2 Interim and Specific Targets, Clean Energy Implementation Plan (CEIP) Methodology

PSE PUGET SOUND ENERGY

Chapter Two: Interim and Specific Targets, Clean Energy Implementation Plan (CEIP) Methodology

Introduction

To achieve the 2030 and 2045 Clean Energy Transformation Act (CETA) goals, each four-year CEIP sets interim targets for renewable and non-emitting energy, and specific targets for energy efficiency, demand response, and renewable energy. Each CEIP also identifies actions to achieve these targets, provide customer benefits, and maintains resource adequacy and affordability.

Interim Targets

PSE's interim target, measured as a percentage of forecasted retail electric sales supplied by renewable and non-emitting sources is 63 percent. This means 63 percent of PSE's electric sales will be served by clean, CETA-eligible energy by 2025. This interim target is calculated based on PSE's load forecast, our current power supply portfolio, and the forecast of specific actions in this CEIP[1]. Thirty-four percent[2] of PSE's retail sales of electricity was supplied by renewable and non-emitting resources in 2020. Using the median water conditions[3], 33 percent of PSE's retails sales of electricity was supplied by renewable and non-emitting resources in 2020. This calculation is based on the publicly available 10K filing[4] and shown in Table 2-1. To calculate median water conditions, median generation for each project is calculated for each month, and annual median generation is the sum of these monthly values.[5]

Table 2-1: 2020 Renewable Energy Comparison with Median Water Conditions

	Renewable energy with actual water conditions	Renewable energy with median water conditions
Total Retail Sales	24,855,073	24,855,073
- CETA Adjustments	1,611,563	1,611,563
CETA Retail Electric Load	**23,243,510**	**23,243,510**
Hydro	5,360,549	5,122,538
Wind	2,516,625	2,516,625
Total Clean Energy Used	**7,877,174**	**7,639,163**
Percentage supplied by renewable and non-emitting resources	**34%**	**33%**

[1] WAC 480-100-640(2)(a)(iii)
[2] WAC 480-100-640(2)(b)
[3] WAC 480-100-640(2)(c)
[4] https://www.sec.gov/ix?doc=/Archives/edgar/data/81100/000108539221000011/psd-20201231.htm
[5] CETA specifically asks utilities to consider median water conditions along with average water conditions to help address potential future climate change conditions and water availability.

To meet the interim target, PSE is pursuing all cost-effective, reliable, and feasible conservation and efficiency resources and demand response consistent with RCW 19.405.040(6)(ii), while protecting the safety, reliable operation, and balance of the electric system[6]. PSE is also working to ensure all customers benefit from the transition to clean energy.

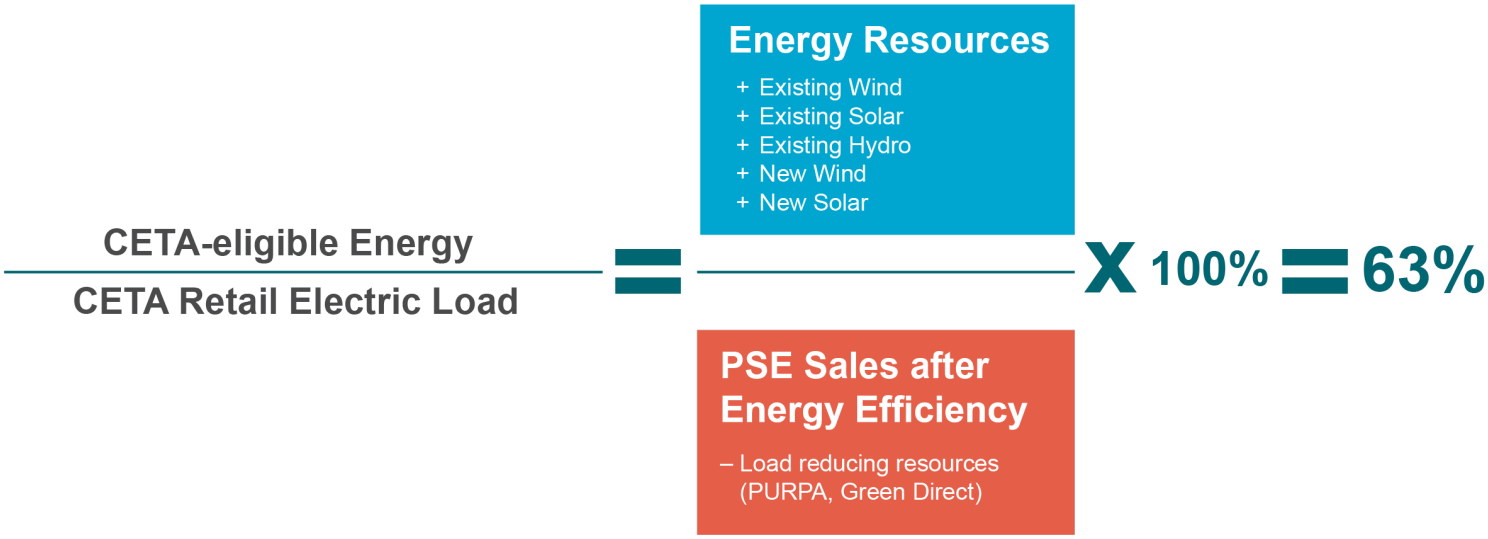
To calculate the interim target, PSE calculates the ratio between the CETA-eligible energy and CETA need:

1. CETA need: We start with PSE's forecasted retail sales and reduce by energy efficiency and load reducing resources like those from the Public Utility Regulatory Policies Act of 1978 (PURPA) and Green Direct.

2. Calculate the total energy from CETA-eligible energy. This calculation includes existing wind, hydroelectric and solar, and new wind and solar resources.

Figure 2-1 illustrates this calculation and Table 2-2 breaks down the calculation for the forecasted energy in the years 2022 through 2025.

Figure 2-1: Calculating the Interim Target



[6] WAC 480-100-640(2)(a)(ii)

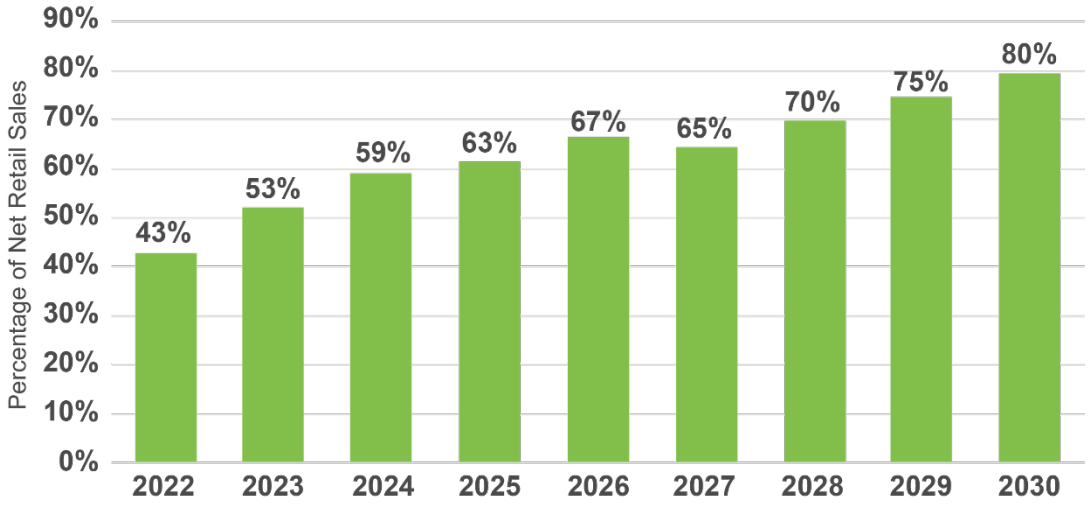
Table 2-2: 2022–2025 Interim Target Calculation[7] (Cumulative energy in MWh)

CETA Summary	2022	2023	2024	2025
Forecast Retail Sales	20,236,296	20,378,670	20,604,482	20,722,203
Energy Efficiency (2022–2023 Biennial Conservation Plan (BCP))[8]	268,359	536,717	805,076	1,073,434
New Demand Response	0	5,702	17,331	47,256
PURPA Contracts	581,349	580,814	624,150	580,304
Green Direct	656,726	656,726	659,726	970,973
DER Solar — Load Reduction	5,585	20,577	37,144	52,749
CETA Retail Electric Load	**18,724,277**	**18,578,133**	**18,461,057**	**17,997,487**
New Wind	0	0	632,336	1,256,988
New Utility-scale Solar	0	0	420,527	629,343
New DER/Non-Wires Solar	0	4,074	8,162	8,148
DER Solar — CETA Eligible	0	7,029	14,584	22,589
Existing Wind/Solar/Biomass (includes signed contracts)	2,390,017	4,054,688	4,076,546	4,054,720
Existing Hydro	5,714,766	5,696,227	5,669,840	5,4049,805
CETA-eligible Energy	**8,104,783**	**9,762,017**	**10,821,995**	**11,381,593**
Interim Target	**43%**	**53%**	**59%**	**63%**

[7] Calculation consistent with WAC 480-100-640(2)(c)

[8] Energy Efficiency includes updated target from the 2022 – 2023 Final BCP

Figure 2-2: 2022–2030 Interim Targets



The projected decrease in the interim target in 2027 reflects the expiration of a hydropower contract. However, PSE does not intend to move backward in the progress to deliver CETA-eligible energy and meet the 2030 and 2045 standards. We will revisit these interim target projections as we prepare a second CEIP covering 2026–2029.

Figure 2-3: 2031–2045 Interim Targets

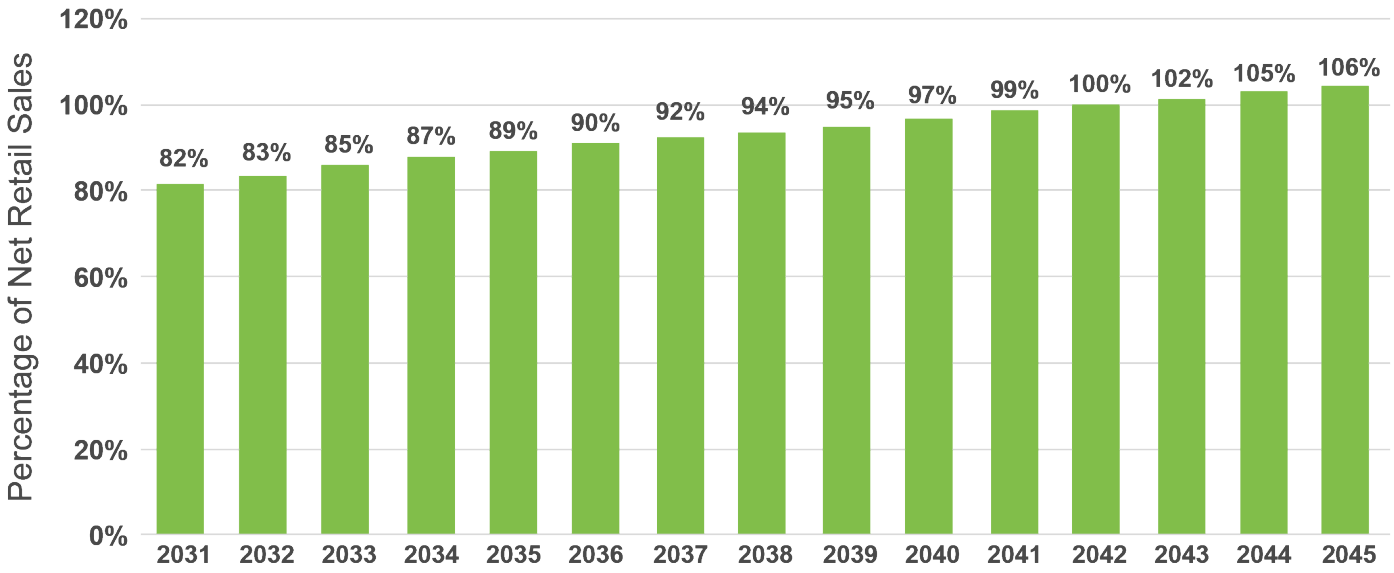


Figure 2-2 shows the ramp-up to the interim target over four years and into 2030. We use the same approach to calculate the interim targets for 2031 through 2045, shown in Figure 2-3.

As shown in Figures 2-2 and 2-3, PSE assumes a linear ramp rate to reach 80 percent by 2030 and 100 percent by 2045. The targets beyond 2025 do not reflect acquiring resources at a ramp rate that meets or exceeds a 2 percent incremental cost of compliance. Instead, the targets build resources to meet the CETA energy need, considering the portfolio cost for the 20 years. As the target goes beyond 2043, the energy used to serve load is more than 100 percent. This is due to market interactions and charging for battery storage that help PSE to balance generation to load across varying hours and conditions. For example, at certain times PSE may generate more energy than it needs to serve load and will sell surplus energy to the market. At other times, PSE will generate more energy than it needs to serve load and use that energy to charge batteries to have the electricity stored and available when it is needed. And in certain instances, PSE generation may fall short of meeting load and the battery storage or market purchases serve to fill in the gap. Interim targets go beyond 100 percent before 2045 because our mix of resources balances fluctuations in the system, like seasonal demand and curtailments. These market interactions are critical to maintaining reliability and reducing costs. PSE's 2021 IRP analyzed the impacts of prohibiting sales to the market and the resulting portfolio costs were almost $1.6 billion dollars more than the comparison portfolio without this constraint due to significantly higher levels of renewable curtailment and other factors[9].

Achieve Desired Resource Adequacy Target

Resource adequacy means ensuring the electric system, the infrastructure and supply, has enough flexibility to balance needs and unexpected events, such as variations in temperature, hydro, wind, and solar generation, equipment failure and forced plant outages, transmission interruption, potential curtailed wholesale power supplies, or any other sudden departure from forecasts. PSE's peak capacity planning standard derived from our 2021 Integrated Resource Plan (IRP) is to achieve a 5 percent Loss of Load Probability[10] (LOLP). The CEIP portfolio reaches that 5 percent target. Table 2-3 illustrates that the CEIP has an adequate peak capacity to maintain at least 5 percent LOLP. This analysis applies the resource adequacy metrics from the 2021 IRP, including the planning reserve margin and effective load-carrying capability of existing and generic resources. Table 2-3 illustrates the peak capacity value for each resource over the four-year CEIP period. As we note in the last column of the table, PSE is surplus in MW to meet the resource adequacy target. Find additional information in Chapter Seven of the 2021 IRP.

[9] 2021 IRP, Chapter Eight, Electric Analysis, Page 41: https://oohpseirp.blob.core.windows.net/media/Default/Reports/2021/Final/08.%20IRP21_Ch8_032921c.pdf

[10] PSE currently uses a loss of load probability (LOLP) consistent with the Northwest Power and Conservation Council to determine the peak capacity need for its service territory. We provide complete discussion of the peak capacity need in the 2021 IRP, Chapter Seven, Resource Adequacy Analysis[10].

Table 2-3: CEIP Maintains Resource Adequacy Targets — Values Shown are MW

	2022	2023	2024	2025
Existing[11] and Recently Acquired Resources	4,295	4,439	4,428	4,369
New Demand-side Resources	73	133	200	262
New Wind & Solar	-	-	40	82
New Energy Storage	-	-	3.1	6.2
New Demand Response	-	1.6	3.5	9.2
CEIP Distributed Solar	0.1	0.5	0.9	1.2
CEIP Distributed Energy Storage	-	0.9	2.4	5.5
Sub-total Resources	4,369	4,575	4,678	4,735
Short-term Market Purchases	1,518	1,485	1,472	1,474
Total Resources	5,887	6,060	6,150	6,209
2021 IRP Mid Demand + Planning Margin	5,656	5,706	5,792	5,845
Surplus/(Deficit) capacity to address customers' peak energy needs	231	354	358	364

Specific Targets

Energy Efficiency Target

Energy efficiency programs and actions reduce the amount of electricity used by customers to meet their energy needs, which reduces customers' carbon footprints, lowers bills, and reduces the overall electric supply needed. This load reduction results in a lower need for new renewable and non-emitting resources and brings PSE closer to meeting the CETA standard of 100 percent by 2045.

PSE's energy efficiency target for the 2022–2025 CETA implementation period is 1,073,434 MWh consistent with the Final Biennial Conservation Plan (BCP) filed on November 1, 2021. Table 2-4 shows the calculated target for each biennium of the four-year period. The annual targets are detailed in PSE's BCP and include all energy efficiency and conservation targets and goals required by the Washington Utilities and Transportation Commission (WUTC).

[11] Existing includes two contracts for resources that are not yet online. Golden Hills is a 200 MW solar contract expected to come online in 2022. Clearwater is a 350 MW Montana wind project scheduled to come online in 2023.

Table 2-4: Energy Efficiency Targets

	2022–2023	2024–2025	Total
Energy Efficiency Targets	536,717 MWh	536,717 MWh	1,073,434 MWh

In our modeling through Aurora, energy efficiency is modeled as a resource. After performing the Long-term Capacity Expansion study and Hourly Economic Dispatch, the new energy efficiency selected by the model is subtracted from the projected retail sales to calculate the CETA interim target.

Energy Efficiency Methodology

PSE's Biennial Conservation Plan (BCP) informed the CEIP energy efficiency targets. To create the BCP, we conduct a Conservation Potential Assessment (CPA), a study that determines the conservation potential — the amount of energy efficiency available in our service territory. We build the conservation potential with a bottom-up approach, using unique energy-efficient technologies applied to appropriate end uses and building types to determine the achievable technical potential.

We use the CPA as inputs for the PSE IRP economic portfolio modeling. The models select the amount of annual energy efficiency that is cost-effective compared to alternative resources. Variables that influence this selection process include load growth, additional generation costs, and other factors. In conjunction with our Conservation Resource Advisory Group (CRAG), PSE uses the achievable, technical, and economic potential to build biennial targets.

We calculate the targets for each biennium, consistent with the Energy Independence Act requirements in WAC 490-109-100(3). The calculation uses a pro-rata share of the 10-year conservation potential identified in the IRP, subtracts the anticipated Northwest Energy Efficiency Alliance (NEEA) savings[12], and then adds a 5 percent decoupling target. On top of this, we add additional firm savings (Schedule 449 Program) and estimated pilot program savings to obtain the final two-year conservation goal. See Table 2-5 for a detailed explanation of this calculation.

Working with our CRAG, we use the information in the conservation potential assessment and other relevant data to build PSE's portfolio of programs that will achieve the targets. These programs fall in residential energy management, business energy management, pilots, and regional programs, like participating in the NEEA and system distribution efficiency activities. The work to implement the biennial targets constitutes specific actions under CETA. For more information on specific actions, see Chapter Four.

[12] NEEA savings are savings achieved through participation in regional programs administered by the Northwest Energy Efficiency Alliance. The electric penalty structure is discussed in RCW 19.285.060 and WAC 480-109-070. The decoupling threshold is described in PSE's Amended Decoupling Accounting Petition in Docket UE-121697 Section III.G.31, page 17.

Table 2-5: Electric Portfolio Savings Target Calculation Summary[13]

Puget Sound Energy 2022–203 Electric Portfolio Savings					
Index	Description	MWh	aMW	Comment	Calculation
Colored cells correspond to indicated lines in Exhibit 1: Savings and Budgets, Two-year Portfolio View.					
	Calculate the EIA[14] Target				
a	CPA[15] Pro-rata Share IRP & CPA Guidance	497,564	56.8	Represents all available conservation that is cost-effective, reliable, and feasible, as a 20% pro-rata share of PSE's 10-year conservation potential, per RCW 19.285.040(1).	Figure 3, Exhibit i
b	EIA Target	497,564	56.8	Meets RCW 18.285.040(1)(a) and (b) requirements	
	Calculate the Penalty Thresholds				
c	Subtract NEEA[16] Savings	-28,382	-3.24	Option A in savings calculation table from NEEA forecast — current method.	
d	EIA Penalty Threshold	469,182	53.6	$61–$64/MWh shortfall penalty, based on 2020 inflation, per RCW 19.285.060.	= b - c
e	Decoupling Threshold	24,878	2.8	5 percent of EIA Target	= b * .05
	Complete the Portfolio			Use CPA Pro-rata share as foundation.	
f	Add Firm Savings Excluded from CPA	9,550	1.1	2022/2023: 449s, special contracts	
g	Add Pilots with Uncertain Savings	4,725	0.5		
h	Total 2022–2023 Utility Conservation Goal	536,717	61.3	The total portfolio PSE manages.	= b + e + (f + g)

[13] Appendix B: Biennial Conservation Plan 1217_Appendix B_BCP_2022-2023_12-17-2021.pdf (cdn-website.com)

[14] EIA: Energy Independence Act. A reference to the 2006 voter initiative, The Washington Clean Energy Initiative. The vote resulted in the creation of RCW 19.285 and WAC 480-109, which is now referred to as the Energy Independence Act. The EIA was also sometimes colloquially referred to as "I-937".

[15] CPA: Conservation Potential Assessment

[16] NEEA: Northwest Energy Efficiency Alliance

PSE's current BCP includes the 2022 and 2023 conservation targets because it is a two-year plan. To obtain the total four-year energy efficiency savings target for the CEIP, we applied the same numbers and methodology for years three and four, although we will adjust the energy efficiency target in our 2023 biennial CEIP update to align with the target identified in the 2024–2025 BCP.

Because of the timing of these two distinct processes, the customer benefit indicators developed through the CEIP process were not available to influence the current BCP. However, PSE used non-energy impacts (NEIs) to develop the target and programs in the BCP. As discussed in Chapter Three, these NEIs reflect some of the same principles of the customer benefit indicators and provide value to each program. In the future, PSE will use customer benefit indicators to determine programs for energy efficiency, and coordinate this with the ongoing work for NEIs.

Demand Response Target

Demand response (DR) programs and actions can reduce the demand on the system during peak events. These programs can lower the need for peaking generation like emitting resources. This reduced need for peaking capacity decreases the use of emitting resources to meet PSE's load and brings us closer to the CETA standards. PSE's demand response target for the 2022–2025 CETA implementation period is 23.7 MW.

Demand Response Methodology

In 2021, PSE commissioned a CPA that included an analysis of demand response opportunities in PSE's service territory. Because PSE is a winter peaking utility, this analysis focused on identifying programs aimed at reducing PSE's winter peak demand. We defined each program and produced technical and achievable potential estimates for each product with a bottom-up method that used number of customers, equipment saturation rates, expected load impact, market conditions, and customer adoption estimates. We determined costs for each program based on a total resource cost perspective.

PSE used information from the CPA in portfolio modeling to estimate the cost-effectiveness of the effective demand response programs. The preferred portfolio from the 2021 IRP and the Clean Energy Action Plan (CEAP) each included a similar selection of demand response programs. We accelerated these programs for the 2021 CEIP model runs according to their cost-effectiveness, i.e., starting with the lowest cost programs and their market potential with the ability to increase over time. The conservation potential assessment is the most up-to-date information assessing demand response potential. This target and mix of demand response programs represent what we aspire to achieve over the four-year period. As PSE gains additional insight from the targeted Distributed Energy Resources (DER) Request for Proposal (RFP), which includes demand response, we may update this target.

Although selected by the model as cost-effective, we did not include critical peak pricing and time-of-use programs in the 2021 CEIP DR target calculation. PSE is developing a time-of-use pilot to identify these savings; we describe this action in Chapter Four, Specific Actions. As we learn more about the

specific rate designs and customer response to those rate designs, we can adjust our DR target to incorporate the projections of including these rates.

We made no changes to the DR target based on customer benefit indicators. PSE will use the results of the Targeted DER RFP to consider customer benefit indicators in the evaluation process. We describe how these programs will be evaluated using the customer benefit indicators in Chapter Three.

Renewable Energy Target[17]:

Renewable resources are essential to meet CETA's clean energy standard because they are clean, non-emitting sources of energy to serve PSE's load. As more load is served with renewable energy, PSE moves closer to reaching the 100 percent goal by 2045. Sixty-three percent of the energy used to serve retail sales will be delivered by CETA-eligible energy by the end of 2025.

Renewable Energy Methodology

Renewable Energy Target is Informed by Updated Information

PSE added more than 750 MW of renewable energy to its power supply between 2005 and 2020. As of 2020, CETA-eligible renewable energy makes up 34 percent of the energy supplied to PSE customers. To establish the renewable energy target for the 2022–2025 period, PSE built on the work of the 2021 CEAP and incorporated new information as it became available and was feasible. We describe this new information in detail in the Methodology section.

PSE also accelerated the forecasted pace of adopting renewable energy from the CEAP. This acceleration and the impact on renewable energy in PSE's portfolio can be seen in Table 2-6 below. PSE pushes beyond 56 percent as originally forecasted in the 2021 IRP to bring in more renewable resources to reach a 63 percent renewable energy target by 2025. The costs associated with meeting this proposed renewable energy target and the other targets in this CEIP are projected to barely exceed the two-percent incremental cost of compliance, as explained further in Chapter 5.

Table 2-6: Increase in Renewable Energy from 2021 IRP/CEAP to CEIP

		2022	2023	2024	2025
2021 IRP	aMW of Renewable Energy	845	1,033	1,038	1,183
	Percent of Retail Sales	39%	48%	48%	56%
2021 CEIP	aMW of Renewable Energy	**935**	**1,145**	**1,290**	**1,379**
	Percent of Retail Sales	43%	53%	59%	63%

PSE proposes to accelerate the pace at which we adopt renewable energy in this CEIP for several reasons. First, we heard from numerous stakeholders a general desire to see PSE move further and

[17] The Renewable Energy target also ensures PSE meets (and exceeds) its EIA target.

faster to the clean energy future. This accelerated pace does that. Second, PSE believes a steady pace of renewable energy acquisition increases the likelihood that we can reach 80 percent by 2030 without using the incremental cost alternative compliance pathway to comply. Finally, PSE prefers to take more aggressive early action in this first CEIP period as opposed to waiting until the second CEIP period when the costs and risks are less clear and could be higher.

PSE currently complies with Washington's Energy Independence Act. The forecasted resource additions of wind and solar are also compliant with Washington's Energy Independence Act. We anticipate these added resources will keep PSE in compliance with the Energy Independence Act renewable portfolio standard (RPS). PSE understands that "renewable" has a different meaning under the Energy Independence Act as compared to CETA. PSE recognizes that only incremental hydro counts as renewable under the Energy Independence Act.

Distributed Energy Resources: A Sub-target of the Renewable Energy Target

The preferred portfolio in the 2021 IRP included distributed energy resources, specifically distributed solar programs, and distributed battery storage. The preferred portfolio identified amounts of distributed energy resources but did not fully consider feasibility or program design. In this CEIP, we incorporate feasibility, benefits, and risk mitigation of distributed solar and battery programs, in the aggregate and for specific programs. For this initial CEIP, we adopt a sub-target to our renewable energy target of 80 MW of distributed solar capacity in 2025, which is the same amount from the IRP preferred portfolio. The market potential evaluation, as described in Appendix K, indicates this sub-target reflects a feasible market adoption rate.

Distributed energy resources provide customer benefits and provide an important risk mitigation measure by providing foundational experience in distributed energy resources. The 2021 IRP analyzed the impacts of a lack of regional transmission availability, which led to an unrealistic pace of development of distributed energy resources[18]. The systems to control distributed energy resources, supply chains, skilled workforce, and distributed system capacity will take many years to develop. By beginning now to incorporate distributed energy resources as part of PSE's supply portfolio, we can establish foundational technologies, operational systems, and experience to maximize the value of distributed resources.

Equitable Distribution of Energy and Non-energy Benefits

A critical part of CETA is ensuring all customers benefit from the transition to clean electricity. PSE does not currently have a specific forecast of the distribution of energy and non-energy benefits for each specific target, although certainly many of the energy and non-energy benefits are known generally for the resource types. It is difficult to forecast the distribution of energy and non-energy benefits without knowing the specific resources or programs PSE will implement, which is dependent on the results of the All-Source RFP and Targeted DER RFP processes. To equitably distribute

[18] PSE 2021 IRP, Sensitivity C constructed no distributed energy resources prior to 2035 and 3200 MW between 2040 and 2045.

benefits, PSE must understand our existing distribution of benefits, identify who experiences these disparities, and measure how much customers benefit. We will continue to develop this system of measuring energy and non-energy benefits as we discuss in greater detail in Chapter Three. We will:

- Use internal benchmarks to uncover disparities within our service territory, including in existing programs like energy efficiency,
- Understand the burdens that may prevent customers from participating, especially in highly impacted communities and vulnerable populations through stakeholder engagement,
- Develop programs through the RFP that alleviate burdens and increase benefits for customers, especially highly impacted communities and vulnerable populations, and
- Implement ways to quantify what benefits are achievable and set up a way to track and report on these benefits for each program or action, over time.

PSE Seeks Commission Approval in this CEIP of its Interim Target, Specific Targets, and Associated Costs

For this first CEIP, PSE seeks approval from the Washington Utilities and Transportation Commission (WUTC) for the following targets, actions, and projected associated costs:

1) **Interim Target:** 63 percent of retail sales by 2025, totaling approximately 11,381,593 MWh
2) **Energy Efficiency Target:**1,073,434 for 2022–2025, subject to update in 2023 to reflect the 2024–2025 Biennial Conservation Plan
3) **Renewable Energy Target:**
    a. 800 MW of new utility-scale renewables
    b. 80 MW of new distributed energy resources
4) **Demand Response Target:** 23.7 MW by 2025
5) **Specific Actions:** Conduct an All-Source Request for Proposal (RFP) and a Targeted DER RFP in 2022–2023 to secure resources to meet PSE's specific and interim targets expressed above plus 50 MW of utility-scale storage and 25 MW of distributed storage by the end of the CEIP period.
6) **Incremental Cost:** To meet targets consistent with the goals of CETA, PSE estimates we will need to spend, on average, a two-percent average annual rate increase specifically to implement the above-stated targets consistent with CETA.

In future CEIPs, when we can better align the timing of resource acquisition processes with the schedule for filing and seeking approval of a CEIP, PSE anticipates including more specific actions and details regarding the resources and costs associated with meeting these targets.

Table 2-7: Specific Targets from 2022–2025, Incremental

	2022	2023	2024	2025
Energy Efficiency (MWh)	268,358.5	268,358.5	268,358.5	268,358.5
Demand Response (MW)	-	5	6	12.7
Renewable Energy [Utility-scale] (MWh)	-	-	1,052,863	833,468
Distributed Energy Resources (MW)	7	23	25	25

Methodology to Develop Targets: from Integrated Resource Plan (IRP) to Clean Energy Implementation Plan (CEIP)

The 2021 IRP/CEAP set the stage for PSE to meet resource needs at the lowest reasonable cost while providing customer benefits over a 10-year horizon. As PSE transitioned to building the four-year roadmap in the CEIP, we refined the assumptions and inputs of the IRP/CEAP resource modeling based on available information. The 2021 CEIP modeling process optimized resource additions to better represent target programs over 2022–2025 using the AURORA long-term capacity expansion model, a benefit-cost analysis (BCA) model, and customer benefit indicators, and iterated on various permutations to maximize spending to the incremental cost guidance.

PSE's CEIP accelerates adding large-scale wind and solar resources and adds some utility-scale battery storage. Table 2-8 highlights the changes in the large-scale resource additions from the 2021 IRP preferred portfolio to the 2021 CEIP. Specifically, there is an overall increase of 100 MW in wind resources over the four-year period and a shift in the timing of some of the forecasted wind energy estimated to come online in 2024. We also add 300 MW of solar energy beginning in 2024. We add 25 MW of utility-scale battery storage in 2024 and 25 MW in 2025. Although this battery storage does not contribute to the overall CETA need, it does contribute to system reliability and renewable resource integration benefits to the portfolio. Over the four-year period, there is no change in other resources as compared to the 2021 IRP preferred portfolio.

These resource additions are an estimate of the types of clean energy resources that PSE may acquire during the four-year CEIP period, and the anticipated timing — they are not intended to be definitive, nor is PSE committing in this CEIP to secure this proposed mix of renewable energy resources through the ongoing RFP processes. Rather, as detailed earlier in this Chapter and in Chapter One, PSE seeks WUTC approval of the specific and interim targets, the associated MW/MWh, certain specific actions, and the overall projected incremental cost associated with achieving those targets and specific actions. As outlined in the plan, these targets and costs ensure reasonable near-term progress that will enable

PSE to spread the costs and risks to customers associated with the clean energy transition gradually over the decade. PSE will incur a high incremental cost to meet the distributed energy resource sub-target; we expect none of these investments would be cost-effective before adopting CETA and considering customer benefit indicators. As such, PSE seeks WUTC approval that our investment in DERs and the DER enabling costs associated with these investments is reasonable and prudent at the level proposed in this plan.

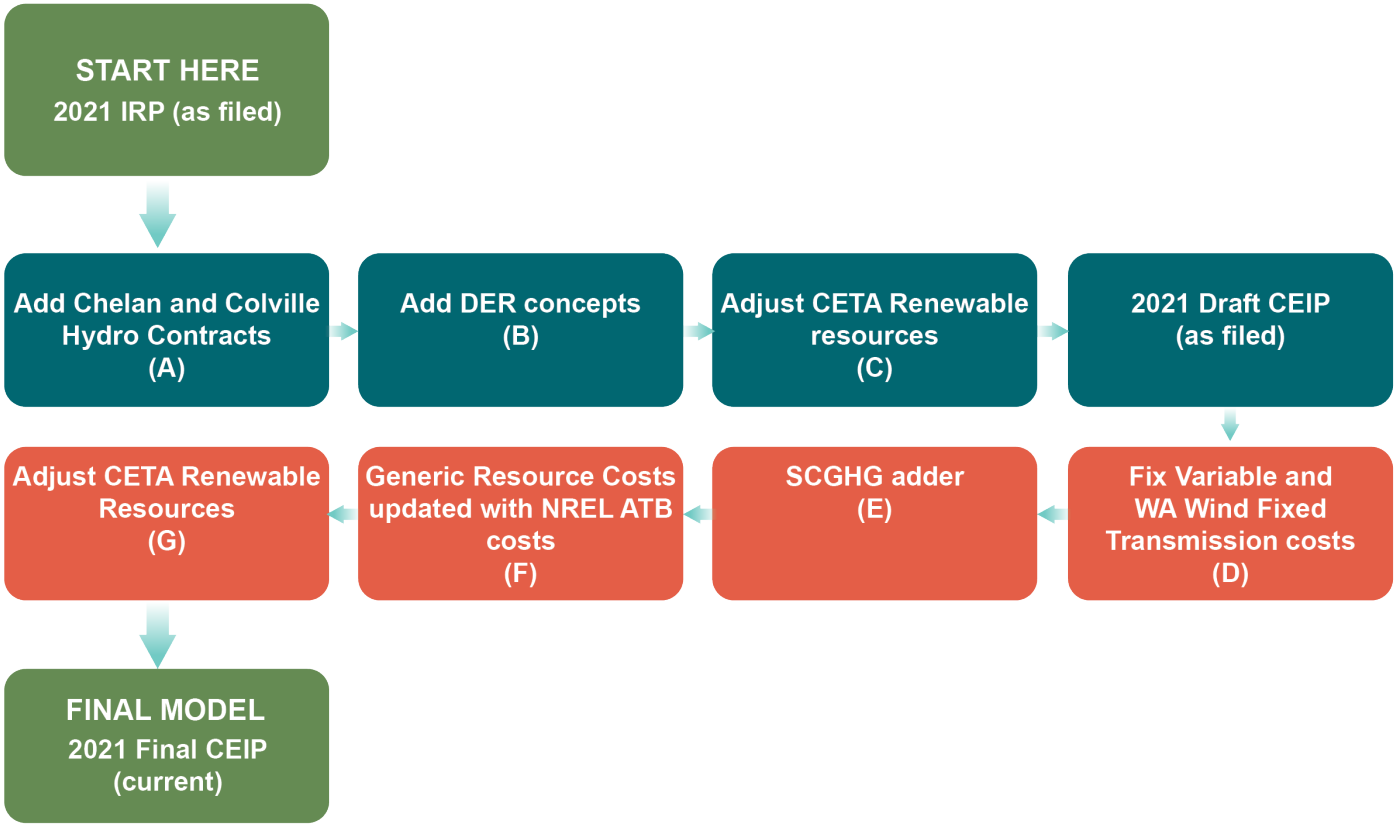
It is important to note the portfolio optimization model is non-linear, highly sensitive to changes to the inputs or assumptions, and has multiple possible solutions. The adjusted CETA needs and new hydroelectric contracts we executed resulted in a different optimization path, which created in a different portfolio. This portfolio satisfies PSE's peak needs, energy needs, and CETA requirements. However, there are other possible permutations of this portfolio that may also satisfy PSE's peak needs, energy needs, and CETA requirements that may be considered through the RFP evaluation processes as we gather actual resource specific information and costs.

Table 2-8: 2021 IRP vs. CEIP Utility Scale Resource Additions in MW (2022–2025)

Scenario	Resource Type	2022	2023	2024	2025	Total
2021 IRP Preferred Portfolio	Battery Storage	-	-	-	-	0
	Solar	-	-	-	-	0
	Wind	-	-	-	400	400
2021 CEIP	Battery Storage	-	-	25	25	50
	Solar	-	-	200	100	300
	Wind	-	-	200	300	500

For the 2021 CEIP, PSE made several updates to the resource inputs from the 2021 IRP. These updates include resource additions, cost assumptions, and accelerating CETA-eligible resources. Figure 2-4 illustrates the process PSE undertook to update assumptions in modeling for the CEIP. We explain the steps we took to update modeling from the 2021 IRP to the 2021 CEIP in greater detail in Figure 2-4.

Figure 2-4: IRP Portfolio to CEIP Portfolio Modeling Updates



A. Add Chelan and Colville Hydro contracts: PSE entered two renewable energy supply contracts after the 2021 CEAP was completed. The first is a new contract for 5 percent of the output of Chelan Public Utility District's Rock Island and Rocky Reach hydropower contracts from 2022 through 2026, providing approximately 49 aMW of energy. The second is a three-year extension of PSE's existing portion of the Colville Tribe's share of the Douglas Public Utility District's Wells Hydro Project for a 5.5 percent share from October 1, 2021, through September 30, 2024, providing approximately 26 aMW of energy. With the acquisition of these hydroelectric contracts, PSE adjusted its CETA need for this CEIP.

B. Specific distributed energy resource programs and costs: As described here and in Appendix D-1, Distributed Energy Resources (DER) Suite Selection and Evaluation, PSE commissioned a detailed evaluation of program costs and potential adoption rates for a range of distributed solar energy and energy storage programs. In the 2021 IRP preferred portfolio, the 80 MW distributed solar and 25 MW distributed battery storage projections were based on generic resource cost assumptions developed in the IRP process. As discussed previously in

this chapter, PSE used updated resource costs for distributed solar and distributed battery storage, developed, and incorporated into AURORA for modeling energy and capacity contributions and the overall cost of the CEIP portfolio. Instead of the generic resource costs used in the 2021 IRP for these distributed resources, PSE used the granular cost information provided by Black & Veatch, seen in Appendix K. This cost information provided the resource cost and the cost for each DER program in this CEIP.

C. Adjust CETA renewable resources: Based on stakeholder feedback, PSE adopted a more aggressive pace of renewable energy acquisition than noted in the 2021 IRP. PSE updated the renewable resource need given the impacts of the additional hydroelectric contracts and made additional adjustments to the resource mix to stay close to the two-percent incremental cost threshold.

D. Fix variable and WA wind fixed transmission costs: PSE learned of two errors in the 2021 IRP modeling related to transmission cost assumptions after the 2021 IRP was completed. The first error was an update to the spinning and supplemental reserve cost used as part of the variable transmission cost for resource modeling. The models assumed the full costs of this transmission rate, however in alignment with the BPA transmission tariff, these costs should have only used 3 percent of the rate. The assumed cost in the 2021 IRP was $9.53/MWh. Once corrected, the variable cost decreased to $0.27/MWh. This change decreases the variable transmission cost for renewable resources outside of PSE's territory. The other error involves the escalation used for WA wind fixed transmission costs. The error was reflected in the conversion of fixed transmission costs from nominal dollars to 2012 dollars in AURORA. As a result, costs for WA Wind fixed transmission costs were lower by 12 percent in 2025 and 46 percent by 2045. We checked all other costs and escalations and this issue only occurred for WA Wind fixed transmission costs; it has been corrected for the final CEIP.

E. Social Cost of Greenhouse Gas Emissions (SCGHG) Adder: PSE recalculated the SCGHG adder for existing and thermal resources based on updated emissions output and the current social cost of carbon price using the 2020 GDP as published on the WUTC website versus the 2019 GDP we used in the 2021 IRP[19]. This inflation update resulted in a minor cost adjustment of about $0.74/metric ton by the year 2025.

F. Generic resource costs: In response to feedback from stakeholders, PSE updated the generic resource costs used in the final CEIP to reflect cost assumptions developed by the National Renewable Energy Lab's Annual Technology Baseline 2021 Report (NREL ATB 2021 Report). The NREL ATB cost assumptions are generally lower for most resources than the costs in PSE's 2021 IRP or the range of bids received in the All-Source RFP. However, it is difficult to compare the generic utility-built and owned resources modeled in the IRP to the PPAs from the

[19] WUTC Social Cost of Carbon update: https://www.utc.wa.gov/regulated-industries/utilities/energy/conservation-and-renewable-energy-overview/clean-energy-transformation-act/social-cost-carbon

All-Source RFP due to the differences in financing, tax incentives, returns, and various cost assumptions including transmission, interconnection, and operational costs. In general, NREL ATB's cost assumptions appeared to be closer to the range of bids received in the All-Source RFP than to the IRP generic resource cost assumptions. PSE bases the premise that NREL ATB cost assumptions are directionally closer to the All-Source RFP solely on the company's preliminary analysis conducted during the Draft CEIP comment period. PSE plans to examine these cost assumptions in more detail and make better-informed assumptions in the next IRP. As a result of this update as well as the acceleration of the forecasted pace of renewable energy resources, the CEIP projects the acquisition of more renewable resources during the CEIP period than the Draft CEIP targeted.

G. Adjust CETA Renewable resources: Except for the utility-scale resources, we carried over the 2021 IRP and CEAP resource need by category targets to this 2021 CEIP. We ran the utility-scale resources through the modeling process after completing the resource cost updates. We gave the utility-scale resources the flexibility to adjust based on CETA MWh need in the modeling process. PSE held the demand response and distributed solar and battery targets constant for the final CEIP. We also updated the energy efficiency target to reflect the final BCP and held it constant.

PSE performed multiple modeling iterations to understand the mix of utility-scale resources for the CEIP and discern their incremental cost and CETA-energy impact on the preferred portfolio.

In the first run, the model selected a large amount of WA wind to meet the clean energy targets at the end of the CEIP period in 2025 to take advantage of the expiring production tax credits (PTCs). This outcome did not seem to reflect what PSE likely would acquire through our All-Source RFP process, given the risk to system reliability from an overreliance on WA wind. Although PSE received a strong response from bidders for wind energy projects, we also received a strong response for solar and BESS projects[20].

Next, PSE performed a second model run that considered a more diverse set of renewable resources: a smaller amount of wind (500 MW) spread over two years instead of one, plus the addition of 300 MW of solar in 2024–2025.

Finally, PSE performed a third model run that kept the wind and solar resources and added 50 MW of batteries over 2024–2025. Although the first model run did not select batteries or solar purely on economics, PSE decided those resources should be in the proposed resource mix for this final CEIP for a couple of reasons. First, a diversified portfolio provides benefits that an all-wind portfolio does not. Second, the addition of batteries supports power system resilience, another benefit to PSE's system. Given the strength and diversity of the proposals seen in the All-Source RFP, this proposed resource mix of solar, wind, and batteries seemed reasonable and more in line with the type of diversified portfolio PSE would like to pursue over the next several years.

[20] *See "*2021 All-Source RFP: Proposal Summary" in Docket UE-210220, which summarizes bids received by resource type.

Distributed Solar and Distributed Battery Storage Updated Modeling

Introduction

In addition to serving as an important pathway to achieving PSE's CEIP goals, DERs create opportunities to enhance benefits to customers and contribute meaningfully to grid operations. The 2021 IRP preferred portfolio included 80 MW of distributed solar (incremental to the 2021 IRP net metering forecast) and 25 MW of distributed battery storage but did not distinguish options to reach these goals. To select preferred methods to reach the distributed energy resource targets, PSE seeks to develop a portfolio of DER programs that help spur customer and third-party adoption of clean energy resources. This section outlines PSE's approach to develop a draft DER preferred portfolio of distributed solar and battery storage programs for this CEIP.

DER Guiding Principles

To achieve the CETA compliance goals while effectively incorporating DERs, PSE is developing supporting systems and tools to use DERs effectively and offer them through a mix of customer products and services, third-party partnerships, and PSE-owned projects. Below are the guiding principles we developed internally and with a third-party consultant, West Monroe. These principles will guide PSE's DER strategy:

- Ensure DER development and deployment are flexible as technologies change,
- Launch customer programs that expand participation in DERs to historically under-served customer groups and ensure the benefits are equitably distributed,
- Become the partner our customers rely on for these new DER programs, and
- Deploy DERs in areas where they provide maximum benefit to the grid.

Concept Ideation

As a first step to develop PSE's proposed DER preferred portfolio for solar and battery storage programs, we partnered with West Monroe to benchmark and study other utilities' DER programs. We captured characteristics such as technology, ownership structure, and customer and utility benefits (see Appendix D-4). We examined and used additional industry knowledge and experience to expand and encompass a broader range of program designs such as ownership, location, and customer segment. PSE then screened and prioritized these concepts based on scalability, feasibility, and accessibility to develop groupings of programs to include in the CEIP (see Appendix D-5). See Tables 2-9 and 2-10 for the lists of concepts we used to select 25 MW of distributed battery storage and 80 MW of distributed solar.

Some of the concepts were dropped from consideration based on their feasibility and lack of information. For example, the rent-to-own solar and community battery share were on the list or supported by stakeholders but did not make the list of concepts. Rent-to-own distributed solar had a

similar market potential as the rooftop solar leasing program but had lower returns for customers. For community battery share, PSE noted a lack of price signals and benchmarks in other utilities, low feasibility, and concerns with costs. Additional details on these and other concepts are in Appendix D-4, D-6, and K. However, even if we did not move a concept on and include it in PSE's proposed preferred DER portfolio, we may consider it in future evaluations based on our Targeted DER RFP responses.

Table 2-9: Distributed Battery Storage Programs

#	Program Concept	Program Description
1	Third-party Customer-sited Distributed Battery Power Purchase Agreement (PPA)	Third-party installs/managed network of customer-sited batteries. Third-party will aggregate network of batteries to respond to dispatch signal from PSE.
2	Third-party Utility-scale Distributed Battery PPA	Third-party installs/managed single/network of batteries to respond to dispatch signal from PSE.
3	Commercial and Industrial (C&I) Bring your own (BYO) Battery	Tariff targeted to existing/new commercial battery owners that encourages optimal load behavior, charge/discharge, and/or PSE access that helps PSE manage system/local peak.
4	C&I Battery Install Incentive	PSE offers upfront incentive to commercial customer to install their own battery storage system, with terms for operating modes that lead to optimal load behavior.
5	C&I Space Leasing for Batteries	PSE leases space from/at C&I customers to deploy battery storage system.
6	Multi-family Unit Battery Program	PSE partners with multi-family unit owner/developer to deploy battery program.
7	PSE Mobile Batteries	PSE deploys mobile batteries to support planned and (un-)planned outages. Batteries can serve at distribution level.
8	PSE Substation Batteries	PSE installs batteries at its substations.
9	PSE Utility-scale Distributed Battery Stations	PSE installs distributed batteries locally, communally, and/or in urban settings (i.e., outside of substations).
10	Residential Battery Install Incentive	PSE offers upfront incentive to residential customers to install their own battery storage system, with terms for operating modes that lead to optimal load behavior.
11	Residential PSE Battery Leasing	PSE installs batteries in customer homes. Customers pay a monthly fee for backup power services; PSE uses battery to manage system/local peaks.

#	Program Concept	Program Description
11a	Residential PSE Battery Leasing — Income-eligible	PSE provides targeted deployment of batteries for income-eligible customers. Customers pay a monthly fee for backup power services; PSE uses battery to manage system/local peaks.

Table 2-10: Distributed Solar Programs

#	Program Concept	Program Description
12	Net Metering — Existing, referred to as Customer Connected Solar	Voluntary customer program to install rooftop solar and state-regulated mandate for compensation on generated energy imported to grid.
12a	Net Metering — Successor	Next iteration of voluntary customer program to install rooftop solar and state-regulated mandate for compensation, at a reduced rate from prior, on generated energy imported to grid.
13	PSE Community Solar	PSE offers customers the ability to subscribe to the output of solar panels deployed throughout the service territory. Customers pay a monthly fee and receive a monthly credit for generation.
13a	PSE Community Solar — Income-eligible	Provides community solar access to income-eligible customers by discounting their monthly subscription fee.
14	Third-party Distributed Solar Power Purchase Agreement (PPA) (or Solar Lease)	Third-party installs/provides rooftop solar panels to customers throughout service territory. PSE off-takes renewable energy via PPA or net metering while the third-party is responsible for managing program and financing equipment.
15	Commercial & Industrial (C&I) Rooftop Solar Incentive	PSE offers upfront incentive to commercial customers, discounting their upfront cost to install and own distributed solar generation throughout service territory.
16	C&I Rooftop Solar Leasing	PSE offers to lease commercial customers' rooftop space to install solar PV. Customer receives a monthly lease payment from PSE; PSE generates renewable energy to supply grid.

#	Program Concept	Program Description
17	Multi-family Solar Partnership	PSE facilitates installation of solar PV at multi-family unit buildings by connecting with technology providers and/or billing support to share production across units.
18	Multi-family Rooftop Solar Incentive	PSE offers incentive to multi-family unit building owners, discounting their upfront cost to install and own solar in PSE's service territory.
19	PSE Customer-sited Solar+Storage	PSE enrolls customers through a monthly incentive program to host Solar+Storage systems with that can offset customers' load from the grid in response to operating settings or dispatch signals from PSE
20	Residential Rooftop Solar Leasing	PSE offers to lease residential customers' rooftop space to install solar PV. Customer receives a monthly lease payment from PSE; PSE generates renewable energy to supply grid.
20a	Residential Rooftop Solar Leasing — Income-eligible	PSE offers to lease income-eligible residential customers rooftop space to install solar PV. Customer receives a monthly lease payment from PSE; PSE generates renewable energy to supply grid.
21	Multi-family Community Solar	Provides community solar access to multi-family unit residences by discounting their monthly subscription fee.

Suite Development and Cost Test Methodology

PSE developed a suite selection process to create the DER preferred portfolio of distributed solar and battery storage programs. We analyzed groupings (“suites”) of programs based on program designs and objectives. This approach provided sensitivity analysis methods and allowed us to evaluate how various criteria shape a portfolio. We show the objectives and methodology for each suite selection in Table 2-11. PSE took the following steps to create and analyze each suite:

1. Organize concepts by suite
2. Gather cost data for each concept
3. Apply cost test to evaluate each suite

We constructed each suite from concepts that aligned with the individual suite objective. We included community solar and income-eligible community solar in all suites because those programs are already

approved by the WUTC and are valuable as they increase solar accessibility. For details on which concepts we considered in each suite, see Appendix D, DER Suite Selection and Evaluation.

PSE engaged a third-party consultant, Black & Veatch, to complete an independent cost and market potential assessment for each concept (see Appendix K, Black & Veatch Cost Report). We used the costs for each concept to inform the utility program and host customer costs. PSE used a DER benefit-cost analysis (BCA) model to quantify potential grid, customer, and societal benefits. For further details on the DER BCA model, please see Appendix D-1, DER Suite Selection and Evaluation. We then mapped each of these costs and benefits to the societal and participant cost tests.

To evaluate the different suites of DERs, PSE followed guidance from the National Standard Practice Manual (NSPM) for Benefit-cost Analysis of Distributed Energy Resources. [21] The NSPM recommends deploying a primary cost test and a secondary cost test where applicable. For a primary cost test, the NSPM recommends a jurisdiction-specific test to align with a jurisdiction's policy goals and objectives. CETA has a clear goal to achieve a 100 percent clean electricity supply and includes safeguards to protect consumers from excessive rates or unreliable service. Of the traditional cost tests, these objectives align with the Societal Cost Test (SCT), which includes electric utility systems, host customers, and societal impacts. As a secondary cost test, we used the Participant Cost Test (PCT) to prioritize concepts with favorable customer economics; that is, concepts customers will be more likely to adopt if the economics are sound. Once these tests were selected, PSE applied each test based on the suite methodology.

Table 2-11: Overview of DER Suite Selection Methodology

Suite #	Name	Suite Objective	Methodology
1	Lowest Cost	Evaluate all concepts with selection that meet IRP DER targets with the lowest utility costs	Evaluated using AURORA. We detail the AURORA modeling in Chapter Two
2	General Rates	Comprised of concepts where all costs would go into general rates	Ordered concepts based on the Societal Cost Test from highest to lowest
3	Voluntary Cost Sharing	Comprised of concepts where participants share in the cost of deploying DERs	Ordered concepts based on the PCT from highest to lowest
4	Broadening Access	Comprised of concepts that help broaden access and remove barriers to DER adoption	Ordered concepts based on the Societal Cost Test from highest to lowest
5	Customer Benefit Indicators	Evaluation of all concepts based on customer benefit indicator scores	Evaluated based on customer benefit indicator (CBI) scores. We detail our use of CBIs in Chapter Three, Highly

[21] Woolf, T., Lane, C., Whited, M., Neme, C., Alter, M., Fine, S., Rabago, K., Schiller, S., Strickland, K., and Chew, B. (2020, August). National Standard Practice Manual For Benefit-Cost Analysis of Distributed Energy Resources. https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/.

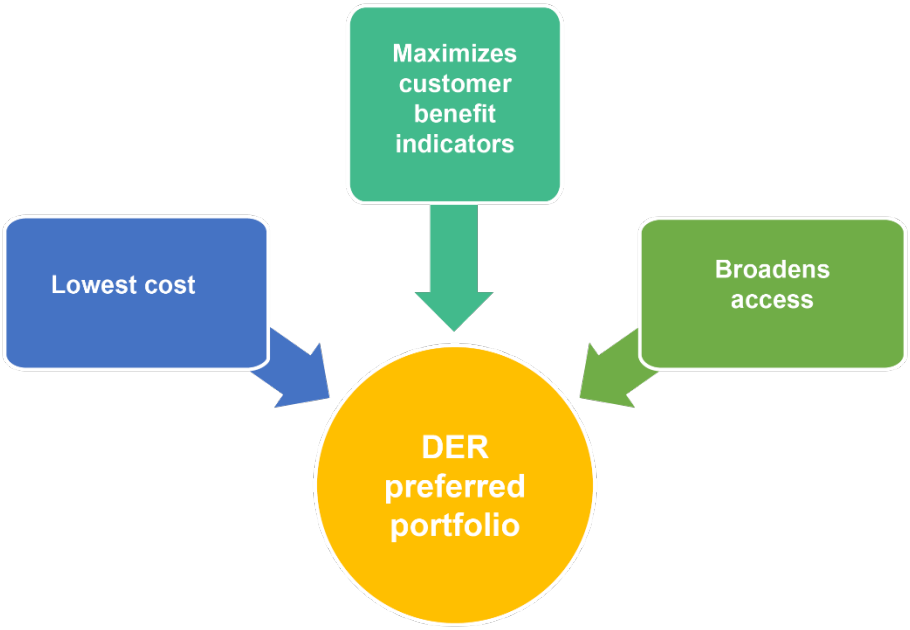
Suite #	Name	Suite Objective	Methodology
			Impacted Communities and Vulnerable Populations, and Customer Benefit Indicators,
6	Preferred Portfolio	Balanced review of all criteria	Hybrid approach to balance lower costs, CBI scores, and diverse program offerings

PSE compared and contrasted portfolio options in the suite selection process to create and inform a balanced DER preferred portfolio that promotes customer benefits, diverse offerings, and minimizes costs. The results of this suite evaluation process are in Appendix D.

DER Preferred Portfolio Selection

To develop the preferred portfolio, PSE used the following methodology to select a mix of DER programs that meet the MW targets for distributed solar and battery storage and promotes customer benefits, diversified offerings, and minimized costs. Figure 2-5 illustrates how we assembled multiple suites to form the DER preferred portfolio.

Figure 2-5: CEIP DER Preferred Portfolio Selection Process



Preferred Portfolio Selection Approach

Phase 1: Develop a short list of concepts — distributed solar and battery storage (Table 2-12)

1. Rank all 25 concepts from lowest to highest, based on capacity cost ($/Watt) as calculated by AURORA.

2. Filter by a total customer benefit indicator (CBI) score using a threshold greater than or equal to the average, rounded down, CBI score. In the case of the CEIP, the average score is 15. Concepts in bold have a score of 15 or more and will move on to Phase 2. We provide more details on the CBI scoring in Chapter Three and Appendix D, DER Suite Selection and Evaluation.

Table 2-12: Phase 1: DER Concept Capacity Cost and Customer Benefit Indicator Score

DER programs	Capacity $/Watt Cost ($/Watt)	Customer benefit indicator score
PSE Community Solar[22]	$ (1.84)	14
C&I Battery BYO	$ (0.53)	13
Third-party Utility-scale Distributed Battery PPA	$ -	14
Net Metering (Existing)[21]*	$ -	-
Net Metering (Successor)[21]	$ -	-
C&I Rooftop Solar Incentive	$ 0.45	16
Multi-family Community Solar	$ 3.08	16
Third-party Distributed Solar PPA (or Solar Lease)	$ 4.64	15
PSE Substation Batteries	$ 4.71	12
C&I Battery Install Incentive	$ 5.22	13
Residential Battery Install Incentive	$ 6.36	15
PSE Mobile Batteries	$ 6.39	12
PSE Customer-sited Solar+Storage Offering	$ 6.46	19
PSE Community Solar — Income-eligible[21]	$ 7.10	16
PSE Utility-scale Distributed Battery Stations	$ 8.87	14
C&I Rooftop Solar Leasing	$ 8.96	16
Multi-family Rooftop Solar Incentive	$ 9.21	16

[22] These concepts are considered must take and did not undergo any further evaluation. These concepts will be included in the preferred portfolio

DER programs	Capacity $/Watt Cost ($/Watt)	Customer benefit indicator score
Third-party Customer-sited Distributed Battery PPA	$ 13.10	16
Residential PSE Battery Leasing	$ 13.92	19
Multi-family Unit Battery Program	$ 14.19	17
Residential PSE Battery Leasing — Income-eligible	$ 16.13	20
Residential Rooftop Solar Leasing	$ 18.42	16
Multi-family Solar Partnership	$ 18.53	16
Residential Rooftop Solar Leasing — Income-eligible	$ 22.47	17
C&I Space Leasing for Batteries	$ 26.33	17

Phase 2: Select preferred portfolio for distributed solar and battery storage (Table 2-13 and 2-14)

3. Rank remaining concepts by SCT, from highest to lowest.
4. Select concepts ranked by high CBI score, high SCT, and low-cost. The concepts in bold represent the concepts that were selected for the preferred portfolio.
5. Ensure offerings are available for all customer classes, include a mix of utility- and customer-sited/owned DER concepts.

Table 2-13: Phase 2 DER Solar Concept Selections

DER programs	Capacity $/Watt Cost ($/Watt)	Customer Benefit Indicator Score	SCT
Third-party Distributed Solar PPA or Solar Lease	$ 4.64	15	0.65
C&I Rooftop Solar Incentive	$ 0.45	16	0.50
Multi-family Community Solar	$ 3.08	16	0.49
C&I Rooftop Solar Leasing	$ 8.96	16	0.38
Residential Rooftop Solar Leasing	$ 18.42	16	0.21
PSE Customer-sited Solar+Storage Offering	$ 6.46	19	0.18
Residential Rooftop Solar Leasing — Income-eligible	$ 22.47	17	0.18
Multi-family Solar Partnership	$ 18.53	16	0.17

DER programs	Capacity $/Watt Cost ($/Watt)	Customer Benefit Indicator Score	SCT
Multi-family Rooftop Solar Incentive	$ 9.21	16	0.12

Table 2-14: Phase 2 DER Storage Concept Selections

DER programs	Capacity Cost ($/Watt)	Customer Benefit Indicator Score	SCT
Third-party Customer-sited Distributed Battery PPA	$ 13.10	16	0.28
Residential PSE Battery Leasing — Income-eligible	$ 16.13	20	0.25
Multi-family Unit Battery Program	$ 14.19	17	0.23
C&I Space Leasing for Batteries	$ 26.33	17	0.23
Residential PSE Battery Leasing	$ 13.92	19	0.22
Residential Battery Install Incentive	$ 6.36	15	0.19
PSE Customer-Sited Solar+Storage Offering	$ 6.46	19	0.18

We selected concepts to fulfill the nameplate capacity amounts of distributed solar and battery storage with this process. Between steps four and five, it was essential to assess whether the initial portfolio represented diversity in utility- and customer-sited/owned DER concepts with offers available to all customer classes like single-family residential, multi-family residential, commercial, and industrial. We show the basis for each concept in Appendix D. After reviewing a draft DER preferred portfolio with internal and external stakeholders like the EAG and IRP, we added additional community solar with a greater MW emphasis on highly impacted communities and multi-family customers (see Chapter Four, Specific Actions). The DER preferred portfolio consists of the DER programs shown in Figure 2-6.

Figure 2-6: CEIP DER Preferred Portfolio Selection

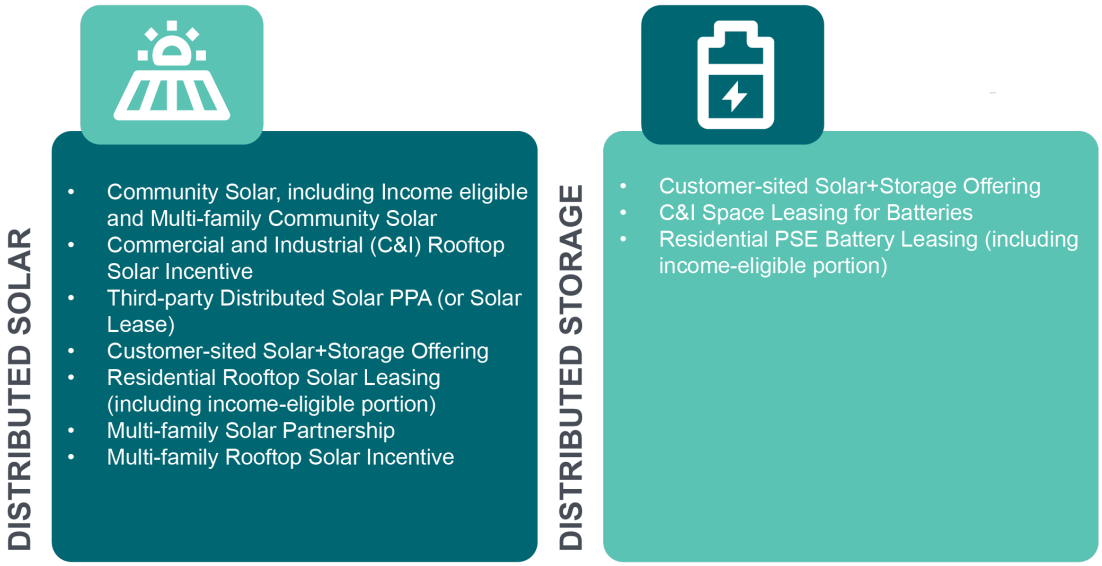


Table 2-15 shows the output of the DER preferred portfolio and the forecasted incremental installed capacity for each concept. The total installed capacity for distributed solar concepts encompasses the 80 MW target and 25 MW for the distributed storage target. The table also forecasts how much PSE plans to install for each concept during the four-years covered by the CEIP. Results may vary depending on what we learn through the Targeted DER RFP process.

Table 2-15: Installed Capacity of DER Preferred Portfolio 2022–2025[23]

DER programs	Incremental Installed Capacity (MW)				Cumulative (MW)
	2022	2023	2024	2025	Total
C&I Space for Batteries — Leasing	0.00	0.00	1.80	7.20	9.00
Residential PSE Battery Leasing	0.00	1.20	1.30	1.30	3.80
Residential PSE Battery (Income-eligible) Leasing	0.00	0.10	0.10	0.10	0.30
PSE Customer-sited Solar+Storage (storage)	0.00	3.68	4.23	4.83	12.74
Total Distributed Storage	**0.00**	**4.98**	**7.43**	**13.43**	**25.84**
PSE Community Solar	5.60	4.80	5.60	0.00	16.00

[23] See Appendix D – DER benefit-cost analysis (BCA) model overview and inputs for full table of Suites

DER programs	Incremental Installed Capacity (MW)				Cumulative (MW)
	2022	2023	2024	2025	Total
PSE Community Solar — Income-eligible	1.40	1.20	1.40	0.00	4.00
Multi-family Community Solar	0.00	0.00	0.00	5.40	5.40
Third-party Distributed Solar PPA or Solar Lease	0.00	3.73	3.73	3.73	11.20
C&I Rooftop Solar Incentive	0.00	6.96	6.96	6.96	20.88
Multi-family Solar Partnership	0.00	0.11	0.11	0.11	0.33
Multi-family Unit Rooftop Solar Incentive	0.00	0.55	0.55	0.55	1.66
Residential Rooftop Solar Leasing	0.00	1.19	1.60	2.00	4.79
Residential Rooftop Solar (Income-eligible) Leasing	0.00	0.17	0.23	0.28	0.68
PSE Customer-sited Solar+Storage (solar)	0.00	4.41	5.07	5.80	15.28
Total Distributed Solar	**7.00**	**23.12**	**25.25**	**24.83**	**80.2**

PSE's proposed DER preferred portfolio is our initial path to meet CEIP targets with a diverse set of distributed energy resource programs. The All-Source and Targeted DER RFPs will provide important data on available resources and programs. Resources we acquire through those processes may vary from what is reflected in the DER preferred portfolio. Customer research and program design will provide additional insight on potential customer adoption rates. We will also be able to better understand how we can expand the scope of programs beyond what is listed in the DER preferred portfolio during the program design and implementation phase. Options for hybrid or other programs may be available for businesses or income-eligible customers. You can find details on the role of these programs and preliminary budget estimates in Chapter Four, Specific Actions and Appendix E, Incremental Costs.

Other CEIP Methodology Assumptions and Limitations

The 2021 CEIP is based on the preferred portfolio identified in the 2021 IRP. We also propagated the assumptions made in the 2021 IRP to the 2021 CEIP, with the following updates:

Constraints

To allow the AURORA model to optimize across the various distributed solar and battery storage concepts in Suite 1, we held the other resources in the model constant. This allowed us to optimize the DER programs based on their refined cost information. The composition of the mix was dictated by 80 MW of distributed solar and 25 MW of distributed battery storage, the CEAP targets adopted after considering initial customer benefits in the IRP process.

Effective Load Carrying Capability

There are five programs in the CEIP: (i) the multi-family unit battery, (ii) residential battery install incentive, (iii) residential PSE battery leasing, (iv) the residential PSE battery leasing — income-eligible, and (v) customer-sited Solar+Storage offering, that uses three-hour lithium-ion batteries with 90 percent round-trip efficiency. The three-hour Li-Ion battery option was not modeled in the 2021 IRP. To update for this resource, we calculated the three-hour Li-Ion battery capacity and its effective load carrying capability (ELCC) using the resource adequacy model (RAM) to model 90 percent round-trip efficiency. When we moved from generic resources to specific resources in our modeling, we used this three-hour battery as the assumed battery resource. The methodology to determine this ELCC is consistent with the 2021 IRP, Chapter Seven. The ELCC value is 19.40 percent in the years before 2031, and 24.4 percent in 2031.

In the PSE customer-sited Solar+Storage program, the distributed battery storage is charged differently than in the IRP hybrid system model assumptions. The distributed battery in this CEIP program can be charged by any generation resource and market purchase, not just on-site solar. This flexible charging resource provides a higher ELCC than the hybrid system. We treat the distributed solar and the distributed battery storage in the hybrid system as an independent resource for ELCC calculation purposes. In the 2021 CEIP, the ELCC value is 19.40 percent in the years before 2031, and 24.4 percent in the year 2031 and thereafter for the customer-sited storage resource. The ELCC value of the customer-sited solar resource uses the same values as the generic DER rooftop solar resource in the IRP.

Resource Adequacy/Peak Capacity Need

Like the modeling for the IRP preferred portfolio, the CEIP will continue to meet resource adequacy and CETA energy needs. PSE studied peak hour capacity needs with a resource adequacy analysis in the 2021 IRP. This analysis evaluated existing PSE resources compared to the projected peak need over the planning horizon. PSE's AURORA modeling forecasts a peak capacity shortfall beginning in 2026 due to the retirement of existing coal resources. PSE currently uses a loss of load probability (LOLP) consistent with the Northwest Power and Conservation Council to determine the peak capacity need for our service territory. Using the LOLP methodology and before any new demand-side resources, the 2021 IRP ascertained we would need 907 MW of capacity by 2027 and 1,381 MW by 2031. We provide

complete discussion of the peak capacity need in the 2021 IRP, Chapter Seven, Resource Adequacy Analysis[24].

The resource adequacy analysis is complex; it ensures the resource system is flexible enough to balance needs and unexpected events such as variations in temperature, hydro, wind, and solar generation, equipment failure and forced plant outages, transmission interruption, potential curtailment of wholesale power supplies, or any other sudden departure from forecasts. Resource adequacy requires that PSE meet the full range of possible demand conditions, even if the potential of experiencing those conditions is relatively low.

We adopted the peak capacity analysis and resource capacity contribution methodology in the 2021 IRP for this CEIP. Since the 2021 IRP was published, PSE has started an additional analysis of its load forecast to incorporate temperatures that reflect climate change and an analysis of the impacts of resource assumptions. Together, these analyses may change the peak capacity need and the capacity contribution of different resources. We will complete the study of these factors in 2022 as part of the 2023 Electric IRP progress report and incorporate them in the 2023 biennial CEIP update.

In addition to firm resources, PSE currently relies on market purchases from the Mid-Columbia (Mid-C) trading hub to meet capacity needs. Based on our evaluation of the existing wholesale electric market, the 2021 IRP recommended using a portion of the available Mid-C transmission for firm resource adequacy (RA) qualifying capacity contracts or a reliable firm capacity resource in place of short-term energy purchases, with a reduction in the amount of short-term capacity over time.

The resources secured to meet the targets in this CEIP will help reduce PSE's short-term market reliance, but we do not expect these resources to provide significant peak capacity. PSE may require additional resources over time to reduce our dependence on the Mid-C market to meet capacity needs. We will provide an update on our reliance on short-term market purchases in the 2023 Electric IRP progress report and 2023 biennial CEIP update.

To stay consistent with the 2021 IRP and because of time constraints in the development of the 2021 CEIP, many analytical inputs, methodologies, and assumptions were carried from the 2021 IRP to the 2021 CEIP. The most important of these are:

Power Demand and Energy Demand

PSE uses time series econometric methods to forecast monthly energy demand and peaks for our electric and gas service territories. PSE observes and gathers sales, customer counts, demand, weather, economic, and demographic variables to estimate use models per customer (UPC), customer counts, and peaks.

[24] 2021 IRP Chapter Seven, Resource Adequacy Analysis: https://oohpseirp.blob.core.windows.net/media/Default/Reports/2021/Final/07.IRP21_Ch7_032921.pdf

In the 2021 IRP base demand forecast, energy demand, before additional demand-side resources (DSR), is expected to grow at an average rate of 1.2 percent annually from 2022 to 2045. This growth increases energy demand from 2,500 aMW in 2022 to 3,316 aMW in 2045. The 2021 IRP high-demand forecast projects an average annual growth rate of 1.6 percent; the low-demand forecast projects 0.9 percent.

To model normal electric summer peak hour demand, we use 93 degrees Fahrenheit as the design temperature. Summer peaks typically occur in July or August. The 2021 IRP base summer peak demand forecast has an average annual growth rate of 1.7 percent. This rate increases the summer peak demand from 3,515 MW in 2022 to 5,183 MW in 2045.

There are no changes to the demand forecast for the CEIP.

Transmission Constraints[25]

Moving energy from where it is generated to where it is used often relies on transmission lines — like moving hydropower from eastern Washington to customers in western Washington. Transmission constraints impact the availability of resources to serve load and significantly constrict the clean and renewable resources necessary to meet clean energy transformation targets.

We modeled the PSE service territory as a two-zone system in the 2021 IRP, with a transmission limit between the PSE service territory and the Mid-C market.

Consistent with the 2021 IRP, PSE modeled a potentially available 750 MW of transmission to Montana and 400 MW to Wyoming.

There are no changes to transmission constraints for the CEIP.

As in the IRP, transmission within PSE's service territory was assumed to be adequate to deliver resources to end use meter, but transmission improvements will be necessary to meet dynamic load and changing flows and remain compliant with mandated NERC reliability standards. PSE will pursue non-wires alternatives to alleviate local transmission needs where possible, which will also contribute to CETA needs. Chapter Four discusses three planned non-wires alternative projects that will contribute 22 MW to resource need.

CETA Contribution Reduction

The DER concepts included in the CEIP help us achieve PSE's CETA goals and meet our stated DER guiding principles. The unique design of the various DER concepts includes retaining environmental attributes, like renewable energy credits, for exported generation and offset by PSE's incentive payment to the customer. While behind-the-meter (BTM) generation for customer-generators has

[25] Transmission constraints are discussed further on pages 5 through 35 in the 2021 IRP Chapter Five, Key Analytical assumptions: https://oohpseirp.blob.core.windows.net/media/Default/Reports/2021/Final/05.%20IRP21_Ch5_032921.pdf

historically been considered net-electric-metering (NEM), PSE intends to retain all environmental attributes for any generation not used to meet on-site load that is exported to the grid.

DER solar programs contribute MWh to meet CETA needs. However, energy generated by BTM DER solar programs does not fully contribute to CETA because some of the BTM energy produced is consumed by the load, and the environmental attributes are owned by the host customer. Therefore, this energy would account for the load-reducing portion of the CETA calculation as opposed to the renewable energy generated on the system. To determine the amount of energy from each DER program that contributes to PSE's CETA need, we developed a CETA contribution fraction. This contribution fraction is the percentage of energy forecasted by a distributed solar program that is eligible for PSE to include in our CETA calculation in Figure 2-1. For instance, PSE community solar has a CETA contribution factor of 56 percent. If 1,000 MWh were produced by the community solar program, only 560 MW would contribute to PSE's CETA calculation. It is assumed that the remaining 440 MWh are consumed by the customer who receives the environmental attributes for those MWh. We show the CETA contribution fractions for each distributed solar program in Table 2-16.

Table 2-16: DER Solar CETA Contribution Fraction

DER Solar Program	CETA contribution (Load reducing or CETA eligible)	CETA Contribution Fraction (%)
PSE Community Solar	Load reducing	56%
PSE Community Solar — Income-eligible	Load reducing	56%
Third-party Distributed Solar PPA	CETA-eligible energy	100%
C&I Rooftop Solar Incentive	Load reducing	52%
C&I Rooftop Solar Leasing	CETA-eligible energy	100%
Multi-family Solar Partnership	Load reducing	81%
Multi-family Unit Rooftop Solar Incentive	Load reducing	81%
PSE Customer-sited Solar+Storage Offering (Solar)	Load reducing	81%
Residential Rooftop Solar Leasing	CETA-eligible energy	100%
Residential Rooftop Solar (Income-eligible) Leasing	CETA-eligible energy	100%
Multi-family Community Solar	Load reducing	56%

Although our exact DER program design regarding environmental attribute ownership will depend on the outcome of PSE's Targeted DER RFP, we allocated all exported generation environmental attributes to PSE in our BTM DER program concepts model. PSE intends to retain environmental attributes from exported generation, but this will not impact existing or future net-electric-metering agreements.