

## Webinar #2: Electric Price Forecast Q&A

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DRAFT 6/11/2020

### Overview

On June 10, 2020 Puget Sound Energy hosted an online meeting with stakeholders to discuss the electric price forecast. Stakeholders shared their input on incorporating clean energy policies in baseline assumptions to inform the electric price forecast. Participants were able to submit feedback on the webinar and meeting materials prior to and after the webinar occurred. Additionally, participants were able to ask questions using a chat box provided by the GoToMeeting platform.

Below is a report of the questions submitted to the chat box. Answers to the questions were provided verbally by IRP staff during the webinar. Please note that questions were answered in order of relevance to the topic currently being discussed. Questions regarding other topics were answered at the end of the webinar session.

To view a recording of the webinar and to hear responses from staff, please visit the project website at [pse-irp.participate.online](https://pse-irp.participate.online).

### Attendees

A total of 68 people attended the meeting, including project staff and six attendees who only called into the meeting and did not identify themselves.

Attendees included:

James Adcock, Larry Becker, Charlie Black, Joni Bosh, Robert Briggs, Koch, Cathy, Stephanie Chase, Zhi Chen, Weimin Dang, Cody Duncan, Kara Durbin, Nancy Esteb, Spencer Gray, Brian Grunkemeyer, Vlad Gutman-Britten, Kelly Hall, Warren Halverson, Lori Hermanson, Fred Heutte, Mike Hopkins, "J", Elizabeth Hossner, Brandon Houskeeper, David Howarth, Doug Howell, Charles Inman, Magat, Jennifer, Kevin Jones, Eric Kang, Dan Kirschner, Michele Kvam, Sarah Laycock, Virginia Lohr, Penny Mabie, Kate Maracas, Kassie Markos, Don Marsh, Sheri Maynard, Jennifer Mersing, David Meyer, Irena Netik, Valerie O'Halloran, Court Olson, Anthony O'Rourke, Bill Pascoe, David Perk, Alison Peters, Kathi Scanlan, Gurvinder Singh, Alexandra Streamer, Tyler Tobin, Rahul Venkatesh, Katie Ware, Eddie Webster, Elyette Weinstein, Willard (Bill) Westre, Bob Williams, John Williams, Scott Williams, and Zacarias Yanez.

## Questions Received

Questions from attendees are posted in the order in which they were received. The first four rows represent questions submitted in advance through the Feedback Form. The webinar began at 1:30 PM PDT and ended at 4:30 PM PDT. A full verbatim chat log is available as an appendix.

Slide number	Question	Sent by
<b>Intro</b>	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.	James Adcock
<b>24</b>	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.	James Adcock
<b>28</b>	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?	James Adcock
<b>42</b>	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?	James Adcock
<b>Welcome Slide</b>	is this the link for go to meeting that will be used for the future meetings? ditto for the code?	Joni Bosh
<b>Welcome Slide</b>	Can everyone see questions and comments posted here?	Doug Howell
<b>8</b>	Slide 8-Staff requests when discussing IRP scenarios used to develop planning assumptions, including alternative scenarios and 'futures', PSE clearly define what it means by each case, including 'base case' and clearly label and reference what is meant for each case for the discussion today	Kathi Scanlan
<b>11</b>	Slide 11-what other analyses needed for the company (last bullet)?	Kathi Scanlan
<b>11</b>	Do avoided costs take into account both avoided generation and avoided T&D?	Don Marsh

Slide number	Question	Sent by
8	Slide Page 8 Raise Hand. But what *are* your "planning assumptions?" Whenever we ask you what is your input modeling data, including what range of calendar dates for each of those input datas, you refuse to answer us. And this has been going on for more than 10 years now. The input modeling data IS part of your "planning assumptions"	James Adcock
11	Slide Page 11 Raise Hand. How do you model the difference in "market prices" between emitting sources of electricity vs. non-emitting sources of electricity? Moving forward towards 2030 the great majority of your electricity needs to come from non-emitting sources.	James Adcock
11	Just to clarify, is the electric price forecast the same value for all the listed uses on slide 11?	Joni Bosh
13	Slide 13-Clarifying Question: When is PSE planning to discuss its resource adequacy and flexibility model(s) in greater detail? Dates of webinars/meetings?	Kathi Scanlan
13	Is Plexos a power flow model?	Kate Maracas
14	Bullet 2- what fundamentals are your referring to, specifically? (I am asking for examples of fundamentals on slide 14. Thanks)	Elyette Weinstein
14	S-14 What MW transmission Constraint numbers are you using for Mid-C and MT wind	Bill Westre
14	I hope James Adcock's statement that his question was not answered will be treated as a question and that Elizabeth will attempt to actually answer his original question.	Virginia Lohr
13	Second Kathi's question - interested in the assumptions and values in the RA model.	Joni Bosh
15	General question: If all resources are lumped into a broad energy price then how does your analysis drive a reasonable resource portfolio	John Williams
16	Do you count only those resources that are permitted, not those that are planned? Slide 16	Joni Bosh
16	What date is the data obtained from NWPCC (regional load)?	Kathi Scanlan
16	Slide 16. How do you in fact model "Regional Load" as an input? What data inputs do you use as inputs to your modeling of "Regional Load?" What range of dates of data inputs used as data to generate your "Regional Load" modeling do you use?	James Adcock
17	On slide 17, does "Resource Assumptions" incorporate any feedback PSE received from the May 28th webinar on Generic Resource Assumptions?	Katie Ware

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17	Slide 17 - PSE needs to assume social cost of carbon (\$74/ton) for all thermal resources. Why isn't this being reflected?	Doug Howell
16	Slide 16 so Aurora is not used to determine the portfolio?	John Williams
17	Why is SCOC not added to box 6 as well	Bill Westre
17	Slide 17: why are there no new thermal plants built in WA? Is that a constraint on the model? Is SCC only applied to facilities built in Washington?	Kelly Hall
*	I think I am directing my questions to specific issues that PSE is mentioning in passing on the page of the slides that PSE is presenting.	James Adcock
17	Slide 17 indicates that the Social Cost of Carbon (SCoC) is included for thermal builds in Washington. Is the SCoC used for dispatching existing thermal resources in Washington?	Charlie Black
16	the question of counting new resources is an important one -- we are already in a situation where most new resources across the west coming online in the next 5 years will not have commitments (contracts, under construction) much more than 2 or 3 years in advance	Fred Heutte
17	note that the NW Council's draft 2021 Plan load forecast is still being refined and will be based on a climate-adjusted baseline -- the initial model inputs will be available soon and PSE should consider using that as perhaps a model sensitivity for the 2021 IRP	Fred Heutte
17	No. SCC needs to apply to thermal power coming into WA	Doug Howell
17	Katie Ware's question was actually a yes/no question. I don't recall hearing if the answer was Yes or No. Please clarify for me.	Virginia Lohr
17	Follow up on slide 17: when you say SCC only on Washington as a result of CETA, do you mean energy delivered to Washington (but facility may be in another state) or only facilities physically located in Washington?	Kelly Hall
17	How PSE internalizes SCC should also be applied to price. You have to assume you are paying this price for planning purposes.	Doug Howell
17	Second Doug Howell's comment that out of state carbon resources need to have the social cost of carbon attached for correct modelling.	Court Olson
17	on the Council's planning process, we are hearing that early modeling results may be available in August or September, though the official draft plan won't be out until early next year	Fred Heutte

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19	will you incorporate other policies and commitments from utilities as well, such as Xcel, Idaho Power, and Avista that have committed to 100% as well. And CO's law that utilities consider SCC and make progress towards 90% carbon reduction by 2050? These will also impact price forecasts.	Kelly Hall
19	The Wood Mac gas price forecast is now two years old. Why isn't PSE using a more current forecast?	Charlie Black
19	To clarify Slide 19, these are changes (particularly WoodMac 2018 gas price) from 2017 IRP to 2019 Progres Report. Are these the assumotions to be used in this IRP?	Dan Kirschner
21	Slide 21-Please explain the light green slivers on top of the blue non-emitting/renewable resources 2021-2027.	Kathi Scanlan
21	s-21 Where is existing WA wind?	Bill Westre
21	Slide 21 Why would you assume that the "Renewable Needs Ramp" starts at the red line of about 10M? and not the blue bar at about 70M? CEIP requires a demonstration of "linear progress ramp."	James Adcock
17	Please answer Kelly Hall's question on slide 17: when you say SCC only on Washington as a result of CETA, do you mean energy delivered to Washington (but facility may be in another state) or only facilities physically located in Washington?	Kevin Jones
21	If the state has a sharp increase in need in 3 years, is it reasonable to assume that prices of new facilities will increase non-linearly due to a spike in demand for new projects? How do you model this effect?	Brian Grunkemeyer
21	Energy demand has not been rising at the rate indicated on this slide as "target". Please confirm that this "target" line is strictly reflecting the renewable energy ramp up needed to meet the law. If so, what future total energy demand is assumed for 2045?	Court Olson
24	Slide 24-What date is PSE for the consultant(s) gas price forecast? Is it one consultant or a blend of consultants gas forecast(s) used as input to Aurora?	Kathi Scanlan
24	Are those estimated MW builds for Solar and wind for the base year or over the 20 years? Sorry, I had interference and missed a bit of what you were saying.	Joni Bosh
25	Slide 25 Given that US economists are predicting that the COVID-ravaged US economy will not fully recover until the end of the decade, shouldn't the long-term gas prices be updated? And that gas price predictions made before the COVID-19 crash don't have relevancy anymore?	James Adcock

Slide number	Question	Sent by
28	Slide 28 What input data assumptions are you using when making this slide? How can we interpret this slide if you don't tell us what assumptions you made when creating this slide? For example, is this slide also based on the assumption of "No New Washington State NG Builds?"	James Adcock
28	my question on slide 28 is the impact of hybrids (solar/wind plus storage), standalone storage and flexible demand at scale on market prices as compared to renewables by themselves	Fred Heutte
28	The cost of gas to society has not gone down. The will of humanity is to eliminate all fossil fuels so that we have any hope of a future. I don't fully understand the things you are saying about social cost of carbon and how and when it will be incorporated, but we need to get off of "natural" gas immediately. Artificially low prices for gas, perhaps because of reduced demand, because more and more people know we need to get off of gas, should not be used to justify more gas. Will your modelling lead us to the future that is our only hope for survival?	Virginia Lohr
28	Will PSE make the hourly power price forecast results available to the IRPAG?	Charlie Black
28	Slide 28 follow-up -- Are you <i>seriously</i> suggesting that this is a reasonable prediction of future volatility???	James Adcock
28	Slide 28 Wouldn't people just build NG Peakers, Battery Storage, or Pumped Hydro to "arbitrage" these high price variability and differential???	James Adcock
29	Slide 29: why did electric price forecast increase on slide 29 when on slide 27 it appears to have declined slightly?	Kelly Hall
	Will you address Charlie Black's question about hourly price forecasts in the next part of the presentation?	Joni Bosh
<b>Break</b>	Why not allow more meeting time in the future so that there <i>is</i> enough time to answer questions?	James Adcock
<b>33 - 34</b>	How accurate historically is the demand forecasting you are using? How much demand can be reduced by extensive conservation? reduce the demand when you cannot meet the need with current resources	John Williams
<b>38</b>	Slide #38 - They can build renewables or "optimize their portfolios." Can you explain more concretely what you mean by optimizing a portfolio that can substitute for building renewables?	Robert Briggs

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34	Slide 34 - Have you given any thought as to how each of these modeled scenarios could affect CETA's incremental cost calculation?	Katie Ware
42	Question 1: What is PSE's base case scenario for electric price forecast - is PSE calling it "IRP Mid - Draft" in this presentation? Please clarify base case.	Kathi Scanlan
42	Question 2: Does PSE mean in the "No CETA" or absent those standards under CETA RCW 19.405.040(1) and 050(1) as well as implied cost of coal close-out in 2025? The "No CETA" scenario is not clear. For example, how does this scenario relate to the CETA incremental cost baseline and draft Clean Energy Implementation Plan (CEIP) draft rules? Staff requests a response to the connection to CETA requirements and CEIP draft rules.	Kathi Scanlan
42	Would you please refresh our memories on what year's data the 7th Power Plan was based on. Is there really no more recent data that could be used to update those projections?	Robert Briggs
Q&A	How is this recent demand data inputted into your modeling? Should more recent years be and climate warming be more highly weighted in your models?	Warren Halverson
Q&A	Will the wholesale power price forecasts be made available at the hourly price level of granularity?	Charlie Black
Q&A	In the context of the 2019 IRP Progress Report and changes compared to these 2021 draft numbers, would you discuss the three primary inputs that affect power prices and what you've seen in terms of changes in modeling and results thus far?	Kathi Scanlan
Q&A	Could you explain the rationale for the position that PSE does not apply the Social Cost of Carbon to electricity that comes in from other states when PSE calculates their IRP power price?	Kevin Jones
Q&A	I was puzzled by the comment made along with slide #26 that the 20-year low price for gas reflected delays in permitting LNG export facilities. Does this suggest that another 20 years of delays are anticipated in Kalama Methanol and Jordan Cove? Or did I mishear? In any case, it strikes me that a longer view on these prices is needed.	Robert Briggs

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Q&A	I know this meeting agenda does not include DR, but since we just completed the UTC DR Workshop, what issues and opportunities do you see for PSE to increase their adoption of DR in this IRP. I recall from the PSE SCC Workshop that little DR was adopted, leading one reviewer to say "there must be something wrong with your model". Do you think the model needs adjustment and was there any insights from the DR Workshop that suggests any specific adjustments?	Kevin Jones
Q&A	I look forward to that discussion My question - do you have any insights at this time?	Kevin Jones
Q&A	Let me rephrase with more content: Thanks for your reply on DR Elizabeth. My question - did PSE receive any insights on DR from the UTC DR Workshop?	Kevin Jones



## Appendix

A full verbatim chat log from the meeting is available below. Questions sent only to the meeting organizers have not been included for brevity.

Name	Time sent	Comment
<b>Doug Howell</b>	1:44 PM	Can every one see questions and comments posted here?
<b>John Williams</b>	1:44 PM	yes
<b>Alexandra Streamer</b>	1:44 PM	Hi Doug - yes, all participants can see the questions and comments
<b>Kathi Scanlan</b>	1:44 PM	yes
<b>Alison Peters</b>	1:45 PM	Joni asked if today's meeting link will work for future meetings. No, there will be a new one each time. Thanks Joni. You can share any future comments or questions with "everyone" so everyone can see them. Thank you!
<b>Kathi Scanlan</b>	1:49 PM	Slide 8-Staff requests when discussing IRP scenarios used to develop planning assumptions, including alternative scenarios and 'futures', PSE clearly define what it means by each case, including 'base case' and clearly label and reference what is meant for each case for the discussion today
<b>Kathi Scanlan</b>	1:56 PM	Slide 11-what other analyses needed for the company (last bullet)?
<b>Don Marsh</b>	1:56 PM	Do avoided costs take into account both avoided generation and avoided T&D?
<b>James Adcock</b>	1:56 PM	Slide Page 8 Raise Hand. But what *are* your "planning assumptions?" Whenever we ask you what is your input modeling data, including what range of calendar dates for each of those input datas, you refuse to answer us. And this has been going on for more than 10 years now. The input modeling data IS part of your "planning assumptions"  Slide Page 11 Raise Hand. How do you model the difference in "market prices" between emitting sources of electricity vs. non-emitting sources of electricity? Moving forward towards 2030 the great majority of your electricity needs to come from non-emitting sources.
<b>Joni Bosh</b>	1:56 PM	Just to clarify, is the electric price forecast the same value for all the listed uses on slide 11?
<b>Joni Bosh</b>	1:58 PM	Thanks
<b>James Adcock</b>	2:00 PM	That was not an answer.
<b>Kathi Scanlan</b>	2:01 PM	Slide 13-Clarifying Question: When is PSE planning to discuss its resource adequacy and flexibility model(s) in greater detail? Dates of webinars/meetings?
<b>Kate Maracas</b>	2:02 PM	Is Plexos a power flow model?
<b>elyette weinstein</b>	2:03 PM	Bullet 2- what fundamentals are your referring to, specifically?
<b>Willard (Bill) Westre</b>	2:03 PM	S-14 What MW transmission Constraint numbers are you using for Mid-C and MT wind

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Virginia Lohr	2:04 PM	I hope James Adcock's statement that his question was not answered will be treated as a question and that Elizabeth will attempt to actually answer his original question.
Joni Bosh	2:04 PM	Second Kathi's question - interested in the assumptions and values in the RA model.
elyette weinstein	2:05 PM	I am asking for examples of fundamentals on slide 14. Thanks
John Williams	2:06 PM	General question: If all resources are lumped into a broad energy price then how does your analysis drive a reasonable resource portfolio
Alexandra Streamer	2:06 PM	Hi Bill - PSE will discuss transmission constraints in more detail during the June 30 webinar
Joni Bosh	2:08 PM	Do you count only those resources that are permitted, not those that are planned? Slide 16
Kathi Scanlan	2:08 PM	Slide 16-What date is the data obtained from NWPCC (regional load)?
James Adcock	2:09 PM	Slide 16. How do you in fact model "Regional Load" as an input? What data inputs do you use as inputs to your modeling of "Regional Load?" What range of dates of data inputs used as data to generate your "Regional Load" modeling do you use?
Katie Ware	2:09 PM	On slide 17, does "Resource Assumptions" incorporate any feedback PSE received from the May 28th webinar on Generic Resource Assumptions?
Doug Howell	2:09 PM	Slide 17 - PSE needs to assume social cost of carbon (\$74/ton) for all thermal resources. Why isn't this being reflected?
John Williams	2:10 PM	SLide 16 so Aurora is not used to determine the portfolio?
Willard (Bill) Westre	2:10 PM	Why is SCOC not added to box 6 as well
Kelly Hall	2:11 PM	Slide 17: why are there no new thermal plants built in WA? Is that a constraint on the model? Is SCC only applied to facilities built in Washington?
John Williams	2:12 PM	Why are SCOS values not applied by each resource, since it is not uniform cross all resources.
James Adcock	2:13 PM	I think I am directing my questions to specific issues that PSE is mentioning in passing on the page of the slides that PSE is presenting.
Charlie Black	2:15 PM	Slide 17 indicates that the Social Cost of Carbon (SCoC) is included for thermal builds in Washington. Is the SCoC used for dispatching existing thermal resources in Washington?
Fred Heutte	2:18 PM	the question of counting new resources is an important one -- we are already in a situation where most new resources across the west coming online in the next 5 years will not have commitments (contracts, under construction) much more than 2 or 3 years in advance
Fred Heutte	2:20 PM	note that the NW Council's draft 2021 Plan load forecast is still being refined and will be based on a climate-adjusted baseline -- the initial model inputs will be available soon and PSE should consider using that as perhaps a model sensitivity for the 2021 IRP
Doug Howell	2:22 PM	No. SCC needs to apply to thermal power coming into WA

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Virginia Lohr	2:23 PM	Katie Ware's question was actually a yes/no question. I don't recall hearing if the answer was Yes or No. Please clarify for me.
Kelly Hall	2:23 PM	Follow up on slide 17: when you say SCC only on Washington as a result of CETA, do you mean energy delivered to Washington (but facility may be in another state) or only facilities physically located in Washington?
Doug Howell	2:24 PM	How PSE internalizes SCC should also be applied to price. You have to assume you are paying this price for planning purposes.
Court Olson	2:25 PM	Second Doug Howell's comment that out of state carbon resources need to have the social cost of carbon attached for correct modelling.
Fred Heutte	2:27 PM	on the Council's planning process, we are hearing that early modeling results may be available in August or September, though the official draft plan won't be out until early next year
Kelly Hall	2:33 PM	Slide 19: will you incorporate other policies and commitments from utilities as well, such as Xcel, Idaho Power, and Avista that have committed to 100% as well. And CO's law that utilities consider SCC and make progress towards 90% carbon reduction by 2050? These will also impact price forecasts.
Charlie Black	2:33 PM	The Wood Mac gas price forecast is now two years old. Why isn't PSE using a more current forecast?
Dan Kirschner	2:34 PM	To clarify Slide 19, these are changes (particularly WoodMac 2018 gas price) from 2017 IRP to 2019 Progress Report. Are these the assumptions to be used in this IRP?
Kathi Scanlan	2:37 PM	Slide 21-Please explain the light green slivers on top of the blue non-emitting/renewable resources 2021-2027.
Willard (Bill) Westre	2:38 PM	s-21 Where is existing WA wind?
Kelly Hall	2:38 PM	Slide 21: Is this assuming that CETA investments occur in 2028 and beyond, or are you simply identifying a need? If you are projecting builds, do you expect any differences if you assume these investments occur earlier, starting in 2022 to demonstrate continuous progress as required by CETA?
Irena Netik	2:39 PM	Response to Charlie Black and Dan Kirschner: Jennifer only covered the changes from 2017 IRP to 2019 IRP progress report. 2021 IRP assumptions will be covered next.
elyette weinstein	2:39 PM	Kathy the light green bars are nuclear.
Fred Heutte	2:39 PM	Gas price risk is a complex issue and I'm very wary of simply accepting any forecast especially my own. We're seeing a lot more short term variability right now but the big question for me is what gas prices will look like by 2025 and after and there, I am not satisfied by the conventional wisdom that it will be quite low -- that may be, but we need a sense of upside risk
James Adcock	2:39 PM	Slide 21 Why would you assume that the "Renewable Needs Ramp" starts at the red line of about 10M? and not the blue bar at about 70M?
Kevin Jones	2:40 PM	Please answer Kelly Hall's question on slide 17: when you say SCC only on Washington as a result of CETA, do you mean energy delivered to Washington (but facility may be in

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		another state) or only facilities physically located in Washington?
<b>James Adcock</b>	2:41 PM	(continued) CEIP requires a demonstration of "linear progress ramp."
<b>James Adcock</b>	2:44 PM	You are not answering my question again, I was not asking about PSE, I was asking about THIS SLIDE about Washington State.
<b>James Adcock</b>	2:44 PM	PSE refused to answer my question again.
<b>Brian Grunkemeyer</b>	2:44 PM	If the state has a sharp increase in need in 3 years, is it reasonable to assume that prices of new facilities will increase non-linearly due to a spike in demand for new projects? How do you model this effect?
<b>Court Olson</b>	2:44 PM	Energy demand has not been rising at the rate indicated on this slide as "target". Please confirm that this "target" line is strictly reflecting the renewable energy ramp up needed to meet the law. If so, what future total energy demand is assumed for 2045?
<b>Kathi Scanlan</b>	2:47 PM	Slide 24-What date is PSE for the consultant(s) gas price forecast? Is it one consultant or a blend of consultants gas forecast(s) used as input to Aurora?
<b>Fred Heutte</b>	2:47 PM	a point on slide 22 I will want to do a Raise Hand discussion later -- nominal dollars vs real/discounted present value dollars
<b>Don Marsh</b>	2:49 PM	Court's question reflects our confusion because the Demand Forecast is presented so late in the assumptions portion of the IRP. We would really like to understand demand at the regional level and PSE's service area earlier in the IRP process.
<b>Joni Bosh</b>	2:51 PM	Are those estimated MW builds for Solar and wind for the base year or over the 20 years? Sorry, I had interference and missed a bit of what you were saying.
<b>James Adcock</b>	2:53 PM	Slide 25 Given that US economists are predicting that the COVID-ravaged US economy will not fully recover until the end of the decade, shouldn't the long-term gas prices be updated? And that gas price predictions made before the COVID-19 crash don't have relevancy anymore?
<b>Dan Kirschner</b>	2:54 PM	Slide 25: this appears to be a reasonable approach for gas prices given various sources/forecasts.
<b>Irena Netik</b>	2:56 PM	Response to Kevin Jones: for the electric power price forecast, SCC is applied to facilities physically located in WA state
<b>James Adcock</b>	2:56 PM	Slide 28 What input data assumptions are you using when making this slide? How can we interpret this slide if you don't tell us what assumptions you made when creating this slide? For example, is this slide also based on the assumption of "No New Washington State NG Builds?"
<b>Fred Heutte</b>	2:56 PM	my question on slide 28 is the impact of hybrids (solar/wind plus storage), standalone storage and flexible demand at scale on market prices as compared to renewables by themselves
<b>Don Marsh</b>	3:00 PM	Slide 28 growing price variability makes a great case for energy storage to alleviate high prices during outlier hours. I hope PSE will have some great analysis regarding the

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		economic case for energy storage, especially as battery prices fall and capacities rise. Many utilities are incorporating more battery projects in their plans than PSE seems to be.
<b>Virginia Lohr</b>	3:02 PM	The cost of gas to society has not gone down. The will of humanity is to eliminate all fossil fuels so that we have any hope of a future. I don't fully understand the things you are saying about social cost of carbon and how and when it will be incorporated, but we need to get off of "natural" gas immediately. Artificially low prices for gas, perhaps because of reduced demand, because more and more people know we need to get off of gas, should not be used to justify more gas. Will your modelling lead us to the future that is our only hope for survival?
<b>Fred Heutte</b>	3:04 PM	let me add to my previous comment on slide 28, I would also include pumped storage not just battery
<b>Charlie Black</b>	3:04 PM	Will PSE make the hourly power price forecast results available to the IRPAG?
<b>James Adcock</b>	3:04 PM	Slide 28 follow-up -- Are you <i>*seriously*</i> suggesting that this is a reasonable prediction of future volatility???
<b>Fred Heutte</b>	3:06 PM	just to note, the California ISO says that of new entries to their transmission queue in 2019, 95% of the new solar is hybrid and 75% of wind
<b>James Adcock</b>	3:06 PM	Slide 28 Wouldn't people just build NG Peakers, Battery Storage, or Pumped Hydro to "arbitrage" these high price variability and differential???
<b>Kelly Hall</b>	3:07 PM	Slide 29: why did electric price forecast increase on slide 29 when on slide 27 it appears to have declined slightly?
<b>Joni Bosh</b>	3:11 PM	Will you address Charlie Black's question about hourly price forecasts in the next part of the presentation?
<b>Irena Netik</b>	3:12 PM	Response to Charlie Black: The hourly gas price forecast is confidential. PSE purchases it from Wood Mackenzie. Under our contract we are only able to publish the results provided here.
<b>Fred Heutte</b>	3:12 PM	Concerning slide 29, an important underlying assumption is that market prices are effectively heat rate based, that is, the marginal unit is usually a gas plant which must recover its fuel and start costs -- while true now (except in the spring runoff), I wonder how true that will be in the future as gas is displaced by clean supply and flexible demand -- just a thought
<b>James Adcock</b>	3:13 PM	Why not allow more meeting time in the future so that there <i>*is*</i> enough time to answer questions?
<b>Don Marsh</b>	3:15 PM	Feedback: a price forecast without some accounting of energy storage seems pretty sketchy, I'm sorry to say.
<b>Fred Heutte</b>	3:16 PM	also, market design (the potential EIM Enhanced Day Ahead Market) and the potential NW Power Pool resource adequacy program could have a significant benefit for reducing and stabilizing market prices, but neither of those is yet in place
<b>Fred Heutte</b>	3:18 PM	one of the disadvantages of a four-year IRP cycle is that policy and market changes are evolving at a faster pace than that
<b>James Adcock</b>	3:18 PM	Slide 33 Comment: This assumes that there is an "open" market where utilities share their renewable resources "as needed" [perhaps at a price] with other utilities. But there is

Name	Time sent	Comment
		no such "open market", AND we know historically, for a variety of reasons, there are "utilities" [and I include BPA in that category] who choose not to openly share their renewables with other utilities. If this continues to be the case, then WA-wide *more* new renewables would need to be built than you assume.
<b>Kate Maracas</b>	3:18 PM	To Fred and all - but EDAM and the NWPP RA program are very likely to be in place - in some form, during this planning horizon.
<b>John Williams</b>	3:22 PM	Slide 33 and 34 How accurate historically is the demand forecasting you are using? How much demand can be reduced by extensive conservation? reduce the demand when you cannot meet the need with current resources
<b>Robert Briggs</b>	3:28 PM	Slide #38 - They can build renewables or "optimize their portfolios." Can you explain more concretely what you mean by optimizing a portfolio that can substitute for building renewables?
<b>James Adcock</b>	3:28 PM	Slide 38 Feedback as you have requested: I personally put a very high priority on PSE *actually* meeting the 2030 "80/20" requirements, including "linear progress towards that goal" until 2030. In order to make that more likely I would prefer that PSE assume the higher level of shortfall -- i.e. that other utilities may choose to NOT "fairly" make all of their renewables available to PSE.
<b>Kevin Jones</b>	3:28 PM	Penny - we are here donating our time. We expect dialogue. Please don't tell me you are protecting my time, which I am donating to this process. My time is wasted if we don't achieve dialogue, which we are again failing to achieve.
<b>Fred Heutte</b>	3:29 PM	Just want to underscore the importance of revisiting or perhaps adjusting from the Council's 7th Plan forecast which was basically locked down in mid-2015.
<b>Katie Ware</b>	3:29 PM	Slide 34 - Have you given any thought as to how each of these modeled scenarios could affect CETA's incremental cost calculation?
<b>James Adcock</b>	3:31 PM	Agree with Kevin Jones -- with the current format, where we cannot directly ask questions, and follow-up to clarify our questions and actually get meaningful answers -- this current choice of PSE meeting format where we are not actually allowed to talk to PSE presenters, and are not actually allowed to directly ask questions and clarifications -- which is "wasting my time."
<b>Virginia Lohr</b>	3:33 PM	Giving PSE time to get through their presentation clearly is simply "informing." People attending these meetings are not doing so simply to be informed, but clearly want to have meaningful input into the process. There appears still to be something broken in the system when the goal is for PSE to get through their presentation. This is no change or even a back-track from the last IRP process. Your feedback requested on slide 38 seems rather simplistic given the entire slide deck.
<b>David Perk</b>	3:34 PM	+1 to what Virginia Lohr writes about informing vs dialog.

Name	Time sent	Comment
<b>Kathi Scanlan</b>	3:34 PM	<p>Question 1: What is PSE's base case scenario for electric price forecast - is PSE calling it "IRP Mid - Draft" in this presentation? Please clarify base case.</p> <p>Question 2: Does PSE mean in the "No CETA" or absent those standards under CETA RCW 19.405.040(1) and 050(1) as well as implied cost of coal close-out in 2025? The "No CETA" scenario is not clear. For example, how does this scenario relate to the CETA incremental cost baseline and draft Clean Energy Implementation Plan (CEIP) draft rules? Staff requests a response to the connection to CETA requirements and CEIP draft rules.</p>
<b>John Williams</b>	3:35 PM	The sensitivity of multiple variable can be addressed by doing a linear regression (?). This may help to determine the "best answer" to the possible scenarios. You need a consulting statistician which I am obviously not.
<b>James Adcock</b>	3:36 PM	Slide 43: I'd like to see a "COVID-19 Crash" compatible scenario, which assumes Low Demand *and* Low Gas Prices, *and* CETA requirements, including "linear implementation ramp" from 2020 to 2030.
<b>Robert Briggs</b>	3:36 PM	Would you please refresh our memories on what year's data the 7th Power Plan was based on. Is there really no more recent data that could be used to update those projections?
<b>Doug Howell</b>	3:36 PM	Slide 42. CETA \$74/ton is now an average or baseline, but certainly not a high case scenario. InterAgency Working Group has high of \$123/ton (2007 dollars)
<b>Robert Briggs</b>	3:38 PM	The comment that the low gas prices were based on delays in approving LNG
<b>Dan Kirschner</b>	3:38 PM	7th Power Plan published in early 2016
<b>Robert Briggs</b>	3:39 PM	2016
<b>Fred Heutte</b>	3:39 PM	The 7th Plan was formally adopted in February 2016.
<b>Fred Heutte</b>	3:41 PM	raise hand -- slides 22 and 27
<b>James Adcock</b>	3:42 PM	Raise Hand.
<b>James Adcock</b>	3:42 PM	Can I use the microphone?
<b>Robert Briggs</b>	3:43 PM	I agree with Fred on the real dollar comment!
<b>Warren Halverson</b>	3:43 PM	In PSE's Docket UE190529 & UG 19530, January 2020, PSE requested a roughly 7% increase in electric and natural gas prices. Simultaneously, the WSJ had an article entitled "Glut pushes natural gas prices below \$2 -- a drop of 61% in two years -- several factors were mentioned.
<b>Robert Briggs</b>	3:44 PM	Two part comment on slide #28.
<b>Warren Halverson</b>	3:45 PM	How is this recent demand data inputted into your modeling? Should more recent years be and climate warming be more highly weighted in your models?
<b>Alexandra Streamer</b>	3:46 PM	@Warren, would you like to verbally state those questions or would you prefer that we read it?
<b>Katie Ware</b>	3:46 PM	Raised hand

Name	Time sent	Comment
Don Marsh	3:48 PM	Raise hand (IAP2 process)
James Adcock	3:49 PM	7th Power Plan was begun in 2010, after the 6th Power Plan was published.
Charlie Black	3:52 PM	Will the wholesale power price forecasts be made available at the hourly price level of granularity?
James Adcock	3:54 PM	WAC regulations require IRP *Participation* NOT *Presentation* !
Kate Maracas	3:58 PM	Riase hand -
James Adcock	3:58 PM	Slide 28 Even "just" BPA hydro modulation -- BPA choosing to generate more when prices are high, and to generate less when prices are low -- since most hydro *is* a form of stored energy -- would *in practice* greatly compress the assume high variability in this slide.
Court Olson	3:59 PM	The response to the question from Don Marsh is not satisfactory. This problem of dialogue and interaction has been long standing with PSE TAG meetings in the past and it has been worsened in the webinar format. This is not because a webinar format prevents the level of interaction that we would like and have been requesting for years. It appears to clearly be the PSE preference to have condensed meetings that are largely in presentation form. Please reconsider your response voiced today by the meeting facilitator. Many of us are not feeling that these meetings are as interactive as they should be. If more time is needed, then make a little more time available for dialogue during presentations. That should not be difficult. We'll appreciate your consideration.
Robert Briggs	4:00 PM	Two part comment on slide #28: There are vertical scale problems on this slide. There may be a lot of valuable data on the slide but they are obscured by the presentation. A log scale or other technique could solve the problem. It does appear that there are significant numbers of VERY inexpensive power. What assumptions about storage are embedded in the graph?
Kathi Scanlan	4:00 PM	In the context of the 2019 IRP Progress Report and changes compared to these 2021 draft numbers, would you discuss the three primary inputs that affect power prices and what you've seen in terms of changes in modeling and results thus far?
Kevin Jones	4:01 PM	I agree with Don re: lack of improvement in exchange of info between the public and PSE and will add (1) TAG members raised this same issue - a lack of dialogue - in the 2019 IRP. I expect that is true from years past. PSE has not solved this problem, despite the IAP2 claims, the remote engagement and the point that there are 50 people on the call, and (2) Comments in response to the 2021 PSE IRP work plan stated: "To successfully address this concern (unresolved issues), we call upon PSE to ensure strong stakeholder engagement and allow sufficient Milestone B time to successfully resolve these issues to the satisfaction of the primary stakeholders" to which PSE responded "We are going to continue to update the meeting schedule as we develop the IRP technical work and receive stakeholder feedback on the specific technical topics". I appreciate your dedication to addressing public concerns by



Name	Time sent	Comment
		allowing sufficient time for dialogue. It appears that additional IRP work plan schedule adjustments are needed.
<b>Fred Heutte</b>	4:08 PM	raise hand for a comment on prices
<b>James Adcock</b>	4:08 PM	Raise Hand
<b>Virginia Lohr</b>	4:08 PM	Please read my comment from 3:33, which reinforces what toehrs ahve said.
<b>Robert Briggs</b>	4:09 PM	I was puzzled by the comment made along with slide #26 that the 20-year low price for gas reflected delays in permitting LNG export facilities. Does this suggest that another 20 years of delays are anticipated in Kalama Methanol and Jordan Cove? Or did I mishear? In any case, it strikes me that a longer view on these prices is needed.
<b>Alexandra Streamer</b>	4:09 PM	To confirm, Virginia, is this the comment: "Giving PSE time to get through their presentation clearly is simply "informing." People attending these meetings are not doing so simply to be informed, but clearly want to have meaningful input into the process. There appears still to be something broken in the system when the goal is for PSE to get through their presentation. This is no change or even a back-track from the last IRP process. Your feedback requested on slide 38 seems rather simplistic given the entire slide deck."
<b>Kevin Jones</b>	4:10 PM	Could you explain the rationale for the position that PSE does not apply the Social Cost of Carbon to electricity that comes in from other states when PSE calculates their IRP power price?
<b>Kevin Jones</b>	4:19 PM	Thanks Elizabeth. I'll give that more thought and see if I have a follow-up input.
<b>Kate Maracas</b>	4:19 PM	Raise hand.
<b>Don Marsh</b>	4:23 PM	I would love to feel that PSE is making a leading-edge effort to embrace smart and modern technologies like energy storage, demand response, distributed generation, and energy efficiency. We feel that many other utilities are doing a better job in these areas. A company serving a technologically advanced and environmentally aware customer base in the Puget Sound region should be providing a great example for the whole country. Stakeholders are trying to do our part.
<b>Don Marsh</b>	4:23 PM	Perhaps that can be demonstrated in the CEIP?
<b>Kevin Jones</b>	4:24 PM	I know this meeting agenda does not include DR, but since we just completed the UTC DR Workshop, what issues and opportunities do you see for PSE to increase their adoption of DR in this IRP. I recall from the PSE SCC Workshop that little DR was adopted, leading one reviewer to say "there must be something wrong with your model". Do you think the model needs adjustment and was there any insights from the DR Workshop that suggests any specific adjustments?
<b>Kathi Scanlan</b>	4:24 PM	Staff appreciates that we can see all questions asked in this GoToMeeting real time. Thank you for making this change.
<b>Alexandra Streamer</b>	4:24 PM	@Don and @Kevin, would you like to read that out or just submitting for comment?
<b>Kevin Jones</b>	4:24 PM	That is a question for PSE to address.

Name	Time sent	Comment
<b>Don Marsh</b>	4:24 PM	You can read mine. Thanks
<b>James Adcock</b>	4:26 PM	If PSE "Promises" to answer my question about what their data sources into their analyses are, and what range of historical dates that data comes from, that would be a step forward after 10 years of waiting. For example PSE just "answered" my previous question about Wind data by referring me to a 5 Terabyte database, out of which PSE only actually uses about 5 Megabytes, which means that somewhere in there literally 1 part in a Million of where PSE pointed me to, is the actual answer. So PSE's "answer" is to send me off for literally a "Find One Needle in a Million Hay Haystack" -- Is This Seriously what you call "Answering my question?"
<b>Robert Briggs</b>	4:27 PM	Regarding slide #35, I'm a little concerned regarding the simplistic choices we have been encouraged to provide feedback on. If you're serious about getting feedback, it needs to be unbundled and have far more technical detail. I prefer the green line (Secenario 1), but why do we not see renewable builds until year 9? I'm confused.
<b>Kevin Jones</b>	4:27 PM	I look forward to that discussion My question - do you have any insights at this time?
<b>James Adcock</b>	4:28 PM	So Once Again -- You are not Answering My Question???
<b>Kevin Jones</b>	4:29 PM	Let me rephrase with more content: Thanks for your reply on DR Elizabeth. My question - did PSE receive any insights on DR from the UTC DR Workshop?
<b>David Perk</b>	4:29 PM	Take a deep breath, James!
<b>James Adcock</b>	4:29 PM	They always dodge my questions.
<b>Kevin Jones</b>	4:30 PM	I suggest PSE stay on for another 10 minutes to answer unanswered questions, allowing others to leave if they choose to.
<b>Robert Briggs</b>	4:30 PM	I second.
<b>Kevin Jones</b>	4:31 PM	Letting the clock take priority over public inputs is disrespectful.