of the draft IRP. A TAG member requested that the information provided be sufficient enough to enable someone to replicate PSE's calculated gas emission rate value independently.

- A TAG member reminded PSE there were multiple components of their request for Action Item #8 (consider a stakeholders request to post and redistribute questions and answers PSE receives), and noted parts of their requests were unaddressed by PSE's proposed action. The member requested PSE post materials and requests received prior to the updating of TAG meeting guidelines, and requested PSE post questions from TAG members to the website. PSE noted their comments and updated the list of action items.

System planning (transmission and distribution)

Jens Nedrud, PSE manager of system planning, provided the TAG with a presentation on how system planning at the transmission and distribution level connects with IRP development. For details, see the *System Planning: transmission and distribution* presentation as distributed in the meeting packet (available on slides 9 through 29 of the meeting materials posted at www.pse.com/irp). Jens described the importance of planning, system planning requirements and regulations, planned major projects to be built in upcoming years, the integration of delivery system planning and IRP analysis, how other states conduct system planning and how that relates to system planning in Washington.

TAG members asked questions and discussed various topics throughout the presentation, making the following key points:

Reliability and undergrounding

Multiple TAG members asked Jens about PSE data on common outage causes. Jens noted PSE presents outage data, including common outage causes, in a reliability report. One TAG member highlighted to PSE the importance of reliability and reliability improvements to them and their neighbors.

One TAG member asked if reliability planning, particularly undergrounding, is conducted as part of the IRP. Jens clarified this is a component of Delivery System Planning (DSP), not the IRP. TAG members again noted the importance of electric reliability and discussed other utilities who have improved their reliability numbers through targeted undergrounding of distribution lines.

Future Energize Eastside meeting

A TAG member asked how DSP interacts with the Energize Eastside project and prioritizing the construction of the project over other reliability solutions. PSE clarified that Energize Eastside will be discussed in detail at a meeting, potentially, in March.

Other TAG members highlighted that the Energize Eastside meeting is scheduled to take place after the City of Bellevue permitting meeting for the project and expressed concern that any technical information discussed at the Energize Eastside meeting in March would not be timely for the permitting meeting. One TAG member mentioned they would like to discuss WUTC requirements for Energize Eastside, projected customer growth, incorporating environmental and social costs in decision making processes, and modeling of a joint utility solution with Seattle City Light at the Energize Eastside meeting.

WUTC topics and requests

One TAG member noted for WUTC members present at the meeting they do not observe a connection between DSP and how planned projects are evaluated. The TAG member requested additional regulatory oversight over planned project evaluation.

Multiple TAG members expressed interest in obtaining access to their advanced metering infrastructure (AMI) data once AMI is implemented in the service area. The WUTC mentioned they are undergoing a rule-making process regarding AMI data and privacy and encouraged TAG members to provide input.

Transmission as an IRP resource

Another TAG member expressed an interest in PSE evaluating transmission as a resource for the IRP, rather than as a component of DSP, because power sources from California and grids on the Columbia could be evaluated. PSE explained that its resource plans have considered transmission to short-term wholesale markets as a resource in IRPs since 2009. PSE noted this topic is part of resource adequacy and will be discussed further at the next TAG meeting.

Winter and summer consumption peaks

Some TAG members noted that while power usage in PSE's service area is currently winter peaking, the region is actually summer peaking, because all the natural gas-fueled power plants run through the summer to help meet energy needs in California. Additionally, summer hydropower may decrease in the future as snowmelt decreases. These TAG members expressed interest in increasing solar power production in the summer to support potential hydropower reduction and expressed concern that PSE is not fully considering the impact of climate change on forecasted loads. One TAG member also expressed concern over summer peak electricity usage with the increase in air conditioning usage in the region. Jens clarified that while summer peaks do occur and air conditioning usage is increasing over time, the region is winter peaking and this is not anticipated to change.

Energy efficiency meeting request

Multiple TAG members expressed gratitude for the interactive meeting style of the TAG meeting, and for the additional meeting being planned to discuss the Energize Eastside project. Those TAG members noted the previous TAG meeting topic on energy efficiency felt insufficient and did not allow for enough interactive components.

PSE planned major projects table

One TAG member noted the table (available on slide 17 of the meeting presentation materials posted on-line at www.pse.com/irp) of planned major projects did not differentiate between those in the implementation phase and those in the closeout phase, and requested this information be specified on the table. PSE provided a handout at the meeting which included the implementation phase and the closeout phase. Multiple other TAG members requested further changes to the planned major projects, including adding approximate length of wires, cost estimates, and the definitions of the different project phases. This information would help TAG members better understand the approximate size and scope of each project.

Portfolio sensitivities

After a one-hour long lunch break, Elizabeth Hossner, PSE consulting resource planning analyst, presented on the proposed portfolio sensitivities to be modeled in the 2019 IRP. For details, see the *Portfolio sensitivities* presentation slides as distributed in the meeting packet (available on slides 31 to 40 of the meeting presentation materials posted at www.pse.com/irp). TAG members asked questions and discussed various topics throughout the conversation, making the following key points:

Providing input on portfolio scenarios

One TAG member expressed concern with the planned portfolio scenarios presented, noting the scenarios were presented at TAG meeting #2 as final and they did not have the opportunity to provide input. PSE responded to the TAG noting assumptions used in the scenarios needed to be developed well in advance in order to develop the IRP 2019 draft on time. Feedback on the TAG member prioritization of potential sensitivities were revised, presented, and discussed.

Price of carbon used in scenarios and sensitivities

Several TAG members shared concerns regarding assumptions in the scenarios and sensitivities related to the price of carbon. Some TAG members noted the risk of regulations pricing carbon emissions has increased over time, potentially justifying higher costs of carbon in PSE assumptions. PSE replied they are looking at a range of potential carbon prices based on potential regulations, and they feel their assumptions are reasonably consistent with the WUTC letter on carbon pricing and will help them meet their 50 percent carbon reduction goal by 2040.

Other TAG members mentioned concern the carbon pricing applied by PSE does not incorporate the full social cost of carbon. PSE explained the scenarios are based on potential regulatory prices imposed on PSE in the future, rather than the full social cost of carbon emissions and their impacts. This is used for planning the price of different energy resources. The concerned TAG members noted if PSE used the full social cost of carbon for their pricing, then PSE would make resource planning decisions based on social impacts to their customers rather than the financial impacts to their customers. PSE expressed confidence their planned risk analysis will show a carbon footprint reduction larger than if just the social cost of carbon were applied. The concerned TAG members reiterated their concern regarding the total cost of carbon emissions to society and expressed a desire for PSE to use it in their planning processes.

Application of carbon adder

One TAG member expressed concern regarding how the carbon adder is applied to the planned IRP portfolio scenarios. PSE applied the cost of carbon to all emitting resources in the Western Electricity Coordinating Council (WECC). The TAG member noted some states in the WECC may not be applying a cost of carbon and some resources in the WECC may close (or retire), potentially altering PSE's sensitivities. PSE responded the methodology used ensures they are systemically looking at potential market prices. The TAG member encouraged PSE to apply the carbon adder additive to market resources without applying it to resources throughout the WECC. PSE responded by explaining that there may be time to adjust portfolio sensitivities, based on what is being discussed during the current legislative session.

Load forecast

Lorin Molander, PSE manager of load forecasting, presented the 2019 IRP load forecast for electric and gas. For details, see the *Load forecast* presentation slides as distributed in the meeting packet (available on slides 31 to 40 of the meeting presentation materials posted at www.pse.com/irp).

Forecast performance

Lorin defined forecast performance as projections of future load with normal temperatures. Each forecast is tracked in its initial year by comparing forecasted values to weather-normalized actual loads observed.

TAG discussion of the forecast performance focused on the weather normalization process used by PSE in the forecast. One TAG member asked PSE about their weather normalization methodology, given the increased temperatures observed on yearly coldest winter days. PSE replied they use a 30-year average of heating degree days. The TAG member expressed concern the methodology uses historic weather data to predict future needs, when future climate may be warmer and reduce the number of heating degree days. PSE noted the TAG member's concern as referencing peak capacity, when the load forecast is addressing energy needs.

Load forecast in the IRP

Lorin described how load forecasts are used in the IRP. The 20-year load forecasts are used as an input into the IRP and do not include long-term projections of conservation. This is then used to develop the IRP analysis to determine the most cost-effective amount of future conservation to include in the resource plan. Lorin noted that projected demand is reduced significantly once forward projections of conservation savings are applied.

Electric results

Lorin reviewed the results for the electric load forecast, noting the results are very similar to the 2017 IRP forecast because new upward and downward drivers of load balanced each other out.

When looking at load forecasts by class (i.e. by commercial, industrial and residential), one TAG member noted significant class percentage share changes between the 2017 IRP load forecast and this load forecast. PSE explained percentages presented in the 2017 IRP for the specific items noted by the TAG member were not weather normalized, but the shares presented during the TAG presentation are weather normalized. Additionally, the information presented during the TAG meeting was the shares of load, not billed sales (which does not include losses).

TAG members discussed both the overall electric load forecast and the peak electric forecast, focusing on how the forecast was displayed on the graph shown in the slide deck. Several TAG members noted historical actual loads include the effects of energy conservation work, while the load forecasts are shown on the same graph and do not include projected conservation. PSE reminded TAG members the load forecasts are used in IRP analysis to determine the needed cost-effective conservation. TAG members expressed a preference for showing historical actual loads with conservation and load forecasts without conservation separately. TAG members asked if conservation market trends are included in the load forecast, and PSE explained they are not at this time, that the IRP analysis will determine the cost effective amount of future conservation, and that amount of conservation will be applied to the load forecast results and presented in the IRP.

Some TAG members also expressed a preference for conservation to be considered as an energy resource in IRP work. PSE noted that it is the IRP that determines how much conservation is cost effective. The IRP separates the need for resources between conservation and supply-side resources. Operationally, the IRP creates the starting point for setting acquisition targets for conservation programs and for the all-source RFP process.

One TAG member asked how localized PSE load forecasts are. PSE explained they produce load forecasts at a system-wide level and at the county level. The TAG member expressed an interest in load forecasts at the city level, but PSE explained the methodology to do this would require a high level of effort and is not regularly produced. The PSE load forecasting group does not produce load forecasts for areas smaller than county or a large cluster of zip codes, given economic drivers used by the model are typically at a county, regional, and US-level. System planning does take factor block loads into our load allocation. These block loads are typically large scale load requests that we receive from developers or high density loads. The total load still aligns with the forecasted system total, but it does change how the future load is distributed throughout the system.

Gas results

Lorin reviewed the results for the electric load forecast, noting the 2019 load forecast is lower than the 2017 load forecast. Lorin also explained that the overall methodology is consistent between electric and gas, but PSE uses different design temperatures for planning purposes. The gas peak forecast projects gas peaks that occur at 13 degrees Fahrenheit, while the electric peak forecast projects electric peaks that occur at 23 degrees Fahrenheit.

TAG members discussed the gas peak forecast, largely focusing on the different design temperature for the gas forecasts. PSE clarified that in the electric industry, it is standard practice for utilities to plan for a normal peak, plus a planning margin or planning “reserve” margin, to provide a buffer for resource adequacy. However, in the natural gas industry, standard practice is to plan for an extreme peak temperature, and is referred to as a design peak temperature. One TAG member expressed concern with the different peak use temperatures used, noting they may not reflect the reality of future temperatures. PSE explained the temperature differences are due to different standards between gas

planning and electric planning, where gas outages due to supply failure can have larger and more dangerous consequences than electric outages. The electric peak forecast is a normal peak temperature with an added buffer. The gas peak forecast is a design peak forecast, which provides an additional buffer for uncertainty. Some TAG members requested to see a gas peak forecast developed using a comparable temperature to the electric peak forecast.

Base, high and low forecast scenarios

Lorin presented the results of the base, high and low forecast scenarios for both electric peak load and gas peak load. One TAG member observed graph of the 2019 scenarios looked like the 2017 scenarios and asked if this is because PSE realized their 2017 conservation planning, and PSE replied they were correct.

Economic and demographic models and inputs

Lorin shared the economic and demographic model used for the population forecast. In recent years the service area experienced a higher population growth rate than previously forecasted, and the decline the forecasted long-term population growth rate is due to less forecasted immigration to the United States. The forecasted trend for the PSE service area is similar to the national trend predicted by Moody's Analytics.

One TAG member noted the forecasted population growth rates do not match forecasted customer growth rate. PSE explained this is because population growth is not the only driver of customer counts, so the relationship is not a one-to-one ratio.

Temperature for electric normal peak

Lorin explained the methodology for using 23 degrees Fahrenheit as the electric normal peak in forecasting. The most common minimum temperature during peak winter hours over the past 30 years, where minimum temperature is defined as the lowest observed temperature observed during peak usage hours. In the last 30 years, 23 degrees was the minimum temperature observed during peak hours four times, and 26 degrees was the minimum temperature observed during peak hours four times. The value of 23 degrees was selected given it is the median of the minimum temperatures observed during peak hours over the past 30 years. In other words, 23 degrees is the "middle" temperature of the set of minimum temperatures, or the 50^{th} percentile.

One TAG member asked if the model using the electric peak accounted for long-duration cold snaps. PSE replied that customer behavior during long-duration cold snaps is likely different from temperatures that occur for only a short duration, and duration of temperatures is not currently incorporated in the peak model. Other TAG members asked if PSE can provide comparable information for electric peaks during summer usage, noting summer peak usage may increase in the future.

Electric vehicle impacts on load forecasts

Lorin presented information on the electric vehicle forecast incorporated into the electric forecasts. Charging load is expected to occur in both residential and commercial classes. Forecasted electric vehicle load is forecasted to increase to 2 percent of total load and peak forecasts by 2030.

One TAG member asked PSE to verify the math used to develop the electric vehicle daily charging profile forecast graph, stating they thought the load percentage might be higher than shown. Other TAG members recommended time-of-use programs or incentives will be incorporated into future forecasts due to projected electric vehicle load increases.

Next steps and action items (status update as of the time of the draft notes)

Irena reviewed outstanding action items updated at the beginning of the meeting, in addition to new action items discussed throughout the meeting:

- PSE will model various carbon impacts in scenarios and/or sensitivities.
    - Status: In progress
- PSE will include carbon impact in scenarios or sensitives.

    - Status: In progress
- PSE will include gas emission rate as a percentage and details on methodology in the draft IRP and the final IRP.
    - In progress; PSE will consider distributing this information to the TAG in advance of the draft IRP.
- PSE will provide a description of the difference between the 2017 and 2019 combined heat and power potential by March 29, 2019.
    - Status: In progress
- PSE will follow up with TAG members regarding posting requests and documents received prior to the revision of TAG guidelines.
    - Status: In progress
- PSE will consider methodology for posting TAG questions and answers publicly.
    - Status: In progress
- PSE will discuss their resource adequacy work at the February 7 TAG meeting and will bring representatives from E3 and other groups to discuss regional resource adequacy work.
    - Status: In progress; scheduled for TAG 5 on February 7, 2019.
- PSE will consider adding a recommendation for time-of-day rate analysis to the 2019 action plan and for further development in a future IRP.
    - Status: In progress
- PSE will develop responses to NWEC questions received concerning TAG #3 material (received a day late for inclusion in the meeting notes).
    - Status: Completed
- PSE will continue planning the Energize Eastside meeting and invite TAG members.
    - Status: In progress
- PSE will consider providing an opportunity for additional energy efficiency dialogue around policy and implementation of energy efficiency.
    - Status: In progress
- PSE will add approximate line miles and project statuses to the planned major projects list and will consider including cost ranges.
    - Status: In progress; to be included in draft IRP and final IRP, cost ranges will be included if publically available.
- PSE will include several previous IRP load forecasts in the IRP and compare those forecasts to actuals for multiple years
    - Status: In progress; to be included in draft IRP and final IRP
- PSE will develop a gas planning standard and will share it with the TAG.
    - Status: In progress; PSE reconsidered this request and instead will be highlighting the differences in the standards at the February 7 TAG meeting.
- PSE will verify the numbers and calculations used to develop the electric vehicle load as a percentage of load in 2035, and include an explanation in the draft IRP and final IRP
    - Status: In progress
- PSE will share draft generic resource assumptions with the TAG prior to the February 7 TAG meeting.
    - Status: In progress
- PSE will share a comparison of the 2017 IRP electric resource costs with the 2019 IRP electric resource costs prior to the February 7 TAG meeting
    - Status: In progress
- PSE will share reliability data with TAG members as provided to the WUTC prior to the February 7 TAG meeting.
    - Status: Provided to TAG members on January 23 via email. Also available by the following link: https://www.utc.wa.gov/regulatedIndustries/utilities/energy/Pages/electricReliabilityReports.aspx

PSE will distribute meeting notes with action items outlined on January 23, 2019. January 30 is the deadline for TAG attendees to provide comments on meeting notes to PSE. PSE will post the final meeting notes on the IRP website: www.pse.com/irp by February 6, 2019.

IRP comment period

The comment period began with comment period facilitator Angie Thomson reviewing the comment guidelines.

- Rob Briggs, Vashon Climate Action Group: I feel a little bit like I'm flogging a dead horse on this one, but it seems this is the method I have for getting this issue of methane leakage rates in the public record. I do have a copy of an email that I sent to PSE earlier this week and would be happy to provide this to the notetaker rather than my comments here[1]. I'll summarize the letter. We need PSE to provide the methane leakage rate as a percentage of methane delivered. It is a standard dimensionless percentage in which the information is presented in scientific literature. It is information PSE must have had in order to present the leakage rate in the form they presented it in, and it is also the way PSE represents their own in-house leakage rate in the PSE IRP 2017. I also think it is important PSE provide a full and complete reference for which they selected the number they chose to use. It is difficult for someone like me to provide useful feedback if I can't find the information you were using as a source. It is a minimum expectation for how PSE will conduct this process.

- Noah Roselander, Vashon Climate Action Group: It is imperative that humans transition to 100 percent renewable energy, but this [IRP] process doesn't feel like it is getting us there. PSE does not—while we get lip service, there is not clear movement in this direction. The market will get us there eventually, but not fast enough. We can hope our legislatures support us and make this required. Our best method is our regulators very strongly push PSE to incorporate the appropriate social cost of carbon that will force the issue, so we can transition as quickly as possible.

- Virginia Lohr, Citizens' Climate Lobby: I appreciate the fact that at earlier in the IRP process members of the TAG asked you provide public comment period. So, you set aside an hour today. What is the purpose of providing the public comment period? You have 5 people signed up and you're limiting us to 2 minutes each. It is to make sure everyone has a chance and you don't cut people off. If we had 50 people that would make sense. But we have 5 people, so what is the purpose of this? What is the purpose of having a public comment period when you don't inform the public that there is a public comment period? You inform the TAG members and some members of an email list, but you don't have others. You'll have a great thing in your notes when you say we held public comment at the request of the TAG and it will seem like you are responsive, but until you are actually responsive and give more time and invite the public, you won't meet the objective we asked for.

- Michele Wylen, Bellevue Resident/Master Electronics: Many comments on Energize Eastside were silenced with a promise to address them in March. However, the public hearing on this is scheduled for January 30. I will rely on the analysis you scheduled for March to bring value to the public hearing. It would make more sense to schedule the technical meeting for before the

[1] See Appendix 1 for the referenced letter written by Rob Briggs and presented to the notetaker.

hearing or move the hearing to a later date. On your website, you have a list of guiding principles. It is on PSE's homepage, there is a list of guiding principles. One item says be fair and reasonable in our decision-making process. Can you help me understand how you are being fair and reasonable to the community by not allowing a technical discussion to happen until after the public hearing? If you need to wait to get the details until March, ask the city to delay the meeting so we can make a fair case for ourselves.

- James Adcock, Citizen at Large: I wanted to clarify an argument we were having at the end of the meeting. That was the concept of reliability as a resource. PSE said it is not a resource, so we will not talk about it during the IRP, and we said yes it was. We were using a cartoon shortcut. When PSE wants to talk about reliability, they talk about loss of load probability. They say we don't have enough peaker plants. They want to build 6 at a cost of $1.2 billion. Those 6 plants are a reliability factor that cost money, but to save 1 outage every 20 years. As customers, we are experiencing outages per year not related to the peaker plants. Those are just as valuable to us as the ones you're talking about, and they cause our TVs to blow up, our cars to blow up, our computers to blow up. I have everything on a USB now. Reliability is a resource that has a real cost to customers. One outage is worth $1.2 billion, so the other outages you're not willing to talk about are worth what?

- Norm Hansen, Bridle Trails Neighborhood: I live in a section of Bellevue that has a lot of trees. We have 9,000 residents and we've been concerned about reliability for the past 20 years. Sometimes outages are due to old equipment, sometimes trees, sometimes animals. There is a draft docket we can put input on. The number is 161024, and apparently this will be put into the 2019 IRP. So, you can get on the record if you want to by going in and signing up with this docket number. I just wanted to let you know that we will be doing that. That is 161024 docket. Thank you.

Appendix 1

Public comment letter written by Rob Briggs of Vashon Climate Action Group to Michele Kvam

Hi Michele,

I am in receipt of your email dated December 28, 2018. Unfortunately, upon review, I find this information only marginally useful and largely unresponsive to the requests made by me and other members of the TAG originally on October 11 at TAG Meeting #2, when the topic of fugitive methane emissions was first presented, and requested again on December 6 at TAG Meeting #3.

To reiterate our request, we need PSE to provide the **lifecycle methane leakage rate as a percentage of methane delivered.** This is the standard dimensionless percentage in which this information is represented in the scientific literature, it is information your technical people must have had at their disposal in order to calculate the CO_2e emissions in Tonnes CO_2/MMBtu, and it is consistent with how PSE represented its own in-house leakage rate in PSE IRP 2017.

I also request that you indicate the numeric value PSE is using in the CO_2e methane emissions calculation for global warming potential. This is also a value that was necessary for your technical people to have in order to calculate the CO_2e emissions in Tonnes CO_2/MMBtu that you provided below. Page 37 of the October 11, 2018 TAG #2 meeting notes indicates the 100-year GWP was used. I note that using the 100-year GWP is to rely on out-of-date science based on IPCC Fourth Assessment Report AR4 (2007), which is entirely inappropriate for a forward-looking 20-year planning exercise like the IRP.

Finally, would you please provide a full and complete reference (with hyperlink) for the BC Province's Natural Gas & Oil Statistics data series alluded to in your email below. It is difficult for TAG members to serve a useful technical review role if they cannot easily identify the documents that PSE is using to make IMPORTANT decisions.

This is a VERY IMPORTANT issue for this IRP process. In their abstract appearing in the 13 July 2018 issue of *Science*, Alvarez et al. find that US fugitive supply chain emissions are equivalent to 2.3% of gross U.S. gas production. They write, "Methane emissions of this magnitude, per unit of natural gas consumed, produce radiative forcing over a 20-year time horizon comparable to the CO2 from natural gas combustion."[2] Consistent with this highly credible finding, I have suggested during TAG meeting discussions on this topic that the fugitive emissions value PSE is proposing to use appears to be low by a factor of approximately three to five. If PSE proceeds using the proposed value in their IRP analysis without proper vetting, it risks invalidating the entire IRP exercise, or at least all analyses in which a gas technology emerges as part of the optimal mix.

I do plan to raise this issue again at the TAG meeting this coming Wednesday (1/9/18), and I do hope PSE will provide the TAG satisfactory answers to these questions we first asked nearly three months ago.

Best regards,

Rob Briggs
Vashon Climate Action Group TAG Representative
[Phone number redacted]

[2] Ramón A. Alvarez, et al., *Assessment of methane emissions from the U.S. oil and gas supply chain*, Science 13 Jul 2018: Vol. 361, Issue 6398, pp. 186-188, DOI: 10.1126/science.aar7204.