

## PSE IRP Feedback Report

### Webinar 12: Delivery System Planning 10-year Plan, Flexibility Analysis Results, Economic, Health and Environmental Benefit (EHEB) Assessment, of Current Conditions Status Update, Portfolio Draft Results

February 10, 2021

2/24/2021

The following stakeholder input was gathered through the online Feedback Form, from February 3 through February 17, 2021. PSE's response to the feedback can be found in the far-right column. To understand how PSE incorporated this feedback into the 2021 IRP, read the Consultation Update, which will be released on March 3, 2021.

Feedback Form Date	Stakeholder	Comment	PSE Response
2/3/2021	Stephanie Chase, Sarah Laycock; Public Counsel Unit, Washington State Attorney General's Office	<p>Public Counsel has reviewed PSE's draft IRP and appreciates the Company's efforts in this planning process. We have a few comments and questions for the Company:</p> <p>Public Counsel understands that PSE has started the process to develop an equity advisory group has begun reaching out to stakeholders. How will that development be described in the final IRP? Is the goal to include more detailed plans for outreach and development of the advisory group in the final IRP?</p> <p>Can PSE provide more detail about what the 'assessment of current conditions' references on page 2-5 includes?</p> <p>Page 2-13 refers to a figure "2-XX." It is unclear which figure this should be and the figure number should be updated.</p> <p>Thank you for your attention and response. Sincerely,</p> <p>Stephanie Chase &amp; Sarah Laycock Regulatory Analysts Public Counsel</p>	<p>PSE is actively working towards forming the PSE's Equity Advisory Group, and anticipates commencing meetings in mid-March. The Final IRP will describe the work PSE has completed as of the filing deadline in regards to consultation and launch of the first Equity Advisory Group. PSE plans to file the Clean Energy Implementation Plan's Public Participation Plan with the Commission in May 2021, which will highlight engagement with customers and advisory groups over the course of the CEIP development.</p> <p>The reference to "assessment of current conditions" corresponds with the process PSE is taking to develop the Economic, Environmental, Health and Environmental Benefits Assessment of Current Conditions. This assessment is needed to provide insight to the existing conditions of PSE customers, based on the assessment metrics proposed by PSE. PSE takes a "snapshot" of existing PSE customers based on metrics identified in the Assessment, in order to capture the conditions of each defined customer group, as well as determine where the disparities may be within each named customer group. PSE describes the assessment further in Appendix K, which will be updated for the Final IRP.</p> <p>The correct figure number is 2-8. PSE appreciates Public Counsel for bringing this to our attention. The reference will be corrected in the Final IRP.</p>
2/8/2021	Keith Dunbar	<p>I read through the draft report. While I see the prospect of 3 or more pumped storage projects (which in my mind will help meet night time electrical demand of non-day light hours for solar cell electrical generation, and non-sustained wind days for wind turbines), I do NOT see any consideration of one or more waste to energy plants being considered. For example, the West Palm Beach County, Florida waste to energy plant provides 95 Megawatts of dependable and sustained energy to the region.</p> <p>In my mind, Snohomish, King and Pierce Counties alone could sustain at least one of these plants. Harmful chemicals are removed, and air quality controls limit emissions. It could be a win-win situation providing a solution to the large majority of solid waste disposal needs of these large populated counties, and would provide dependable energy to PSE and the region. The siting of such a facility should be adjacent to existing rail corridors. County waste management centers and transfer stations could locate adjacent to rail lines as well to transport waste material to the plant. This would help to eliminate long-haul of waste along the regions transportation network, help in reducing congestion and fuel use of trucks that would reduce long haul trips. Another waste to energy plant could be considered for the northern service area in Whatcom and Skagit Counties as well.</p> <p>Along with additional research on Hydrogen Fusion as a potential energy source, one or more waste to energy plants should be studied. Spokane, WA has one, but it is an older and much less efficient plant than those found in West Palm Beach County and other locales.</p>	<p>Thank you for the suggestions concerning PSE acquiring power from waste-to-energy plants and input concerning resource siting and recommendation for close proximity to rail. Currently, PSE purchases electricity produced through a waste-to-energy project via a power purchase agreement under a Schedule 91 contract. PSE also purchases the pipeline quality natural gas from the largest landfill in PSE's service territory, the Cedar Hills landfill. Waste-to-energy projects are discussed in PSE's Draft IRP in Appendix D on pages D-71 and D-72.</p>
2/17/2021	Orijit Ghoshal, Invenergy	<p><u>General comments on Webinar 12:</u> Invenergy is concerned that PSE is not providing clear and detailed information about its assumptions, analyses and results for the 2021 IRP. These concerns were reinforced during Webinar #12. The vague and insufficiently detailed information being provided by PSE makes it difficult to assess whether the Flexibility Analysis and Portfolio Draft Results presented on February 12, 2021 are sound and reasonable. While this has been an ongoing concern, PSE's willingness to share meaningful information and constructively respond to stakeholder questions and comments appears to be degrading further.</p>	<p>Thank you for your general comments and specific comments to include the Social Cost of Greenhouse Gases in the Flexibility Analysis, revise flexibility cost savings, perform portfolio analysis using SCGHG as an incremental cost of dispatch, and to provide more detail on the timing of resource additions. Your letter is included as an attachment to this report, and individual questions and PSE's responses provided below.</p>

Feedback Form Date	Stakeholder	Comment	PSE Response
2/17/2021	Invenergy	<p><u>Specific comments on Webinar 12 (Flexibility Analysis, Question 1):</u> Social Cost of Greenhouse Gas (SCGHG): It was not clear from PSE's presentation whether or how it has included the SCGHG flexibility analysis it performed using the PLEXOS model. In response to stakeholder questions, PSE initially stated that the SCGHG was included "in the portfolio model". However, the portfolio model is separate from PLEXOS. When prompted, PSE admitted that it did not include the SCGHG in the flexibility analysis. Invenergy continues to urge PSE to include the SCGHG as a variable cost of dispatch for GHG-emitting generation, including in the flexibility analysis. Not including the SCGHG in the flexibility analysis ignores the environmental externality costs of dispatching GHG-emitting resources. It also biases PSE's results in favor of more GHG-intensive peaking generation relative to less GHG-intensive combined-cycle combustion turbine (CCCT) generation.</p>	<p>PSE models SCGHG as a planning adder, not as a dispatch cost, since we are trying to model real-world dispatch of resources. However, PSE evaluated a portfolio sensitivity where the SCGHG was included as a dispatch cost. Detailed portfolio results will be available in the Final IRP. Since the purpose of the flexibility analysis is to track the dispatch changes from the day ahead to the real time, fixed costs are not included in this modeling process, just variable costs. The SCGHG is accounted for in the portfolio modelling rather than the Flexibility Analysis.</p>
2/17/2021	Invenergy	<p><u>Specific comments on Webinar 12 (Flexibility Analysis, Question 2):</u> Flexibility Cost Savings: Slide 32 of PSE's presentation shows flexibility cost savings of \$23.45- \$25.39/kilowatt-year for peaking generation and \$5.27 per kilowatt-year for CCCT generation. If PSE's analysis only addressed intra-hour (e.g., 15-minute) Flex Up and Flex Down violations, the results appear quite high, especially for peaking generation. Alternatively, if the flexibility analysis also addressed flexibility benefits across longer time increments (e.g., hourly, diurnal) – as it should – PSE's assumptions about the flexibility capabilities of CCCTs are unrealistically restrictive. In addition, if PSE's flexibility analysis treats all CCCTs as being dispatched on a concurrent basis, this would further under-value the flexibility benefits of CCCTs compared to a more realistic operational approach that allows CCCTs to be dispatched on a sequential basis (i.e., not necessarily at the same time). Under a sequential dispatch approach, a group of CCCTs could provide flexibility cost savings because only one or a few CCCTs would need to be operated at partial-loading at any given point in time.</p>	<p>CCCT's are non-cycling units since they cannot be turned on and off every hour like a more flexible SCCT or battery. So they are dispatched in the day ahead model and in the hourly model. When moving into the real time model, if the unit is already on, they can be flexed from min load (partial load) to full load. The decision to commit a CCCT in the model is done through the unit commitment logic. This logic is applied individually to each unit (sequential basis), however the decision to commit a unit is dependent on what has already been committed.</p> <p>Below is an excerpt from the manual located in the help function of the AURORA model on how the unit commitment logic works:</p> <p>Unit Commitment is used for all non-cycling units and commitment decisions evaluated and updated for every hour of the dispatch. This method uses zone-specific, 168 hour-ahead, internal market price forecasts to evaluate the economics of unit commit and de-commit decisions. The internal zone forecasts use observed zonal price history in conjunction with other observed simulation parameters to produce the 168 hour-ahead forecast. The internal forecasts are updated dynamically each hour as model chronology proceeds.</p> <p>At the beginning of each dispatch hour, all non-cycling units are classified according to their commitment eligibility. Units that have been offline for at least their minimum down time are eligible for commitment. Those that have been running for at least their minimum up time are eligible for de-commitment. For commitment eligible units, an algorithm is run to determine the unit's expected pattern of operation and resulting cash flow over its minimum up time, if started in the hour, and compensated according to the hourly price profile contained in the internal forecast. Unit minimum capacity, heat rate at minimum, bid factors, start up costs, start up fuel, and operating fuel choice decisions are fully represented in this algorithm. If estimated profit over the minimum up period exceeds the economic hurdle rate for commitment (specified through the unit's non-cycling factor), a decision is made to commit the unit (unless the forecasted value of operation in the first hour is negative, excluding all start-up costs).</p> <p>A similar process is used to evaluate the economics of shut down decisions for any non-cycling units that are eligible for de-commitment in the hour. The model will decide to either continue operating the unit for an additional hour, or to shut the unit down (de-commit), depending on the expected consequences (profitability) of continued operation. Those consequences are estimated by examining hours successively farther into the future, one hour at a time, until the accumulated forecasted operating results satisfy one of two alternative conditions; either accumulated value (revenues – variable costs) is a loss that exceeds start-up cost, or accumulated value is positive.</p>
2/17/2021	Invenergy	<p><u>Specific comments on Webinar 12 (Portfolio Analysis Results, Question 3):</u> Social Cost of Greenhouse Gas (SCGHG): From PSE's presentation, it is not clear whether it has performed meaningful portfolio analyses that include the SCGHG as an incremental cost of dispatch for GHG-emitting generation. Instead, PSE continues to treat the SCGHG as a fixed cost, calculated after-the-fact, based on generation dispatch costs that exclude the SCGHG. Invenergy has previously</p>	<p>PSE appreciates Invenergy's extensive comments regarding SCGHG. However, PSE believes that CETA is clear that SCGHG should be applied as a cost adder and disagrees with Invenergy's position to apply the SCGHG as a dispatch cost. Nevertheless, in response to Invenergy's and other stakeholder's feedback, PSE has modeled SCGHG as a dispatch cost as</p>

Feedback Form Date	Stakeholder	Comment	PSE Response
		submitted extensive comments, including in PSE's 2021 IRP process and in the Clean Energy Transformation Act (CETA) rulemakings that explain why the SCGHG must be included as an incremental cost of dispatch. Invenergy continues to encourage PSE to include the SCGHG as an incremental cost of dispatch for GHG-emitting generating resources, including in its portfolio analyses.	one of the portfolio sensitivities. The portfolio modeling was not finished for the Feb. 10 webinar and will be included in the final IRP. Stakeholders will see that including SCGHG as a dispatch cost does not have any meaningful change on the portfolio results.
2/17/2021	Invenergy	<u>Specific comments on Webinar 12 (Timing of Resource Additions, Question 4)</u> : PSE's presentation of the results from its updated portfolio analysis provides a startling lack of detail about the timing of new resource additions. The only place where new resource additions are presented for PSE's updated portfolio analysis is on Slide 54, entitled "Portfolio costs and resource additions". This slide only provides total additions for each type of resource over the entire period from 2022-2045. No information is provided for the timing of resource additions within the 24-year planning horizon. As a result, this makes it very difficult to assess the validity of PSE's portfolio analysis and results. In particular, it obscures results for resource additions during the critical upcoming period, including the next five years. That is the most important timeframe for the 2021 IRP, in part because PSE will be able to use its 2025 IRP to update its resource strategy for the latter half of the coming decade. Invenergy considers it highly unusual for PSE to obscure the results of its portfolio analysis in this way, and at such a late stage in the 2021 IRP process. Invenergy requests that PSE provide more detailed information as soon as possible about the timing of the resource additions in its portfolio analysis, including annual resource additions, by type of resource, during 2022-2029.	The portfolio modeling was not finished for the Feb. 10 webinar and PSE did not want to share partial results. Detailed portfolio results, including the annual builds will be available for each portfolio in the final IRP.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Questions and comments from presentation.	Thank you for your questions. PSE inserted each item below along with PSE's responses.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 12: Where do the proposed criteria come from? Why 3+ yrs, for example? We gather that depending on the circumstances, storage could be implemented as fast or faster than traditional wire solutions.	<p>Getting any type of planned project completed in today's environment is a lengthy process. A pole replacement project takes 2 years and cable replacement project takes 3 years from the beginning of the planning analysis to completion. While it would seem like the 3+ year timeframe is long, it is quite typical.</p> <p>Let's break the process down for better understanding. Year 1 is the planning analysis, gathering data to identify the need and alternatives. For non-wires solutions and hybrid analysis this is about a 6 month process. Then any solution is evaluated through PSE iDOT model and funding is determined. Year 2 encompasses about 6 months for performing design and permitting which may include a lengthy RFP procurement process. For solutions that need land or right of way, it may take even longer depending on the public participation. This permitting process takes the same amount of time even for replacing an asset in place or installing on PSE property. Year 3 is spent in construction.</p> <p>For DERs, like behavior based demand response, additional time is needed to market, procure, integrate, test, and confirm that expected results work. Some traditional wire solutions take a long time due to public participation processes, processes that may impact DER solutions in a similar way. PSE will continue to evaluate this time criteria as more projects are implemented and can be learned from. Additionally, leading utilities also use a timeframe of 3-5 years as key suitability criteria to consider non-wire alternatives. Finally, PSE's own experience with Bainbridge Island for which study work began in 2018 will only begin to implement its demand response program in 2021 and battery in 2022.</p>
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 19: PSE's guiding question seems to be - does the company have enough time? Is there a reason why PSE would or would not see system needs coming pretty far in the future? It is a 10-year plan, after all. Could the company provide some examples of what would occur that would cause a change in planning requirements for a circuit that would not be identified in the 10-year plan?	<p>By looking out at least 3+ years and into the horizon of 10 years, there is enough time to analyze for future non-wire analysis. However, like the IRP that is iterative, assumptions change and therefore needs not previously identified may surface. Assumptions regarding load and local customer request routinely reshape the plan.</p> <p>PSE's 10-year plan is based on system forecasts fully including conservation efforts. This process does identify our large growth areas well, however, there are still near term changes</p>

Feedback Form Date	Stakeholder	Comment	PSE Response
			that can accelerate growth in a local area. We have seen this in many of our downtown cores as they rapidly build out to meet demand, or in other warehouse districts where high energy density companies have taken up occupancy. Those have consisted of data centers in the past and more recently, office buildings implementing a high number of EV chargers have accelerated growth in local areas. These changes in assumptions has surfaced new near term needs in some cases.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 21: This graph is useful. Is there a wired solution cost estimate that could be included in this graph?	The levelized cost of capacity graphic is a very good way to detail the stack of cost-effective non-wire alternatives. More information regarding the costs for the wired and non-wired alternatives can be found in the Bainbridge Island study in Appendix M of the IRP and also on the project website at <a href="https://psebainbridge.com/reliability-and-grid-modernization">https://psebainbridge.com/reliability-and-grid-modernization</a> .
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 22: To what degree does this analysis hinge on battery valuation? If option 3 BAU + DER + ES is clearly more expensive, but the value stream of the related resources may provide more benefits than just solving local capacity constraints.	Part of the feasibility analysis is determining if the cost difference between a wired solution vs a non-wired (or hybrid) solution is close enough to complete a more detailed economic evaluation considering the additional value streams of energy storage. In the case of Kitsap, our industry experts recommended no further analysis as the benefit streams from energy storage would not be able to offset a cost delta of \$100-130M to implement the energy storage system. In addition, this would be a very large battery system estimated at 45 MW, and 250+ MWh's of storage. There are very few examples of energy storage deferring this large of a transmission deferral need in the industry. Based on this as well as the significant cost increase to address this need with non-wire alternatives, the wired solution was recommended.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 24: This is also a useful chart, but it seems that the NWA solution works in many scenarios. For a diurnal need such as this circuit shows, a longer- but not multi-day solution may be workable. Is there a \$/kw-yr cost threshold that would beat the traditional wired solution? A tipping-point analysis on how cheap batteries need to be to beat the traditional solution may be informative.	As the lower graphic shows, the discharge time is up to 12 consecutive hours in year 1 and this will increase as load grows over time. When sizing an energy storage system both the discharge and recharge time including round trip efficiency losses need to be taken into account. Thus, a larger energy storage system is needed to fully address the capacity needs for the Lynden substation. Regarding an overall cost tipping point, we evaluate each project alternative comparing the portfolio cost to implement and thus address each need. In this case, the cost for a hybrid alternative using energy storage to address the capacity needs was over twice the cost of the wired alternative.  For future optimistic pricing considerations, a tipping-point analysis could be helpful in identifying when a non-wire alternatives should consider a certain technology. This is something we will be continually updating as new technologies evolve and cost to implement decrease.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slides 37-38: Census tracts at least partially on Indian Country as Highly Impacted Communities. They are not a separate designation under CETA. We suggest nesting tribes under HIC's header.	Thank you for clarifying the relationship between Highly Impacted Communities and Tribes. PSE will include census tracts at least partially located on Indian Country as Highly Impacted Communities in the assessment results provided in the Final IRP. These results will be available in Appendix K. PSE will continue to engage with Tribes to better understand the designation for these named communities for the CEIP.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 38 - under vulnerable populations: it's probably just semantics, but rather than saying "requires definition" it may be more accurate to say "requires selection of specific adverse socioeconomic factors and sensitivity factors"	Thank you for the suggestion of language that more clearly explains the process of identifying Vulnerable Populations. Future work will endeavor to incorporate this language when describing assessment methodology.
2/18/2021	Kyle Frankiewicz, Washington	Slide 40: This is something that took a few conversations to click, but vulnerable populations are more about demographics, and highly impacted communities are more geographically defined. Of course, there will be overlap, but identifying vulnerable populations means selecting factors, not scores on the map.	Thank you for clarifying the relationship between Highly Impacted Communities and Vulnerable Populations; where HICs are characterized by the Cumulative Impact Analysis (a largely geographic analysis) and VPs are characterized by selected demographics.

Feedback Form Date	Stakeholder	Comment	PSE Response
	Utilities and Transportation Commission	<ul style="list-style-type: none"> <li>○ Map scores may be useful for understanding geographic distribution of those demographics (which is relevant to disparities mapping and program design), but it's important to clarify that vulnerable populations are first and foremost a demographic designation.</li> <li>○ All factors must be linked to either adverse socioeconomic factor or vulnerability factor; it would be helpful to say whether a given factor is related to one of these two categories of factors, and to provide some justification for each bulleted factor being considered – this will be needed in CEIPs.</li> <li>○ Note: Vulnerable populations are not covered by DOH's CIA – per statute, CIA is specific to highly impacted communities. DOH's mapping may help identify relevant factors as one possible data source, but UTC rules require utilities to propose specific factors in their CEIPs. Designation is not about averages; it is a binary yes/no regarding whether a customer meets the threshold of one or more of the sensitivity factors/adverse socioeconomic factors. <ul style="list-style-type: none"> <li>▪ If, for example, one factor is low-income status based on 200 percent FPL, any customers meeting that threshold are vulnerable even if they don't meet any of the other factors' thresholds, and even if they are not in an area identified as a highly impacted community.</li> </ul> </li> <li>○ Equitable distribution determination may allow for consideration of degrees of vulnerability, but we need to start by understanding the full universe of vulnerable populations.</li> </ul>	<p>PSE had previously interpreted the rulemaking to mean that HICs and VPs were both geographically defined, with HICs characterized by the CIA and VPs characterized by a subset of indicators specifically related to vulnerability (socioeconomic factors and sensitive populations).</p> <p>PSE sees the value in approaching the assessment from both a geographic and demographic perspective. However, given time constraints, demographic characterization of VPs will not be incorporated into the 2021 IRP. PSE will make efforts to revise the assessment in time for the Clean Energy Implementation Plan.</p> <p>As part of the CEIP process, PSE will work with the Equity Advisory Group and customers to refine the definition of vulnerable populations, including the demographic factors:</p> <ul style="list-style-type: none"> <li>• VPs characterized by demographic indicators</li> <li>• VP demographic indicators will be justified as either an adverse socioeconomic factor or vulnerability factor</li> <li>• VPs will be characterized on a binary basis, whereby if an individual meets any demographic criteria, that individual will be considered vulnerable</li> <li>• Customer and Equity Advisory Group feedback</li> </ul>
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 41: For CEIPs, utilities need to be conducting customer outreach on vulnerable populations factors, then bring that research to the stakeholder process for help processing customer input. The customer input component doesn't seem to be included or at least not clearly identified.	Thank you for the guidance regarding customer feedback on vulnerable populations and the assessment. PSE has incorporated stakeholder feedback from the November Webinar into the Economic, Health and Environmental Benefits Assessment and will continue to incorporate additional feedback from this and future meetings. PSE is in the process of establishing the public participation process, including the formation of an Equity Advisory Group, to provide additional guidance on these matters as the CEIP is developed. Through the public participation process, PSE envisions engaging customers across the service area, and using this feedback in conversations with the EAG and other advisory groups.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 43: How can this assessment be supplemented with a demographic analysis rather than being purely geographic?	PSE had previously not understood the assessment to require a demographic analysis component. It will take time to gather relevant data and establish methods and criteria. Please look for progress on this topic as the CEIP is developed. Also see responses above.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 44: CIA ranks have limited use for understand magnitudes, but the map includes underlying data that can be used to understand magnitude of disparities. Are you going to supplement the tool with other analysis including demographic and qualitative analysis? How is the assessment tool helpful for understanding indicators since customer benefit indicators must be developed based on customer input?	<p>Underlying data used to develop ranks may always be consulted by PSE when interpreting the results of the assessment. PSE has elected to not include underlying data in the public facing assessment to facilitate comparisons between disparate data types, allow for combinations of disparate data types and allow for sharing of otherwise confidential/proprietary information.</p> <p>Supplementary demographic information will be included in future work related to CEIP development (see responses above). Qualitative analysis will be included in narrative discussion of the assessment metrics within Appendix K of the Final IRP and further developed in the CEIP.</p> <p>PSE expects the Economic, Health and Environmental Benefit Assessment and customer benefit indicators to evolve as the long term planning process transitions from the IRP to the CEIP. The Equity Advisory Group will have an opportunity to inform assessment methodology, criteria and indicators. These insights will then be incorporated into future work in an iterative</p>

Feedback Form Date	Stakeholder	Comment	PSE Response
			process. This first assessment is intended to begin the conversation and assess current conditions at PSE.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 45: This slide may still need more lines including between: 1) CBIs and IRP [this is reflected on slide 56], and 2) HICs/VPs and CBIs. Line from assessment should be linked to plans, not CBIs as those stem directly from customer outreach.	Thank you for sharing this feedback on our concept flow diagram. PSE is still actively developing its understanding of how these new ideas and how workflows will mesh together throughout the power planning process. PSE will incorporate this guidance into its practice and future communications.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 46: CBIs are about benefits/burdens, not programs, data sources etc. <ul style="list-style-type: none"> <li>○ CBIs on this list could benefit from some translation of current format to outcomes</li> <li>○ Economic CBIs of energy burden, unemployment, poverty and health CBIs of SO2, NOx, and PM seem the most like outcomes.</li> <li>○ CBIs are what are called “assessment metrics” on this slide. If a label is needed for the “resiliency”-level element, I’d recommend CBI area or category. It may still be helpful to have assessment metrics based on their correlation with CBIs</li> <li>○ Generally speaking, the examples of this slide warrant a conversation about how specific CBIs should be. Is resiliency specific enough or should CBIs be specific measures of resiliency? UTC rules contemplated multiple CBIs could/should roll up to the CBI areas listed in the statute/UTC rules.</li> </ul>	Thank you for the feedback on Customer Benefit Indicators. Your insights are very helpful as PSE develops its understanding of CBIs. <ul style="list-style-type: none"> <li>• Outcomes – Thinking of CBIs as outcomes is a very useful tool. PSE acknowledges that several CBIs listed on this slide may align more closely with programs, than outcomes. PSE will work to re-align Assessment CBIs to be more outcome focused, however, the outcomes of this effort will not appear in the Final IRP, but will be available for the CEIP.</li> <li>• PSE will adjust messaging away from “Assessment Metrics” and instead use CBI to describe specific measures of benefits and burdens. To aid in organization and workflow, CBIs will be grouped by “CBI Type”. These changes will be incorporated into the Final IRP and future communications.</li> <li>• PSE will continue to explore the specificity of CBIs both internally and with stakeholders as CBIs are further developed.</li> </ul>
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 47: We believe the term assessment metrics might be used in multiple ways. We suggest dropping the term from this slide and calling them CBI categories. <ul style="list-style-type: none"> <li>○ In the context of the assessment, relationship between "assessment metrics" and CBIs might be correlated or not. For example, people who experience bad air quality might really care about air quality improvement, or not--maybe they care more about jobs. This is why it is important to include customer input in this process.</li> </ul>	Thank you for this comment. It helps to clarify the relationship between “Assessment Metrics” and “Customer Benefit Indicators”. In the Final IRP and in future communications, PSE will use the term “Customer Benefit Indicator” instead of “Assessment Metric”. Furthermore, customer input will be used to further develop Customer Benefit Indicators as the Equity Advisory Group is established.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 57: Do talking points include comments about updating these CBIs in the CEIPs based on customer input?	Thank you for the question. Yes, CBIs will be informed by customer input as the Equity Advisory Group is established and the public participation process is implemented for the CEIP. These changes will not be incorporated in to the Final IRP due to time constraints, but will be available for the CEIP.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 58: Does PSE consider values in addition to ranks? Adoption order describes max. customer benefit scenario in terms of maximizing CBI values.	Thank you for the question. PSE has elected to use ranks because: 1) Ranks distill complex, nuanced information into a more palatable format; and 2) Ranks allow for combination of different data types into an overall value while preserving relative order (i.e. averaging across CBIs).  PSE would contend that ranks are derived from and therefore representative of CBI values. Furthermore, CBI values for each portfolio will be included and discussed in narrative in the Final IRP. PSE will discuss weighting factors through the public participation process and EAG discussions for the CEIP, which may provide more insight to the value of customer benefit indicators.

Feedback Form Date	Stakeholder	Comment	PSE Response
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 59: We appreciate discussion of tradeoffs on this slide. How does PSE expect this process to evolve in the next IRP when weighting factors have been developed/approved in the CEIP?	Thank you for the comment. PSE fully expects the CBI/portfolio development process to evolve in future IRP cycles, and PSE looks forward to continued community engagement on the process.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide ~60: Fellow participant Christine Bunch of the City of Seattle highlighted the possible underinclusion of factors connected to vulnerable populations. With her comment that some metrics could be specific to energy burden - % of participation in EE programs from low-income households, % of households participating in weatherization programs, % getting access to utility discounts, etc.	Thank you for reiterating these comments. PSE recognizes that these are important CBIs to consider in the portfolio development process. However, these indicators are not native outputs to existing portfolio modeling processes which makes incorporation of these concepts difficult. PSE is developing strategies to broaden the capacity of the portfolio development process to integrate these "non-native" data types. Results of this research will not be available for the Final IRP, but will develop for future IRP cycles and the CEIP.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Slide 63: This slide is fascinating and brings up a lot of complicated issues. <ul style="list-style-type: none"> <li>o How was the green area calculated? What extrapolations were made and what was the starting point for the baseline costs? Do these connect to a recent GRC, to the most recent commission basis report, or the company's most recent revenue forecast?</li> <li>o The preferred portfolio has historically been the company's least-reasonable-cost plan to comply with all statutory requirements. However, with CETA, it could be that the 80%-by-2030 requirement and the 2% cost constraint are mutually exclusive. In that case, staff believes the preferred portfolio should prioritize the 2030 requirement. The company's forecasting of the 2% cost constraint and adjusting any resource acquisitions based on this constraint is analysis that should be contained in the CEIP.</li> </ul>	<ol style="list-style-type: none"> <li>1. The green shaded area of the graph starts with the 2019 GRC revenue requirement, then PSE assumes 2.5% each year for inflation. The first year, 2022, is calculated as 2% of the assumed 2021 revenue requirement (2019 revenue requirement plus 2.5% added in 2020 and 2021). The second year is calculated as 2% of the 2023 assumed revenue requirement (2022 assumed revenue requirement plus 2.5%) plus the 2% spent in 2022. This compounding 2% calculation continues for each year through 2030.</li> <li>2. PSE agrees that the adjusting of the resource additions by the 2% cost constraint should be done in the CEIP. The cost analysis in the IRP is based on a lot of assumptions around resource costs and the underlying revenue requirement. The cost calculation should be done on actual resource costs and revenue requirement.</li> </ol>
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	Staff recommendations.	Thank you for your recommendations. PSE inserted each recommendation below along with PSE's responses.
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	<p><b>EHEB - Review of distinction between demographic analysis and geospatial analysis:</b> Our commentary is contained above, but the core idea is that CETA's requirements regarding highly impacted communities and vulnerable populations require two distinct methods of analysis. We see PSE's analysis as, thus far, being focused primarily, maybe exclusively, performed from a geospatial lens. For example, slide 41 implies that vulnerable populations are effectively the CIA list of highly impacted communities with a few other factors considered, and the analysis is done on a census tract level. The demographic lens is also critical, and appears to be missing.</p> <ol style="list-style-type: none"> <li>a. Step 1a: ID communities based on CIA and selected adverse socioeconomic factors and vulnerability factors</li> <li>b. Step 1b: determine "assessment metrics" based on what's listed in rule/statute (e.g., energy/non-energy benefits, public health, etc.)</li> <li>c. Step 1c: compare disparities between "assessment metrics" for named communities vs. non-named. It seems like PSE is equating those socioeconomic/vulnerability factors with assessment metrics</li> <li>d. Step 2: Solicit customer input to determine what those communities and populations want the CBIs to be.</li> </ol> <p>We're happy to discuss this further.</p>	<p>Thank you for the commentary on Highly Impacted Communities and Vulnerable Populations. PSE sees the value in approaching the assessment from both a geographic and demographic perspective. However, given time constraints, demographic characterization of VPs will not be incorporated into the 2021 IRP. PSE will make efforts to revise the assessment in time for the Clean Energy Implementation Plan.</p> <p>As revisions to PSE's Highly Impacted Communities and Vulnerable Populations assessment are enacted, PSE will be sure to subscribe to the steps laid out in this recommendation.</p>

Feedback Form Date	Stakeholder	Comment	PSE Response
2/18/2021	Kyle Frankiewicz, Washington Utilities and Transportation Commission	<b>2% revenue increase constraint:</b> PSE is welcome to perform some analysis in the IRP to better understand what a portfolio which is limited by the 2% cost cap might look like. However, we believe those competing requirements in CETA are reconciled in the CEIP. We recommend that the preferred portfolio in the IRP should contain the company's least-reasonable-cost approach to meeting all other requirements in CETA.	PSE agrees that the preferred portfolio will meet the CETA requirements without any adjustment for the 2% constraint. The IRP will include the cost calculation as information to stakeholders to estimate the costs associated with acquiring new resources to meet CETA.
2/19/2021	Renewable Northwest	The letter dated February 17, 2021 submitted in feedback form and sent to PSE on February 19, 2021, is uploaded as part of the Feedback Report.	Thank you for your letter. PSE inserted the recommendations and questions from the letter along with PSE's responses below and noted the questions that will be addressed in the Consultation Update available on February 24, 2021.
2/19/2021	Renewable Northwest	We recommend PSE design the incremental cost of compliance threshold (as shorthand, just "cost threshold") sensitivity as a split analysis, considering how various resource configurations or planning decisions will affect how closely the company tracks to the cost threshold and, thus, how likely it is the company will achieve its 2045 clean energy commitment. At minimum, PSE should consider (3 specific suggestions inserted by PSE below):	Thank you for the general recommendation.
2/19/2021	Renewable Northwest	<b>How altered procurement timelines may adjust the portfolio's diversion from the cost threshold.</b> In the slide deck, PSE reveals that the Mid Scenario falls below the cost threshold until around 2026, when coal-fired resources must be removed from PSE's allocation of electricity. First, PSE should clarify whether the Mid Scenario reported in the draft IRP 5 accounts for the SCGHG of gas-enabled combustion turbines, as it's not currently clear that alternative fuels will be comparable in cost and, thus, least cost. And if the Mid Scenario actually mirrors sensitivity W, which ramps in distributed energy resources ("DERs") over time and includes biodiesel-fueled combustion turbines, PSE should revise its fuel cost assumptions, as biodiesel will not remain at a stale price across the planning horizon. Beyond that, PSE notes in the draft IRP that the model prefers to procure DERs near the end of the planning horizon to realize cost reductions, and that sensitivities V and W are performed to spread those procurements at only a slight increase in levelized cost. However, the actual "spread" of procurements is still back-end heavy, with the Mid Scenario reporting nearly two-thirds of the DER procurements in the 2031 to 2045 timeframe. PSE should analyze how a more evenly-distributed DER procurement schedule may - at a minor increase in cost - allow PSE to remain below the cost threshold beyond 2026.	Thank you for your comments; responses below: <ul style="list-style-type: none"> <li>The Mid Scenario from the Draft IRP assumes frame peaker plants will operate on natural gas with the SCGHG.</li> <li>Price futures for alternative fuels such as biodiesel and hydrogen are wildly uncertain. PSE could not source reliable prices futures during this IRP cycle, but aims to include a more nuanced approach in future IRP cycles.</li> <li>For the Balanced Portfolio, distributed resources were ramped in evenly over time, as follows: <ul style="list-style-type: none"> <li>Distributed ground-mounted solar: 50 MW in 2025</li> <li>Distributed rooftop solar: 30 MW/year from the year 2025 to 2045 for a total of 630 MW by 2045</li> <li>Battery energy storage: 25 MW/year 2025 to 2031 for a total of 175 MW by 2031</li> </ul> </li> </ul>
2/19/2021	Renewable Northwest	<b>How portfolios with a slightly higher levelized cost in the near term (from 2022 to 2026) may extend the number of years PSE falls below the cost threshold.</b> Renewable Northwest has urged PSE in previous comments to consider how the model's preference for lowest-cost resources may be undervaluing the dynamic, long-term contributions of slightly higher cost resources. For example, PSE has indicated in various sensitivity analyses and in past webinars that the model selected the 2-hour Li-ion battery because it was least cost. However, because this resource does not offer as much flexibility value and resource adequacy contribution as a 4-hour Li-ion battery or a solar + 4-hour Li-ion battery hybrid resource, there may be unrealized cost reductions to procuring these resources earlier in the planning period. Because the capital cost is higher, the extra margin below the cost threshold in the near term should prompt PSE to study whether earlier investments in these resources may not only track PSE closer to the cost threshold beyond 2026, but also improve the flexibility of PSE's system by a means compliant with CETA.	PSE has incorporated a flexibility benefit, which is modeled as a cost-reducer, to storage resources. PSE's analysis shows that the flexibility benefit for 4hr Li-Ion batteries (\$18.45/kW-yr) is lower than for 2hr Li-Ion batteries (\$20.45/kW-yr). PSE understands this result to stem from a need to increase market purchases to ensure the larger batteries are adequately charged. PSE intends to review its modeling storage logic to ensure these state-of-charge decisions are accurate representations of reality in future IRP cycles.  Furthermore, PSE has modeled additional sensitivities to investigate the difference between different storage types/durations. These sensitivities include N 100% Renewable by 2030 selecting for 1. Batteries (2hr Li-Ion) and 2. PHES (8hr); O Gas Generation out by 2045 for 1. Batteries (2hr Li-Ion) and 2. PHSE (8hr); and P No New Thermal before 2030 for 1. 2hr Li-Ion, 2. PHES (8hr) and 3. 4hr Li-Ion. These results will be included in the Final IRP.
2/19/2021	Renewable Northwest	<b>How revising resource assumptions to better align with current estimates alters the Mid Scenario's relationship to the cost threshold.</b> See the comments of Renewable Northwest, submitted to docket UE-200304, for details and references.	Thank you for your comments submitted to PSE's electric IRP docket.
2/19/2021	Renewable Northwest	Regarding the flexibility analysis, we have a few clarifying questions and comments which would be helpful for this process in the current IRP as well as going forward. (3 specific questions inserted by PSE below):	Thank you for your questions.

Feedback Form Date	Stakeholder	Comment	PSE Response
2/19/2021	Renewable Northwest	It would be helpful if staff provides a detailed look at the magnitude and duration of the flex violations coming out of the model. As we mentioned in our previous comments, flexibility is not uni-dimensional but involves four key dimensions, each of which should be accounted for in the modeling effort. This would provide a better understanding as to what resource types and technologies would be most efficient and cost-effective in treating those violations. For example, battery storage resources of smaller sizes (30-minute or 1-hour duration) may be more cost-effective in providing flexibility (both up and down) reserves if the both the magnitude and duration of the majority of flex violations are shorter in nature.	PSE will provide a detailed Flexibility Analysis description in the Final IRP document which will address the details requested.
2/19/2021	Renewable Northwest	In the webinar, staff mentioned that the reason the flexibility value or benefit for 4-hour battery storage is lower is because that resource requires to be charged using market purchases which have an associated social cost of greenhouse gas ("SCGHG"). <b>Hybrid resources</b> , on the other hand, can assist PSE meet its CETA goals, can provide clean, non-emitting energy to charge the battery, and can capture the sizable federal ITC, ensuring cost-effectiveness. It would be helpful if staff can run the flexibility analysis to evaluate the flexibility benefits of a solar + 2-hour Li-ion and solar + 4-hour Li-ion battery configurations.	Thank you for your feedback. For the 2021 IRP, PSE did not model hybrid resources in the flexibility analysis. PSE continues to make improvements to the modeling work and will evaluate hybrid resources as part of future IRPs.
2/19/2021	Renewable Northwest	To what level of detail does this analysis evaluate other flexibility-related value streams such as <b>fast-frequency response and voltage (volt/var) support</b> ? As conventional power plants retire, these key grid services will become increasingly important, and resources like batteries which are able to provide these services should be valued accordingly in flexibility analyses.	The Plexos model is not set-up to evaluate voltage support or frequency response. The IRP team has investigated other flexibility value streams, but was not able to include the analysis in this IRP. PSE will work to include a more robust flexibility analysis in future IRPs.