CUSTOMER BENEFIT INDICATOR METRICS

APPENDIX H

PUGET SOUND ENERGY

Contents

1. Introduction

For the 2023 Biennial CEIP Update (Biennial Update), PSE provided customer benefit indicators as seen in Figure H.1, which were approved by the commission in Order 08 and includes additional customer benefit indicators (CBIs) and metrics in Condition 12. In addition to the update CBI table H.1, PSE is providing 2021 and 2022 data for those indicators in which the data is available as of October 27, 3023. In addition to the data provided in Appendix H, PSE filed a comprehensive CBI metric report of all CBIs and metrics to the WUTC on June 16, 2023 (Docket Number UE-210795)[1] PSE continues to evaluate data availability for all metrics, as well as other regulatory requirements and policies that would apply.

These indicators will be used to forecast the distribution of benefits and measure progress over time. The purpose of this Appendix H is to outline each metric, an equation to calculate, the expected data source, and expected impact to customers. Data availability and relevancy will evolve over time, and changes to how metrics are measured will be required.

Table H.1: Customer benefit indicators and metrics

CETA category	Indicator	Direction	Specific actions	Metric
Energy Benefits Non-energy Benefits Reduction of Burdens	Improved participation in clean energy programs from highly impacted communities and vulnerable populations	Increase	• Energy Efficiency • Demand Response • Distributed Resources	• Number and percentage of participation in energy efficiency, demand response, and distributed resource programs or services by PSE customers within highly impacted communities and vulnerable populations • Percentage of electricity generated by distributed renewable energy projects • **NEW - Number of residential appliance and equipment rebates provided to customers residing in named communities** • **NEW - Number of residential rebates provided to customers residing in rental units**
Non-energy Benefits	Increase in Quality and quantity of clean energy jobs	Increase	• Energy Efficiency • Demand Response	Increase quantity of jobs based on: • Number of jobs created by PSE programs for residents of highly impacted and vulnerable populations • Number of local workers in jobs for programs • Number of part-time and full-time

1. https://www.utc.wa.gov/casedocket/2021/210795/docsets
https://apiproxy.utc.wa.gov/cases/GetDocument?docID=1021&year=2021&docketNumber=210795

CETA category	Indicator	Direction	Specific actions	Metric
				jobs by project Increase quality of jobs based on: • Range of wages paid to workers • Additional benefits offered • Demographics of workers
Non-energy Benefits	Improved home comfort	Increase	• Energy Efficiency	Dollar in net present value (NPV) in NEI benefits for EE programs. [2]
Reduction of burdens	Increase in Culturally-and-linguistically accessible program communications for named communities	Increase	• Energy Efficiency • Demand Response • Distributed Resources	• Outreach material available in non-English languages • Outreach material available in English languages • Outreach material impressions in non-English languages • Outreach material impressions in English languages
NEW - Reduction of Burdens	**Decrease number of households with a high energy burden**	**Decrease**	• **Energy Efficiency** • **Energy Assistance** • **Distributed Resources**	• **Number and percent of households** • **Average excess burden per household**
Environment	Reduced Greenhouse gas emissions	Reduce	Utility-scale resources	• PSE-owned electric operations metric tons of annual CO2e emissions • PSE contracted electric supply metric tons of annual CO2e emissions
Public Health	Improved outdoor air quality	Reduce	Utility-scale resources	Regulated pollutant emissions (SO2, NOx, PM2.5)
Public Health	Improved community health	Reduce	N/A [3]	Occurrence of health factors like hospital admittance, and work loss days
Resilience	Decrease frequency and duration of outages	Decrease	• Utility-scale resources • DER Storage • Demand Response	• **Utility-scale:** Number of outages, total hours of outages, and total backup load served during outages using System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) Reduction in peak demand through demand response

2. PSE is updating the metric for this CBI to be consistent with direction provided in Order 08, paragraph 152.
3. PSE is unsure how its current metric of tracking hospital discharge rates will inform any current or future specific actions to improve community health as it relates to clean energy. PSE will continue to explore alternative metrics for inclusion in the 2025 CEIP.

CETA category	Indicator	Direction	Specific actions	Metric
				programs • **DR:** Peak demand through demand response programs
Risk Reduction Energy Security	Improved access to reliable, clean energy	Increase	• DER Storage • Net Metering	Number of customers who have access to emergency power
NEW - Energy Security	**Decrease residential arrearages and disconnections for nonpayment**	**Decrease**	**Energy Assistance programs like PSE's Bill Discount Rate program (PSE | Bill Discount Rate)**	• **Number and percentage of residential electric disconnections for nonpayment by month, measured by location and demographic information (zip code/census tract, KLI customers, Vulnerable Populations, Highly Impacted Communities, and for all customers in total). If residential disconnections are not required to be reported quarterly to the Commission in any other docket (e.g., U-200281 or U-210800) or rule, PSE must report residential disconnections as reported pursuant to Commission Order 04 (Appendix A Third Revised Term Sheet, Section J, Part 2.a), in Docket U-200281, on a quarterly basis through the end of this CEIP implementation period (December 31, 2025).** • **Residential arrearages as reported pursuant to Commission Order 04 (Appendix A Third Revised Term Sheet, Section J, Part 8 a-c) in Docket U-200281. If residential arrearages are not required to be reported to the Commission in any other docket (e.g., U-200281 or U-210800) or rule, PSE must track the following residential electric data by month, measured by location and demographic information (zip code/census tract, KLI customers, Vulnerable Populations, Highly Impacted Communities, and for all customers in total)** • **The number of customers with past-due balances (arrearages)** • **The amounts of past-due balances that are past due 30+, 60+, and 90+ days, as compared to total arrearages.**

2. Improved participation from named communities

2.1. Customer benefit indicator categories

PSE is committed to supporting customers within highly impacted communities and vulnerable populations and ensure they receive direct benefits from clean energy programs. These benefits include the following categories:

- **Reduction of burdens:** Customer within highly impacted communities and vulnerable populations may currently experience the burden of high energy cost, or lack of access to clean energy programs. The existing programs may have additional barriers that prevent participation in clean energy programs as well. By improving participation, customers will see these burdens reduced for them.
- **Non-energy benefits:** Customers specifically in highly impacted communities and vulnerable populations will become more knowledgeable of these programs and be able to access more clean energy options
- **Energy benefits:** Customers may not have clean energy delivered locally or receive the benefits of demand side resources. By improving participation in programs like EE and DER, customers may be able to realize more efficient homes or consume local energy from a community solar or rooftop solar program.

2.2. 2021 and 2022 metric data

This metric will calculate the count and percent of participation by customers within highly impacted communities and vulnerable populations by:

- EE programs participation by all customers, highly impacted communities and vulnerable populations
- DR programs participation by all customers, highly impacted communities and vulnerable populations
- DER programs participation by all customers, highly impacted communities and vulnerable populations

PSE is evaluating data availability and options for measuring this metric in future DR programs.

This metric will calculate the number of distributed and community renewable programs and the percentage of electricity generated by distributed renewable energy projects by all customers, highly impacted communities and vulnerable populations.

Table H.2: Clean energy program participation by customers within named communities

Metric	Energy Efficiency		Distributed DER		Demand Response
	2021[4]	2022	2021	2022	
All PSE customers	277,675 | 25%	360,874 | 33%	91,636 | 33%	12,557 | 33%	Future use
Number and percentage of participation by Highly Impacted Communities	75,970 | 27%	107,239 | 31%	20,402 | 24%	3,397 | 27%	Future use
Number and percentage of participation by low vulnerable populations	95,077 | 34%	101,882 | 25%	36,988 | 40%	5,321 | 43%	Future use
Number and Percentage of participation by medium vulnerable populations	96,670 | 35%	117,473 | 32%	31,272 | 35%	4,551 | 36%	Future use
Number and Percentage of participation by high vulnerable populations	85,928 | 31%	141,519 | 42%	23,376 | 25%	2,685 | 21%	Future use

PSE also committed to reporting on the percentage of electricity generated by distributed renewable energy project for distributed resources.

Table H.3: Clean energy program generation by customers from named communities

Metric	All PSE customers		Highly impacted communities		Vulnerable populations (Low)		Vulnerable populations (Medium)		Vulnerable populations (High)	
	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Distributed Resources	49 33%	2,295 33%	8 16.33%	570 24.84%	20 40.82%	781 34.03%	20 40.82%	706 30.76%	9 18.37%	808 35.21%

In the Commission Order 08, PSE was directed to report on the number of residential appliances and equipment rebates provided by customers residing in named communities and rental units.

4. Numbers reported for Energy Efficiency in 2021 were revised from PSE's original report. The previous version did not include the Home Energy Reports (HER) Program numbers. Numbers reported here in the Biennial update now include participation numbers from the HER Program.

Table H.4: Residential rebates received by customers within named communities

Metric	All of PSE's		Highly impacted communities		Vulnerable populations Low		Vulnerable populations Medium		Vulnerable populations High	
	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Number of residential appliance and equipment rebates provided to customers residing in named communities	15,548	13,834	3,554	2,953	5,083	4,599	6,309	5,501	4,156	3,734
Number of residential rebates provided to customers residing in rental units	759	712	206	151	241	247	280	248	238	217

2.3. Data source

Table H.5: Data sources for calculating increases in clean jobs

Category	Dataset	Units	Source
Increase number and percentage of participation in energy efficiency, demand response, and distributed resource programs or services by PSE customers within highly impacted communities and vulnerable population	Count of customer	Internal PSE Data	Annually
Increase percentage of electricity generated by distributed renewable energy projects	Count of customer		Annually

2.4. Expected specific action impact on metric

Customers within highly impacted communities and vulnerable populations are likely to face significant barriers to DER program participation. For example, customers in highly impacted communities and vulnerable populations are more likely to have low- or moderate-income levels that make it difficult to afford the equipment purchases that traditional downstream energy efficiency programs target. Over time, as PSE defines DER concept models that are appropriate for customers within highly impacted communities and vulnerable populations and their respective residences, this metric should show an increase in participation among these communities.

3. Increase in quantity and quality of clean energy jobs

3.1. Customer benefit indicator categories

Non-energy benefits will focus on PSE's clean energy programs for job creation. As Table H.6 shows below, E2[5] reported in their annual report that Washington is ranked at 41 for total and sector job growth in 2022. The clean energy industries have created a total of 78,570 jobs in Washington statewide and 47,000 of those jobs are in King County and Pierce County alone. This metric will ensure PSE's program continuously works to achieve the promise of new and sustained clean job creation.

Table H.6: Washington clean energy employment

Clean Energy Job Growth	Net New CE Jobs	Total Energy Sector Job Growth	CE Share of New	Total State Job Growth	CE Share Total Sate New Jobs	RE Job Growth	Storage/ Grid Job Growth	EE Job Growth	Biofuels Job Growth	CV Job Growth
2.4%	1,835	2.8%	46.1%	3.7%	1.4%	3.6%	5.0%	1.6%	-0.6%	10.6%

*Washington ranked at 41 for total and sector job growth in 2022.

3.2. 2021 and 2022 metric data

This metric applies to all of PSE service territory and the state as a whole, with a particular focus on customers in vulnerable populations and highly impacted communities.

- Number of jobs created by PSE programs for residents of named communities
- Number of Local workers in jobs for programs
- Number of part-time and full-time jobs by project
- Demographics of workers
- Range of wages paid to workers
- Additional benefits offered

3.3. Measurement

This indicator measures the increase in clean energy jobs that PSE programs create. PSE has executed contracts for our capacity reducing demand response programs and will begin tracking in 2024. PSE's energy efficiency program worked with its implementation vendors to ask whether the data requested in the CBI could be made available on an annual basis. Fortunately, most vendors polled said that providing such data is possible, though at least one said that they don't typically provide details on salaries or employee demographics to third parties. PSE will continue to develop a data

5. E2: Clean Jobs America 2023 (PDF)

collection process whereby jobs can be estimated by directly requesting jobs data from vendors. In this way, PSE will be able to provide the details necessary to report on the quality of jobs.

3.4. Data sources

Table H.7 below presents the data sources PSE is considering for calculating increases in clean energy jobs prompted by PSE programs.

Table H.7: Data sources for calculating increases in clean jobs

Category	Dataset	Units	Source	Source Reporting
Qualitative and Quantitative	Number of jobs created for residents of named communities	Numerical	Contracts with Vendors	Annually
	Number of Local workers in jobs for programs	Numerical	Contracts with Vendors	Annually
	Number of part-time and full-time jobs by project	Numerical	Contracts with Vendors	Annually
	Demographics of workers	Numerical	Contracts with Vendors	Annually
	Range of wages paid to workers	Numerical	Contracts with Vendors	Annually
	Additional benefits offered	Qualitative Description	Contracts with Vendors	Annually

3.5. Issues and data gaps

- **Issue #1: Construction jobs created will differ from O&M jobs.** PSE will need to consider an additional layer of how O&M activities for renewable resources will impact jobs once the respective resource is online. For example, solar and gas turbines will both have some number of jobs for construction, but during operation, solar will require much fewer jobs because they don't require as much maintenance.
  - **Mitigation Strategy.** We recommend ongoing research to establish the forward-looking sustainable jobs impacts relating to renewable resources compared to conventional power plants.
- **Issue #2: Duration and tenure of new jobs is uncertain.** Beyond simply construction and O&M job positions, job turnover complicates the tracking of jobs sustainably held by people from named populations. For example, it is possible that jobs are initially filled by people from named

populations but are replaced by people from outside of named populations after a while. It is not likely that PSE will be able to track such nuanced turnover.

- **Mitigation Strategy.** One way to account for this uncertainty is to run annual surveys among DER maintenance crews and renewable plant employees to determine duration of tenure and whether they live in named populations or not. If retaining members of named populations proves too difficult, PSE can revisit this issue and determine whether program designs can and would be advisable to increase retention of these positions.

3.6. Expected specific action impact on metric

It is anticipated that PSE's programs will create new construction jobs, however, a few potential challenges are highlighted above. To recap, it is possible that ongoing O&M positions may be less than conventional power plants with comparable capacity. Additionally, the retention of newly created jobs among members of highly impacted communities and vulnerable populations is not guaranteed. Employment-related impacts can be represented as net jobs if job losses that may have occurred in non-energy efficiency or renewable energy-related sectors due to the program (e.g., decrease in demand for coal) are quantified, as well. Net jobs would present the program impacts on jobs after any losses have been subtracted from the increase. With additional research, PSE can track and measure these risks and challenges and adjust program designs and metric calculation methodologies accordingly.

Lastly, it is important to note that new clean jobs are not necessarily or likely to be filled by members of highly impacted communities or vulnerable populations, or even local PSE residents unless programs or measurements are designed to specifically encourage and capture the locality of these jobs.

4. Improved home comfort

4.1. Customer benefit indicator categories

Non-energy benefits are the annual dollar savings per year associated with quantifiable non-energy impacts of PSE programs or measures. Improved home comfort may encompass more than one non-energy impact. Consistent with direction provided in Order 08, paragraph 152, PSE is updating the metric for this CBI and will provide a new metric in the 2025 CEIP.

5. Increase in culturally and linguistically accessible program communications for highly impacted communities and vulnerable populations

5.1. Customer benefit indicator categories

Reduction of Burdens: A barrier to participation or awareness of programs is language and cultural relevance for some customers. By expanding materials and webpages developed in more languages, PSE can reach more customers, especially those who have historically been underrepresented in clean electricity participation, thus reducing the burden on those customers.

5.2. 2021 and 2022 metric data

This metric measures the outreach material available in non-English languages; outreach material available in English language; outreach material impressions in non-English languages, and outreach material impressions in English language for energy efficiency. In the future PSE will report outreach material on DR programs and utility scale resources. In the future this metric can be calculated and presented for the following populations:

- All residential PSE customers
- Highly impacted communities
- Vulnerable populations

Table H.8: Outreach material for energy efficiency and distributed resources

Metric	2021 [6]	2022 Energy Efficiency	2022 Distributed Resources
Outreach material available in non-English languages	N/A	69	2
Outreach material available in English language	N/A	1,781	72
Outreach material impressions in non-English languages	N/A	592,586	N/A
Outreach material impressions in English language	N/A	80,696,514	234,716

6. As stated in the CEIP, outreach material would be available in 2022, therefore 2021 outreach material data is not available.

5.3. Data sources

Table H.9: Data sources for measuring Increase in Accessible Program Communication

Category	Units	Source	Source Reporting
Outreach material available in non-English languages	Number of materials	Internal PSE Data	Annually
Outreach material available in English language	Number of materials		Annually
Outreach material impressions in non-English languages	Number of material impressions		Annually
Outreach material impressions in English language	Number of material impressions		Annually

5.4. Expected specific action impact on metric

Increased communication with PSE customers should allow more customers to participate in DER, DR and EE programs. Customers will be able to gain more knowledge about the opportunities available to them. PSE anticipates that participation will increase due to the additional outreach materials available.

6. Decrease number of households with high energy burden

6.1. Customer benefit indicator categories

Reduction of burdens. Some households, including households within highly impacted communities and vulnerable populations, are burdened by high energy costs. Barriers may reduce participation in these programs thereby preventing energy costs and consumption reductions in some households. By decreasing household energy burden, customers will see these high energy burdens reduced for them.

6.2. 2021 and 2022 metric data

For the purposes of this metric, we consider the number and percentage of households with energy burden above 6%. In virtue of tracking these raw values, we can track whether these metrics have decreased over time.

This metric will measure the number and percent of households and the average excess burden per household. The metric can be calculated and presented for the following populations:

- All Residential PSE customers

- Highly Impacted Communities
- Known Low-Income (KLI)
- Vulnerable Populations

Table H.10: Number and percent of households with energy burden

KLI		Highly impacted communities		Vulnerable populations Low		Vulnerable populations Medium		Vulnerable populations High	
2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
17961 13.7%	19580 13.1%	44652 34.2%	50369 33.7%	25794 19.7%	30,283 20.3%	41725 31.9%	48,333 32.3%	$63217 48.4%	70,797 47.4%

Table H.11: Average excess burden per household

KLI		Highly impacted communities		Vulnerable populations Low		Vulnerable populations Medium		Vulnerable populations High	
2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
$857.7	$937.2	$1,017.1	$984.1	$1,236.6	$1,187.2	$988.7	$1,020	$911.9	$875.5

6.3. Data sources

Table H.12 presents the data sources needed to calculate affordability of clean energy. Note that we present three possible data sources for household income. The first source is household income data purchased by PSE. The second is ACS data, which are easily accessible but naturally do not provide individual household income. Nevertheless, ACS data would allow PSE to compare the bill reduction and the affordability of clean energy by census tract. A more granular assessment of the metric would include collecting customer self-reported income. One direct way that PSE can collect this information is to request it on the customer's program application. Collection of customer data should be evaluated carefully, with stakeholder input, and also with consideration given to privacy issues and applicable regulatory requirements. Other data sources may be available and PSE will continue to update data sources over time.

Table H.12: Data sources to calculate energy

Category	Dataset	Source	Units	Source Reporting
Number and percent of households Participant Identification	Program participation	PSE Program Tracking Database	T/F	Annually
	PSE Customers	PSE Customer Database	Utility meter	Annually
Average excess burden per household Energy Cost	Electricity cost	PSE Customer Billing Data	$/year	Annually

Category	Dataset	Source	Units	Source Reporting
Average excess burden per household Household Income	Option 1. Household income	Data purchased by PSE	$/year	Annually
	Option 2. Self-reported income	Collect During Program Sign Up	$/year	Annually

6.4. Issues and data gaps

Issue 1: Delay in Census Tract Data Availability. Census tract-level income data from the ACS 5-year rollup has about a 2-year lag in reporting.

Risk Mitigation Recommendation: Use purchased household income data, or PSE would have to use slightly outdated income data for census tract.

6.5. Expected specific action impact on metric

Overall, the cost of complying with CETA is expected to increase customers' bills over time. PSE lacks control over factors that may impact customer incomes, such as a recession or another pandemic. However, PSE has a number of programs such as the Bill Discount Rate program, which are expected to help decrease the metric above.

7. Reduced greenhouse gas emissions

7.1. Customer benefit indicator categories

Environment. This metric will measure the extent that PSE's programs are affecting greenhouse gas (GHG) emissions. The resulting reduction of GHGs will directly support the environment and are in synergy with Washington's larger umbrella climate policies such as the Clean Energy Transformation Act (CETA). As established by CETA, PSE will be eliminating coal-fired electricity by or before 2025, reach carbon neutrality by or before 2030, and eventually deliver 100% renewable or non- emitting electricity by 2045. While PSE is transforming its supply, it will need to simultaneously accommodate added load due to buildings and transportation electrification efforts. Ultimately, this metric will measure the GHG impacts of each PSE program individually and in aggregate.

7.2. 2021 and 2022 metric data

GHG emissions and resulting climate change affect the entire planet, and although there may be differences in the effect of climate change in localized areas, this metric will not track those downstream effects of climate change. PSE can use this metric to measure avoided emissions due to utility scale resource emissions and PSE contracted electric supply metric tons of annual CO2e emissions.

This metric can be calculated at the following level of granularity:

Utility Scale Resources: This represents the PSE-owned electric operations metric tons of annual CO2 emissions as well as the PSE contracted electric supply metric tons of annual CO2 emissions (Total – Firm and Non-Firm Contracts Purchases).

Table H.13: Reduced greenhouse gas emissions

Metric	Utility-scale Resources (Per WAC 173-444)	
	2021	2022[7]
PSE-owned electric operations metric tons of annual CO2e emissions	5,679,695	5,266,627
PSE contracted electric supply metric tons of annual CO2e emissions (Total – Firm and Non-firm Contract Purchases)	3,273,194	4,197,962

7.3. Measurement

Table H.14 below shows the methods PSE uses to measure avoided emissions. PSE reports greenhouse gas emissions as required under EPA and Washington State regulations. PSE will regularly review GHG Protocol Standards, US EPA literature and other relevant websites and reference sources to determine whether calculation methodologies, emission factors and/or relevant emissions sources have been updated or added that would trigger a significant cumulative change in the company's base year emissions.

Table H.14: Reduced greenhouse gas emissions calculation

Title	Calculations
Annual Avoided Emissions [CO2e/year]	1. WAC 173-441; 40 CFR 98; 2. The Climate Registry Electric Sector Protocol

7.4. Data sources

Table H.15 below presents data sources for an annual approach to calculate GHG reductions. As shown, the annual approach can be calculated using tracking data. PSE may also use annual greenhouse gas inventory report to use as a benchmark to the results of this calculation.

Table H.15: Data sources for calculating reduction in greenhouse gas emissions

Category	Dataset	Units	Source	Source Reporting
PSE GHG Reports	Emissions Rate of PSE Generation	tons CO2/kWh	PSE Greenhouse Gas Inventory	Annually

7. PSE's GHG inventory is currently being reviewed, which will likely cause updates to the 2022 numbers.

7.5. Issues and data gaps

Reporting actual numbers for the previous calendar year will be an ongoing issue. GHG numbers are not finalized until mid-November, which is after the CEIP and Biennial update are due. For the most updated GHG numbers visit PSE | Greenhouse Gas Policy.

7.6. Expected specific action impact on metric

Solar PV, demand-response/load flexibility, and energy efficiency resources will reduce CO2. While all distributed resources have the potential to reduce GHGs, storage will not always reduce marginal emissions. If customers use storage to capture arbitrage opportunities or reduce demand charges, or if PSE uses storage to reduce wholesale electricity costs, this calculation may reveal that marginal GHGs stay neutral or may even increase. PSE therefore may wish to consider using marginal emissions forecasts to inform storage dispatch optimization algorithms.

Energy storage impacts emissions at the grid level by increasing or decreasing net demand on a marginal basis, i.e. conceptually impacting whether the marginal power plant operating (the last power plant in the plant "stack") ramps up or down with respect to grid demand. The marginal power plant in the stack tends to be the least efficient, most costly to run, and highest emitting. When storage charges it conceptually increases demand from this marginal power plant thereby increasing emissions, and when storage discharges it decreases demand from this last power plant. The marginal power plant operation changes frequently throughout the day, at an hourly or shorter time interval. If energy storage tends to charge when the marginal power plant is a relatively low emitter of GHGs (e.g. during daytime when solar plants are operating, or when hydro or wind is operating) and discharge when the marginal power plant is a relatively high emitter of GHGs (e.g. during peak periods of demand, late afternoons or evenings), storage can effectively reduce net emissions from marginal power plants for a given time period, when taking into account energy storage efficiency losses.

However, battery operational software that is programmed to decide when to charge and discharge energy storage projects is often based upon economic objectives and not GHG emission objectives. Maximizing economic gain (or utility bill savings for behind the meter projects) tends to be the driving factor. Retail tariffs (rate structure) tend to be relatively static in nature and designed to have some time sensitive economic structures (e.g. peak and off-peak rates) to incentivize changes in demand. Retail tariffs are typically designed based on average system characteristics like peak demand and are often immutable for years until periodic general rate cases making them hard to align with hourly, daily, or seasonal variations. Retail tariffs are not aligned with marginal GHG emission rates. When a battery is programmed to maximize return to the owner based on a retail tariff, the legacy retail tariff price signals may not incentivize the battery to charge when marginal emission rates are lowest and discharge when marginal emission rates are highest. The result can increase net emissions for the system even if the battery is operating optimally from an economic perspective.

8. Improved outdoor air quality

8.1. Customer benefit indicator categories

Public Health. Recent studies have suggested that regional territories can save millions of dollars through renewable energy and energy efficiency resources[8]. As PSE meets the CETA requirements, reduced fossil fuel use in the state and region associated with electric generation decreases emissions, which should improve outdoor air quality, directly benefitting public health. This metric will quantify the reduction of PM2.5, SO2, and NOx, the conventional generation emissions that contribute to poor outdoor air quality and impact public health. The net impacts of transportation electrification on these emissions will also be measured in the future.

8.2. 2021 and 2022 metric data

This benefit may affect all customers and may more specifically benefit customers living in highly impacted communities with worse air quality. This may also impact people outside PSE's service territory as energy sources used for PSE's electric supply include some outside PSE's electric service territory.

Table H.16: Improved outdoor air quality

Metric	2021	2022
PM 2.5	202	189
SO2	1,874	2,062
NOX	5,996	6,355

8.3. Data sources

Table H.17 below presents the data sources to calculate reductions in PM2.5, SO2, and NOx.

Table H.17: Data sources for calculating improvements in outdoor air quality

Category	Dataset	Units	Source	Source Reporting
PSE GHG Reports	Emissions Rate of PSE Generation	tons CO2/ kWh	PSE Greenhouse Gas Inventory	Annually

8. https://www.hsph.harvard.edu/news/hsph-in-the-news/renewable-energy-projects-can-improve-health/

8.4. Expected specific action impact on metric

Reductions in PM2.5, SO2, and NOx emissions should follow similar trends to those reported in reductions in GHGs. As with GHGs, some resources will reduce these emissions, but PSE will need to monitor storage dispatch as dispatching to optimize cost may not always reduce emissions.

9. Improved community health

9.1. Customer benefit indicator categories

Public Health. For this Biennial Update, PSE reports on data from the Washington Department of Health hospital discharge rates.

PSE is unsure how this metric of tracking hospital discharge rates will inform any current or future specific actions to improve community health as it relates to clean energy. PSE will continue to explore alternative metrics for inclusion in the 2025 CEIP.

PSE also continues to evaluate other potential metrics to use for Community Health in the future.

9.2. 2021 and 2022 metric data

Currently, PSE is tracking hospital discharge information. The metric can be calculated and presented for the following populations:

- All Residential PSE customers
- Highly Impacted Communities
- Vulnerable Populations

Table H.18: Improved community health

Metric	Highly impacted communities		Vulnerable populations Low		Vulnerable populations Medium		Vulnerable populations High	
	2021	2022	2021	2022	2021	2022	2021	2022
As a percent of Total Hospital Discharges	32%	30%	30%	29%	31%	32%	38%	38%

PSE is in the process of evaluating other metrics related to community health. PSE is also collaborating with the University of Washington Center for Health and Global Environment to understand the health indicators that pose risks for extreme heat exposure and levels of populations with this sensitivity in conjunction with DER installation opportunities. This collaborative effort will inform future metrics related to community health.

9.3. Expected specific action impact on metric

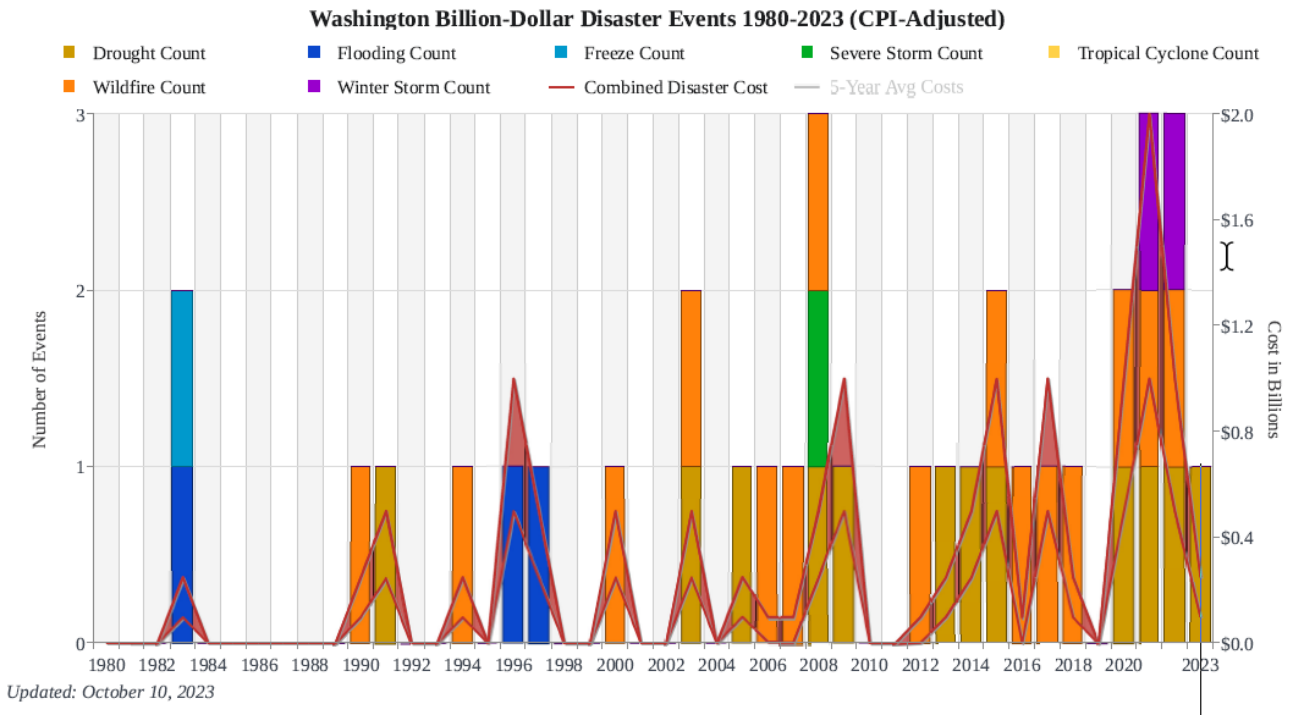
PSE is unsure how its current metric of tracking hospital discharge rates will inform any current or future specific actions to improve community health as it relates to clean energy. PSE will continue to explore alternative metrics for inclusion in the 2025 CEIP.

10. Decrease in frequency and duration of outages

10.1. Customer benefit indicator categories

Resiliency. The DOE and other organizations have published several articles that advocate that utilities take specific steps to increase resilience to these events, including the number and duration of outages. This metric focuses on the degree to which PSE programs can specifically reduce customer outages. The next metric, Resilience, more fully covers elements that address community resilience.

Figure H.1: Disaster Events in Washington State[9]



10.2. 2021 and 2022 metric data

This metric will measure frequency and duration of outages using SAIDI (the average duration (or length) of sustained interruptions per customer for the year) and SAIFI (the average number of sustained interruptions (or outages) per customer for the year. PSE plans to measure peak demand

9. Washington Summary | Billion-Dollar Weather and Climate Disasters | National Centers for Environmental Information (NCEI) (noaa.gov)

through demand response programs. PSE has executed three contracts through the demand response program. PSE is enrolling customers and plans to run events this winter season for two of the contracts. The metric can be calculated and presented for the following populations:

- All residential PSE customers
- Highly impacted communities
- Vulnerable populations

Table H.19: Comparison of SAIDI and SAIFI for named communities

Metric	PSE – all customers		Highly Impacted Communities		Vulnerable Population	
	2021	2022	2021	2022	2021	2022
Average customer count	1,192,766	1,208,346	458,095	463,388	385,735	389,616
SQI 3 – SAIDI (minutes)	206.95	181.29	184.28	142.59	140.33	121.01
SQI 4 – SAIFI (interruptions)	1.26	1.06	1.00	0.86	0.84	0.75

10.3. Data sources

Table H.20 below presents the data sources to use for this calculation.

Table H.20: Data sources for calculating decrease frequency and duration of outages

Category	Units	Source	Source Reporting
Average number of sustained interruptions per customer for the year	Average number	PSE Outage Data	Annually
Average Duration of Outages [hour]	Average Duration		Annually

10.4. Issues and data gaps

Issue 1: Counterfactuals are not necessarily clear. Outages can be driven by many causes, including weather, car accidents and many other causes. A historical baseline or other formulaic approaches must be determined to quantify reductions.

Risk Mitigation Strategy. This approach also may require interaction with PSE system operation and planning teams to determine or at least approximate the counterfactual as a baseline.

Issue 2: Behind the Meter (BTM) Resource Data Not Necessarily Available to PSE. If PSE wishes to calculate storage- mitigated outages, they will not have access to battery dispatch data unless they have coordinated with battery vendors to have access to those data.

Risk Mitigation Strategy. PSE should seek to include site-specific battery dispatch data transfers within contracts with participating vendors. If battery vendors are willing, able, and incentivized to provide each outage metric, this will be the easiest path for PSE to calculate this measurement. However, if battery vendors do not have full visibility into the customer's outage duration, these details may not be enough to calculate the full metric. If vendors cannot provide fully calculated metrics, they should be able to provide battery state of charge, so PSE could align battery performance during known outages to calculate the metric. This, however, would complicate the calculation.

10.5. Expected specific action impact on metric

We anticipate customers participating in DER storage programs should have less time without power during an outage compared to customers without DER storage.

11. Improved access to reliable clean energy

11.1. Customer benefit indicator categories

Risk reduction. The continued rise in extreme weather events, from extreme heat and cold events to severe storms, sea level rise, and wildfires, puts PSE and its customers at increased risk of experiencing extended power outages. By providing customers with backup power during outages, PSE can reduce some of the risks associated with these events.

Energy security. In addition to climate change, this metric will also in part measure PSE's ability to provide customers with backup power potential in response to extreme weather events.

Where another metric accounts for the specific reduction in frequency and duration of specific outages, this metric interprets improved access to reliable clean energy through the lens of the number of customers who have access to emergency power. As described below, this metric quantifies the extent to which PSE can increase access to backup power for more of its customers.

11.2. 2021 and 2022 metric data

This metric will calculate the number of customers who have access to emergency power in their home or facility through net metering and battery storage.

The metric can be calculated and presented for the following populations:

- All residential PSE customers
- Highly impacted communities

- Vulnerable populations

Table H.21: Improved access to reliable clean energy

Metric	Highly impacted communities		Vulnerable populations Low		Vulnerable populations Medium		Vulnerable populations High	
	2021[10]	2022	2021	2022	2021	2022	2021	2022
Improved Access to Reliable, Clean Energy	N/A	677	N/A	1869	N/A	963	N/A	480

11.3. Data sources

Table H.22 below presents the data sources to use for this calculation.

Table H.22 below presents the data sources to use for this calculation

Category	Dataset	Units	Source	Source Reporting
Customers Served by Program	Number of customers with solar + storage	Count of Customers	PSE Tracking Data	Annually
	Number of Customers in Highly Impacted Communities with Solar + Storage	Count of Customers		Annually
	Number of Customers Vulnerable Populations Low with Solar + Storage	Count of Customers		Annually
	Number of Customers Vulnerable populations Medium with Solar + Storage	Count of Customers		Annually
	Number of Customers in Vulnerable populations High with Solar + Storage	Count of Customers		Annually

10. Tracking for this metric didn't begin until January 2022.

11.4. Issues and data gaps

Defining a community resilience hub or number of customers with access to (and knowledge of) one versus those that actually utilize one may be difficult metrics to confirm and are highly subjective. E.g., someone may come by to charge his or her phone for 30 minutes while someone else may sleep overnight. Is the value to each of those people different for this metric?

Issue 1: Challenges Identifying Number of People Served by Community Centers. Defining the number of people who have access to a community center with backup power will require estimating facility capacity through sources such as fire department occupation limits or collecting these data through the course of program administration. In addition, the number of people who have access to the facility does not account for the variation in the amount of time that residents will spend at the facility. For example, someone may come by to charge his or her phone for 30 minutes while someone else may sleep overnight.

Risk Mitigation Strategy. One option would be to follow up with community resilience facilities following outages to estimate the number of customers who utilized the center during the outage.

11.5. Expected specific action impact on metric

This metric will quantify the extent to which PSE programs provide customers backup power within their residence or at a community center. As customers utilize these centers to access power during an outage, it will be important for PSE to assess whether facility capacities are large enough to provide sufficient power resources to community members. For example, it is possible that customers wish to stay at facilities longer than expected to have sufficient and sustained power for work. It is also possible that as electric vehicle adoption enters a mass-market phase that customers will require charging infrastructure to power their vehicles. This metric as currently defined does not yet capture such nuances, although it is designed to add small additional statistics (e.g. backup EV charging station utilization) to assess whether facilities are delivering adequate services. Such additions can be made once programs are in place and PSE receives customer feedback.

12. Decrease residential arrearages and disconnections for non-payment

12.1. Customer benefit indicator categories

Energy security. Customers, especially low income customers, highly impacted communities and vulnerable populations may currently experience past due balances and the inability to pay. The delay in payments and accumulated non-payments over time may lead to energy insecurity through disconnections. By assisting customers with arrearages through energy assistance programs, customers may avoid disconnection for non-payment and maintain energy security.

12.2. 2021 and 2022 metric data

Arrearages. For the purpose of this metric, we are considering two types of arrearages - both the total number of customers that are in arrears as well as the total dollar amount that they are in arrears by location and demographic information.

Disconnections. For the purpose of this metric, we are considering the total number of customers facing disconnect by location and demographic information.

These metrics will be calculated for the following populations:

- All Residential PSE customers
- Highly impacted communities
- Known Low-Income
- Vulnerable populations

Table H.23: Decrease Residential Arrearages and Disconnections for Nonpayment

Metric	PSE – all customers	
	2021	2022[11]
Number and percentage of residential electric disconnections for nonpayment by month, measured by location and demographic information (zip code/census tract, KLI customers, Vulnerable Populations, Highly Impacted Communities, and for all customers in total)[12]	N/A	PSE is providing details from the following file in the GRC docket 220066-220067-PSE-2022-Annual-MYRP-Rpt-Attach-A-(03-31-2023).xlsx, advancing equity by zip code. These are part of the settlement agreement under dockets UE-220066/UG-220067 and 210918 (Consolidated). There were no disconnections reported in the months of January - April 2022.
Residential arrearages	$870,844,654.84	$1,145,979,801.17
The number of customers with past-due balances (arrearages)	2,298,554	2,621,924
The amounts of past-due balances that are past due 30+ days, as compared to total arrearages	$115,788,685.88	$157,636,235.71
The amounts of past-due balances that are past due 60+ days, as compared to total arrearages	$80,886,853.77	$115,292,783.96
The amounts of past-due balances that are past due 90+ days, as compared to total arrearages	$435,757,431.49	$580,987,697.84

11. For 2021 and 2022 data see docket UTC Case Docket Document Sets | UTC (wa.gov)
    For 2022 number and percentage data see docket UTC Case Docket Document Sets | UTC (wa.gov)
12. PSE did not report or track disconnections until May 2022.

12.3. Data sources

Table H.24 below presents the data sources to use for this calculation.

Table H.24: Data sources for calculating arrearages

Category	Dataset	Units	Source	Source Reporting
Energy Security	Number and percentage of residential electric disconnections for nonpayment	Number and Percent	PSE Tracking Data	Annually
	Residential arrearages	US Dollar		Annually
	Number of customers with past-due balances	Count of Customers		Annually
	Amounts of past-due balances that are past due 30+, 60+, and 90+ days,	US Dollar		Annually

12.4. Issues and data gaps

Issue 1: Missing Zip Codes or Named Community Designations. Due to data discrepancy/data quality issues between PSE's source system and PSE's data reporting system there may be some accounts where a zip code and/or a named community designation may not be assigned to a customer.

Risk Mitigation Recommendation. Continuously identify and fix missing data issues as they are identified.

Issue 2: Duplicate Past Due Balances. There are a select few customers where portions of their past due balance belong to both a residential and commercial contract. Therefore, when summing total commercial customers and total residential customers past due, the number may not match the grand total.

Issue 3: No Disconnect Data Prior to May 2022. There was a disconnect moratorium in place prior to May of 2022, so there will be no data for disconnections prior to May 2022.

12.5. Expected specific action impact on metric

In general, PSE's offerings of energy assistance programs, like the Bill Discount Rate program, should decrease customer arrearages and the potential for disconnections over time. PSE cannot control whether or not a customer applies for these programs but can continue to provide these programs to customers that are eligible to participate and look for ways to make it easier for eligible customers to participate