Appendix D: Introduction

For the 2021 CEIP, PSE developed a DER preferred portfolio and identified key enablers to develop, launch, and operate a portfolio of DER programs most efficiently and effectively. This section provides more detailed documentation on how PSE developed the DER preferred portfolio and DER Enablement Roadmap.

Appendix D-1: DER Suite Selection and Evaluation

This section provides a detailed overview of how the DER preferred portfolio was selected for the 2021 CEIP, including the DER suite selection methodology, preferred portfolio selection results, and approach to benefit cost assessment.

Appendix D-2: DER Preferred Portfolio Selection

Excel file used for the DER preferred selection that includes a matrix of key valuation metrics and documents the step-by-step process for selection.

Appendix D-3: DER CBI Scoring

Excel file used to evaluate each concept across Customer Benefit Indicators.

Appendix D-4: DER Concept Benchmarking

Initial benchmarking conducted to identify DER programs at other utilities. This served as a starting point for the concept ideation and screening for consideration in the CEIP.

Appendix D-5: DER Concept Screening Methodology

Overview of the methodology used to screen the initial concept list to narrow to a shorter list for further evaluation.

Appendix D-6: DER Original Concept List Screening

Excel file where the screening methodology was applied to the original DER concept list. To further assess the remaining concepts, PSE then contracted a third party to perform a cost and market potential assessment (see Appendix K).

Appendix D-7: DER Enablement Roadmap Development

In order to efficiently and effectively design, launch, and manage a portfolio of DER pilots and programs for the 2021 CEIP, PSE contracted a third party consultant, West Monroe, to identify key enablers (e.g., activities and technologies) and construct a roadmap to support PSE in successfully meeting the DER targets. DER programs require both new processes and new tools to achieve energy, capacity, and customer benefits. PSE worked with a third party on a gap analysis to identify the strategies and tools that would enable PSE to implement DER programs with a steep ramp rate. The enablement roadmap

sequences the development and roll-out of the strategies and tools in coordination with the expected DER program types and scale such that they are available when needed.

Appendix D-1: DER Suite Selection and Evaluation

This section documents the methodology and processes PSE used to construct the DER preferred portfolio for this CEIP and to fulfill the distributed solar and battery energy storage capacity requirements identified by the 2021 IRP and PSE's obligations for Washington's Clean Energy Transformation Act ("CETA"). PSE intends to leverage both the All-Source RFP as well as the Targeted DER RFP to fulfill demand response capacity needs.

Preferred Portfolio and Suite Selection Process

The goal of the PSE DER preferred portfolio is to establish a set of programs that provides accessibility across all customer groups, and uses a mix of non-utility owned and utility-owned assets to meet the distributed energy resource targets. As more is learned through implementation in the first CEIP, it is anticipated that the program mix may be adjusted. To support design of programs for the CEIP, as well as to provide a replicable framework to evaluate program mixes, PSE designed a Suite Selection process to analyze sensitivity when optimizing for specific criteria or objectives. These criteria and objectives are defined in Table D-1 below.

Table D-1: 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 2 – Methodology to Develop Targets: from Integrated Resource Plan (IRP) to Clean Energy Implementation Plan (CEIP)
2	General Rates	Comprised of concepts where all costs would go into general rates	Ordered concepts based on the Societal Cost Test (SCT) 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 Participant Cost Test (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 SCT 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. The use of CBIs is detailed in Chapter 3 – Applying Customer Benefit Indicators in the 2021 CEIP
6	Preferred Portfolio	Balanced review of all criteria	Hybrid approach to balance lower costs, CBI scores, and diversity of program offerings

Figure D-1 illustrates a high-level summary of the Suite Selection process, including the key evaluation metrics used in the preferred portfolio approach. Table D-2 shows the 20 DER concepts evaluated in the Suite Selection process, with applicability and shortlist for each suite denoted. Table D-3 shows all concepts with values for each of the key metrics (e.g., CBI, SCT, capacity cost).

Figure D-1: Overview of DER Suite Selection Process

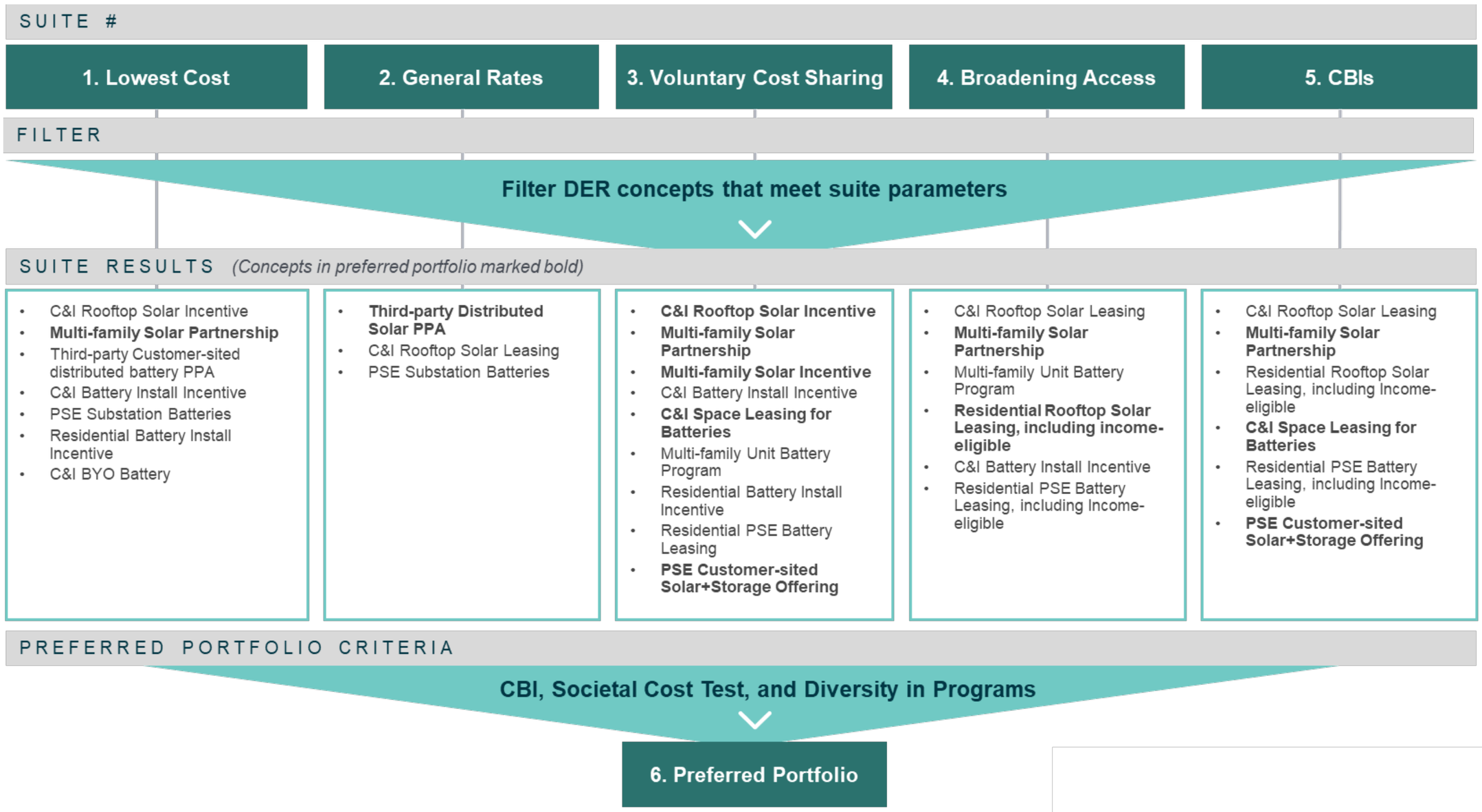

Table D-2: List of DER concepts with applicability (denoted with shaded cells) and shortlist by suite (denoted with check marks).

Program Concept	Resource Type	Suite 1	Suite 2	Suite 3	Suite 4	Suite 5	Suite 6 (Preferred Portfolio)
Third-party Customer-sited Distributed Battery PPA	Battery	✓					
Third-party Utility-scale Distributed Battery PPA	Battery						
C&I Battery Install Incentive	Battery	✓		✓	✓		
C&I Space Leasing for Batteries	Battery					✓	✓
Multi-family Unit Battery Program	Battery			✓	✓	✓	
PSE Mobile Batteries	Battery						
PSE Substation Batteries	Battery	✓	✓				
PSE Utility-scale Distributed Battery Stations	Battery						
Residential Battery Install Incentive	Battery	✓		✓			
Residential PSE Battery Leasing	Battery			✓	✓	✓	✓
Residential PSE Battery Leasing – Income-Eligible	Battery				✓	✓	✓
C&I Battery BYO	Battery	✓					
Third-party Distributed Solar PPA (or Solar Lease)	Solar		✓				✓
C&I Rooftop Solar Incentive	Solar	✓		✓		✓	✓
C&I Rooftop Solar Leasing	Solar		✓		✓	✓	
Multi-family Solar Partnership	Solar	✓		✓	✓	✓	✓
Multi-family Rooftop Solar Incentive	Solar			✓			✓
PSE Customer-Sited Solar+Storage Offering	Solar+Battery			✓		✓	✓
				✓		✓	✓
Residential Rooftop Solar Leasing	Solar				✓	✓	✓
Residential Rooftop Solar Leasing – Income-Eligible	Solar				✓	✓	✓

Table D-3: List of all DER concepts with market potential and key scoring criteria values.[1]

Program Concept	Resource Type	FOTM or BTM	Ownership	2022	2023	2024	2025	2022-2025 Max Mkt Potential	Capacity Cost ($/Watt)[2]	SCT	CBI Score
Third-party Distributed Solar PPA (or Solar Lease)	Solar	FOTM	Third Party	-	3.73	3.73	3.73	11.2	($4.64)	0.65	15
C&I Rooftop Solar Incentive	Solar	BTM	Customer(s)	-	6.96	6.96	6.96	20.88	($0.45)	0.50	16
C&I Rooftop Solar Leasing	Solar	FOTM	PSE or PPA	-	15.6	20	24.4	60	($8.96)	0.38	16
Residential Rooftop Solar Leasing	Solar	FOTM	PSE or PPA	-	1.19	1.6	2	4.79	($18.42)	0.21	16
Residential Rooftop Solar Leasing – Income-eligible	Solar	FOTM	PSE or PPA	-	0.17	0.23	0.28	0.68	($22.47)	0.18	17
Multi-family Solar Partnership	Solar	BTM	Landlord or Third Party	-	0.11	0.11	0.11	0.33	($18.53)	0.17	16
Multi-family Rooftop Solar Incentive	Solar	BTM	Landlord or Third Party	-	0.55	0.55	0.55	1.66	($9.21)	0.12	16
PSE Customer-Sited Solar+Storage Offering	Solar	BTM	Customer(s)	-	4.41	5.07	5.8	15.28	($6.46)	0.18	19
PSE Customer-Sited Solar+Storage Offering	Battery	BTM	Customer(s)	-	3.68	4.23	4.83	12.74	($6.46)	0.18	19
C&I Battery BYO	Battery	BTM	Customer(s)	-	0.47	0.47	0.67	1.6	$0.53	0.26	13
C&I Space Leasing for Batteries	Battery	FOTM	PSE	-	8.4	8.4	8.4	25.2	($26.33)	0.20	17
Multi-family Unit Battery Program	Battery	BTM	PSE or PPA	-	0.92	0.92	0.92	2.75	($14.19)	0.18	17
Residential Battery Install Incentive	Battery	BTM	Customer(s)	-	0.4	0.46	0.52	1.38	($6.36)	0.19	15
Residential PSE Battery Leasing	Battery	BTM	PSE	-	1.52	1.54	1.56	4.62	($13.92)	0.18	19
Residential PSE Battery Leasing – Income-Eligible	Battery	BTM	PSE	-	0.15	0.15	0.15	0.44	($16.13)	0.19	20
Third-party Customer-Sited Distributed Battery PPA	Battery	BTM	Third Party	-	9.27	9.47	9.67	28.4	($13.10)	0.28	16
Third-party Utility-scale Distributed Battery PPA	Battery	FOTM	Third Party	-	-	-	-	-	NA	NA	14
C&I Battery Install Incentive	Battery	BTM	Customer(s)	-	.73	.93	1.33	3.00	($5.22)	0.17	13
PSE Mobile Batteries	Battery	FOTM	PSE	-	NA	NA	NA	NA	($6.39)	0.41	12
PSE Substation Batteries	Battery	FOTM	PSE	-	NA	NA	NA	NA	($4.71)	0.46	12
PSE Utility-scale Distributed Battery Stations	Battery	FOTM	PSE	-	NA	NA	NA	NA	($8.87)	0.31	14

[1] Some concepts do not include market potential (noted with NA) as they are designed to be owned and operated directly by PSE. Given PSE's direct ownership of these concepts, traditional market potential forecasts are not applicable.
[2] For more details on this metric, please see the Preferred Portfolio Selection Approach section within this Appendix

The preferred portfolio approach and criteria was established through collaboration with the Equity Advisory Group (EAG), the Integrated Resource Plan (IRP) Stakeholder Group, and PSE internal stakeholders representing diverse functions associated with fulfilling PSE's CETA obligations. The following approach was established for selecting DER concepts for its preferred portfolio:

Preferred Portfolio Selection Approach

Phase 1: Develop a Short List of Concepts (Solar and Battery Energy Storage)

- Rank all concepts by lowest capacity cost ($/Watt) as calculated by AURORA.[3]
- Filter by customer benefit indicator (CBI) score, using a threshold of greater than or equal to average, rounded down, CBI score. Further descriptions of CBI scoring can be found in Chapter 3 – Applying Customer Benefit Indicators in the 2021 CEIP.

Phase 2: Perform Preferred Portfolio Selection for Each Technology (Solar and Battery Energy Storage)

- Rank remaining concepts by SCT, from highest to lowest.
- Select concepts with prioritization for high CBI score, high SCT, and low cost.
- Adjust final list of concepts to ensure offerings are available for all customer classes, with a mix of utility- and customer-sited/owned DER concepts included in selection.

Concepts were selected through this process to fulfill the MW targets for both distributed solar and battery energy storage. In between steps 4 and 5, it was important to assess whether the initial portfolio represented diversity in utility- and customer-sited/owned DER concepts with offerings for all customer classes (e.g., single-family residential, multi-family residential, commercial and industrial). The selections for each of the solar and battery energy storage systems (BESS) concepts are further detailed below.

Distributed Solar Selection

Prior to starting the preferred portfolio selection, PSE accounted for 20 MW to come from PSE's approved **Community Solar Program**, of which 4 MW is dedicated to income-eligible customers, as a "must-take" to the DER Preferred Portfolio. Based on guidance from the EAG to put a greater MW emphasis on highly impacted communities and multi-family customers, an additional 5.2 MW for 2025 was selected for the preferred portfolio. Community Solar programs are well-suited to increase accessibility of solar energy for targeted populations such as multi-family and income-eligible customers as they do not rely on home ownership or access to suitable roof space. The DER Cost and Market Potential Assessment (see Appendix K) provides sufficient market potential to support the feasibility of 5.2 MW of Community Solar for highly impacted communities and multi-family customers. This PSE-owned concept targeting residential customers with a portion dedicated to income-eligible

[3] The Capacity Cost ($/Watt) figure was calculated by running all concepts through AURORA as must-take. The total aggregated net cost between 2022-2047 for each concept was then divided by the respective MW capacity for each concept.

customers, multi-family customers, and highly impacted communities provides a first broad step in increasing accessibility to renewable energy.

After completing steps 1-3, the **C&I Rooftop Solar Incentive** and **Third-party Distributed Solar PPA (or Solar Lease)** concepts were selected, for a projected 20.4 MW and 11.1 MW of market potential, respectively. These two concepts were selected for best meeting criteria defined in the preferred portfolio selection approach with highest SCT and low capacity cost, as well as large market potential. As a behind-the-meter ("BTM"), customer-owned program and front-of-meter ("FOTM"), Third Party-owned program, respectively, these two concepts contribute to a diverse portfolio of program concepts, allowing for commercial customers to participate, either with a solar project themselves, or with their roof space.

The **PSE Customer-Sited Solar+Storage Offering** was selected, projected for 14.7 MW of market potential of solar capacity. The concept was noted for scoring highly on a $/Watt, SCT, and CBI scoring basis, aligning with the preferred portfolio selection criteria and also for providing a large market potential. This selection also continued to diversify the portfolio with its first customer-owned residential program concept.

The next programs selected were **PSE Residential Rooftop Solar Leasing** and **PSE Residential Rooftop Solar Leasing – Income-Eligible** concepts; projected for 4.9 MW and 0.7 MW of market potential, respectively. Though smaller in comparative market potential and scoring lower via criteria set forth in the preferred portfolio selection approach, these PSE-owned concepts target residential customer rooftops, providing the opportunity to increase renewable energy in more communities that historically have barriers to adoption. This benefit of broader accessibility, decreasing the burden of customer classes, and ability to leverage customer roof space through PSE's territory helped justify the higher potential cost of these concepts.

The final selections were the **Multi-family Solar Partnership** and **Multi-family Rooftop Solar Incentive** concepts; projected for 0.3 MW and 1.7 MW of market potential, respectively. Similar to prior concepts for rooftop leasing, though scoring lower via criteria set forth in the preferred portfolio selection approach and having a smaller market potential, the Third Party-owned concept's target of multi-family residential buildings facilitates the opportunity for increasing renewable energy in more communities that historically have barriers to adoption. This ensures an increase of accessibility for customers.

While providing great market potential, the C&I Rooftop Solar Leasing concept was not selected as other C&I concepts had higher scoring per the criteria set forth in this approach. Further, residential, multi-family, and customer-owned concepts were sought to increasingly diversify the portfolio selection and ensure accessibility for a diverse customer base.

Battery Energy Storage Selection

After completing steps 1-3 of the approach, the **PSE Customer-Sited Solar+Storage Offering** was selected first as it had already been selected as part of the solar DER concepts. The projected market

potential for the BESS resource is 12.5 MW. This selection was further validated as it fulfilled the criteria set forth in the approach and was one of the few options with significant market potential to help meet the targeted peak capacity contribution.

The C&I Battery Bring Your Own ("BYO"), Multi-family Unit Battery Program, and Residential Battery Install Incentive were not selected based on limited market potential. The team elected to revisit these concepts if needed to ensure a diverse portfolio, but first sought concepts with larger market potential to build upon.

The next concept selected was the **C&I Space Leasing for Batteries**, projected for 9.0 MW of market potential. This concept was noted for its high SCT and CBI scores. Despite higher capacity cost, the high market potential will help enable PSE to satisfy its peak capacity contribution obligation. Through a PSE-owned, front-of-the-meter approach, this concept lowers barriers for access and increases potential community access in local outage events.

To expand the diversity of programs, the next concepts selected were **Residential PSE Battery Leasing** and **Residential PSE Battery Leasing – Income-Eligible**; projected for 3.80 MW and 0.3 MW of market potential, respectively. Although both concepts were noted for only moderate SCT and capacity cost, both concepts were selected for their high CBI score and moderate market potential. These utility-owned concepts targeted to residential customers would increase accessibility and lower barriers to adoption and serve as a compliment to the **PSE Customer-Sited Solar+Storage Offering** concept, as it requires no upfront capital investment from the customer.

Lastly, the Third-party Customer-Sited Distributed Battery PPA was not selected due to having the lowest SCT and low CBI, despite large market potential. Furthermore, the selected programs already met the targeted capacity with diversity in target customers, ownership, and support of accessibility.

DER Preferred Portfolio Results Summary

The preferred portfolio approach resulted in a selection of nine total DER programs (with income eligible segments within mass market programs) to meet the renewable energy and peak capacity contribution needs, shown in Table D-4. Eight of these programs were selected through this process and the community solar programs were selected as "must take" as well as considered high-priority due to increased accessibility. This portfolio consists of a mixture of utility, commercial-, and residential-facing programs, with both Front-of-the-Meter ("FOTM") and Behind-the-Meter ("BTM") deployments. Furthermore, several of the distributed solar and BESS programs are specifically aimed at increasing accessibility and lowering barriers to investment, participation, or adoption.

Table D-4: Preferred portfolio results summary.

SOLAR											
Program Concept	Resource Type	FOTM or BTM	Ownership	2022	2023	2024	2025	MW TOTAL	AURORA $/Watt Cost	SCT	CBI Score
PSE Community Solar	Solar	FOTM	PSE or PPA	5.60	4.80	5.60	-	16.00	$ 1.84	0.27	14
PSE Community Solar – Income-eligible	Solar	FOTM	PSE or PPA	1.40	1.20	1.40	-	4.00	$ (7.10)	0.51	16
Multi-family Community Solar	Solar	FOTM	PSE or PPA	-	-	-	5.2	5.2	$ (3.08)	0.49	16
C&I Rooftop Solar Incentive	Solar	BTM	Customer(s)	-	6.80	6.80	6.80	20.40	$ (0.45)	0.50	16
Third-party Distributed Solar PPA (or Solar Lease)	Solar	FOTM	Third Party	-	3.70	3.70	3.70	11.10	$ (4.64)	0.65	15
PSE Customer-Sited Solar+Storage Offering	Solar	BTM	Customer(s)	-	4.20	4.90	5.60	14.70	$ (6.46)	0.18	19
Residential Rooftop Solar Leasing – Income-Eligible	Solar	FOTM	PSE or PPA	-	0.18	0.23	0.27	0.68	$ (22.47)	0.18	17
Residential Rooftop Solar Leasing	Solar	FOTM	PSE or PPA	-	1.30	1.62	1.94	4.86	$ (18.42)	0.21	16
Multi-family Solar Partnership	Solar	BTM	Landlord or Third Party	-	0.11	0.11	0.11	0.33	$ (18.53)	0.17	16
Multi-family Rooftop Solar Incentive	Solar	BTM	Landlord or Third Party	-	0.58	0.58	0.58	1.66	$ (9.21)	0.12	16
							Total Nameplate MW Selected	**78.93**			

BATTERY											
Program Concept	Resource Type	FOTM or BTM	Ownership	2022	2023	2024	2025	MW TOTAL	AURORA $/Watt Cost	SCT	CBI Score
PSE Customer-Sited Solar+Storage Offering	Battery	BTM	Customer(s)	-	3.50	4.00	5.00	12.50	$ (6.46)	0.18	19
C&I Space Leasing for Batteries	Battery	FOTM	PSE	-	-	1.80	7.20	9.00	$ (26.33)	0.20	17
Residential PSE Battery Leasing - Income-Eligible	Battery	BTM	PSE	-	0.10	0.10	0.10	0.3	$ (16.13)	0.19	20
Residential PSE Battery Leasing	Battery	BTM	PSE	-	1.20	1.30	1.30	3.80	$ (13.92)	0.18	19
							Total Nameplate MW Selected	**25.60**			

DER BCA Methodology

As part of the Preferred Portfolio approach, PSE aimed to employ a cost test to help evaluate and compare the benefits and costs of DER concepts. Given AURORA's primary focus on quantifying utility costs, PSE collaborated with West Monroe to develop a Benefit Cost Analysis (BCA) tool to quantify costs and benefits from multiple perspectives (e.g., utility, adopting customer/host, and society).

For consistency across modeling platforms, all applicable assumptions from AURORA used in IRP analyses were carried over to the BCA. Similarly, the BCA used the same DER concept cost and operating parameters, provided within the report available in Appendix K, as those costs are used as inputs for AURORA. Given the expanded types of costs and benefits included in the BCA's modeling when compared to AURORA, additional modeling assumptions were necessary. These assumptions were first drawn from internal PSE data (e.g., PSE historical outage frequency and outage durations). For those assumptions not available from internal PSE data, national best practices were used based on examples from other regional utilities or other utility benchmarking studies.

This section documents the use cases and benefits quantified as well as how the cost tests were selected and implemented.

Use Cases and Benefits

Benefits from each perspective (e.g., utility, host customer, society) were identified across the various technologies (e.g., solar, battery, solar + storage) and program design (e.g., BTM/FOTM, ownership structure) represented in the range of concepts. The BCA model was constructed to quantify each of these benefits, when applicable. Combining these benefits with the costs from each perspective, the BCA model performs cost tests in alignment with the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resource ("NSPM"), described further below. While PSE identified additional benefits such as job creation, energy security, and other non-energy impacts, these were difficult to quantify and therefore were not included at this time.

Customer Benefits

Bill Savings

One of the primary benefits of DER adoption is the opportunity to reduce electricity costs. The BCA tool calculates the anticipated bill impacts for each DER concept for both volumetric and demand-based rates, as applicable. The various rates included for analysis in the BCA tool include Schedules 24, 25, 26, and 7. Bill impacts are calculated for a number of concurrent use cases, including battery charging and discharging as well as energy offset by behind-the-meter solar. All Customer Bill Impacts are correspondingly tracked from the Utility perspective as lost revenue.

Incentives

To reduce upfront cost barriers of adoption and/or reward customers for use of their DERs for grid services, PSE aims to provide various incentives as applicable to each concept. The BCA tool models the impact of various incentive structures to customers, PSE, and third parties. Incentives were tracked on both the payer and recipient. Similar to modeling in the IRP, incentives paid over multiple years had an annual escalation rate applied. The incentive structures modeled include:

- one-time upfront $/kW or $/kWh incentive (based on solar or BESS nameplate capacity);
- annual $/kW lease payments;
- monthly demand response payment/penalties;
- Income Tax Credit (ITC) and Modified Accelerated Cost Recovery System (MACRS);
- $/kWh energy payments.

Backup Power

In the event of a power outage, BESS can provide backup power, increasing resiliency for customers. This can be further improved when paired with solar to provide backup power in extended outages. The BCA tool calculates backup power benefits for customer-sited BESS concepts. The methodology to calculate this value was developed in conjunction with West Monroe and was based on customer-specific interruption costs[4] by Lawrence Berkeley National Laboratory (LBNL). These LBNL interruption costs ($/kW) for various outage durations (e.g., momentary, 30 minutes, 1 hour, 4 hours) were applied to the corresponding annual frequency of outages at each outage duration based on 4 years of historical PSE outage data. All charging costs associated with outage events were attributed to the DER concepts host (PSE or Customer) regardless of ownership.

Society Benefits

Greenhouse Gas Reductions

The solar concepts provide a source of clean energy generation, which reduce the energy requirements from fossil-fuel based generation sources. The BCA tool quantifies the total MWh of solar generation and applies a Social Cost of Carbon to the quantify the value of avoided carbon emissions, consistent with the 2021 IRP.

Utility Benefits

Peak Capacity Reduction

Solar and BESS concepts can help reduce PSE's system peaks, creating savings in peak capacity procurement and transmission and distribution upgrade costs. The magnitude of each concept's capacity contribution to peak reduction was calculated from PSE's peak load using technology specific

[4] Sullivan, Michael, Josh Schellenburg, and Marshall Blundell. "Updated Value of Service Reliability Estimates for Electric Utility Customers in the United States." Jan. 2015. Web. 15 Nov. 2020.

Effective Load Carrying Capacity (ELCC) values used in the 2021 IRP. The System avoided capacity value from PSE's Schedule 91 filing with the WA UTC was applied to the peak capacity reduction value available for each DER concept. Given the distributed nature of the DER concepts analyzed, avoided transmission and distribution values were also applied to the peak reduction capacity value. Figures for the avoided transmission and distribution values were developed by the Northwest Power and Conservation Council (NWPCC) for their 7th Power Plan[5]. Additional deration values were applied to each DER concept modeled to reflect each resources peak reduction availability reflective of the specific concepts primary use case.

Frequency Response

Solar and storage technologies can contribute to meeting PSE's annual frequency response requirement. However, due to requirement of a constant derate of a solar system's energy output to utilize the resource for frequency response, only the impact of storage concepts were modeled for this CEIP. The frequency response contribution that the various storage concepts are able to provide on a capacity basis were based on internal PSE input. Similarly, the monetary value of this calculated capacity is based on the average annual cost of PSE's current frequency response obligation in the form of a $/MW value.

Operational Flexibility

BESS can be dispatched to provide sub-hourly flexibility benefits for grid operations. The BCA tool calculated a Flexibility Benefit value using the same values developed for the 2021 IRP. These values were differentiated by the BESS's discharge rate (e.g., 2hr, 3hr, or 4hr) and included as a PSE financial benefit regardless of whether DER concept was PSE owned. No direct financial benefit was provided to non-PSE participants for the calculated flexibility benefit value.

Cost Tests

PSE and West Monroe followed guidance from the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resource ("NSPM")[6]. The NSPM recommends deploying a primary cost test as well as a secondary cost test where applicable. As noted in Chapter 2 Distributed Solar and Distributed Battery Storage Updated Modeling, PSE selected the Societal Cost Test ("SCT") as a primary cost test due to alignment with CETA goals, which seek a clean energy future (e.g., providing societal health benefits through greenhouse gas reduction) while including safeguards to protect consumers from excessive rates or unreliable service (e.g., managing utility costs to limit rate impacts). As a secondary cost test, PSE selected the Participant Cost Test ("PCT") to help identify cost-sharing

[5] Piliaris, J. (2019, December). Puget Sound Energy Filing UE-191062, Avoided Cost Methodology for Power Purchases from Schedule 92. https://apiproxy.utc.wa.gov/cases/GetDocument?docID=5&year=2019&docketNumber=191062.

[6] 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/.

programs with a better business case for the adopting customer. This would help PSE evaluate programs that may be able to attract greater uptake while managing utility costs.

To implement these cost tests in the BCA model, each cost and benefit was mapped to a utility cost, utility benefit, host cost, host benefit, or societal benefit. These were then examined individually to determine applicability to each cost test. The SCT consists of most utility costs, utility benefits, societal benefits, host costs, and select host benefits. Certain items were not included when they would cancel out other benefits or costs, misrepresenting the net benefit for society. For example, tax incentives to host customers are not considered because they are a cost to all taxpayers (thus cancel out in societal view). Similarly, the incentive payment a host receives from the utility is not included as a benefit because it does not benefit all customers and inclusion would net out the utility cost of providing the incentive payment. The PCT consists of all host benefits and host costs. Unlike in the SCT, the PCT includes items such as tax incentives and program incentives.