EXH. CLS-7HC
DOCKET UE-20___
2020 PSE PCORC
WITNESS: CINDY L. SONG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent**	**Docket UE-20____**

SIXTH EXHIBIT (HIGHLY CONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF

CINDY L. SONG

ON BEHALF OF PUGET SOUND ENERGY

REDACTED VERSION

DECEMBER 9, 2020

Report to the Board of Directors

Golden Hills Wind Project Shaped PPA

May 7, 2020

Table of contents

LIST OF ATTACHMENTS

List of attachments

1. Executive summary

The purpose of this report to the Board of Directors is to inform the board and request authorization to execute a 20-year power purchase agreement ("PPA") with Avangrid Renewables ("Avangrid") to purchase the output from the 200 MW Golden Hills wind development project at a flat price of $[redacted]/MWh[1] and a capacity payment of $[redacted] kW/month during winter months,[2] in accordance with the resolutions set forth in Attachment 1. The PPA combines the as-generated output of the Golden Hills Wind Project with a winter shaping and firming product. In addition \to the intermittent wind generation, Avangrid has committed to deliver 150 MW an hour for seven hours per day during Winter Super-Peak Hours[3]. Under the terms of the PPA, Avangrid will begin delivering energy to Puget Sound Energy's ("PSE" or "the Company") system by June 2022. The total levelized cost of energy delivered to PSE is $[redacted]/MWh[4].

While the Golden Hills Wind Project is a competitive offer on an as-generated basis, the value to PSE is enhanced due to the unique "Firm Winter Super Peak" product offered by Avangrid Renewables. This shaped product ensures that energy is delivered to PSE during the winter months (November through February) in [redacted] MW blocks of firm energy during the highest load hours of the day. Avangrid is uniquely able to offer the shaped product because of the large concentration of variable and firm assets owned or controlled by Avangrid on BPAs system. Avangrid also has a portfolio of existing, firm point-to-point transmission rights on BPAs system, which allows for firm delivery to PSEs system.

PSE received nearly 100 proposals from a wide range of resources in response to the 2018 RFP. Proposals were subjected to a rigorous evaluation process (described in Section 5, Attachment 8(a) and Attachment 8(b)) that included both quantitative and qualitative analysis. The Golden Hills Shaped WInd PPA was selected as part of an optimized portfolio of resources that resulted in the lowest reasonable cost and risk solution to meet PSE's renewable (RPS-compliant) and capacity needs. This report summarizes the business case for executing the Golden Hills Shaped Wind PPA and describes the analysis of its benefits, costs and risks as conducted by PSE's resource planning and acquisition teams.

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[1] *As described in Section 6 (Key risks), PSE has agreed to pay an additional $[redacted]/MWh for the use of union labor and another additional $[redacted]/MWh for the use of apprenticeship labor.*

[2] *For the purposes of this PPA, winter months are defined as November through February.*

[3] *Winter Super-Peak Hours: November through February, Monday through Saturday [redacted] and [redacted].*

[4] *Much of the analysis presented in the report was conducted concurrently with contract negations and assumption updates. The levelized cost reflects the terms and assumptions presented to the board of directors on May 7, 2020.*

2. Product and counterparty

Counterparty

General Description

Avangrid Renewables, LLC[5] ("Avangrid") is a large renewable energy developer with 6,500 MW in operation at approximately 75 sites and a considerable development pipeline. Avangrid has extensive experiencedeveloping, constructing and owning projects located in the Pacific Northwest, including several projects immediately adjacent to the proposed Golden Hills Wind Project. Avangrid operates over 600 MW of wind generation in Sherman and Wasco counties in Oregon.

Past PSE Experience

PSE has a current commercial agreement with Avangrid Renewables for a portion of the Klondike III Wind Project, and an executed PPA for the output of the Lund Hill Solar Project when completed.

> **Klondike III Wind –** PSE's wind portfolio includes a 20-year PPA with Iberdrola Renewables for a 50 MW share of electricity generated at the Klondike III wind farm in Sherman County, OR. The wind farm has 125 turbines and a total project capacity of nearly 224 MW. The PPA was executed on July 11th, 2007 and remains in effect until November 2026.
>
> **Lund Hill Solar –** PSE conducted a Renewable Resource RFP in 2017 seeking resources to expand its voluntary Green Direct program (Schedule 139) and ultimately selected a 20-year PPA with Avangrid Renewables for the output of the Lund Hill Solar Project. Lund Hill will be a 150 MW solar facility located in Klickitat County, Washington. The project is expected to begin delivering energy to PSE's Green Direct program in March 2021. The Lund Hill PPA, which was negotiated and executed in 2018, was used as a template for contract negotiations for the Golden Hills Wind Project.

Summary of key contract terms

The Golden Hills Shaped Wind PPA would combine as-generated output from the Golden Hills wind development project with a firm winter product during Winter Super-Peak Hours[6]. During all other hours output would be delivered on an as-generated basis. During the months of November through February, PSE would receive the benefit of firm winter capacity during Winter Super-Peak Hours.

Avangrid proposes to provide shaping capacity from a mix of resources, including its fleet of existing resources and limited amounts of market purchases. Avangrid will be responsible for the integration of

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[5] *Avangrid Renewables, LLC was formerly known as Iberdrola Renewables, Inc., which was previously known as PPM Energy, Inc.*

[6] *Winter Super-Peak Hours are defined as Monday through Saturday, excluding NERC holidays, for hours ending* [redacted] *and hours ending* [redacted] *during the months of November through February.*

the wind project and it is expected the plant will be balanced through Avangrid's balancing authority ("BA"). To ensure firm delivery, Avangrid proposes to use [redacted] MW of its existing firm transmission to deliver power to PSE's system year round. While the proposed firm transmission is less than the project total capacity of 200 MW, it is sufficient to ensure delivery of the shaped capacity product in the winter months, with minimal exposure to conditional firm or non-firm transmission in the as-generated summer months. This structure allows the project to help meet both PSE's RPS-driven renewable need and its capacity resource need. The project is expected to achieve commercial operation by June 30, 2022. Key PPA terms are summarized below:

- **Parties:** A newly formed Special Purpose Entity or Project LLC will be formed, "Golden Hills, LLC" ("Seller"), backed by Avangrid Renewables, LLC and Puget Sound Energy ("Buyer").
- **As generated product:** Delivery of up to 200 MW of as-generated Golden Hills Wind Project output during all hours except Winter Super-Peak Hours.
- **Shaped product:** Winter Super-Peak Hours are November through February ("winter period") delivery of [redacted] MW[7] of firm energy to PSE's system during the "peak period". For the purposes of this contract, the peak period is defined as [redacted] heavy load hours ("HLH") split into morning and evening sections as detailed below.
  - Morning Peak:

    [redacted]
  - Evening Peak:

    [redacted]
  - PSE will receive all of the attributes generated by the wind project. Additionally, the contract includes a true-up mechanism to account for any differences in delivered and metered energy. This true-up is due to the intermittent nature of the wind project, and will occur on a monthly basis immediately after the conclusion of each month.

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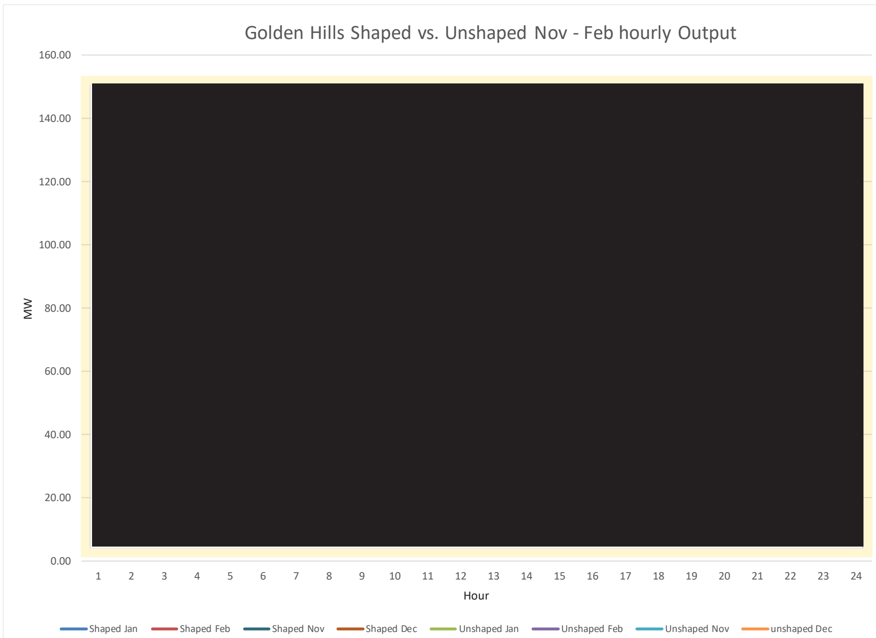
[7] *Delivery will be the greater of* [redacted] *MW or the actual generation from the Golden Hills wind project.*

Figure 1. ***Golden Hills Shaped Wind PPA: Shaped vs. unshaped output***[8]



[redacted]

Figure 1 above shows the additional capacity benefit provided by the shaped product during Winter Super Peak Hours. The chart compares the expected daily energy with and without the shaping product in each month.

- **Contract Price:** Energy generated from the Golden Hills Wind Project will be delivered to the point of delivery ("POD") at a flat price of $[redacted]/MWh[9]. The shaped product will be delivered to the POD at a flat capacity payment price of $[redacted]/kW-month. Additionally, energy used to deliver the shaped product, in excess of what is generated by the project, will be priced at the average market price.
- **Point of interconnection:** The project will interconnect to the Bonneville Power Administration's ("BPA") 230 kV School House Substation via a seven-mile generation tie-line.
- **Point of delivery:** Seller will deliver the power to PSE's system at BPAT.PSEI.
- **Commercial Operation Date –** The commercial operation date ("COD") will be achieved when 95 percent of the Planned Nameplate Capacity is ready for continuous delivery and all other contract

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[8] *This chart is consistent with the data used in the financial modeling of the project. It does not reflect the latest update to the wind study in Attachment 6, which PSE received from Avangrid on April 20, 2020.*

[9] *As described in Section 6 (Key risks), PSE has agreed to pay an additional $[redacted]/MWh for the use of union labor and another additional $[redacted]/MWh for the use of apprenticeship labor.*

provisions for project completion have been met. The Guaranteed Commercial Operations Date is scheduled for June 30, 2022.

- **Contract Term –** The contract term will be 20 years, beginning when commercial operation of the project is achieved.

For a detailed summary of material PPA terms, see Attachment 3. For a detailed (12x24) comparison of the output associated with the shaped and unshaped components of the PPA, see Attachment 6(b).

Credit Assessment

Avangrid Renewables, LLC is a subsidiary of Avangrid Renewables Holdings, Inc., which is a subsidiary of Avangrid, Inc., a publicly traded company listed on the New York Stock Exchange under the ticker symbol "AGR."[1] Avangrid, Inc. is expected to provide a parental guarantee in support of Avangrid Renewables, LLC performance obligations under the draft PPA. Avangrid, Inc. has the benefit of a solid balance sheet with positive cash flow from a geographically diversified U.S. revenue base of regulated and quasi-regulated assets. Standard & Poor's has assigned a corporate credit rating ("CCR") of BBB+ with a stable outlook. Moody's Investor Service has assigned an issuer credit rating of Baa1 with a negative outlook.

Iberdrola S.A. is the majority shareholder of Avangrid. Iberdrola S.A. is a publicly traded company listed on the Madrid Stock Exchange under the ticker symbol of "IBE."[2] It owns 29 GW of renewable generation capacity and provides energy to more than 100 million customers worldwide. Its credit rating is the same as Avangrid, Inc.

[1] *Avangrid's most recent SEC filings can be found at the following web page: http://www.avangrid.com/InvestorRelations/secfilings.html.*
[2] *The most recent annual reports can be found on the following investor relations web page: https://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENWEBACCINFAN&codCache=1339427 3719861205.*

3. Project description

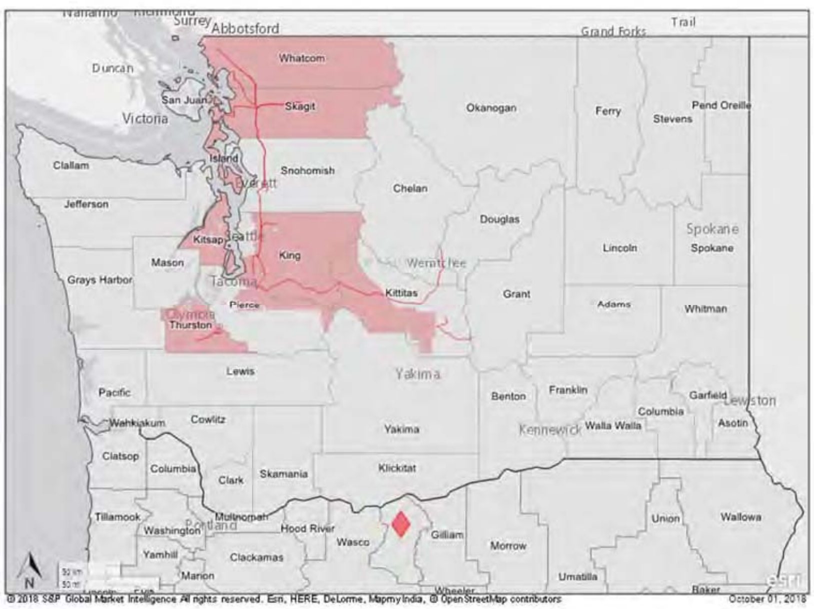
General description of facility and footprint

Project description

Golden Hills is a 200 MW wind development project that is expected to be commercially operational by June 30, 2022. The project is located in Sherman County, Oregon, which is approximately 24 miles east/southeast of The Dalles. Golden Hills is located upwind of numerous operational wind farms, including the Klondike Wind Farm complex; Hay Canyon; Patu Wind Farm; Biglow I, II and III; and Star Point.

The project site is surrounded by canyons south of the Columbia River Gorge; however, there are no viewshed impacts from the river. Ground cover is comprised primarily of dryland wheat, which helps to minimize wildlife impacts.

Figure 2. ***Location of Golden Hills Wind Project***



A seven-mile generation tie-line is required to interconnect the project substation to the point-of-interconnection at Bonneville Power Administration's ("BPA") 230 kV School House Substation. Just over three miles of the tie-line was built and conductored during the construction of a prior project. This section of the line is located outside the Golden Hills project boundary, and is co-located on existing generation tie-line structures. The portion that has not yet been built (approximately 3.5 miles) is located within the project boundary.

Technical and Operations

The project is expected to be built using 41 Vestas model 4.3 wind turbines with a 105-meter hub height, and 10 GE model 2.5-116 wind turbines with a 90-meter hub height.[10] Avangrid Renewable's proposal to PSE stated that their technicians follow an ongoing scheduled and corrective maintenance program for all of their turbines. Additionally, corrective and scheduled maintenance is typically planned for statistically low wind hours and seasons.

Avangrid Renewables expects a low forced outage rate for Golden Hills. The project will be located within the Avangrid Balancing Authority, which is expected to minimize curtailments related to BPA oversupply. With more than 1,400 MW of wind in the Northwest, Avangrid has strong wind resource data for the area and experience responding to and correcting issues that could lead to forced outages. According to their proposal, Avangrid's National Control Center, which manages real-time asset operations and dispatch, monitors and responds to any issues 24 hours a day, seven days a week.

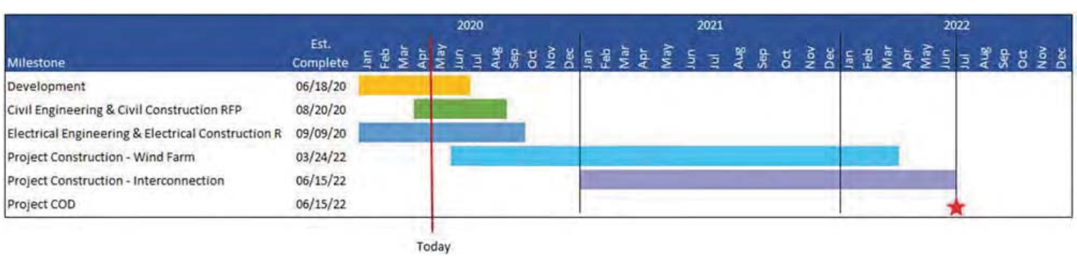
See Attachment 4(b) for a copy of Avangrid's proposed Golden Hills Wind Project turbine layout. See also Attachment 6(a) for a copy of Avangrid's wind resource report for the wind farm.

Project schedule

Golden Hills is a relatively mature development project with pre-construction site control, discretionary permitting and transmission work substantially complete. Avangrid expects to begin the construction phase of the project in June 2020. This phase will include building of the O&M structure, road and foundation work, construction of the remaining 3.5 miles of generation tie-line to be located within the project boundary, construction of the wind farm, and construction of the substation. The wind project is expected to be commercially operational by the end of June 2022.

Figure 3 depicts a high level development schedule for the project. A detailed development schedule is provided in Attachment 4(a).

Figure 3. ***Golden Hills Wind Project Development and Construction Schedule***



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[10] *Turbine selection and layout details reflect the best available information at the time this report was completed. This information is subject to change until the final design work is completed. Final design must be provided to PSE by June 2021.*

Project development progress

Avangrid's management team has extensive experience in renewable energy development, construction and operations. The team has demonstrated skill at successfully executing projects in both the Pacific Northwest and across the United States.

Based on the analysis conducted by PSE's cross-functional resource evaluation team (described in Section 5 and Attachment 8(a)), there appear to be no major real estate, permitting, technical, community relations, interconnection or transmission concerns associated with the Golden Hills wind development project.

Real Estate

The rights necessary for the development and operation of the wind project appear to be in good order and complete. The Golden Hills wind project originated in 2002 with a series of option agreements for real estate rights. These options were later exercised by former owner Orion Energy, resulting in grant of easement agreements and restrictive covenant documents with landowners. According to a random sampling of the wind farm easement documents provided by Avangrid, the "pre-development term" for the project has been extended through June 30, 2020, which aligns with Avangrid's construction schedule.

A pro-forma title policy dated June 12, 2017 was submitted for all project lands. In addition, an ALTA survey was performed in 2010. Avangrid is in the process of updating both the title reports and the ALTA survey.

Permitting

The project received an amended site certification agreement from the Oregon Energy Facility Siting Council ("EFSC") in November 2018. The agreement allows the seller to install up to 125 turbines on 25,900 acres with a maximum generating capacity of 400 MW. Construction must begin by June 18, 2020. The EFSC site certificate encompasses all state and county permits. After issuing the certificate, the council has ongoing regulatory authority over the construction and operation of the facility.

As previously stated, project construction is currently scheduled to begin in June 2020, which is consistent with the required start date in the EFSC site certificate. Commercial operation of the project is currently scheduled to occur in June 2022. However, the EFSC permit requires project completion by June 2021, unless an extension is granted. Avangrid has stated they will request an extension to the project completion dates as needed to facilitate the proposed project schedule. Avangrid has stated that EFSC staff is supportive of the extension in order to meet the project's June 2022 COD. The extension must be approved by the Council. Similar amendments have typically taken four to six months to complete.

All discretionary permits needed to begin construction have been granted. No federal permits are needed for project construction or operation. Avangrid does not intend to pursue an eagle take permit for the project from the U.S. Fish and Wildlife Service. Avangrid has stated that required EFSC pre-construction filings will not be complete by June 18, 2020 but are working with EFSC to extend the deadlines. A permitting checklist is provided as Attachment 5.

SECTION 3. PROJECT DESCRIPTION

Transmission plan

Avangrid will deliver as-generated energy from the Golden Hills Wind Project and winter peak shaped energy to PSE's system using its existing portfolio of long-term, firm, point-to-point transmission on BPA's system. The following sections describe the interconnection and transmission components for energy delivery.

Generation Tie-line and Interconnection

The project will interconnect to BPA's system at the existing 230 kV Schoolhouse Substation (the "POI") via an approximately seven-mile generation tie-line from the project's collection station. Feasibility, system impact, and facility studies were completed as part of the Large Generator Interconnection Agreement ("LGIA") process. Avangrid provided a copy of the final LGIA, which clarified the costs to interconnect the project at the 230 kV Schoolhouse Substation. Interconnection costs for the developer are estimated to be $5.2 million and are already included in the PPA price.

Integration and Energy Delivery

Avangrid will use [redacted] MW of its existing long-term, firm, point-to-point transmission rights and [redacted] MW of short-term firm redirected products to deliver the energy to PSE's system. Avangrid will take responsibility for integrating the energy to be delivered, including ancillary services, such as scheduling, balancing and operating reserves; and any transmission capacity up to the point of delivery ("POD") at BPAT.PSEI.

Community relations

Avangrid Renewables owns and operates several existing projects located adjacent to the Golden Hills project. The developer has a presence in the community with a history of supporting Sherman County through local hiring, charitable contributions, and tax and lease revenue. Avangrid proposed a planned outreach approach that includes community meetings, which would likely be helpful in fostering support for the project.

There appears to be no local opposition to the project. As the project is located outside PSE's territory and no opposition has been identified, it is unlikely that PSE would be exposed to any adverse reputational risks.

Project execution

As previously noted, Avangrid expects to begin the construction phase of the project in June 2020 and commercial operation is scheduled for June 2022. This phase will include road and foundation work, wind farm construction (including the 3.5-mile portion of the generation tie-line located within the project boundary), and substation construction.

In general, PSE considers the proposed construction schedule to be reasonable. Additionally, Avangrid's demonstrated experience developing and operating wind farms, supports their ability to successfully complete the proposed project. A high level project schedule is shown on page 7. Avangrid's detailed construction schedule is provided as Attachment 4(a).

PSE intends to monitor key development milestones, including the turbine supply contract and the engineering, procurement, and construction ("EPC") contract execution dates. These dates are guaranteed to occur no later than September 1, 2020. PSE has expressed a preference that Avangrid's EPC contractor utilize a Project Labor Agreement or Community Workforce Agreement for major construction activities. Additionally, Avangrid will purse commercially reasonable efforts to qualify to meet the Washington State Apprenticeship and Training Council requirement to allow PSE to qualify for a one and two-tenths (1.2) REC multiplier. PSE has added an incentive to the contract to offset the costs if Avangrid achieves the labor preferences.

COVID 19 Delays and PTC Value Erosion

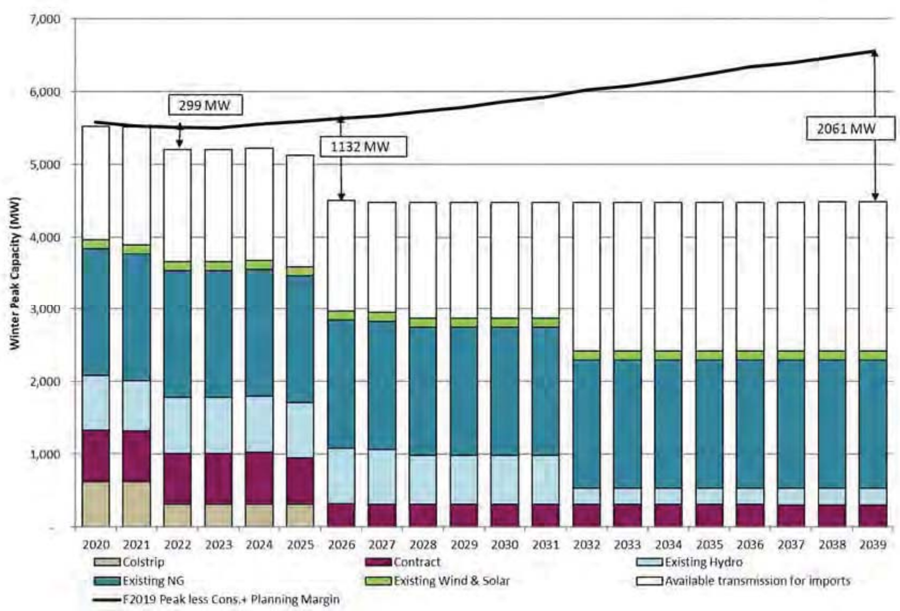
The project schedule has already been modified from what was originally submitted to the 2018 RFP to account for the uncertainty in COVID delays. Avangrid has proposed a COD of June 2022 and assumes the risks of meeting IRS requirements to qualify for PTCs. PSE has included language that allows PSE to share any potential PTC benefits if there are incremental PTC increases as a result of current events. Avangrid does not have the right to change pricing if construction delays impact PTCs.

4. Determination of need

PSE's electric resource acquisition process is guided by our integrated resource planning analysis, which evaluates and establishes the Company's capacity (physical reliability) and renewable resource (policy driven) [11] needs on a biennial basis, consistent with Chapter 480-100-238 WAC. Our most recent Integrated Resource Plan ("IRP") includes a detailed discussion of PSE's electric planning standard and describes our methodology for analyzing the Company's resource needs. The IRP can be found on PSE's web site at http://www.pse.com/irp.

Since issuing the 2017 IRP, PSE has updated its assessment of the Company's capacity and renewable resource needs multiple times. Figures 4 and 5 below depict the final update used in the comparative resource analysis described in Section 5. This update was prepared in spring 2019 to align with PSE's F2019 load forecast and conservation from the 2017 IRP. Figure 4 reflects an overall increase in expected capacity need compared to the need forecast in the 2017 IRP.

Figure 4. ***Capacity resource need***

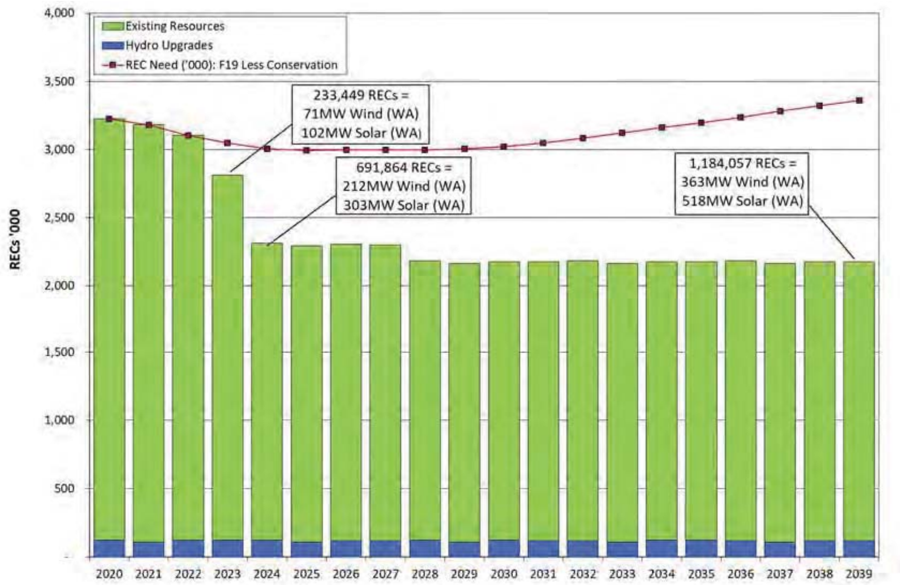


[11] *PSE has a legal obligation to meet the requirements of the Energy Independence Act (Chapter 19.285 RCW), also referred to as Washington state's renewable portfolio standard (RPS). See discussion of Figure 5 in Section 4 for additional information about the RPS.*

Figure 4 assumes the decommissioning of Colstrip units 1&2 by the end of 2019, consistent with an agreement reached during the RFP evaluation. Figures 4 and 5 do not reflect the impact of Senate Bill 5116, also known as the Clean Energy Transformation Act ("CETA"), which became Washington law during Phase 2 of the RFP.[12] However, consistent with CETA's mandate to eliminate coal-fired resources after 2025, the updated capacity need does reflect the removal of Colstrip units 3&4 from the Company's electric resource portfolio starting in 2026.

Figure 5 shows the Company's need for additional renewable resources, which is driven by Washington state's renewable portfolio standard ("RPS"). The RPS, which increased from 9 percent to 15 percent of load in 2020, need is delayed by PSE's banked renewable energy credits ("RECs") until 2023.

Figure 5. ***Renewable resource need (RPS compliance)***



See Attachment 8(a) for more information about the capacity and renewable resource need assessments used in PSE's comparative analysis of resource alternatives.

[12] *CETA sets several statewide policy goals, including a requirement to eliminate coal-fired resources after 2025, 80 percent carbon free generation and overall carbon neutral electricity by 2030, and 100 percent carbon free electricity by 2045.*

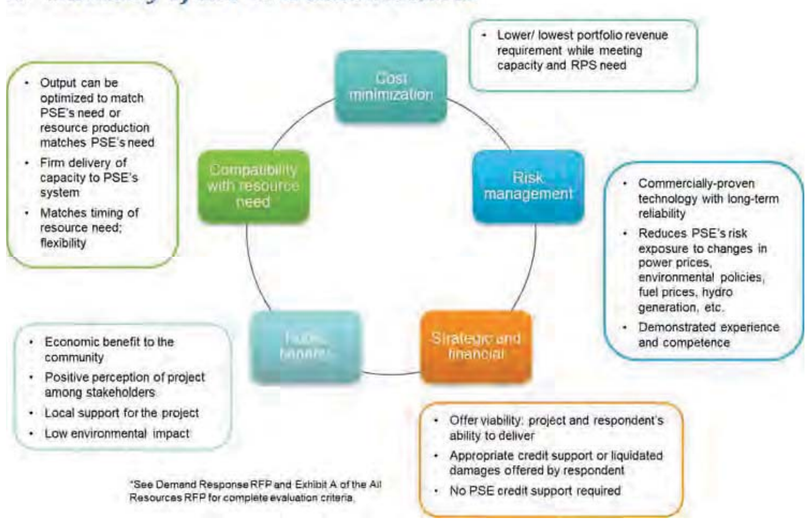
5. Comparative analysis

PSE filed All Resources and Demand Response requests for proposals ("2018 RFPs") in June 2018, based on the resource needs originally established in the 2017 IRP and later updated as described in Section 4 and Attachment 8(a). The Company received nearly 100 unique proposals in response to the 2018 RFPs, the largest ever response to a PSE RFP. PSE's RFP evaluation team performed a thorough comparative analysis consistent with guidance set forth in the Washington Administrative Code ("WAC") 480-107-035 and the Revised Code of Washington ("RCW") 19.280.020, which encourage utilities to seek resources that provide clean, safe and reliable power to meet their renewable and capacity needs using lowest reasonable cost as a criterion.

PSE relied upon its experience as a resource owner and evaluator, its familiarity with the region's energy market, and analytical tools used throughout multiple IRP and RFP cycles to perform the RFP analysis. The cross-functional evaluation team followed a structured, two-phased process to screen and rank individual proposals based on an evaluation of costs, risks and benefits. The first phase included a preliminary qualitative and quantitative screening designed to identify the most promising proposals and eliminate resources with prohibitive costs, minimal portfolio benefits or excessive risk. The second phase included a more rigorous due diligence review and portfolio optimization analysis, with the goal of identifying a short list of resources representing a combined best-fit to need, while minimizing cost and risk.

The evaluation team considered a variety of quantitative and qualitative factors to reasonably compare proposals with diverse attributes. Each proposal was evaluated based on its compliance with either the All Resources or Demand Response RFP, and according to the criteria summarized in Figure 6.

Figure 6. ***Summary of RFP evaluation criteria***[13]



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[13] *See Appendix B to Attachment 8(a) for a detailed list of the RFP evaluation criteria.*

SECTION 5. COMPARATIVE ANALYSIS

PSE's analysis shows that when combined with the Company's existing electric resource portfolio, the following short list, including the Golden Hills Shaped Wind PPA, represents the most favorable combination of resources to meet PSE's renewable and capacity needs at the lowest reasonable cost and risk:

- **Golden Hills Shaped Wind PPA** proposed by Avangrid Renewables, a 20-year fixed price power purchase agreement ("PPA") delivering to BPAT.PSEI the output from a 200 MW wind development project paired with shaped capacity up to [redacted] MW during winter peak hours[14], beginning in June 2022;
- [redacted] proposed by [redacted] a 25-year fixed price power purchase agreement ("PPA") delivering the output from a [redacted] MW Montana wind development project to the [redacted], beginning in December 2021;
- **SPI Biomass PPA** proposed by Sierra Pacific Industries, a 17-year fixed price power purchase agreement ("PPA") delivering 17 MW of firm capacity (and up to an additional 3 MW of variable energy) from a biomass project located on PSE's system to the Fredonia Substation, beginning in January 2021; and
- **BPA Peak Capacity Product** proposed by the Bonneville Power Administration, a 5-year capacity tolling agreement ("CTA") for firm capacity delivered to BPAT.PSEI that may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis, beginning in January 2022.
- **MSCG Fixed Price PPA** proposed by Morgan Stanley Capital Group, is a 4-year 363 day fixed price PPA delivered to BPAT.PSEI. The contract delivers 100 MW per hour during Heavy Load Hours[15] in the first quarter (January – March) and last quarter (October – December) of each year. The contract starts in January of 2022 and ends December 2026.

In addition to being the optimal portfolio selected in the RFP optimization analysis, the short list aligns well with public and state policy preferences and, specifically, the Clean Energy Transformation Act, which became Washington law during PSE's RFP evaluation process. Attachment 8(a) describes in detail the 2018 RFP evaluation process, the results it produced, and how PSE considered a variety of qualitative and quantitative criteria to select resources that best meet the needs of its customers. Attachment 8(b) presents the results of updated portfolio analysis performed subsequent to the 2018 RFP, which reaffirms the selection of the Golden Hills Shaped Wind PPA as part of a lowest reasonable cost solution to meet the needs of customers.

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[14] *Shaped schedule: November through February,* [redacted] *and* [redacted].

[15] *Heavy Load Hours are defined as hour ending 0700 to hour ending 2200 Monday through Saturday, excluding NERC holidays.*

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6. Key risks

This section summarizes generally the principal risks associated with the Golden Hills Shaped Wind Project and PPA. For a more detailed assessment of risks and proposed mitigations, see Attachment 7.

Project development and construction risks

Development is considered to be mature and associated risks are expected to be minimal

The Golden Hills Shaped Wind project and power purchase agreement ("PPA") is considered to be a lower risk proposal because of the relatively advanced nature of the project development work and substantial experience of the developer. All real estate rights appear to be in good order and complete. The EFSC site certificate has been approved, which supersedes the authority of all state and county permits, and no federal permits are required for project construction or operation. Interconnection and transmission plans are well underway: an LGIA has been executed with BPA, all transmission-related studies have been completed, Avangrid will use existing transmission rights from its pool of transmission resources to deliver the energy year round, and the portion of the generation tie-line located outside the project boundary has already been built and conductored. As such, the Golden Hills wind development project is considered to be relatively mature and associated development risks are expected to be minimal.

Additionally, as previously described, Golden Hills is sited in a wind-friendly location south of the Columbia River Gorge where there is no known opposition to the project and no viewshed impacts from the river. Furthermore, the dryland wheat ground cover helps to minimize wildlife impacts.

Construction schedule is generally considered to be reasonable

Construction period risks include project cost and schedule risks associated with construction activities including road and foundation work, turbine erection and other wind farm construction (including the portion of the generation tie-line located within the project boundary), and substation construction. PSE generally considers Avangrid's construction schedule to be reasonable; however, certain risks have been identified for mitigation, including:

- **EFSC site certificate-required construction start and completion dates**

  The Oregon EFSC site certificate requires construction to start no later than June 18, 2020 and project completion to occur no later than June 18, 2021, but the current project schedule anticipates a June 2022 COD. It is expected that Avangrid will request extensions as needed to facilitate the proposed project schedule. Assuming that continuous effort is made during construction, this request is considered to be relatively low risk, assuming the request is filled in a timely manner.

- **Union Labor**

  PSE has expressed a preference for a project labor agreement or community workforce agreement for major construction activities at the project. If Avangrid and its selected EPC contractor execute such an agreement with the LIUNA and IBEW labor unions, PSE has agreed to pay an additional [redacted] $/MWh to account for the additional cost of labor.

- **Apprenticeship Labor**

  If apprenticeship labor meets the requirements of the Washington State Apprenticeship and Training Council, Avangrid will utilize apprenticeship labor during the construction phase of the project. Use of apprenticeship labor will increase the PPA price by an additional [redacted] $/MWh. The project will qualify for a one and two-tenths (1.2) multiplier for the environmental attributes generated from the project throughout the term of the PPA.

- **Impact of delayed COD on project costs**

  Construction risks include any unexpected delays to the project schedule that could jeopardize the June 2022 COD. Given the reasonableness of the proposed schedule and Avangrid's track record of success in developing and operating wind farms, PSE believes that this is an acceptable risk with a relatively low likelihood of occurrence.

- **COVID Delay Risks**

  The contract recognizes that the impacts of COVID19 on the construction schedule are not known at this time. The contract structure allows for up to a 90-day delay in COD due to COVID and Force Majeure related delays. After this 90-day period, liquidated damages begin to accumulate. Pre-COD PSE has the right to terminate the contract in December 2022.

To help minimize the risk of schedule slip for the project due to unexpected delays or an inability to complete the development work as scheduled, the PPA specifies a series of key project milestones to be met by Avangrid, including a project COD milestone. In the event certain milestones are missed, damages would be imposed on Avangrid. These damages would be refundable, in the event that the overall project COD milestone is ultimately achieved.

Counterparty, production and product risks

The principle ongoing risks during the term of the PPA are the potential for underperformance of the wind farm that could impact its ability to contribute renewable energy credits ("RECs") to help meet PSE's renewable resource needs,[16] default by the counterparty, and uncertainties related to the treatment of the shaped product under CETA. The PPA includes language to help mitigate the risks of resource underperformance or default, including minimum performance guarantees, liquidated damages for failing to meet guarantees, and the ability of PSE to collect credit support posted by Avangrid. The WUTC is still in rulemaking to interpret and codify the new CETA legislation in the Washington Administrative Code. The rulemaking remains ongoing and is not expected to be completed before a PPA must be executed to meet a June 2022 COD. The PPA also includes language requiring the parties to work together to identify a solution, in the event the shaped portion of the PPA is not considered CETA compliant. Additionally, the

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[16]PSE has a legal obligation to meet the requirements of the Energy Independence Act, Chapter 19.285 RCW and the Clean Energy Transformation Act ("CETA"), Chapter 19.405 RCW. The Energy Independence Act requires PSE to acquire qualifying eligible renewable resources and/or renewable energy credits to meet 15 percent of its load by 2020. CETA sets statewide policy goals for the elimination of coal-fired resources by 2025, 80 percent carbon free generation and overall carbon neutral electricity by 2030, and 100 percent carbon free electricity by 2045.

SECTION 6. KEY RISKS

Winter Super-Peak hours must be shaped using resources that will allow the PPA to satisfy the Washington Emissions Performance Standard ("EPS"). The PPA has been structured such that the firm super-peak component will be sourced from compliant resources. However, the PPA contains language that allows PSE to seek a determination on EPS compliance prior to COD. In the event that the contract is not found to be in compliance, PSE has the right to convert the PPA product to an as-generated only resource that is delivered and integrated by Avangrid.

PPA terms are summarized in Section 2 and in greater detail in Attachment 3. Terms associated with specific risks are summarized in Attachment 7.

7. PPA and project benefits

Together with the 2018 RFP short list resources identified in Section 5, the Golden Hills Shaped Wind PPA helps to meet PSE's capacity and RPS-driven renewable resource needs at the lowest reasonable portfolio cost to customers. Additionally, the project provides a number of other valuable benefits:

- Golden Hills is a cost competitive, large-scale wind project that helps to meet PSE's renewable and capacity resource needs beginning in late June 2022;
- Golden Hills aligns well with Washington state's clean energy goals, including SB 5116, also known as the Clean Energy Transformation Act, which became law in May 2019;
- The Golden Hills PPA's unique shaped wind product structure helps to meet PSE's winter peak capacity need beginning in June 2022;
- Avangrid Renewables is a strong counterparty willing to offer a parent guarantee, that has a positive history of working with PSE, including two successful, existing contractual relationships;
- The PPA pairs existing Avangrid transmission rights on BPA's system with as-generated Golden Hills output and winter super-peak products (November – February) to provide a firm, point-to-point energy delivery solution to PSE's system;
- Avangrid will integrate and balance the wind project alleviating the need for PSE to commit valuable flexible capacity resources to integrate the wind project;
- PSE has negotiated the option to shift the shape of the firm Winter Super-Peak Hours.
- The quantitative and qualitative results of PSE's 2018 RFP evaluation support selection of the Golden Hills Shaped Wind PPA as part of an optimal portfolio, best fit to need solution at the lowest reasonable cost;
- Golden Hills is a mature ("shovel ready") development project backed by an experienced developer, which demonstrated more advanced progress than many 2018 RFP alternatives; and
- Golden Hills is sited in a relatively wind-friendly location adjacent to several other existing wind farms, with no known local opposition and where the developer has a history of hiring locally, and supporting the local community with charitable contributions, lease revenue and tax revenue.

8. Regulatory process, rate impacts and recommendation

Regulatory process, rate impacts and recommendation

PSE will seek a determination of compliance with the Washington state Emission Performance Standards prior to the determination of prudence. PSE will file an application with the WUTC after executing the PPA.

PSE will also seek a determination of prudence for the Golden Hills Shaped Wind PPA in an upcoming Power Cost Only Rate Case ("PCORC") or General Rate Case ("GRC") filing with the Washington Utilities and Transportation Commission, as determined by PSE's regulatory needs. Commercial operation of the underlying wind project is expected to be achieved in June 2022. Regulatory approval of new rates typically occurs five to eleven months after filing, depending on the type of filing.

Rate impact of PPA

The levelized cost of the PPA is approximately $[redacted]/MWh. The Resource Acquisition team estimates the net effect on electric rates to be an increase of approximately one percent. This is based on the 2018 current baseline rate.

Recommendation

Based on the determination of need, the analysis of alternatives and the project benefits presented in this report, PSE management recommends that the Board of Directors adopt the Resolutions set forth in Attachment 1 to enter into the Golden Hills Shaped Wind PPA with Avangrid Renewables.

PUGET SOUND ENERGY

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 1. Board Resolutions

Board Resolutions

PUGET SOUND ENERGY, INC. PROPOSED BOARD RESOLUTIONS

Approval of Golden Hills Wind Power Purchase Agreement

WHEREAS, Golden Hills Wind Farm LLC ("Golden Hills") is the owner and developer of a wind power electric generation facility with an anticipated aggregate nameplate capacity of approximately 200 MW located in Sherman County, Oregon (the "Wind Project");

WHEREAS, PSE has been engaged in negotiations with Golden Hills with respect to the purchase by PSE of the electrical output of the Wind Project along with a shaped product during winter months pursuant to the Power Purchase Agreement substantially with the terms and on the conditions as presented at this meeting (the "PPA");

WHEREAS, management has presented information to the Board of Directors of PSE (the "Board") regarding the negotiation of the PPA and management's assessment of the operational and financial benefits to the Company and to its customers of entering into it;

WHEREAS, with input from management, the Board has considered information relating to the PPA as the Board has deemed appropriate;

WHEREAS, the Board has determined that it is in the best interest of PSE that PSE enter into the PPA subject to the conditions set forth in the PPA;

NOW THEREFORE, BE IT RESOLVED, that the Board hereby adopts and approves the PPA, as summarized in the materials provided to the Board;

RESOLVED FURTHER, that the officers of PSE are, and each of them hereby is, authorized in the name and on behalf of PSE to execute and deliver the PPA, together with such modifications thereto as any of such officers shall approve, the execution thereof on behalf of PSE to be conclusive evidence of such approval by the Board.

RESOLVED FURTHER, that PSE's officers are, and each of them hereby is, authorized to negotiate, execute and deliver any other agreements contemplated by the PPA and anticipated by it, the execution thereof by such officer(s) to be conclusive evidence that such agreements, documents and instruments are hereby approved.

RESOLVED FURTHER, that PSE's officers are, and each of them hereby is, authorized to do and perform or cause to be done or performed all other acts necessary or desirable in order to effectuate the transactions contemplated by the PPA, including, but not limited to, (i) the engagement, by written contract or otherwise, of any and all persons deemed necessary, appropriate or desirable to effectuate the transactions contemplated by the PPA and related documents, upon such terms and conditions as such officers, or any of them, may deem appropriate, and to pay all fees and expenses incurred in connection therewith, (ii) the preparation and filing with appropriate governmental authorities of all applications, notifications, certificates, reports, statements or other documents or instruments relating to the PPA and the other transactions contemplated by the PPA, including any applications, certificates or other filings required under the rules and regulations of the Securities and Exchange Commission and the laws of the State of Washington, and to arrange for payment of any fees required in connection therewith, and (iii) all such other acts and things which any one or more of them shall deem necessary, advisable or appropriate in order to carry out the intent and purpose of the foregoing, and the taking of any and all such actions and the performance of any and all such things in connection therewith shall conclusively establish each such officer's authority therefor from PSE and the approval and ratification thereof by the Board.

RESOLVED FURTHER, that each of the officers of PSE or any of them are authorized, in the name and on behalf of PSE, to perform such acts and to execute and deliver such documents as they or any of them deem necessary or advisable to carry out the intent and purpose of these resolutions, including, but not limited to, the execution of any necessary or advisable agreements, instruments, certificates, affidavits, or other documents in connection therewith, and the taking of any and all such actions and the execution of any and all such documents or instruments in connection with the foregoing shall conclusively establish their authority therefor from PSE and the approval and ratification thereof by the Board.

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 2. Presentation

2018 All Resources RFP Golden Hills PPA Execution

Board of Directors Decisional

May 7, 2020

PUGET SOUND ENERGY

Decisional

Decisional: Based on analysis performed to date for the 2018 RFP, management requests that the board of directors authorize PSE to execute the following contract:

- Golden Hills PPA (counterparty: Avangrid Renewables) 200 MW, 20-year PPA from a wind project paired with a shaped product to deliver [redacted] MW capacity during winter peak hours (November – February, [redacted] & [redacted]*).

*Monday through Saturday, excluding NERC Holidays.

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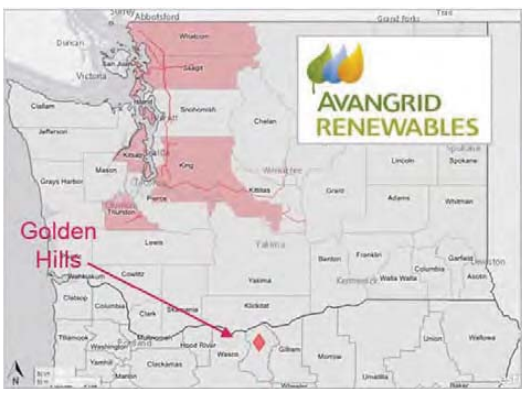
Golden Hills PPA overview

Seller:
- Avangrid Renewables, Inc.

Product:
- 200MW Wind + Winter shaped product
- NCF from wind project: [redacted]%*
- Winter shaped product: [redacted] MW during [redacted] & [redacted] Monday through Saturday, excluding NERC Holidays



Key terms:
- Guaranteed COD: 6/30/2022
- Term: 20 years
- Point of delivery: BPAT.PSEI
- Credit support:
  - Pre COD: $[redacted] ($[redacted] in letter of credit)
  - Post COD: $[redacted]

Price:

Price for generated energy	$[redacted]/MWh
Capacity charge (Nov-Feb)	$[redacted]kw-month @150MW
Shaped energy	Flat [redacted]
Expected annual generation	[redacted]MWh*
Expected annual payments	~[redacted]

*NCF subject to change until turbine layout is finalized.

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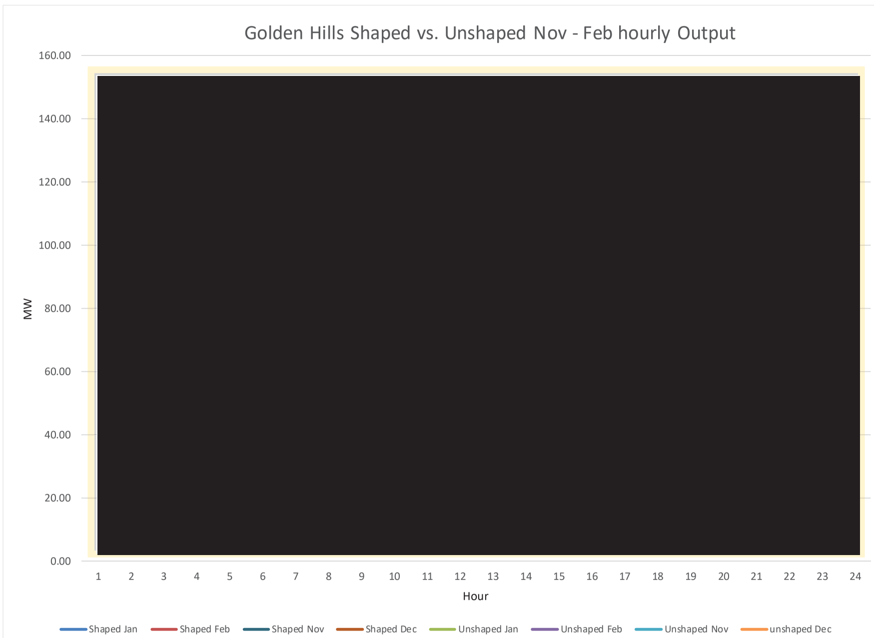
The uniquely shaped product during winter months yields 24 MW higher peak capacity contribution

Avangrid Renewables offered a synthetic peak capacity output profile for winter months (Nov-Feb) that reshapes the wind output in those months to optimize the coincidence to PSE's load profile.



- As generated, Golden Hills Wind has an ELCC of 24.5%, a peak capacity contribution of 49 MW.
- The reshaped wind product offers an ELCC of 36.5%, a peak capacity contribution of 73 MW.

PSE PUGET SOUND ENERGY

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Preliminary analysis shows that annual floating price exposure from shaped product is between -$[redacted] (price ↑ 2σ) and + $[redacted] (price ↓ 2σ)

Winter super peak hours – Nov to Feb HE 8-10 & HE 18-21

Delivered energy	=	Metered energy from wind	+	Scheduling forecast error	+	Shaped energy
Settlement		Fixed price $[redacted]/MWh		**Scheduled > Metered:** [redacted] **Scheduled < Metered:** [redacted]		[redacted]

Non-winter super peak hours

Delivered energy	=	Metered energy from wind	+	Scheduling forecast error
Settlement		Fixed price $[redacted]/MWh		[redacted]

Forecast error occurs due to intermittent nature of wind and the difference in the forecasted energy at the time of schedule (75 minutes before the hour of flow) and the amount of energy actually metered during the hour.

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Key risks & mitigation plan

Risk	Respon sibility	Impact without mitigation	Proposed PSE mitigation
Commercial operation delay – construction / COVID-19	Avangrid	Capacity deficit	Liquidated Damages assessed on counterparty; manage with short term purchases.
Available long-term firm transmission ([redacted] MW) is less than project nameplate capacity (200 MW)	Avangrid	Possible impact to energy delivery in excess of [redacted] MW	Excess energy that is not delivered to PSE system will be delivered to Mid-C and priced below market.
Shaped product resource pool may not be 100% renewable	PSE	May misalign with CETA requirements	If resource pool unable to be modified by agreement of the parties, would require carbon mitigation strategy starting in 2030.

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Key risks & mitigation plan - continued

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Seller may use unspecified market purchases to resupply shaped winter energy. Coal or other high emission power could mistakenly be delivered to PSE (operational error)	Avangrid	Exposes PSE to CETA fines and to Emissions Performance Standard	Avangrid barred from using coal powered resource for resupply. PSE has termination right in the event of repeated or excessive unspecified source deliveries.
[redacted] price risk	PSE	**Winter super peak** • Scheduled > metered: settled at [redacted] price.	None. [redacted] price provides PSE with hedge against real-time price volatility during highest winter load hours. Preliminary analysis shows that annual floating price exposure is between -$[redacted] (price ↑ 2σ) and + $[redacted] (price ↓ 2σ).

Represented labor and apprenticeship labor

- PSE expressed a preference for Avangrid Renewables to require EPC contractor to utilize a Project Labor Agreement or Community Workforce Agreement for major construction activities with LIUNA and IBEW unions and will pay an additional cost of $[redacted]/MWh if Avangrid Renewables does.
  - Expect annual payment ~$[redacted]/year to use union labor, or $[redacted] NPV over the life of the 20-year PPA
- PSE prefers Avangrid Renewables to use apprenticeship labor, and will pay an additional cost of $[redacted]/MWh.
  - Project will qualify for 1.2x REC multiplier
  - Expect annual payment up to ~$[redacted]/year or $[redacted] NPV over the life of the 20-year PPA

Union Labor	+	Apprenticeship	=	Labor Adder (Total Project Cost)
$[redacted]		$[redacted]		$[redacted]

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Key benefits

- Incremental wind energy with shaped capacity product provides contribution to both RPS and capacity needs identified in the 2018 RFP
- Avangrid will provide firm transmission delivered to PSE system for up to [redacted] MW of the 200 MW project nameplate capacity
- Avangrid will balance project through Avangrid balancing authority alleviating need for PSE's resources to provide flexible ramping capacity for wind variability
- The "as generated" delivery of wind and bundled RECs is consistent with Washington state's clean energy goals
- Winter super peak delivery guarantee provides PSE with hedge against volumetric risk and real-time price volatility during highest winter load hours
- Option to shift winter shape available allowing optimization to demand need
- Quantitative analysis demonstrates that Golden Hills PPA (shaped) performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution
- Project is "shovel-ready"
- Strong counterparty with a parent guarantee

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Decisional

Decisional: Based on analysis performed to date for the 2018 RFP, management requests that the board of directors authorize PSE to execute the following contract:

- Golden Hills PPA (counterparty: Avangrid Renewables) 200 MW, 20-year PPA from a wind project paired with a shaped product to deliver [redacted] MW capacity during winter peak hours (November – February, [redacted] & [redacted]*).

*Monday through Saturday, excluding NERC Holidays.

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APPENDIX

Shaped product delivered from unspecified sources - Emissions Performance Standard and CETA risks and mitigation

Since the shaped product will be delivered from the wind project and other resources from Avangrid's generation assets or market purchases, there are potential EPS and CETA compliance risks:

RCW 80.80.40 (EPS)

Risks

- For a contract with multiple sources, each source must pass the EPS (925 lbs/MWh)
- 12% annual limit on unspecified sources

Mitigation

- Avangrid will limit market purchases to 12% and supply from existing compliant portfolio.
- Winter shaped product contingent upon EPS compliance determination filing. If the determination ruling is negative, PSE has the option to go with the unshaped product.

RCW 19.405 (CETA)

Risks

- No coal fired resources starting in 2026
- Carbon Neutral after 2030
- Uncertainty from current CETA rulemaking

Mitigation

- Avangrid is prohibited from supplying coal fired resource, will have to pay penalty if accidental delivery happens.
- PSE can terminate PPA if delivery happens more than 4 times.
- If resource pool unable to be modified by agreement of the parties, would require carbon mitigation strategy starting in 2030.

Mitigation strategy to manage EPS compliance risk – option to convert to unshaped product

Shaped product contingent upon EPS compliance

1. Super peak hours are being supplied by:
   - Golden Hills wind project
   - Avangrid's portfolio of compliant resources including hydro, thermal, and wind resources
   - Other short term purchases from specified compliant resources
   - 12% limit from unspecified resources
   - Prohibit coal resource delivery
2. After review by internal stakeholders there is confidence that proposed contract structure satisfies the EPS.
3. PSE has the option to convert the PPA from a shaped product to an as-generated PPA in the unlikely event there is an unfavorable determination on EPS compliance.
4. Alternatives analysis shows that the unshaped product is the best remaining alternative to meet PSE's peak capacity need.

Modified terms for unshaped product

- PPA reverts to as-generated resource (wind only)
- ELCC: ~25%
- Term: 20 years
- Point of Delivery: BPAT.PSEI
- Expected Output: ~[redacted]MWh
- **Fixed Price: $[redacted] MWh**
- Expected Annual Payment: ~ $[redacted]/ year
- Portfolio effects: Portfolio cost including social cost of carbon increases by about ~$21M relative to the shaped product
- Still part of the optimal portfolio

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Permitting status – all discretionary permits are completed, project is shovel ready

Status	Permit	Agency	Notes
	Clean Water Act, Section 404	U.S. Army Corps of Engineers	Not required, wetland/streams avoided
	Proposed Construction and Actual Construction	Federal Aviation Administration	DNHs obtained for all turbine locations
	Site Certificate	Oregon Energy Facilities Siting Council	Complete
	Archaeological Permit	Oregon Department of Parks and Recreation, SHPO	Not required
	Conditional Use Permit	Sherman County	Complete, approval delegated under Site Certificate

Pending permits upon EPC contract execution

Status	Permit	Agency	Est Date	Notes
	Water Right Permit or Water Use Authorization	Oregon Water Resources Department	Jan 2021	O&M will use exempt well. EPC contractor to provide construction water.
	Construction Storm Water Permit 1200-C	Oregon Department of Environmental Quality	Dec 2020	EPC contractor to provide
	Building Permit	Sherman County	Feb 2021	EPC contractor to provide

Portfolio optimization results shows that Golden Hills shaped product is selected as part of least cost optimized portfolio

(A) List	(B) Project ID	(C) Project	(D) Resource	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs	(H) Portfolio Benefits
1	18100	SPI	Biomass	17 MW	16 MW	[redacted]	
2	18161	BPA Peak Capacity Product	Call Option	100 MW	53 MW	[redacted]	
3	18169	[redacted]	MT Wind	[redacted] MW	[redacted] MW	[redacted]	
4	18170	Golden Hills Shaped	Wind	200 MW	73 MW	[redacted]	
5	xxxxx	Morgan Stanley Sys PPA	Systerm PPA	100 MW	79 MW	[redacted]	
6		**Total Peak Capacity Credits - MWs**			[redacted] **MW**		
7		**Total Annual RECs**				[redacted]	
8		**Portfolio Benefits - $M**					**$711**
9		**Portfolio Benefits w/ Carbon Costs as an Adder - $M** [2,3,4]					**$1,144**

Peak Capacity and REC Need 2022-2025	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need/(Surplus) after Resources	-[redacted] MW	-[redacted] MW	-[redacted] MW	110 MW
REC Need	0	233,449	691,864	700,482
REC Need/(Surplus) after Resources	-2,278,361	-2,044,911	-1,586,496	-1,577,879

1. The annual project RECs for Golden Hills include 0.2X apprenticeship multiplier.
2. Social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO_2 / MWh for market purchases is added into social cost of carbon calculation.
4. Includes $[redacted]/MWh adder (2020 dollars) for represented labor and $[redacted]/MWh adder (2020 dollars) for apprenticeship labor for Golden Hills.

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REDACTED VERSION

Detailed Portfolio Optimization Results: as of 05.07.2020

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
List	Project ID	Project	Resource	Nameplate	Peak Capacity Credit	RECs	Recommended Portfolio: Clearwater + Renewables
1	18100	SPI	Biomass	17 MW	16 MW	[redacted]	X
2	18161	BPA Peak Capacity Product	Call Option	100 MW	53 MW	[redacted]	X
3	18169	[redacted]	MT Wind	[redacted]MW	[redacted]MW	[redacted]	X
3b.	18169	[redacted]	MT Wind	[redacted]MW	[redacted]MW	[redacted]	
4a.	18173	[redacted]	MT Wind	[redacted]MW	[redacted]MW	[redacted]	
4b.	18173	[redacted]	MT Wind	[redacted]MW	[redacted]MW	[redacted]	
5	18170	Golden Hills Shaped	Wind	200 MW	73 MW	[redacted]	X
5b.	18170	[redacted]	Wind	[redacted]MW	[redacted]MW	[redacted]	
6	xxxxx	Morgan Stanley Sys PPA	Systerm PPA	100 MW	79 MW	[redacted]	X
7	18132	[redacted]	Wind	[redacted]MW	[redacted]W	[redacted]	
8	18179	[redacted]	Wind	[redacted]MW	[redacted]W	[redacted]	
9	18166	[redacted]	Wind	[redacted]MW	[redacted]W	[redacted]	
10	18175	[redacted]	Wind	[redacted]MW	[redacted]W	[redacted]	
11	18125	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
12	18111	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
13	18127	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
14	18135	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
15	18139	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
16	18131	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
17	18114	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
18	18122	[redacted]	Solar	[redacted]MW	[redacted]W	[redacted]	
19	18163	[redacted]	REC-only	[redacted]W	[redacted]W	[redacted]	
20	18165	[redacted]	REC-only	[redacted]W	[redacted]W	[redacted]	
21	UP-002	[redacted]	REC-only	[redacted]W	[redacted]W	[redacted]	
22	18103	[redacted]	Thermal	[redacted]MW	[redacted]MW	[redacted]	
23	XXXXX	[redacted]	Thermal	[redacted]MW	[redacted]MW	[redacted]	
24	XXXXX	Generic Peaker	Generic	237 MW	224 MW	N/A	
25	XXXXX	Generic Battery	Generic	175 MW	66 MW	N/A	
26		**Total Peak Capacity Credits - MWs**					[redacted] MW
27		**Total Annual RECs**					**2,278,361**
28		**Portfolio Benefits - $M**					**$711**
29		**Portfolio Benefits w/ Carbon Costs as an Adder - $M** [2,3,4]					**$1,144**

Peak Capacity and REC Need 2022-2025	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs for Golden Hills include 0.2X apprenticeship multiplier.
2. Social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO_2 / MWh for market purchases is added into social cost of carbon calculation.
4. Includes $[redacted]/MWh adder (2020 dollars) for represented labor and [redacted]/MWh adder (2020 dollars) for apprenticeship labor for Golden Hills.

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Alternatives analysis shows that the unshaped product from Golden Hills is the next best alternative after the shaped product

Peak capacity need

Line	*units in MW*	2020	2021	2022	2023	2024	2025	2026
1	Peak Need	5,814	5,871	5,908	5,948	6,046	6,121	6,187
2	Resources exclude RFP projects & Colstrip Unit 4 sale	5,845	5,904	5,609	5,656	5,688	5,645	5,062
3	**Deficit as shown for 2018 RFP**	**-32**	**-33**	**299**	**292**	**358**	**476**	**1,125**
4								
5	Colstrip 4 sale	-	95	95	95	95	95	-
6	**Deficit w/ Colstrip 4 Sale**	**-32**	**62**	**394**	**387**	**453**	**571**	**1,125**
7								
8	2018 RFP Projects without Golden Hills							
9	SPI	-	16	16	16	16	16	16
10	BPA	-	-	54	54	54	54	54
11	Morgan Stanley	-	-	79	79	79	79	79
12	[redacted]	-	-	[redacted]				
13	Subtotal	-	16					
14								
15	**Deficit w/ RFP Projects without Golden Hills**	**(32)**	**46**	[redacted]				

Alternatives analysis for unshaped Golden Hills project

		(A)	(B)	(C)	(D)
	$ in millions	**Nameplate**	**ELCC**	**Net cost**	**Cost with CO^2 and capacity value**
16	Golden Hiils Shaped @ 37% ELCC	200 MW	73 MW	$147.4	($10.0)
17	**Golden Hills Unshaped @ 25% ELCC**	**200 MW**	**49 MW**	**$126.8**	**($6.4)**
18	[redacted]	[redacted] MW	[redacted] MW	$224.9	$70.1
19	[redacted]	[redacted] MW	[redacted] MW	$257.6	$28.9
20	[redacted]	[redacted] MW	[redacted] MW	$141.6	$23.5
21	[redacted]	[redacted] MW	[redacted] MW	$84.4	$17.3
22	[redacted]	[redacted] MW	[redacted] MW	$156.7	$117.1

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PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 3. Material Terms of the PPA

Material Terms of the Golden Hills Wind Project PPA

Transaction Description:	Power Purchase Agreement ("**PPA**") with Golden Hills Wind Farm LLC, a subsidiary of Avangrid Renewables, LLC ("**Seller**"), for power as-generated from the Generating Facility, as well as a shaped product during certain winter peak periods. See "Product" below.
Generating Facility:	Golden Hills Wind Project, a 200 MW_{AC} wind facility to be constructed in Sherman County, Oregon.
Delivery Term:	Commencing on the Commercial Operation Date ("**COD**") and continuing for 20 contract years. The "Guaranteed Commercial Operation Date" is [June 30, 2022]; although the Seller may declare COD earlier and may be incentivized to do so on the basis of available tax credits.
Product:	<u>Firm (LD) Product ([redacted] MW per hour)</u> – During Winter Super-Peak Hours, all power generated from the Generating Facility and shaped power from other specified portfolio assets of Seller, as well as a limited amount of power from unspecified sources, on a Firm (LD) basis. <u>As-Generated Product (200 MW_{AC} nameplate capacity)</u> – During non-super peak hours in the winter and all hours not in the winter, all power generated from the Generating Facility. <u>Renewable Energy Credits (200 MW nameplate capacity)</u>: During the Delivery Term, all renewable energy credits generated from the Generating Facility. "Winter" means November, December, January, and February. "Winter Super-Peak Hours" means Winter hour ending [redacted] PPT through hour ending [redacted] PPT and hour ending [redacted] PPT through hour ending [redacted] occurring Monday through Saturday, excluding NERC holidays.
Point of Delivery:	Bonneville Power Administration contract point BPAT.PSEI
Contract Quantity:	Expected annual generation of [redacted] MWh
Contract Price:	<u>As-Generated Product</u> - $[redacted] per MWh

REDACTED VERSION

ATTACHMENT 3. MATERIAL TERMS OF THE PPA

	Labor Adder – PSE has included a $[redacted] per MWh adder and a $[redacted] adder to the As-Generated Product. These adders will trigger if Avangrid meets certain labor provisions. Firm (LD) Product - $[redacted] per kW-month for each Winter month. Additionally, delivered energy that is not generated by Golden Hills Wind Project will be priced at the average monthly Mid-Columbia price.
Transmission Services:	Each party will arrange for its own transmission services.
Operating Reserves:	N/A
Generator-Related Charges	N/A
Force Majeure:	Force Majeure is defined as any event or circumstance which prevents or delays a party from performing under the PPA and where (a) such event or circumstance is not within the reasonable control of the party claiming force majeure, (b) the party claiming force majeure has taken all reasonable precautions and measures to avoid or mitigate such force majeure, and (c) such force majeure is not the direct result of the negligence or failure of the party claiming force majeure. After 90 days of a continuous force majeure event (or 180 days where an additional amount of time is reasonably needed to obtain and install equipment), the party not claiming the force majeure event may terminate the PPA. The COVID-19 pandemic is specifically identified as a potential force majeure event and certain events and circumstances resulting therefrom are considered unforeseeable, such as government restrictions, transmission provider delays, labor shortages, etc.
Emissions Performance Standards:	WUTC Determination / PSE Option: PSE intends to pursue a determination from WUTC that the PPA complies with RCW 80.80. If such determination is not obtained by COD, PSE has the option to convert the PPA to an "as-generated" PPA for the output from the Generating Facility. Please see attached Exhibit B for the contract price for an "as-generated" PPA. Restrictions on Energy Sources: For deliveries of the firm product, Seller shall deliver energy in the following order:

	.. First, Seller shall deliver from the Generating Facility;
	:. Second, Seller shall deliver from certain "Portfolio Resources;" and/or from third parties, subject to the restriction described below on the use of "unspecified resources" within the meaning of RCW 80.80.
	Additionally,
	"Portfolio Resources" are resources that meet the Emissions Performance Standard.
	All third party resources used that are not "unspecified resources" must meet the Emissions Performance Standard.
	Seller may not deliver an aggregate quantity of 12% of the total energy delivered in a contract year from "unspecified sources."
	Seller may not deliver power from a coal-fired resource.
Credit Support:	Prior to COD – Seller must provide $[redacted] in credit support, of which $[redacted] must come in the form of a letter of credit (the remainder may be in the form of a parent guaranty or cash collateral). At and After COD – Seller must provide $[redacted] in credit support (which may be in the form of a parent guaranty, cash collateral or a letter of credit).
Failure to Deliver or Receive Product:	Failures to deliver or receive product as required by the PPA will be settled financially based on (i) cover costs with respect to the Firm (LD) product to be delivered during Winter Super Peak Hours and (ii) the then applicable real-time Mid-C market prices and a market price for the renewable energy credits.
Availability Guaranty:	Guaranty – The Generating Facility must achieve a "Guaranteed Annual Availability Factor" of [redacted]%. Damages – Cover costs for lost energy attributable to deficient availability, based on Mid-C market prices and a market price for the renewable energy credits. Event of Default – It is an event of default if Seller fails to cause the Generating Facility to achieve an availability factor of [redacted]% for any two consecutive years.

REDACTED VERSION

ATTACHMENT 3. MATERIAL TERMS OF THE PPA

Delay LDs and Early Termination Rights:	The "Target Construction Start Date" is September 1, 2020. In the event that Seller does not start construction by the "Target Construction Start Date," Seller shall pay $[redacted] a day in liquidated damages for each day of delay. The "Guaranteed Commercial Operation Date" is June 30, 2022. In the event that Seller does not achieve COD by the "Guaranteed Commercial Operation Date," Seller shall pay $[redacted]/MW, multiplied by the planned nameplate capacity for each day of delay. In the event that construction has not started within 90 days of the "Target Construction Start Date," PSE may terminate the PPA and shall be entitled to a termination payment of $[redacted]. [In the event that Seller has not placed an order for wind turbines with a non-refundable deposit as of April 1, 2021, PSE may terminate the PPA and shall be entitled to a termination payment of $[redacted].] In the event that Seller has not achieved COD within 180 days of the "Guaranteed Commercial Operation Date," PSE may terminate the PPA and shall be entitled to a termination payment of $[redacted].
Default:	The PPA includes customary events of default having customary cure periods, e.g., failure to make payments when due, failure to perform a material obligation (other than a failure to deliver or receive Product), breach of representation or warranty, bankruptcy, and failure to maintain required credit support. Additional seller events of default include: (a) delivery of energy from a coal-fired resource on [redacted] separate occasions, (b) failure to deliver the firm product in the winter for a period of [redacted] consecutive hours or [redacted] total hours during a winter period, or (c) failure to cause the Generating Facility to achieve an availability factor of [redacted] for two consecutive years. Each party is obligated to mitigate damages resulting from the other party's default or non-performance.
Termination:	If an event of default occurs, the non-defaulting party has the right to terminate the PPA. In addition, the defaulting party must pay a termination payment equal to (a) the market value of the PPA, plus (b) any costs incurred by the non-defaulting party as a result of the termination, plus (c) any unpaid amounts owing under the PPA by the defaulting party.
Indemnification:	The PPA includes customary indemnification obligations between the parties.

PSE PUGET SOUND ENERGY

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 4(a). Detailed Project Schedule

ID	
1	[redacted]
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41	
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Project: 200416 GoldenHills altern
Date: 4/20/20

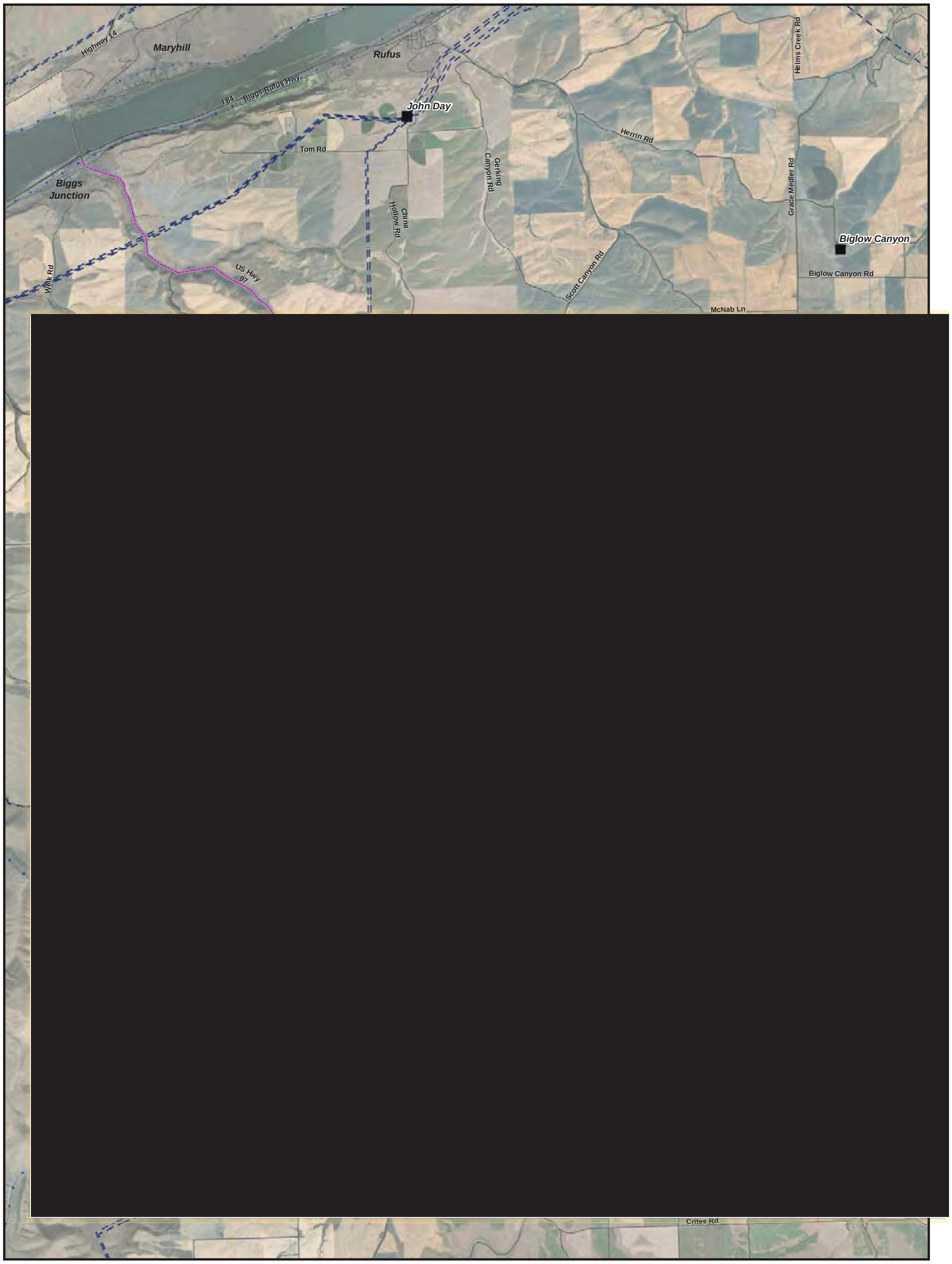
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	Manual Progress
Summary	Inactive Task	Duration-only	Finish-only	

REDACTED VERSION

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 4(b). Turbine Layout Map

Updated turbine layout provided by Avangrid on 4/20/20.
Subject to change based on final design.



Legend

- Turbine
- Overhead 230-kV Gen-Tie/Transmission Line
- Underground 34.5-kV Collector Line
- Proposed O&M Facility
- Proposed Substation
- Lease Boundary
- City/Town
- Existing Substation
- Existing Roads
- Main Rail Line
- Existing Transmission Line

Preliminary Road Design

- New Road (Permanent)
- Maintain Existing Road (Permanent)

PRELIMINARY

N

0 1 2
Miles

Site Plan Map
Golden Hills Wind Project
Sherman County, Oregon

AVANGRID RENEWABLES

Path: \\gis.ar.local\GIS\USA\ONSHORE\PROJECTS\GoldenHills\MXD\OTHERS\Golden_Hills_Facilities_Map_11x17.mxd

Modified Date: 4/20/2020

REDACTED VERSION

PSE PUGET SOUND ENERGY

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 5. Permitting Checklist

Golden Hills Permits

Agency	Permit	Status
U.S. Army Corps of Engineers	Clean Water Act, Section 404	Not required, wetland/streams avoided
Federal Aviation Administration	Proposed Construction and Actual Construction	DNHs obtained for all turbine locations
Oregon Energy Facilities Siting Council	Site Certificate *	Complete
Oregon Water Resources Department	Water Right Permit or Water Use Authorization	O&M will use exempt well. Contractor to provide construction water.
Oregon Department of Parks and Recreation, SHPO	Archaeological permit	Not required.
Oregon Department of Environmental Quality	Construction Storm Water Permit 1200-C	To be obtained by contractor
Sherman County	Conditional Use Permit	Complete. Approval delegated under Site Certificate.
Sherman County	Building Permit	To be obtained by Contractor

* Site Certificate consolidates state and county review into a single permit. Represents key discretionary permit.

PUGET SOUND ENERGY

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 6(a). Wind Resource Report (Avangrid)

Updated wind resource report provided by Avangrid on 4/20/20.
Subject to change based on final design.

Golden Hills Wind Farm, OR

Energy Yield Assessment Summary

20 April 2020

Issue B

1. PROJECT DESCRIPTION

The Golden Hills Wind Farm is located in Sherman County, Oregon. It is located approximately 39 km East-Southeast of The Dalles. The proposed wind farm is located on undulated, open farmland.

Avangrid Renewables has analyzed the proposed 51 turbine layout, consisting of **41 x V150-4.3 at 105 m and 10 x GE2.5-116 wind turbines at 90 m hub heights**. Turbine base elevations range from 441 to 663m.

Over the course of the measurement campaign, there have been a total of 15 measurement locations at the Golden Hills site, including one co-located lidar. A map of the Golden Hills turbine and measurement locations are shown in Figure 1 and Figure 2.

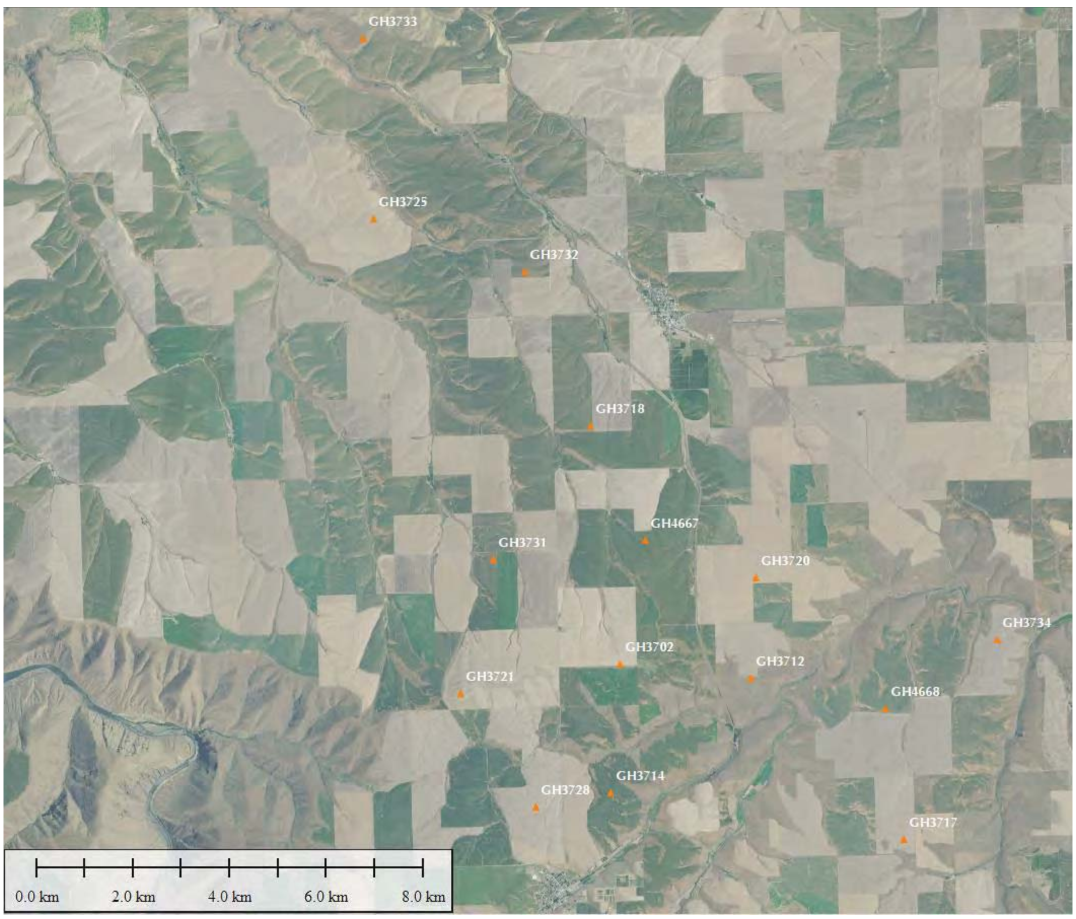


Figure 1. Golden Hills measurement locations and surrounding area

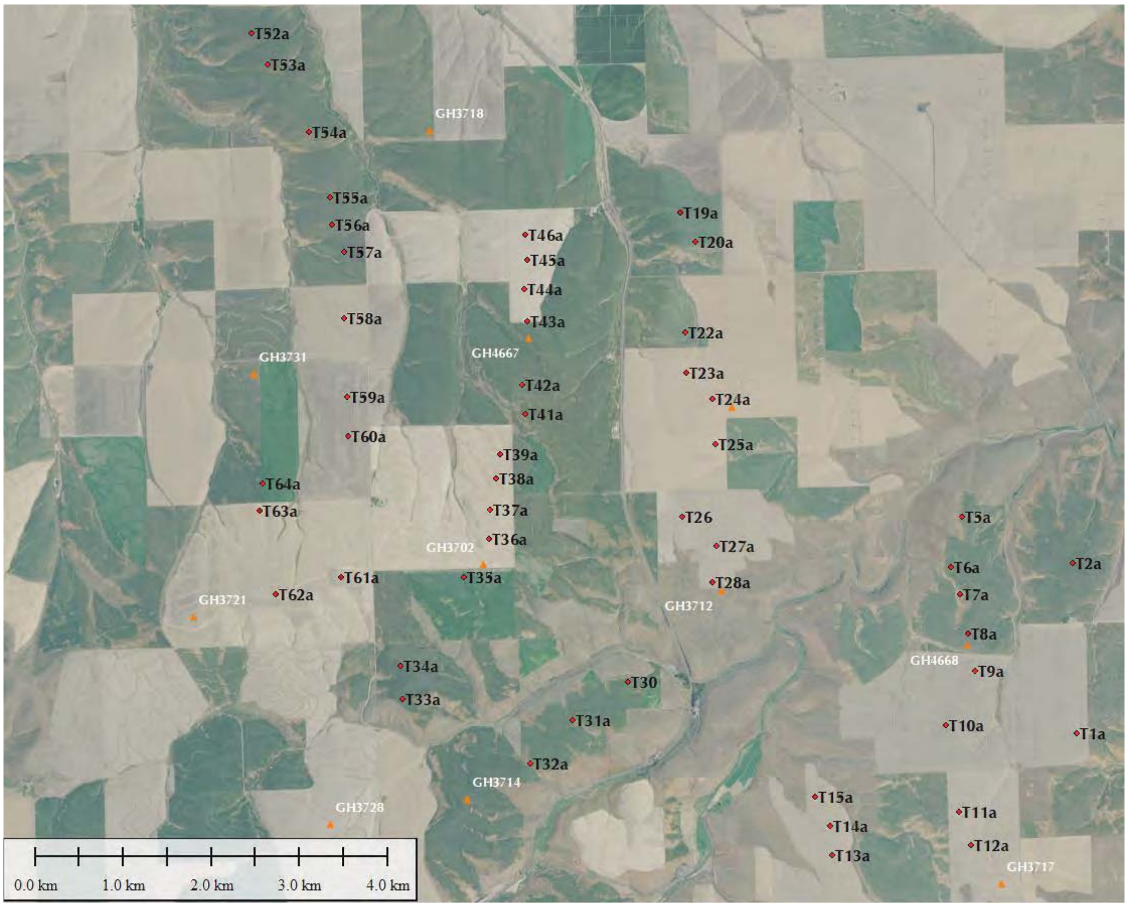


Figure 2. Golden Hills measurement and turbine locations

Based on sources of long-term temperature and pressure data, the energy assessment is based on an air density of 1.159 kg/m^3 at a mean hub height elevation of 644 m.

2. ON-SITE WIND MEASUREMENTS

The wind resource measurements have been conducted at 15 locations at the site and are described below in Table 1.

Mast / Remote Sensing ID	UTM Z10		Elevation [m]	Measurement heights [m]	Measurement period	
	Easting [m]	Northing [m]			Start	End
GH3702_1 GH3702_2	678579	5043981	604	50, 40, 30 50, 30	10/4/2001 2/26/2005	2/26/2005 8/1/2017
GH3705	686352	5044473	478	50.59, 30	2/14/02	11/22/04
GH3712	681288	5043683	544	49.70, 26.35	2/24/05	2/1/09
GH3714	678403	5041326	582	30.30, 15.80	2/24/05	5/1/17
GH3717_1 GH3717_2	684459	5040352	575	50, 30 49.47, 26.3	2/26/05 1/22/18	1/22/08 2/1/09
GH3718	677976	5048898	466	49.50, 26	2/24/05	8/3/19
GH3720	681405	5045754	547	58, 32	4/5/08	4/10/13
GH3721	675290	5043379	668	58, 32	4/9/08	2/5/14
GH3725	673498	5053176	370	49.66, 30	4/19/08	8/1/17
GH3728	676844	5041038	602	30, 15	6/1/08	8/21/13
GH3731	675977	5046137	531	58, 40	9/10/10	9/14/2019*
GH3732	676624	5052091	376	58, 40	9/12/10	9/14/2019*
GH3733	673282	5056903	315	58, 40	9/14/10	8/23/16
GH3734	686383	5044492	476	58, 40	8/25/16	9/14/2019*
GH4655	678579	5043990	606	58,48,32	5/1/18	9/14/2019*
GH4657	678403	5041326	582	58,48,32	5/6/18	9/14/2019*
GH4611	675291	5043377	669	58,48,32	5/7/18	9/14/2019*
GH4667	679100	5046544	532	58,48,32	5/9/18	9/14/2019*
GH4668	684075	5043061	519	58,48,32	5/3/18	9/14/2019*
WLS7-148	678533	5043301	606	40,50,60-120	8/23/19	9/14/2019*

Table 1. Coordinates, measurement levels and measurement periods for Golden Hills measurements. Similar color shading indicates mast installed in the same location. *End date represents data utilized in this analysis; as of this report locations are still collecting data.

The wind data were quality-controlled according to Avangrid Renewables internal technical specifications, such as excluding data affected by icing. Additionally, data from redundant sensors (when available) at each height were combined to minimize tower-shading effects in the wind speed measurements. Mast 3734 was installed in 2016 in the location of Mast 3705 and therefore has been utilized in place of Mast 3705 in the analysis.

3. WIND ANALYSIS

3.1 Reference Period Analysis

For the purpose of establishing a temporally-consistent, seasonally-representative description of the Golden Hills wind regime, reference periods have been selected to characterize the wind speed and direction frequency distributions and wind shear, as well as investigate the relative wind resource variation across the measurement locations. The reference periods were selected as the following:

- Masts 3712 and 3717: January 2006 to December 2007
- Mast 3734, 4665, 4657, 4661, 4667 and 4668: August 2018 to August 2019
- All other masts: January 2011 to December 2012

Measurement ID		Reference period summary		
		Period	Valid data points	Availability [%]
GH3702	50 m	Jan 2011 to Dec 2012	100,614	[redacted]
GH3712	49.7 m	Jan 2006 - Dec 2007	98,778	[redacted]
GH3714	30 m	Jan 2011 to Dec 2012	100,758	[redacted]
GH3717	50 m	Jan 2006 - Dec 2007	100,320	[redacted]
GH3718	50 m	Jan 2011 to Dec 2012	101,892	[redacted]
GH3720	58 m		101,046	[redacted]
GH3721	58 m		100,836	[redacted]
Gh3725	50 m		101,773	[redacted]
GH3728	30 m		100,122	[redacted]
GH3731	58 m		102,122	[redacted]
GH3732	58 m		100,618	[redacted]
GH3733	58 m		101,922	[redacted]
GH3734	58 m	Aug 2018 to Aug 2019	43,482	[redacted]
GH4665	58 m		48,579	[redacted]
GH4657	58 m		48,514	[redacted]
GH4661	58 m		46,731	[redacted]
GH4667	58 m		50,514	[redacted]
GH4668	58 m		48,934	[redacted]

Table 2. Summary of reference periods

REDACTED VERSION

3.2 Wind Shear

The variation of wind speed with height has been characterized using the power law shear model:

$$\frac{U_1}{U_2} = \left(\frac{h_1}{h_2}\right)^{\alpha}$$

U_1: Wind speed at height 1
U_2: Wind speed at height 2
h_1: Height 1
h_2: Height 2
α: power law shear exponent

The LIDAR unit WLS7-148 was co-located and had an overlapping measurement period with Mast 4655 of less than one month. Wind shear exponents for the concurrent period between similar heights at the LIDAR and mast were 0.14 and 0.16, respectively. Given the very short period of concurrent data however, this shear information has not been considered quantitatively in this wind analysis.

The results of this analysis are presented in Table 3 below for the reference periods mentioned above.

Measurement ID	Heights	Period	Mean Wind Speed [m/s]	Power law shear exponent
GH3702	50m/30m	January 2011 - December-2012	[redacted]	[redacted]
GH3712	49.7m/26.35m	January 2006 - December-2007	[redacted]	[redacted]
GH3714	30.3m/15.8m	January 2011 - December-2012	[redacted]	[redacted]
GH3717	50m/30m	January 2006 - December-2007	[redacted]	[redacted]
GH3718	49.5m/26m	January 2011 - December-2012	[redacted]	[redacted]
GH3720	58m/32m	January 2011 - December-2012	[redacted]	[redacted]
GH3721	58m/32m	January 2011 - December-2012	[redacted]	[redacted]
Gh3725	49.7m/30m	January 2011 - December-2012	[redacted]	[redacted]
GH3728	30m/15m	January 2011 - December-2012	[redacted]	[redacted]
GH3731	58m/40m	January 2011 - December-2012	[redacted]	[redacted]
GH3732	58m/40m	January 2011 - December-2012	[redacted]	[redacted]
GH3733	58m/40m	January 2011 - December-2012	[redacted]	[redacted]
GH3734	58m/32m	August 2018 - August 2019	[redacted]	[redacted]
GH4665	58m/32m	August 2018 - August 2019	[redacted]	[redacted]
GH4657	58m/32m	August 2018 - August 2019	[redacted]	[redacted]
GH4661	58m/32m	August 2018 - August 2019	[redacted]	[redacted]
GH4667	58m/32m	August 2018 - August 2019	[redacted]	[redacted]
GH4668	58m/32m	August 2018 - August 2019	[redacted]	[redacted]

Table 3. Summary of reference period wind speeds

3.3 Long-Term Wind Regime

In order to characterize the long-term expectations at the site, Avangrid Renewables reviewed multiple sources of reference wind speed data, including Vortex CFSR, Vortex ERA-I, Vortex MERRA2, MERRA2, ERA5 and Chinook. Based on weekly correlations of reference data sources to Mast 3731, the Chinook and an average of the ERA5 datasets have been selected as the long-term reference, giving a long-term mean wind speed at Mast 3731 of [redacted] m/s at 58m.

Correlation	Data Points	R^2	Long-term wind speed at Mast G3731 at 58 m (m/s)
Chinook	380	0.83	[redacted]
ERA5 45.5_120.75	320	0.83	
ERA5 45.5_121	352	0.90	

Table 4. Regression results between Mast 3731 and the selected long-term correction

The long-term wind speeds of overlapping locations have been assessed independently. It was found that the long-term wind speeds at the same locations are in good agreement and therefore masts 3702, 3714 and 3721, which have the longer periods of record, will be utilized further in the analysis in place of masts 4655, 4657 and 4661, respectively.

The long-term wind speeds at the remaining Golden Hills masts were determined through daily correlations between Mast 3731 and each mast as shown in Table 5.

Mast	Data Points	R^2	Long-term wind speed at measurement height (m/s)
GH3702	1134	0.96	[redacted]
GH3712	1320	0.83	
GH3714	1984	0.96	
GH3717	957	0.84	
GH3718	2510	0.97	
GH3720	872	0.95	
GH3721	433	0.94	
GH3725	2024	0.91	
GH3728	975	0.94	
GH3732	2716	0.94	
GH3733	1998	0.88	
GH3734	652	0.93	
GH4667	328	0.98	
GH4668	447	0.94	

Table 5. Daily correlation analysis from Mast 3731 to the remaining site masts

3.3 Summary of Long-Term Hub Height Wind Regime

The results of the reference period, wind shear, and long-term wind regime analysis have been combined to derive long-term hub height wind speed and direction frequency distributions at each mast location. These results are summarized in Table 6 and presented as wind speed distributions and wind roses in Figures 3 and 4 for Mast 3731.

REDACTED VERSION

Mast	Long Term WS at measurement height	Power law shear exponent	Long-term hub height wind speed [m /s]	
			90 m	105 m
GH3702	[redacted]			
GH3712	[redacted]			
GH3714	[redacted]			
GH3717	[redacted]			
GH3718	[redacted]			
GH3720	[redacted]			
GH3721	[redacted]			
GH3725	[redacted]			
GH3728	[redacted]			
GH3731	[redacted]			
GH3732	[redacted]			
GH3733	[redacted]			
GH3734	[redacted]			
GH4667	[redacted]			
GH4668	[redacted]			

Table 6. Summary of wind regimes at the Golden Hills masts

[redacted]

Figure 3. Long-term hub height wind speed distribution at Mast 3731

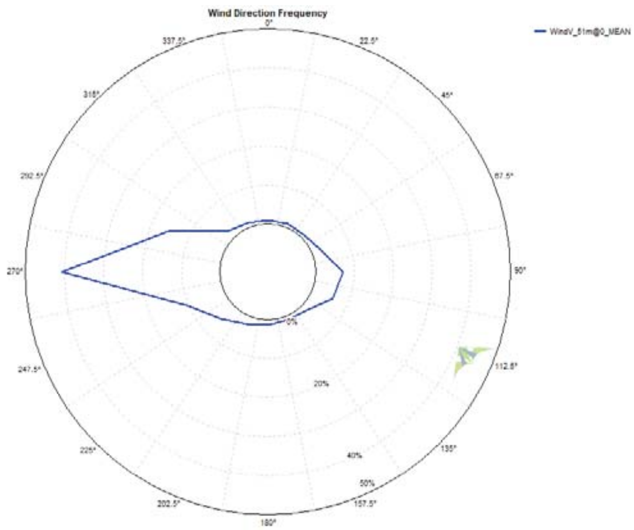


Figure 4. Wind rose at Mast 3731

3.4 Wind Flow modeling

The variation in wind regime over the Golden Hills site was predicted using a mesoscale-microscale simulation of the AWS/UL MASS (Mesoscale Atmospheric Simulation System) model. The resulting wind resource grid (*.WRG) was modeled at 105 m and 90 m with a resolution of 50 m.

The final wind flow model was produced by adjusting the WRG to the ten main reference period masts, Mast 3702, 3714, 3718, 3720, 3721, 3725, 3728, 3731, 3732 and 3733, while including 3712, 3717, 3734, 4667 and 4668 as additional correction wind speed points. The project layout, initiating mast locations, and wind speed map at 105 m are shown in Figure 5.

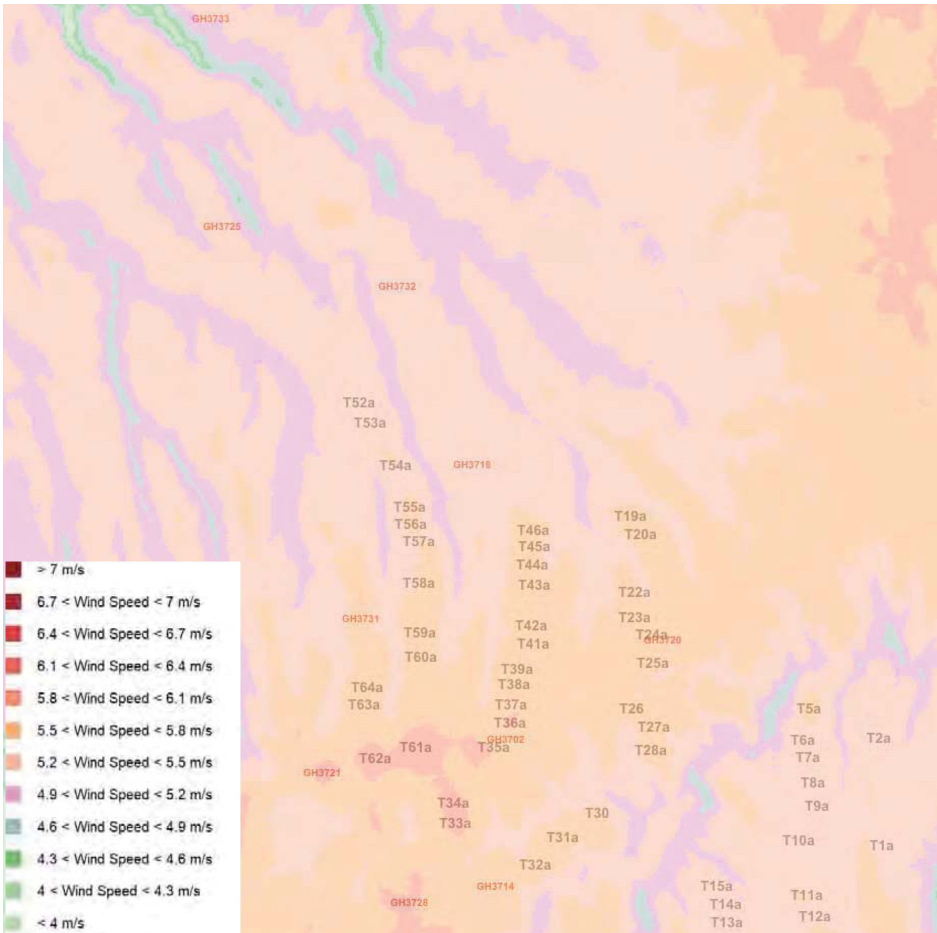


Figure 5. Project layout, initiation masts, and wind flow map

4. ENERGY ANALYSIS

The energy production of the wind farm is calculated using the OpenWind model, which incorporates the wind analysis results at the met mast locations, the wind flow map, turbine locations, and turbine technical specifications.

4.1 Turbine Technology

The turbine models considered in this analysis are the Vestas V150-4.3 machine at 105 m and the GE2.5-116 at 90 m. The turbine power and thrust curves are presented in Table 7 and Figure 6.

GE2.5-116 at 1.16 kg/m³		
WS [m/s]	Power [kW]	Ct
1	[redacted]	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
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15		
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21		
22		
23		
24		
31		
32		

V150-4.3 MW 1.15kg/m³		
WS [m/s]	Power [kW]	Ct
1	[redacted]	
2		
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Table 7. Turbine power and thrust curves

[redacted]

Figure 6. Turbine power and thrust curves

4.2 Gross to Net Energy Losses

The results presented in Table 8 are calculated by applying energy loss factors to the gross energy production calculated by OpenWind.

Total Plant Capacity	201.3 MW
Gross Energy Production	[redacted] GWh
Availability	[redacted]
Electrical	[redacted]
Wake	[redacted]
Turbine Performance	[redacted]
Environmental	[redacted]
Curtailment-wind sector management	[redacted]
Total Gross-to-Net Losses	[redacted]
Avangrid Technical Specification	[redacted]
Net Energy Production (25 years)	[redacted] GWh
Net Capacity Factor (25 years)	[redacted]

Table 8. Energy production summary

The losses are based on standard Avangrid Renewables assumptions, considering the following specific details:

- Wake: The array loss for each turbine comprising the array was calculated by OpenWind. In the case of Golden Hills, the neighboring wake impacts were considered fully inherent in the measured wind speed data and therefore an additional external wake loss was not applied. Klondike II, however, is expected to be repowered with larger and taller turbines. Based on OpenWind calculations, the additional impact from this repower is estimated to have a negligible impact on the project and therefore no future wake loss has been applied.
- Environmental: Includes a 0.2% loss associated with a high temperature derating using a time series approach in OpenWind. The GE 2.5-116 and Vestas V150-4.3 machines derate starting at 41ºC and 30 ºC, respectively, through 45 ºC as detailed below.

REDACTED VERSION

Temperature	GE 2.5-116 Power (kW)	V150-4.3 Power (kW)
30	2500	4000
40	2500	3300
45	0	690

- Grid/Clipping loss – The Golden Hills project has a maximum interconnect size of 200 MW. The project has been over-built by 1.3 MW in order to maximize project profitability. The OpenWind "time-series" model output indicated that no energy loss should be expected due to clipping.

4.3 Seasonal and diurnal production variation

The expected monthly and daily variation in energy production is presented in Table 9 in the form of a 12 x 24 matrix.

Net Capacity Factor [%]													
HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
00 - 01	[redacted]												
01 - 02													
02 - 03													
03 - 04													
04 - 05													
05 - 06													
06 - 07													
07 - 08													
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21 - 22													
22 - 23													
23 - 24													
AVG													

Table 9. 12x24 energy production matrix

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 6(b). Shaped vs. Unshaped Products (12x24 Comparison)

Shaped vs. Unshaped Products (12x24 Comparison)

This attachment presents the expected hourly net capacity factor by month, expected daily generation by month, and expected monthly generation for the Golden Hills Wind Project shaped and unshaped products. Each table includes columns that represent months and rows that represent hours. The tables are heat maps, wherein green indicates high generation and red indicates low generation. Each table is further described below.

Unshaped product output

Table 1 presents the average monthly net capacity factor for the Golden Hills Wind Project. The values represent the percent net capacity factor in that month. For example, the expected net capacity factor in January for hour ending 10 is [redacted] percent.

Table 1. *Unshaped product average monthly net capacity factor*[1]

					Project MNCF							
Hour Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1	[redacted]												
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
Total													

[1] *Net Capacity Factors are consistent with wind resource report dated April 20, 2020. See Attachment 6(a) for a copy of the report.*

ATTACHMENT 6(b). SHAPED VS. UNSHAPED PRODUCTS (12X24 COMPARISON)

Table 2 presents the expected hourly generation per day of the Golden Hills Wind Project. The values represent the expected hourly generation for each day in a given month. For example, the expected hourly generation in January for hour ending 10 is [redacted] MWh.

Table 2. *Unshaped product expected daily project megawatt hours*

	Daily Project Megawatt Hours (MWh) in AC
Hour Ending	[redacted]
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
Total	

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ATTACHMENT 6(b). SHAPED VS. UNSHAPED PRODUCTS (12X24 COMPARISON)

Table 3 presents the expected hourly generation per month of the Golden Hills Wind Project. The values represent the expected hourly generation for all hours in a given month. For example, the sum of all expected hourly generation in January for hour ending 10 is [redacted] MWh.

Table 3. *Unshaped product expected monthly project megawatt hours*

	Monthly Project Megawatt Hours (MWh) in AC												
Hour Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1	[redacted]												
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
Total													

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ATTACHMENT 6(b). SHAPED VS. UNSHAPED PRODUCTS (12X24 COMPARISON)

Shaped product output

Table 4 presents the same average monthly net capacity factor as Table 1 above. It has been included to illustrate that the shaping product from Avangrid will not change the net capacity factor of the Golden Hills Wind Project. The values represent the percent net capacity factor in each month. For example, the expected net capacity factor in January for hour ending 10 is [redacted] percent.

Table 4. ***Shaped product average monthly net capacity factor***

					Project MNCF							
Hour Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1	[redacted]												
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
Total													

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ATTACHMENT 6(b). SHAPED VS. UNSHAPED PRODUCTS (12X24 COMPARISON)

Table 5 presents the expected hourly generation per day. The values represent the expected hourly generation of the Golden Hills Wind Project plus the energy provided by the shaping product for each day in a given month. For example, the expected hourly generation in January for hour ending 10 is [redacted] MWh[2]. When compared to the [redacted] MW from Table 2, this value illustrates how the shaped product adds generation during peak periods.

Table 5. ***Shaped product expected daily project megawatt hours***

Low Generation High Generation

				Daily Project Megawatt Hours (MWh) in AC								
Hour Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1	[redacted]												
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
Total													

[2] *Because super peak hours do not include Sundays or NERC holidays, average daily generation during super peak hours is less than 150 MW.*

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PSE Report to the Board of Directors: Golden Hills Wind Project Shaped PPA

ATTACHMENT 6(b). SHAPED VS. UNSHAPED PRODUCTS (12X24 COMPARISON)

Table 6 presents the expected hourly generation per month. The values represent the expected hourly generation of the Golden Hills Wind Project plus the energy provided by the shaping product for all hours in a given month. For example, the sum of all expected hourly generation in January for hour ending 10 is 4,142 MWh. This table illustrates how the shaped product adds generation during peak periods.

Table 6. *Shaped product expected monthly project megawatt hours*

Hour Ending	Monthly Project Megawatt Hours (MWh) in AC
1	[redacted]
2	[redacted]
3	[redacted]
4	[redacted]
5	[redacted]
6	[redacted]
7	[redacted]
8	[redacted]
9	[redacted]
10	[redacted]
11	[redacted]
12	[redacted]
13	[redacted]
14	[redacted]
15	[redacted]
16	[redacted]
17	[redacted]
18	[redacted]
19	[redacted]
20	[redacted]
21	[redacted]
22	[redacted]
23	[redacted]
24	[redacted]
Total	[redacted]

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PSE Report to the Board of Directors:
Golden Hills Shaped Wind Project PPA

Attachment 7. Detailed Risks and Mitigations

Detailed Risks and Mitigations

This attachment describes the risks and mitigations associated with the Golden Hills Shaped Wind project and power purchase agreement ("PPA"). The project is considered to be a relatively lower risk development project because of the advanced nature of the development work.

Golden Hills is a relatively mature development site, located upwind of numerous operational wind farms, including the Klondike Wind Farm complex, Hay Canyon, Patu Wind Farm, Biglow I, II and III, and Star Point. Avangrid Renewables operates over 600 MW of wind generation in Sherman and Wasco counties. The site is surrounded by canyons south of the Columbia River Gorge, although there will be no viewshed impacts from the river. The ground cover on site is comprised primarily of dryland wheat, which helps minimize wildlife impacts.

All real estate rights necessary for the development and operation of the wind project appear to be in good order and complete, and Avangrid has provided relevant easement documentation for PSE's review.

Golden Hills has an approved Site Certificate from the Oregon Energy Facility Siting Council ("EFSC"), which encompasses all state and county permits. This permit will have to be extended, to accommodate the new schedule. Avangrid carries the risk for this extension and indicates that this is primarily a procedural consideration. After issuing a site certificate, the council has ongoing regulatory authority over the construction and operation of the facility. No federal permits are needed for project construction or operation.

The LGIA was completed in 2017, all transmission-related studies have been completed and provided to PSE, and transmission risks are expected to be minimal. Avangrid will assign five existing transmission service requests ("TSRs") totaling [redacted] MW to the project year-round to ensure firm delivery of the 150 MW shaped product to PSE's system during the winter peak period. Avangrid will use short-term transmission redirects to deliver any as-generated output in excess of the [redacted] MW up to the project's full 200 MW nameplate capacity. The portion of the generation tie-line that will interconnect the site to BPA's 230 kV Schoolhouse Substation, that is located outside the project boundary, was built and conductored during construction of a prior project.

Construction is scheduled to begin in June 2020 and commercial operation of the project is currently scheduled to occur in June 2022. The EFSC permit requires construction to start no later than June 18, 2020 and project completion to occur no later than June 18, 2021, unless an extension is granted. It is expected that Avangrid will request extensions to the project completion date as needed to facilitate the proposed schedule. The construction phase includes road and foundation work, wind farm construction and substation construction.

Table 1 describes risks associated with constructing the project. Table 2 describes ongoing risks, such as counterparty risks and performance risks during the term of the 20-year PPA.

ATTACHMENT 5. Detailed Risks and Mitigations

Table 1. ***Project construction risks***

Construction Risk Category	Risk	Mitigation
Construction schedule delay(s), including COVID 19 delay(s), impacts COD	Any unexpected delay(s) to project schedule could jeopardize 2022 COD and result in additional costs as PSE would have to purchase replacement energy and capacity.	PSE is including PPA language that specifies a project COD milestone to be met by Avangrid. PSE is also including language that imposes damages on Avangrid for failing to meet the COD milestone.
EFSC required start date for construction	Unexpected delay(s) to start of construction could jeopardize ability to meet Energy Facility Site Certificate required start by June 18, 2020.	The definition of "construction" is work performed on a site, excluding surveying, exploration or other activities to define or characterize the site, the cost of which exceeds $[redacted]. Avangrid states that it will meet the EFSC start of construction date with the construction of the O&M building. PSE is including PPA language requiring periodic reporting upon the effective date and tying liquidated damages to the project Start of Construction milestone.
EFSC required finish date for construction	Energy Facility Site Certificate requires construction finish by June 18, 2021.	Assuming construction is started on time, the likelihood of EFSC halting construction is very low, as long as construction updates are provided and a timely request for extension is filed, if needed. PSE is including PPA language requiring periodic reporting upon the effective date and tying liquidated damages to the project COD milestone.

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ATTACHMENT 5. Detailed Risks and Mitigations

Construction Risk Category	Risk	Mitigation
Project Labor Agreement	Unexpected delay or inability to execute a project labor agreement between the project's engineering, procurement and construction ("EPC") contractor and local labor unions could delay the overall project COD or materially increase the cost of the PPA.	PSE is including PPA language that specifies certain interim project milestones and a project COD milestone to be met by Avangrid. PSE is including language that would impose damages on Avangrid for failing to achieve the COD milestone. PSE is including language that states a preference for a project labor agreement. Per the PPA terms, Avangrid is incentivized to include a project labor agreement in their EPC contract.

Table 2. ***Ongoing risks during the PPA term***

Ongoing Risk Category	Risk	Mitigation
Wind resource output	Wind farm fails to generate output as expected on an annual basis, reducing clean energy contribution to help meet Washington state's renewable portfolio standard ("RPS") and Clean Energy Transformation Act ("CETA") targets.	PSE has included PPA language that guarantees [redacted] percent availability on an annual basis. Failure to meet the guaranteed minimum output availability would trigger liquidated damages. Failure below 80 percent availability during a biannual basis would trigger a termination right.

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ATTACHMENT 5. Detailed Risks and Mitigations

Ongoing Risk Category	Risk	Mitigation
Events of default	Events of counterparty default subject to the terms of the PPA (excluding force majeure events) could cause a peak capacity or clean energy shortfall that PSE may need to replace with other resources.	PPA language gives PSE the right, but not the obligation, to recover credit support posted by Avangrid (up to $[redacted]).
Shaped product treatment under CETA	Shaped product may not be viewed as compliant with Washington state's Clean Energy Transformation Act ("CETA"). The Washington Utilities and Transportation Commission has initiated a rulemaking to interpret the new law; however, this process is not expected to be completed before a PPA must be executed to meet the June 2022 COD.	Subject to change based on negotiations: PPA language prohibits the delivery of coal power. In the event that Avangrid accidently provides coal power to PSE, Avangrid will pay a penalty. PSE has the right, but not the obligation, to terminate the PPA on the fourth instance.
Firm delivery	While the project can produce a maximum of 200 MW, only [redacted] MW of firm transmission will be available.	Avangrid will utilize short-term redirects and short-term transmission purchases to cover the difference, a maximum of [redacted] MW. Additionally, the PPA stipulates that as a last resort, if transmission cannot be acquired, Avangrid will give a three-hour notice and the surplus generation will be delivered at the Mid-C market hub at favorable pricing terms.

ATTACHMENT 5. Detailed Risks and Mitigations

Ongoing Risk Category	Risk	Mitigation
Emissions Performance Standard	RCW 80.80 establishes an Emissions Performance Standards that applies to base load resources, resources with multiple sources, and limits the amount of unspecified power than can be a part of a contract. A contract must be deemed to be in compliance with the Emissions Performance Standards to be recovered in rates. The winter shaped product must meet the Emissions Performance Standards.	PSE has included language that ensures the winter shaped product will be supplied by resources that comply with the Emissions Performance Standards. These resources are: • Golden Hills • Avangrid's compliant portfolio resources • Compliant short-term market pictures • Up to 12 percent unspecified short-term market purchases Additionally, prior to a rate case PSE will ask the WUTC to determine if the contract complies with the EPS. In the unlikely event of a negative finding, PSE can convert the PPA to a wind-only, "as generated" contract that complies with the Emissions Performance Standards.
Derivative Accounting Review	The unique structure of the shaped PPA requires an accounting review to identify any potential accounting and/or derivative implications. The review is currently in process.	Final contract execution will incorporate accounting review findings and ensure that there are no material impacts to the PPA's underlying economics. Final review is expected to be completed on or before May 29, 2020.

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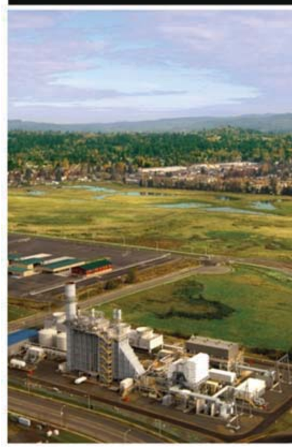
PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 8(a). Comparative Analysis (2018 RFP Analysis)



2018 RFP Evaluation Process Document

August 2018 – December 2019

PUGET SOUND ENERGY

Table of Contents

TABLE OF CONTENTS

List of Appendices

2018 RFP EVALUATION PROCESS DOCUMENT

SECTION 1. EXECUTIVE SUMMARY

The purpose of this document is to provide contemporaneously prepared summary documentation of PSE's evaluation process, results and decision-making related to the 2018 All Resources and Demand Response Requests for Proposals ("2018 RFPs"). Puget Sound Energy's ("PSE" or "the Company") RFP process is guided by rules set forth in Washington Administrative Code Chapter 480-107 ("Chapter 480-107 WAC") and guidance from its most recent Integrated Resource Plan ("IRP").

1. Executive summary

PSE conducted its 2018 RFP evaluation process in an environment of modest but steady economic growth; lower expected load growth, gas and power prices than forecast in the 2017 IRP; and lower than expected capital costs for renewable and storage development resources.[1] At the same time, PSE started to see the impact of declining and expiring tax credits for renewable development projects, as looming deadlines began to put upward pressure on the cost of early development projects unable to meet safe harbor deadlines to lock in higher incentives.[2]

This RFP also took place against a backdrop of changing federal and state environmental policies and regulations. At the federal level, uncertainties included efforts by the current administration to repeal and replace the Clean Power Plan[3] and the potential withdrawal of the U.S. from The Paris Agreement[4] to combat climate change, both of which were announced in 2017. In July 2019, the EPA issued the Affordable Clean Energy rule, which repealed the Clean Power Plan and loosened emissions reductions guidelines for states and power plants. During Phase 1 of the RFP, Initiative 1631 ("I-1631") proposed a Washington state carbon tax that failed to pass at the ballot box in November 2018. However, during Phase 2 of the RFP, the state's legislature passed Senate Bill 5116, The Clean Energy Transformation Act ("CETA"), which sets statewide policy goals for the elimination of coal-fired resources by 2025, 80 percent carbon free generation and overall carbon neutral electricity by 2030, and 100 percent carbon free electricity by 2045.

PSE received nearly 100 proposals from a wide range of resources in response to the 2018 RFPs. Unlike prior RFPs, the vast majority of these proposals were for renewable or non-emitting resources. At the same time, traditional baseload resource options were few in number and faced serious competition on an economic basis from resources capable of contributing to both the renewable resource and peak capacity needs established in the RFP. These "dual value" resources, such as Montana wind and biomass, offered tremendous benefit to the portfolio. Ultimately, three of the four shortlisted proposals offered dual-value contributions to need.

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[1] See Section 3 for a comparison of 2017 IRP to 2018 RFP gas prices, power prices and load forecasts. See also Appendix E for a more detailed discussion of PSE's key assumptions and how these assumptions have changed since the 2017 IRP.
[2] Declining and expiring federal tax credits for renewable development projects include the production tax credit ("PTC") and the investment tax credit ("ITC"). See Section 3 herein for a discussion of PTCs and ITCs.
[3] In December 2017 the EPA began the process of repealing and replacing the Clean Power Plan by asking the public for input.
[4] President Trump announced that the U.S. would cease participation in the 2015 Paris Agreement on June 1, 2017; however, the White House later clarified that the U.S. would abide by withdrawal terms specified in the agreement, which state that the earliest effective withdrawal date by the U.S. cannot be prior to November 4, 2020, four years after the Agreement became effective in the U.S. and one day after the 2020 U.S. presidential election.

PSE's evaluation team relied upon its experience as a resource owner and evaluator, its familiarity with the region's energy market, and analytical tools used throughout multiple IRP and RFP cycles to identify the lowest reasonable cost resource opportunities to meet PSE's renewable and capacity needs. To do this, PSE's evaluation process involved quantitative analysis using the Aurora model (variable costs and dispatch) and PSE's portfolio screening and optimization model (fixed costs and portfolio analysis) to analyze resource costs and characteristics; and qualitative analysis based on specific evaluation criteria to compare the risks and merits of each proposal. The evaluation criteria are described in Appendix B. PSE updated its load, power and gas price forecasts prior to filing the RFPs in June 2018 and again prior to the due diligence phase of the evaluation ("Phase 2") to reflect the most current information available to us at the time the analysis was conducted. Key inputs to the quantitative analysis are presented in Appendix E.

The results of the RFP analysis led PSE's RFP team to recommend pursuing the following proposals:

- [redacted] **(#18169),** a 25-year fixed price power purchase agreement ("PPA") delivering up to [redacted] MW[5] of the output from a Montana wind development project to the [redacted] beginning as early as December 2021;[6]
- **Golden Hills Shaped Wind PPA (#18170),** a 20-year fixed price power purchase agreement ("PPA") delivering to BPAT.PSEI the output from a 200 MW wind development project paired with shaped capacity up to [redacted] MW during winter peak hours[7], beginning in December 2021;
- **SPI Biomass PPA (#18100),** a 17-year fixed price power purchase agreement ("PPA") delivering 17 MW of firm capacity (and up to an additional 3 MW of variable energy) from a biomass project located on PSE's system to the Fredonia Substation, beginning in January 2021;
- **BPA Peak Capacity Product (#18161),** a 5-year capacity tolling agreement ("CTA") for firm capacity delivered to BPAT.PSEI that may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis, beginning in January 2022.

Subsequent to PSE's RFP evaluation, the Company received two new unsolicited proposals. PSE performed a re-evaluation of its resource alternatives (described in Section 8), which confirmed its RFP selections and added the following proposal to the recommended short list:

- **Morgan Stanley System PPA (#UP006),** a 5-year fixed price system PPA for 100 MW of firm heavy load hour ("HLH")[8] energy delivered in Q1 and Q4 only, beginning in January 2022.[9]

PSE's analysis shows that when combined with the Company's existing electric resource portfolio, the selected RFP proposals represent the most favorable combination of resources to meet PSE's renewable and capacity needs at the lowest reasonable cost and risk. This report describes the 2018 RFP evaluation

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[5] *Actual contract capacity is expected to be dependent upon the outcome of required transmission studies.*
[6] *Actual contractual commercial operation date ("COD") may be later, depending upon the outcome of required transmission studies.*
[7] *Shaped schedule: November through February, hours ending (HE)* [redacted] *and* [redacted]
[8] *Heavy load hour ("HLH") means hours ending ("HE") 7-11 Monday through Saturday except NERC holidays.*
[9] *MSCG is offering a 0 emissions (no RECs) system PPA.*

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process, the results it produced, and how PSE considered a variety of qualitative and quantitative criteria to select resources that best meet the needs of its customers.

2019 IRP update since completing the 2018 RFP:

PSE conducted its 2018 RFP evaluation between August 2018 and July 2019, in parallel with its 2019 integrated resource planning ("IRP") process. Many of the 2018 RFP modeling assumptions were updated to reflect 2019 IRP assumptions vetted by the IRPs public stakeholder groups, the IRP Advisory Group ("IRPAG") and the Technical Advisory Group ("IRTAG"). At the time, the 2019 IRP was expected to be filed in January 2020.

Subsequent to completing the 2018 RFPs, PSE was asked by the WUTC to withhold its next IRP until an upcoming rulemaking could incorporate Washington's new Clean Energy Transformation Act ("CETA") into Chapter 480-100-238 WAC ("the Integrated Resource Planning rule") and Chapter 480-107 WAC ("the Resource Acquisition rule"). This document reflects what PSE knew at the time the RFP evaluation was conducted.

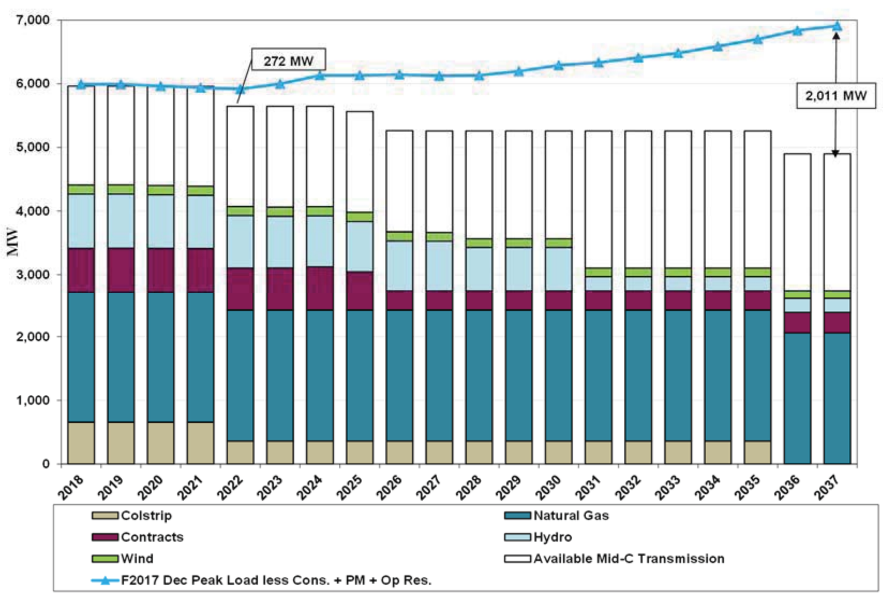
2. Resource need

PSE's electric resource acquisition process is guided by our integrated resource planning analysis, which evaluates and establishes the Company's capacity (physical reliability) and renewable resource (policy driven)[10] needs on a biennial basis, consistent with Chapter 480-100-238 WAC. Our most recent Integrated Resource Plan ("IRP") includes a detailed discussion of PSE's electric planning standard and describes our methodology for analyzing the Company's resource needs. The IRP can be found on PSE's web site at http://www.pse.com/irp.

PSE's 2017 IRP identified a need for new renewable and capacity resources

After publishing the 2017 IRP, PSE updated the assessment of its capacity and renewable resource needs in its 2018 RFP filings to reflect the company's 2017 load forecast and 100 MW of Mid-C transmission determined to be available after the IRP was filed. Figures 1 and 2 include these updates and conservation from the 2017 IRP, but do not include demand response. As shown in Figure 1, PSE forecast a modest capacity need prior to 2021 that was expected to increase to a deficit of 272 MW in 2022 after the retirement of Colstrip 1&2.

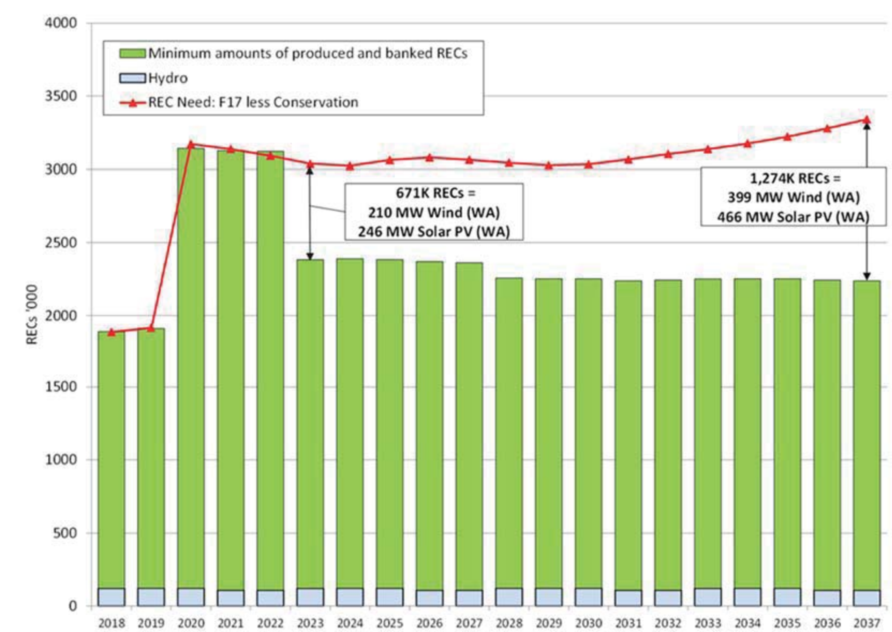
Figure 1. ***Phase 1 Capacity Need (as filed)***



[10] *PSE has a legal obligation to meet the requirements of the Energy Independence Act (Chapter 19.285 RCW), also referred to as Washington state's renewable portfolio standard (RPS). See Section 3 for a discussion of the RPS.*

As shown in Figure 2, the renewable resource need (also known as the "RPS need") forecast demonstrates a need for 671,000 renewable energy credits ("RECs") beginning in 2023. This need is driven by an increase in Washington state's renewable portfolio standard ("RPS") from 9 percent to 15 percent in 2020. However, PSE's inventory of banked RECs delays the need for additional resources to meet this incremental increase until 2023.

Figure 2. ***Renewable Resource Need (as filed)***

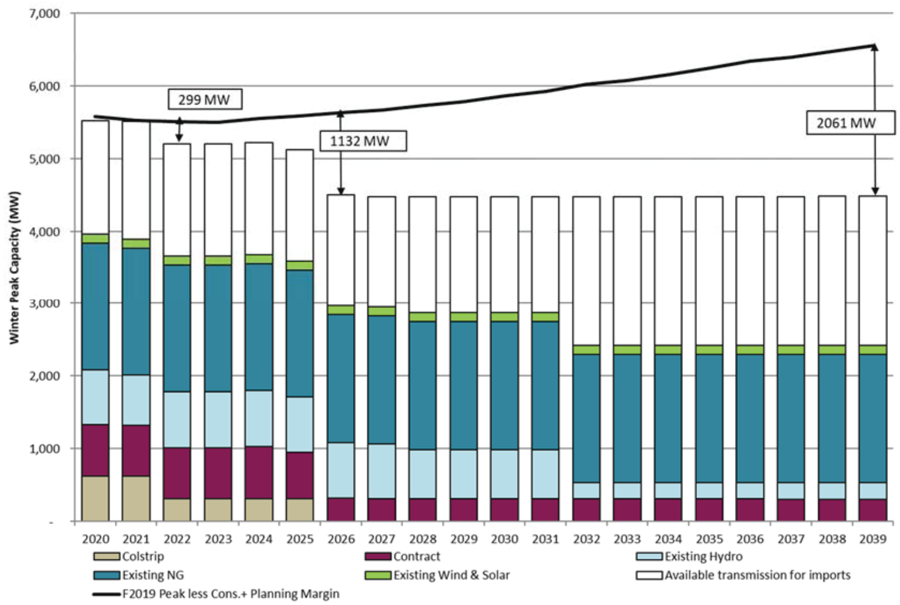


PSE's 2018 RFPs sought resources capable of meeting one or both of its resource needs. Proposals for resources with the ability to meet both the renewable resource and peak capacity needs offered substantial value to PSE's electric power portfolio, avoided certain environmental compliance and permitting risks, and aligned well with the state's clean energy policy goals.

Resource need forecasts updated for Phase 2

PSE updated its renewable resource and capacity need assessments before the second phase of the RFP to reflect the most current information available at the time the analysis was performed. Figures 3 and 4 depict the updated need based on the F2019 load forecast and conservation from the 2017 IRP. Figure 3 shows an overall increase in the need for capacity resources over the planning horizon, including an increase of new capacity in 2022 from 272 MW (as filed) to 299 MW (Phase 2).

Figure 3. ***Phase 2 Capacity Need***



During Phase 2, PSE reached an agreement to decommission Colstrip units 1&2 ("Units 1&2") by the end of 2019. Prior to this agreement, PSE had planned to shut down these units no later than July 2022. This accelerated timeline is not reflected in Figure 3. Instead, the Company released a separate RFP in May 2019 seeking short-term resources to bridge the gap expected to be created by the early closure of Units 1 &2 until long-term resources from the 2018 All Resources RFP could be secured and deployed.

Figures 3 and 4 do not reflect the impact of Senate Bill 5116, also known as the Clean Energy Transformation Act ("CETA"), which became Washington law during Phase 2 of the RFP.[11] However, consistent with CETA's mandate to eliminate coal-fired resources after 2025, the Phase 2 capacity need (shown in Figure 3) does reflect the removal of Colstrip units 3&4 from the company's electric resource portfolio starting in 2026.

Figure 4 shows a reduced renewable need of 233,449 RECs in 2023 (compared to the 671,000 RECs sought in the 2018 RFP filing), which grows to 691,864 RECs in 2024. The renewable resource need is driven by Washington state's RPS, but delayed by PSE's banked RECs until 2023.

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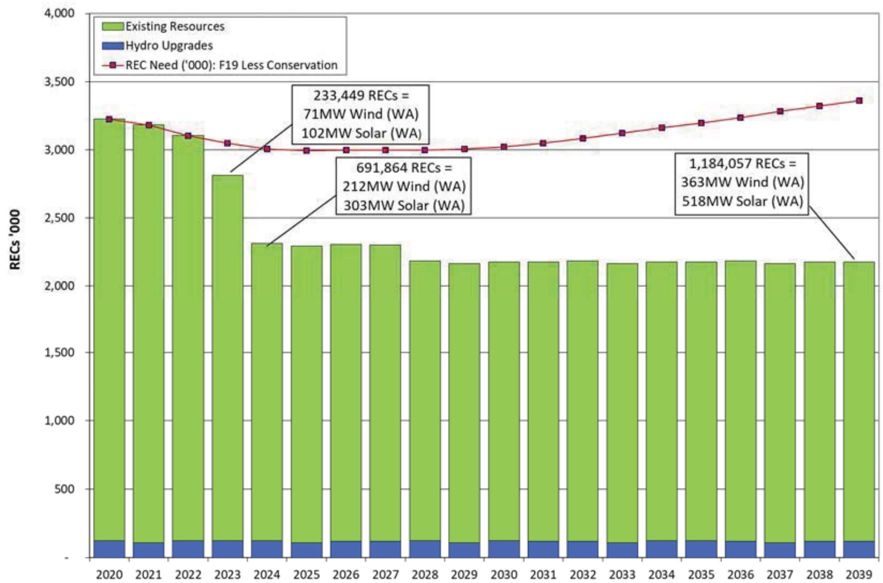
[11] *CETA sets several statewide policy goals, including a requirement to eliminate coal-fired resources after 2025, 80 percent carbon free generation and overall carbon neutral electricity by 2030, and 100 percent carbon free electricity by 2045.*

Figure 4. ***Phase 2 Renewable Resource Need***



3. RFP environment

Forecast gas prices, power prices and load growth have decreased since the 2017 IRP

PSE filed its most recent Integrated Resource Plan (IRP) in November 2017 and performed its 2018 RFP analysis between August 2018 and June 2019. The Company updated its IRP modeling assumptions for each phase of the RFP evaluation to reflect then-current conditions. Table 1 shows how three key assumptions have changed since the 2017 IRP was filed.

Forecast levelized Mid-C power prices dropped nearly $17/MWh and gas prices dropped a little more than $0.50/mmbtu between the IRP and Phase 2 of the RFP. Average annual load growth assumptions also dropped 0.2 percent during the same time period.

Table 1. ***Comparison of Key Modeling Assumptions: 2017 IRP and 2018 RFP***

Modeling Assumption	2017 IRP *(filed Nov. 2017)*	RFP Phase 1 *(Aug. 2018 – Mar. 2019)*	RFP Phase 2 *(Apr. 2019 – Jul. 2019)*	Phase 2 Update *(Aug. 2019 – Nov. 2019)*
Mid-C power prices levelized	$40.48/MWh	$33.92/MWh	$28.75/MWh	$23.66/MWh
Gas prices levelized	$4.02/mmbtu	$3.74/mmbtu	$3.50/mmbtu	No change
Annual average load growth	0.7%	0.5%	0.5%	No change

Consistent with PSE's IRP modeling assumptions, the RFP analysis uses power price forecasts from the Aurora dispatch model and gas price forecasts from Wood Mackenzie. Load forecasting modeling and methodologies are consistent with those described in PSE's most recent Integrated Resource Plan. More information about RFP power and gas price forecasts, load forecasts and other modeling assumptions is provided in Appendix E.

PSE analyzed regional resource adequacy in the 2017 IRP

Because PSE relies in part on wholesale market purchases to meet its current and forecast energy and peak demand obligations, PSE's planning function considers regional resource adequacy in its biennial Integrated Resource Plan. For more than a decade, the Pacific Northwest has experienced a large capacity surplus that has kept wholesale power prices relatively low and made these existing resources a lower cost alternative for filling PSE's peak capacity need than building new generation. The 2017 IRP was prepared using results and data from three studies of regional load/resource balance published by three regional planning entities: the Northwest Power and Conservation Council ("NPCC"), [12] the Pacific

[12] Source: "Pacific Northwest Power Supply Adequacy Assessment for 2021", published September 27, 2016 by Northwest Power and Conservation Council.

Northwest Utilities Conference Committee ("PNUCC")[13] and the Bonneville Power Administration ("BPA").[14] While the studies differed in certain details, they all generally anticipated that the Pacific Northwest would cross over into deficit at some point over the next decade unless new supply-side or demand-side resources are developed. The plan goes on to say that the region appears to be in the process of adding new resources (mainly in the form of additional investments in conservation) to fill the expected gap.

PSE conducted extensive analysis in its 2017 IRP and ultimately determined that wholesale market purchases above its current 1,600 MW level, when paired with additional firm transmission rights that PSE may have during peak load events, are a reliable and cost-effective way to meet resource need compared to other available new resource alternatives evaluated in the plan. For a discussion of PSE's analysis of regional resource adequacy in the 2017 IRP and regional studies used in the preparation of the plan, see 2017 IRP Chapter 6 (Electric Analysis), and appendices F (Regional Resource Adequacy Studies) and G (Wholesale Market Risk). An update to this analysis is currently underway for the next IRP, which is expected to be filed in January 2020.

Environmental laws, regulations, policies and tax incentives are changing

Clean Energy Transformation Act ("CETA")

During Phase 2 of the RFP, Washington state's legislature passed Senate Bill 5116, the Clean Energy Transformation Act ("CETA"), which sets statewide policy goals for the elimination of coal-fired resources in 2025, 80 percent carbon free generation and overall carbon neutral electricity by 2030, and 100 percent carbon free electricity by 2045. The Washington Utilities and Transportation Commission ("WUTC") has launched a rulemaking process to clarify and interpret requirements under the Clean Energy Transformation Act. The first utility milestone under the law is to prepare and submit a clean energy implementation plan by 2022.

PSE will have a clearer view of the impacts of the new law on our planning and acquisition functions as these processes progress. In the meantime, the RFP evaluation team considered a range of social costs of carbon in our quantitative analyses and qualitatively considered the environmental risks associated with proposals. A description of the scenarios tested in the quantitative analysis, including the carbon assumptions associated with each scenario, is provided in Appendix E.

The Company will continue to stay engaged in the progress of the WUTC rulemaking process. Meanwhile, PSE will continue to comply with all existing applicable state and federal regulations, such as Washington's Clean Air Rule (Chapter 173-442 WAC), Emission Performance Standards (Chapter 80.80.040 RCW) and The Energy Independence Act (Chapter 19.285 RCW).

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[13] *Source: "Northwest Regional Forecast of Power Loads and Resources 2017-2026", published April 2016 by Pacific Northwest Utilities Conference Committee.*

[14] *Source: "2016 Pacific Northwest Loads and Resources Study", published December 22, 2016 by Bonneville Power Administration.*

The Energy Independence Act (Washington's RPS law)

The Energy Independence Act (Chapter 19.285 RCW), also known as Washington state's renewable portfolio standard ("RPS"), requires electric utilities serving at least 25,000 retail customers to use qualifying renewable energy to meet a percentage of customer load. The target percentage has increased over time from 3 percent in 2012 to 9 percent in 2016, and will increase again to 15 percent in 2020.[15]

To contribute to meeting the state RPS, a qualifying renewable resource located outside the Pacific Northwest[16] must be delivered into Washington state on a real-time basis without shaping, storage or integration service. This requirement applied to several wind development resources located in central and southeastern Montana that were proposed in response to PSE's 2018 RFP.

Tax incentives for renewable development projects

There are two primary federal tax incentives available for utility-scale renewable development projects: production tax credits ("PTC"), the type commonly used for wind projects, and investment tax credits ("ITC"), the type commonly used for solar projects. Both types of tax incentives are designed to ramp down or expire over the next three years.

Production Tax Credits

The federal PTC is a per kilowatt-hour tax credit based on output from a qualified renewable energy resource. The PTC rate is an inflation-adjusted rate, currently $25/MWh in 2019. The PTC is available for the first 10 years of production. Starting in 2017, the PTC rate is reduced 20 percent annually through 2019, based on the year construction of a renewable project begins.

Table 2. ***PTC rate reduction schedule***

Start of Construction	Production Tax Credit Rate Percentage	Project Completion Date
2016	100%	2020
2017	80%	2021
2018	60%	2022
2019	40%	2023
2020	0%	

The PTC includes certain requirements that must be met to receive the incentive associated with a particular construction start year. One requirement is that a project must be completed within four years of the construction start date. Additionally, the developer must either spend five percent of the total project capital costs (the "safe harbor" provision) or demonstrate that it commenced "physical work of a

[15] A utility is not required to meet a renewable energy target if it spends at least four percent of its retail revenue requirement on the incremental cost of renewable energy and renewable energy credits. The cost cap for a utility that has no load growth is one percent.

[16] The Pacific Northwest is defined in Section 3 of the Pacific Northwest Electric Power Planning and Conservation Act (94 Stat. 2698; 16 U.S.C. Sec. 839a) for the Bonneville Power Administration.

significant nature" on the facility (the "physical work test") within the construction start year. Assuming the requirements are met, a project with a construction start date in 2019 that is completed by 2021 would be eligible to receive a tax credit of $20/MWh (25/MWH*80 percent).

Investment Tax Credit

The ITC is a dollar for dollar reduction in the income taxes that a company would otherwise pay the federal government. The ITC rate applies to the amount of investment in solar property. The current rate is 30 percent, but it ramps down annually beginning in 2020. The 30 percent ITC rate results in a $30 reduction in taxes paid for a $100 investment, resulting in a net investment of $70.

Table 3. ***ITC rate reduction schedule***

Start of Construction	Investment Tax Credit Rate	Project Completion Date
2019	30%	2023
2020	26%	2023
2021	22%	2023
2022+	10%	Ongoing

Safe harbor rules for the ITC are similar to the PTC rules, although the ITC rules include a sunset clause that requires an ITC project to be completed by 2023 to qualify for a 30 percent, 26 percent or 22 percent credit. Projects completed after 2023 would receive a 10 percent credit.

Solar equipment tariffs

In early 2018, the federal government issued a 30 percent solar panel import tariff under section 201 of the Trade Act of 1974. The tariff is designed to decline over a four year period. In late 2018, under Section 301 of the same act, the federal government imposed a 10 percent tariff on certain Chinese imports that include solar module components such as inverters, junction boxes and backsheets.

The impact of these tariffs have been widespread in the solar industry and likely increased the pricing of solar proposals received in response to the 2018 All Resources RFP. At the same time, solar industry cost reductions and technological advancements, such as the development of bifacial solar technology (and its exemption from the Section 201 tariffs), have had a muting effect on the tariff increases. Ultimately, PSE continued to see lower overall solar pricing in the 2018 RFP, despite any weakening in cost reductions that may have been caused by the tariffs.

Permitting and transmission challenges for development resources

Permitting matters

Development of traditional carbon-emitting capacity resources (e.g., natural gas-fired combustion turbines) in PSE's western Washington service territory is more challenging than ever politically and from a permitting standpoint. PSE received four proposals for natural gas-fired generation resources in response to the 2018 RFP, each of which proposed either an existing resource or the expansion of an existing site where PSE would be substantially responsible for the permitting.

There are relatively few “shovel ready” renewable (i.e., wind and solar) projects available in the market today. Nearly all of the proposed renewable resources were development projects. Many were early development projects without site control or any completed permitting work, which have greater potential for unknown risks than more mature alternatives. Additionally, while the processes and mitigations required to site wind projects are relatively well established in this region, large-scale solar projects are newer and require much larger permanent footprints than wind projects. Local jurisdictions and agencies continue to wrestle with how to evaluate and mitigate solar project impacts on native habitat and farm land. PSE looks at a variety of factors to determine the relative risk of development proposals (e.g., site control, permitting progress or well-developed permitting and outreach plans, the experience and qualifications of the development team, etc.) and considers potential mitigation opportunities. For selected proposals, PSE monitors project progress during development and construction to ensure that contractually agreed-upon milestones are met.

Batteries are an attractive capacity option from a permitting perspective because the footprint is small and impacts are generally low. As a result, there is more opportunity to site and build these resources, and the projects typically face fewer challenges than other traditional capacity resource options. Other storage resources, such as pumped hydro storage, require large-scale development and construction projects with a variety of potential risks, including long Federal Energy Regulatory Commission (“FERC”) permitting and construction timelines that could delay already long lead times and impact expected commercial operation dates. Further development of these resources could help reduce potential risks and make the proposals more attractive in future RFPs.

Transmission matters

Bonneville Power Administration

Transmission to PSE’s system is constrained. Although PSE holds transmission rights on the Bonneville Power Administration (“BPA”) system that are not tied to specific resources, these rights are earmarked for PSE’s programmatic hedging program and for meeting winter capacity need on a short-term basis. Until BPA completes upgrades on critical constrained paths, PSE is unlikely to obtain additional firm transmission to the PSE system for new resources. To qualify as a capacity resource, PSE asked RFP bidders proposing resources on the BPA system to identify available long-term firm transmission to PSE's system or demonstrate that BPA would grant such transmission rights. Therefore, BPAs TSR Study and Expansion Process (“TSEP”), formerly known as Network Open Season (“NOS”), was of particular interest during the 2018 RFP.

In response to increased electric generation resource development in the Northwest, which has been largely driven by wind developers, BPA implemented the TSEP, or Cluster Study, process to help the agency identify and prioritize needed transmission system upgrades. The Cluster Study process eliminated the outdated requests by clearing the existing queue, requiring parties seeking transmission service to submit new requests through TSEP, and obligating all TSEP participants to accept the transmission they request if BPA implements an upgrade. Thus, the TSEP process allowed BPA to prioritize and plan transmission upgrades based on a committed need.

One of the most critical paths for delivering energy to PSE load centers from resources located east of the Cascade Mountains is the Cross Cascades North ("CCN") flowgate. In March 2012, a regional planning entity called ColumbiaGrid released the final report created by the CCN study team, indicating that the best alternative for increasing the transmission capacity on the CCN flowgate is through a new 500kV BPA transmission line, estimated to cost over $1 billion. The report did not specify exactly when a new transmission line would need to be built, and BPA currently does not have such a project in its 10-year plan. There are a few smaller transmission upgrades that will increase the transmission capacity on the CCN flowgate in the near-term; however, PSE expects to have difficulty obtaining new transmission capacity on the CCN flowgate within the next 10 years.

Another critical path for delivering energy is the Cross Cascades South ("CCS") flowgate. In the 2019 TSEP, BPA identified impacts to third-party transmission systems, in order to grant transmission service that impacts the CCS flowgate. The plan of service, costs, and timelines have yet to be determined.

Colstrip Transmission System

Colstrip Units 1&2 were originally planned for closure in July 2022. In May 2019, an announcement was made to expedite the closure date to the end of 2019. PSE's capacity from Units 1&2 utilize three legs of transmission: (1) Colstrip Transmission System ("CTS"), (2) Eastern Intertie, and (3) BPA main grid. All three segments were analyzed for potential use for a proposed Montana renewables project.

This RFP assumed reuse of all three transmission segments associated with the closure of Units 1&2 for a wind resource in Montana. Two of the transmission segments are contracted through BPA and are periodically renewed. BPA contract costs were considered sunk until the point of contract renewal. After renewal, the cost of the BPA transmission would be borne by the Montana wind project. Costs associated with PSE's ownership share of the CTS were also considered to be sunk costs.

The RFP analysis assumed that when Colstrip 1&2 are decommissioned, 300 MW of transmission capacity will be available to PSE on the CTS. An additional 83 MW of transmission is currently available from PSE's transmission provider along the CTS and this capacity could also potentially be used for a resource in Montana.

The transmission capacity available from Units 1&2 along the Eastern Intertie and BPA main grid is also presumed to be 300 MW on each segment. Along the Eastern Intertie, there is a potential to purchase additional transmission from BPA, up to 144 MW.

For the BPA main grid transmission, there is potential to redirect transmission elsewhere in BPA's network based on available transmission capacity ("ATC") analysis and BPA system constraints. The redirects could be utilized for resources elsewhere in the Pacific Northwest, or market purchases at the Mid-Columbia marketing hub ("Mid-C"), if the Colstrip transmission is not reused for a Montana wind resource.

Along with the anticipated transmission availability, there has been considerable discussion of the potential impacts on CTS transmission availability and operating characteristics that could result from changing a thermal resource to a wind resource. The variability of a renewable resource may require upgrades on the CTS to mitigate dynamic flows. Most notably, the Montana Renewable Development Action Plan emphasized the potential need for a new Remedial Action Scheme ("RAS") for Montana wind resources. The costs and scope for a new RAS are unknown, and this protection scheme would be critical to delivering renewable energy to PSE's load center.

4. Proposals received

RFP proposals received

PSE received a total of 97 proposals for new resources in response to the 2018 All Resources and Demand Response RFPs, the largest response ever to an All Resources RFP. Table 4 compares the proposals received in response to past RFPs to those received in response to the current RFPs.

Table 4. ***RFP proposals received, 2005 - 2018***[17]

As of 3/25/19	2018 All Resource and Demand Response RFPs		2017 Renewables Only RFP (Green Direct 2.0)		2011 All Source RFP		2010 All Source RFP		2008 All Source RFP		2005 All Source RFP	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW[1]**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	17	574	2	24	1	10				
Solar - PV + BESS	20	2848										
Wind - Off Shore	1	400										
Wind On Shore	16	3303	20	2601	4	369	21	3776	8	862	10	1165
Wind + Winter Sys PPA	1	371										
Wind + Solar and/or BESS	2	464	4	339								
Storage - Battery ("BESS")	17	1265			2	251						
Storage - Pumped Hydro	2	900										
Biomass	2	72			3	61	9	590				
Biomass + BESS	1	15										
Natural Gas-fired Generation	4	1377			10	2624	18	5342	10	2588	17	4307
Geothermal	2	43									1	48
Hydro - Run of River	1	38	2	4	1	77	2	105	3	165	3	139
System PPA / Call Option	1	100			4	400	10	n/a	9	1675	7	400
Unbundled RECs	5						2	n/a				
Demand Response	6	154					1	80			1	34
Coal - Traditional + IGCC					1	500			1	100	6	4950
Cold Fusion					1	1880						
Distributed Generation											1	5
Waste-to-Energy / Landfill Gas					1	23					1	5
TOTAL	**97**	**13,590**	**43**	**3,518**	**29**	**6,209**	**64**	**9,903**	**31**	**5,390**	**47**	**11,053**

**The Max Cap MW column reflects the total combined potential capacity*

This table demonstrates the significant increase in total proposals received this cycle and the diversity of the resources offered.

[17] Table 4 does not include the two additional unsolicited proposals received subsequent to selecting the short list at the end of Phase 2, which were considered as part of the Phase 2 Update (the "Reevaluation") process between August and November 2019. See Appendix A for a complete list of the proposals received during the 2018 RFP and those received immediately after, which were included in the Phase 2 Update.

Table 5 summarizes the overall resource mix, total offered capacity, offer structure and operating status of the proposed resources. Totals do not include unsolicited proposals received during the RFP evaluation, which are described later in this section. Demand response proposals are not included in the operating status column totals. See Appendix A for a complete list of proposals received, including unsolicited proposals.

Table 5. ***2018 RFP proposals by resource type***[18]

Resource Type	# Proposals	Max Cap MW	Offer Structure(s)			Operating Status		
			Own	PPA/Toll/ Other Agmt	Both	Development	Construction	Operating
Solar - PV	16	2,240	1	14	1	16		
Solar - PV + BESS	20	2,848		18	2	20		
Wind - Off Shore	1	400			1	1		
Wind On Shore	16	3,303	3	11	2	15		1
Wind + Winter Sys PPA	1	371		1		1		
Wind + Solar + BESS	2	464	1	1		2		
Storage - Battery ("BESS")	17	1,265	1	8	8	17		
Storage - Pumped Hydro	2	900			2	2		
Biomass	2	72		2				2
Biomass + BESS	1	15		1		1		
Natural Gas CCCT	2	1,020		1	1			2
Natural Gas SCCT	1	245			1	1		
Natural Gas Recip	1	112	1			1		
Geothermal	2	43			2	1	1	
Hydro - Run of River	1	38		1				1
System PPA / Call Option	1	100		1				1
Unbundled RECs	5	n/a		5		5		
DR Direct Load Control	4	109		4				
DR C&I Curtailment	2	44		2				
TOTAL	**97**	**13,589**	**7**	**70**	**20**	**83**	**1**	**7**

**The Max Cap MW column reflects the total combined potential capacity*

Most RFP proposals included multiple offer options in which one or more of the terms or features varied. Some renewable generation proposals offered configurations including battery storage as a way to align delivery of intermittently produced generation with PSE's load. Two respondents offered hybrid proposals featuring a combination of wind and solar generation with options to include battery storage. Proposals often contained pricing for multiple offer structure options, such as the sale of assets (e.g., existing plant sale, various build and transfer options, or development rights), offtake agreements (e.g., power purchases, capacity tolling or unbundled renewable energy credits ("RECs")), or demand response program agreements. Some proposals offered pricing options adjusted for different transmission delivery points, start dates or resource capacities. Many offtake agreement proposals offered pricing options for different term lengths or price structures (e.g., fixed or escalating pricing). Additionally, some demand response proposals featured a variety of program options and recruitment levels from different customer classes.

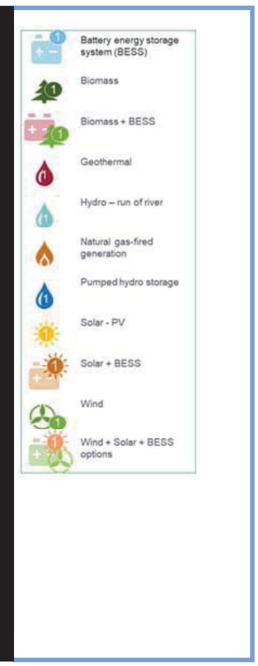
[18] *Table acronyms include: battery energy storage system ("BESS"), commercial and industrial customers ("C&I"), combined cycle combustion turbine ("CCCT"), demand response ("DR"), power purchase agreement ("PPA"), renewable energy credit ("REC") and simple cycle combustion turbine ("SCCT").*

As shown in Table 5, almost 93 percent of proposals offered at least one offtake agreement option and nearly 28 percent of proposals offered at least one ownership option. Nearly 92 percent proposed development resources, many of which were early stage development projects.

Location is another key criterion affecting transmission and interconnection feasibility and cost, permitting and public support. Figure 5 depicts generally the location of resources proposed in response to the RFP.

Figure 5. ***Illustrative Map of Proposed RFP Resources***

[redacted]



As shown, PSE received proposals for resources located in five states this RFP cycle. Roughly 70 percent of proposed projects representing nearly all proposed resource types were located in Washington. Resources are grouped primarily along the I-5 corridor and in central and southeast Washington. PSE also received proposals for eleven resources located in Oregon and nine resources located in Montana. Oregon proposals included a variety of renewables, hybrid renewables with storage options, and gas-fired generation located primarily in the northeast quadrant of the state. Resources in Montana included six wind projects, a pumped storage project and a pair of solar projects (one with a battery storage option). Additionally, PSE received three proposals for resources located in Idaho and Nevada.

Unsolicited proposals received during the RFP process

The Company received two unsolicited proposals during the Phase 1 evaluation[19] and three unsolicited proposals during the Phase 2 evaluation.[20] To ensure selection of the lowest reasonable cost and risk options available to PSE, unsolicited proposals received a preliminary cost screening alongside the RFP analysis, consistent with our Phase 1 quantitative analysis. If determined to be competitive on a cost basis with PSE's RFP proposals, an unsolicited proposal would be rolled into the RFP process for a full quantitative and qualitative evaluation.

Subsequent to selecting the RFP short list at the end of the evaluation process and initiating negotiation discussions with selected counterparties, PSE received two new unsolicited proposals.[21] PSE customarily considers new and unsolicited information and re-evaluates its resource decisions to ensure that the Company selects the lowest reasonable cost solutions to meet customer needs, consistent with resource acquisition prudence rules and policies including WAC 480-107. As such, PSE performed a Phase 2 Update (also referred to herein as the "re-evaluation") analysis of its resource options, including the two new proposal. The re-evaluation is discussed in Section 8.

See Appendix A for a complete list of the 2018 RFP and unsolicited proposals received during the RFP evaluation.

Self-build proposals

PSE used capital and operational resource costs produced by HDR as part of a study commissioned for the 2019 IRP to approximate self-build resource costs for a variety of renewable and capacity resources. Phase 1 costs were based on a draft report from HDR, which was later revised as a result of feedback from the IRP stakeholder group. PSE updated its resource cost assumptions for Phase 2 based on the final report. Generic resource costs and other key assumptions are presented in Appendix E.

Self-build challenges: Renewable resources

Prior to the 2018 RFP, PSE determined that it would be at a competitive disadvantage with renewable developers this RFP cycle. Indicative prices from the Company's 2017 Renewable Resources RFP were low and PSE knew that many of the same sellers would respond to its 2018 RFP. Additionally, many wind developers had already purchased turbines in 2017 and planned to qualify for 80 percent of the PTC by

[19] Unsolicited proposals received during the Phase 1 evaluation included an offer to purchase or offtake power from a [redacted] MW pumped hydro storage project to be located in central Washington and an offer to purchase unbundled RECs from an operating solar farm located in Idaho.
[20] Unsolicited proposals received during the Phase 2 evaluation included three solar farms, a [redacted] MW development project in southwestern Washington and two development projects in Oregon for between [redacted] and [redacted] MW of solar power with options to include battery storage.
[21] Unsolicited proposals received during the negotiation process including an offer to purchase or offtake power from [redacted] operating natural gas-fired facility, and an up to [redacted] MW system power PPA with seasonal and heavy load hour ("HLH") shaping and no emissions (no RECs).

REDACTED VERSION

completing construction in 2021.[22] Because PSE is unable to commit financial resources before evaluating alternatives in an RFP, the way a developer might, the Company's earliest opportunity to lock in a PTC rate would have been 2019. A project with a construction start date in 2019 could qualify for just 40 percent of the PTC. Alternatively, PSE would be on equal footing with developers in its ability to capture a higher ITC rate for solar projects. However, while a developer may choose to factor the full benefit of the ITC into its PPA pricing, a benefit to PSE's customers, tax rules provide that a utility's investors must keep a portion of the ITC benefits based on IRS normalization rules. In other words, customers would not receive the full benefit of the ITC for a solar self-build resource.

Self-build challenges: Natural gas-fired resources

Given the substantial uncertainties surrounding federal and state environmental policies this RFP cycle, a challenging permitting environment and the potential for delays to the commercial operation date of a new resource, PSE did not actively pursue a self-build natural gas-fired peaker or combined cycle project in this RFP. Similar to its approach to renewable self-build, PSE used the generic resource costs developed by HDR for the 2019 IRP as a proxy for self-build gas resources in its RFP analysis.

Transmission redirect option

The "transmission redirect option" refers to an assumption that when Colstrip Units 1&2 are shut down, the BPA transmission used to deliver the energy to PSE's load could be "redirected" from Garrison-PSEI, to Mid-C-PSEI. This option assumes that the transmission would be available beginning January 2022 for a 50-year term, thereby providing additional firm capacity for market purchases. PSE originally assumed that 300 MW could be redirected from Garrison to Mid-C; however, based on further internal analysis, discussion with BPA, and updated ATC calculations and flowgate constraints within BPA's network, it was determined that only up to 100 MW could be redirected to Mid-C. While redirecting the remaining 200 MW remained potentially feasible, the location, source and cost of this redirect were unclear. As a result, PSE withdrew this portion of the redirect from its analysis and assumed a 100 MW redirect instead.

The 100 MW redirect paired with market option was later eliminated from consideration during Phase 2 based on the standalone portfolio analysis results. The results determined that two of the proposed Montana wind proposals, both of which assumed use of this transmission, offered more favorable portfolio benefits than the transmission redirect option. The results of the Phase 2 standalone portfolio analysis can be found in Appendix D.

[22] A developer that either spent five percent of a project's total capital costs (the "safe harbor" provision) or that can demonstrate it commenced "physical work of a significant nature" on the facility (the "physical work test") in 2017 and completes construction within four years of the construction start date would be eligible to receive 80 percent of the PTC, the rate associated with a 2017 construction start date.

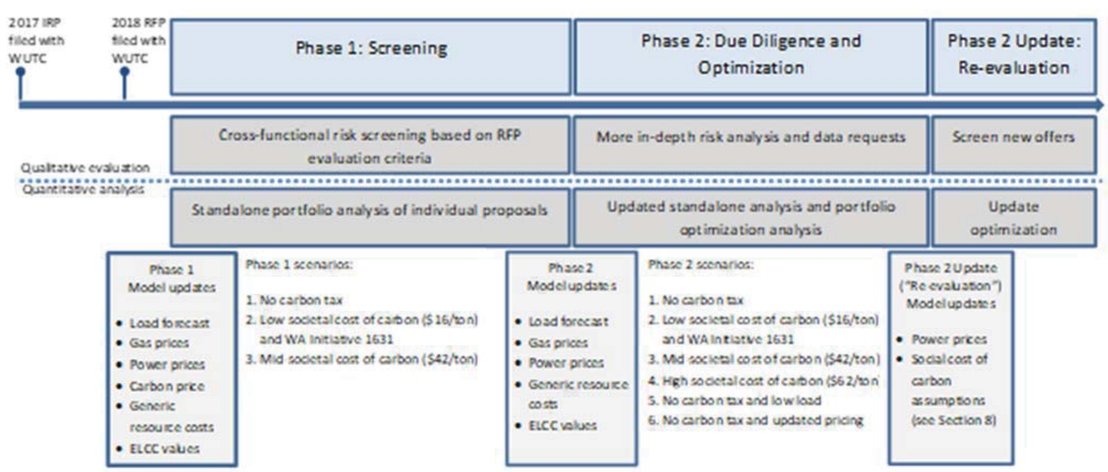
5. Evaluation process overview

PSE's resource evaluation process is designed to be consistent with guidance set forth in the Washington Administrative Code ("WAC") and the Revised Code of Washington ("RCW"), which encourage utilities to seek resources that provide clean, safe and reliable power to meet their renewable and capacity needs using lowest reasonable cost as a criterion. RCW 19.280.020 defines "lowest reasonable cost" as "the lowest cost mix of generating resources and conservation and efficiency resources determined through a detailed and consistent analysis of a wide range of commercially available resources." Further, WAC 480-107-035 provides guidance regarding the minimum criteria that must be considered when evaluating and comparing resources:

At a minimum, the ranking criteria must recognize resource cost, market-volatility risks, demand-side resource uncertainties, resource dispatchability, resource effect on system operation, credit and financial risks to the utility, the risks imposed on ratepayers, public policies regarding resource preference adopted by Washington state or the federal government, and environmental effects including those associated with resources that emit carbon dioxide. The ranking criteria must recognize differences in relative amounts of risk inherent among different technologies, fuel sources, financing arrangements, and contract provisions. The ranking process must complement power acquisition goals identified in the utility's integrated resource plan.

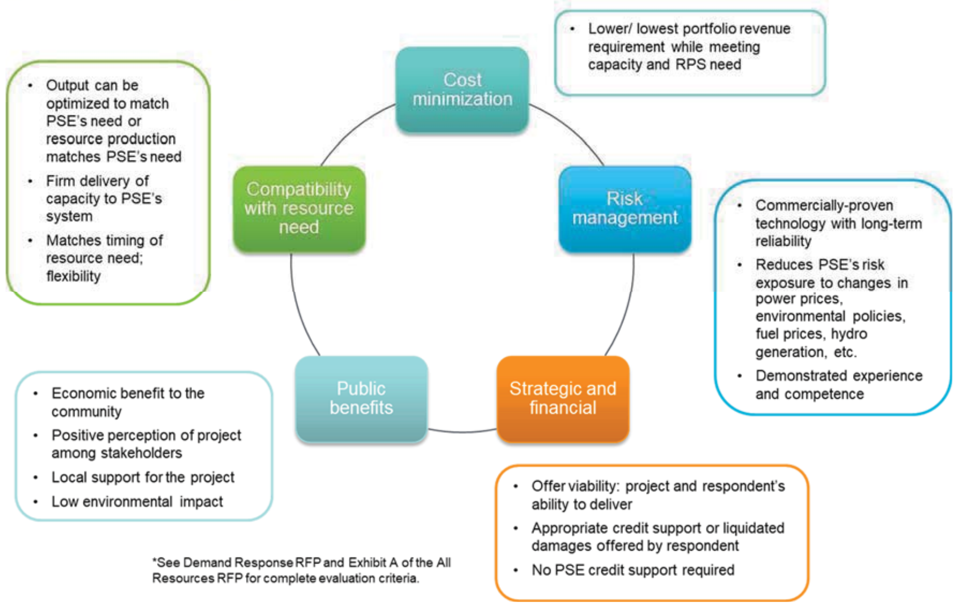
PSE follows a structured, two-phased evaluation process (shown in Figure 6) to screen and rank individual proposals based on an evaluation of costs, risks and benefits. The first phase includes a preliminary qualitative and quantitative screening designed to identify the most promising proposals and eliminate resources with prohibitive costs, minimal portfolio benefits or excessive risk. The second phase includes a more rigorous due diligence review and portfolio optimization analysis, with the goal of identifying a shortlist of resources representing a combined best-fit, lowest reasonable cost solution to meet the resource needs established in the RFP.

Figure 6. ***2018 RFP Evaluation Process Overview***



PSE considers a variety of quantitative and qualitative factors to reasonably compare proposals with diverse attributes. Each proposal is evaluated based on its compliance with either the All Resources or Demand Response RFP, and according to the criteria summarized in Figure 7.

Figure 7. ***Summary of RFP evaluation criteria (See Appendix B for a detailed list)***



Section 6 (Phase 1) and Section 7 (Phase 2) describe in detail the two phases of PSE's analysis process and results. See also Appendix E for details related to the models, assumptions and scenarios used in PSE's 2018 RFP analysis.

Reporting and transparency

The RFP team kept PSE's Energy Management Committee ("EMC") apprised of its progress and decisions throughout the RFP evaluation process. The team presented four updates to the EMC during the RFP evaluation: (1) a summary of proposals received in September 2018, (2) a report on the Phase 1 results in March 2019, (3) an update on Phase 2 in June 2019, and (4) a report on the Phase 2 results in July 2019. Subsequent to the RFP, the team continued to present updates to the EMC as new information became available during the early part of the negotiation process. This included a report on the Phase 2 Update ("Re-evaluation") results in November 2019. The RFP team will continue to update the EMC and PSE's Board of Directors on an as-needed basis as negotiations with selected counterparties continue and will seek appropriate approvals prior to executing contracts with selected counterparties. Copies of updates presented to the EMC during the RFP evaluation are attached as Appendix F.

In addition to its internal reporting, PSE's RFP team kept the WUTC apprised of its progress. Subsequent to filing the draft RFP, PSE engaged in multiple calls with WUTC staff related to the contents of the draft RFPs and to establish a reasonable process for addressing public comments. During the evaluation process, PSE presented updates to WUTC staff on three occasions: (1) a summary of proposals received in September 2018, (2) a report on the Phase 1 results in March 2019, and (3) a report on the Phase 2 and Phase 2 update results in December 2019. PSE also hosted members of the WUTC staff policy team to review the RFP proposals at PSE's Bellevue headquarters in June 2019.

The Resource Acquisition rule, in Chapter 480-107-035 WAC, requires utilities to keep a summary of RFP proposals received available on site for public review once the proposals are opened for ranking. This rule also requires that the summary be updated to include the final ranking for each proposal at the conclusion of the RFP. PSE has complied with this rule and will update the summary with final rankings upon completing the RFP.

6. Screening process and results ("Phase 1")

The Phase 1 evaluation process included an assessment of both the qualitative and quantitative attributes of individual proposals; screened and ranked proposals on an economic basis; and eliminated proposals with prohibitively high cost, lower benefit to PSE's power portfolio than alternatives, or unacceptable risks (also called "fatal flaws"). Examples of fatal flaws include, but are not limited to: proposals that failed to provide sufficient information to substantiate a viable project, feasibility constraints, the inability to permit the project or deliver energy, commercially unproven technology, excessive counterparty risk, and regulatory or legal risk associated with noncompliance that could adversely affect PSE.

Upon completing the Phase 1 screening, the RFP team identified a "candidate list" of the most promising proposals for a more thorough due diligence analysis and further quantitative scrutiny in Phase 2. The following discussion describes in detail PSE's Phase 1 analysis and results.

Phase 1 qualitative analysis: Cross-functional risk screening

The RFP team conducted a qualitative review in Phase 1 to identify, assess and document the risks associated with each RFP proposal. This process included identifying potential risks for more focused examination should a proposal advance to Phase 2 and any fatal flaws that would immediately eliminate a proposal from further consideration. The team also considered the relative likelihood that certain substantial risks might occur.

Throughout Phase 1, the RFP team met weekly with a cross-functional evaluation team of subject matter experts ("SMEs") to discuss the costs, risks and merits of individual proposals. Each week, SMEs would review and evaluate a subset of proposals (typically four to six per week) based on the evaluation criteria described in Section 5 and Appendix B. During the meetings, SMEs summarized the proposal elements associated with their areas of expertise, described their overall findings and discussed potential risks that might impact PSE as an owner or offtaker. SMEs also prepared follow-up questions for the developers on an as-needed basis. Many of the concerns and questions raised in Phase 1 later became the basis for data requests during Phase 2. At a minimum, the weekly meetings included team discussion of commercial terms, counterparty considerations, development status including site control and permitting matters, technical considerations, operating characteristics, transmission and interconnection matters, community and government relations, and periodic updates on the economic analysis. On an as-needed basis, PSE invited additional SMEs to review certain proposals. For example, when natural gas-fired resources were discussed, PSE included experts from its natural gas fuel supply and environmental compliance teams.

After the weekly review meetings, SME findings were aggregated and documented in a memorandum format. A summary of these findings is presented in the Executive Summary attached to Appendix C.

One of the central challenges this RFP cycle was the proportionally large number of proposals for development projects (nearly 92 percent), most of which were early development projects. This is a shift from prior RFPs, which generally attracted a more balanced mix of operational, mature and early development options. PSE's analysis found that while some early development offers were competitively priced, they also introduced considerably more uncertainty. In general, existing projects without operational issues and more mature development projects proposed by experienced developers with bankable plans (i.e., site control, secured permits, etc.) were considered to be substantially less risky than early development alternatives.

In Phase 1, PSE tended to give proposals the benefit of the doubt related to unknowns or uncertainties, while documenting potential risks for further review and verification in Phase 2. Additionally, if certain elements of a proposal were either missing or unclear, PSE generally requested supplemental information or clarification from developers. However, two proposals were considered to be extremely underdeveloped. Neither proposal contained the minimum amount of information needed to substantiate or evaluate the viability of the proposed resource, or its associated costs and risks. These two proposals were subsequently removed from consideration. They were the only proposals eliminated during Phase 1 based on qualitative fatal flaws.

Phase 1 quantitative analysis: Economic screening of individual proposals

PSE used PSM III and the Aurora dispatch model to perform the quantitative analysis for both phases of its RFP evaluation. Aurora is a forecasting and energy dispatch model used to provide revenue and production inputs to the PSM III model. PSE used Aurora to develop Mid-C market power prices for its pricing scenarios. Other key inputs from Aurora included revenues, energy dispatch, variable costs (such as fuel and variable O&M), emissions related to existing resources, and market purchases and sales.

PSM III is a Microsoft Excel-based financial optimization model developed by PSE to evaluate the incremental cost and risk of a wide variety of resource alternatives and portfolio strategies. At a high level, the model calculates the long-term revenue requirements for PSE's incremental generic power portfolio based on the 2017 IRP resource strategy and a current outlook on the Company's capacity, renewable and energy needs. Generic resources are then replaced in the model with a specific proposal from the 2018 RFP to measure the impact on PSE's overall portfolio cost. This allows PSE to compare the cost of individual RFP offers to the cost of generic resources and each other.

PSM III calculates five metrics used by the RFP team to assess the economic competiveness of individual proposals: portfolio benefit, levelized net cost per kW or REC, levelized portfolio benefit per kW or REC, levelized cost, and portfolio benefit ratio. A definition for each metric is included in Appendix E. Each metric provides a slightly different perspective on the economic benefits associated with the proposals. The evaluation process used multiple metrics in its resource analysis because no one metric provides a complete view of the relative competitiveness of an individual proposal. As an example, levelized cost of energy is a traditional metric used by the industry for the purposes of comparing proposals; however, it does not take into account whether or how much a resource would contribute to meeting PSE's capacity or renewable resource needs.

PSE's Phase 1 screening analyzed each project on a standalone basis and, using the metrics from PSM III, compared the portfolio impact in three potential future scenarios. Each of the scenarios was constructed using base demand, gas price and generic resource cost assumptions; however, carbon assumptions were varied to test a range of potential future carbon costs:

- Scenario 1: No carbon tax
- Scenario 2: Low societal cost of carbon ($16/ton)[23]
- Scenario 3: Mid-societal cost of carbon ($42/ton)[24]

The 2018 RFP evaluation was performed in parallel with the development of PSE's 2019 IRP and, as a result, many of the assumptions were evolving throughout the RFP evaluation process. Subsequent to the 2017 IRP, PSE updated a variety of modeling assumptions including gas prices, Mid-C market power prices, load forecasts, generic resource cost assumptions and other key inputs. PSE's Phase 1 modeling assumptions are presented in Appendix E.

Value stream considerations in the quantitative analysis

The Phase 1 quantitative analysis considered the cost of a particular proposal compared to its value within PSE's electric power portfolio. The primary value streams included the contribution of a resource toward meeting PSE's renewable resource need, its peak capacity need, or both. The RFP team compiled two distinct lists to rank these values: 1) resources capable of meeting the renewable resource need and 2) resources capable of meeting the peak capacity need. Two metrics were most useful in understanding the contributions of resources with different attributes to each of these resource needs, the portfolio benefit per kW metric (PB/Kw-yr) for capacity need and the portfolio benefit per REC metric (PB/REC) for renewable resource need. In general, most proposals offered either a material peak capacity or renewable resource contribution, but not both. Most renewable resources offered only a very minor contribution to the peak capacity need and, therefore, only appear on the renewable ranking list. However, there were several exceptions, such as Montana wind, Columbia Gorge wind, and biomass, which offered considerable contributions to meeting both the renewable resource and peak capacity needs. These resources appear on both lists. Phase 1 quantitative analysis results and rankings for both the renewable resources and peak capacity needs are presented in Appendix C.

Wind and solar projects, which comprised the bulk of early-development proposals received in the RFP, featured capacity factors ranging between 20 percent and 50 percent, varying due to site-specific attributes and the proposed generation technology. The projected correlation between the hourly and seasonal generation profiles and PSE load projections were important considerations in valuing a project's contribution to meeting peak capacity need. This metric, represented as percentage, is a fractional quantity based on the characteristics of a resource relative to a "perfect" capacity resource's contribution to a peak capacity event. This value is closely tied to expected load carrying capability ("ELCC"). ELCC assumptions for the 2018 RFP are described in Appendix E. The methodology for calculating the value of ELCC assumptions is described in Appendix N to PSE's 2017 IRP.

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[23] *The Scenario 2 low societal cost of carbon assumption ($16/ton) is based on a Washington state carbon tax proposed in Initiative 1631, which failed to pass at the ballot box in November 2018.*
[24] *Source of Scenario 3 mid-societal cost of carbon assumption ($42/ton): "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866, Interagency Working Group on Social Cost of Greenhouse Gases," United States Government, Aug. 2016.*

Because peak capacity resources must be available when and where needed, PSE's analysis considered the characteristics of the resource, the proposed delivery point and the likely availability of "firm" delivery to PSE's system when determining the application of ELCC values for resources. Firm delivery to PSE's system means that the energy output from the proposed project would be delivered on an as-generated basis, with less risk of curtailment due to a transmission constraint.

To qualify as a capacity resource, proposed projects intertied on third-party transmission systems, often BPA, were assessed to determine whether a request for firm, point-to-point transmission to PSE's system would likely be granted. Since many of the RFP responses proposed early development projects, developers often had not yet secured interconnection and transmission services. Some awaited the outcome of pending analysis and studies performed by the transmission operator. If PSE's energy delivery team determined that a proposed resource was unlikely to be granted firm delivery to PSE's system (or if the potential solution was determined to be too difficult or too uncertain), the proposal did not receive the benefit of a contribution to capacity in PSE's analysis. In Phase 1, PSE's quantitative analysis generally gave projects the benefit of the doubt regarding the likelihood that transmission would be granted; however, transmission and interconnection availability and cost risks became a common topic in data requests and received more critical consideration in Phase 2.

To allow additional flexibility for developers in the 2018 RFP, PSE considered resource proposals with a variety of delivery points including busbar (typically the project's point of interconnection ("POI")), the Mid-Columbia energy delivery point ("Mid-C") and BPAT.PSEI, or that are located on PSE's system. Projects located on PSE's system or delivering to BPAT.PSEI could be analyzed with a contribution to peak capacity, while other projects delivering to busbar or Mid-C generally could not. Proposed resources delivering to Mid-C generally assumed that PSE could leverage existing transmission capacity to the Company's load center (PSEI.SYSTEM). However, this transmission pathway is often used for short-term transactions in high-load, high-demand scenarios. Because a new resource delivering to Mid-C would supplant an existing capacity asset (market purchases) already counted toward meeting PSE's peak capacity need, its contribution to peak capacity could not be considered an incremental benefit to PSE's power portfolio in the RFP analysis.

Project proposals featuring busbar delivery pushed to PSE the risk of securing transmission service from the project's POI to the Company's load center (PSEI.SYSTEM). PSE's analysis assessed on a case-by-case basis the most applicable delivery point, and the likelihood and costs of securing firm point-to-point transmission service to PSE's system. The nine Montana renewable projects are notable examples of this scenario, in which the sellers proposed to intertie their projects to the Colstrip Transmission System ("CTS"). Montana resource proposals pushed the responsibility for securing transmission for these projects to PSE, assuming that PSE could use 300 MW of existing transmission rights presumed to be available after the closure of Colstrip Units 1&2 to bring wind power from areas along the CTS to BPAT.PSEI. At the time of PSE's analysis, the relevant transmission operators and affected parties had not yet studied the effect on the transmission system of replacing Units 1&2 with a potential new variable resource generator. As such, PSE's assessment of projects with interconnection points along this transmission pathway included this risk as part of its Phase 1 qualitative analysis.

Key findings by resource type

Energy storage

Of the 97 proposals received in response to the 2018 RFP, two were pumped hydro storage projects, 17 were standalone battery energy storage systems ("BESS"), and another 23 offered renewable generation paired with a BESS resource. PSE's quantitative analysis applies several value streams to storage resources. Value streams for BESS projects and pumped hydro storage projects include a contribution to peak capacity (with firm energy delivery to PSE's system) and a flexibility benefit. Additionally, BESS projects located on PSE's system receive a transmission system deferral value.

Battery energy storage:

Costs declining, but still higher than alternative capacity resources

	Proposed	Phase 2
Battery only	17	0
Battery + renewable	23	0

The *contribution to peak capacity value* is described in the previous section on pages 25 and 26.

The *transmission system deferral value* is an avoided cost metric representing the mitigation benefit of neither building nor retrofitting transmission assets as a result of adding the operational flexibility of a battery to the transmission system. PSE's analysis assumed a deferral value of $26/kW-yr escalated at 2.5 percent annually. This proxy value was applied to all BESS proposals in the preliminary quantitative screening. This is conceptually similar to the benefit of the doubt approach applied throughout Phase 1.[25]

The *flexibility value* quantifies the sub-hourly benefits of adding a generation asset to the transmission system. These benefits, which apply to both pumped hydro and battery energy storage resources, include: regulation up and down, voltage control, frequency control, spinning reserves, non-spinning reserves and supplemental reserves. Storage resources with higher maximum output capacities and longer durations offered greater flexibility benefits.

Pumped hydro storage:

Very high cost compared to alternatives; large projects with substantial development and/or construction risks

	Proposed	Phase 2
Pumped hydro storage	2	0

Even with these value streams applied and a significant decrease in pricing over the past several years, BESS proposals were not competitive enough with other capacity alternatives in PSE's screening analysis to be selected for Phase 2 consideration. The pumped hydro storage proposals had even higher costs than the BESS proposals, very long lead times and considerable development or construction risks; they were also not selected for Phase 2 consideration. This cycle, PSE received enough proposals with sufficiently attractive capacity contributions to effectively meet its physical reliability need at substantially lower costs than those proposed for storage. However, as traditional capacity resource options become

[25] *If any of the BESS proposals had been selected for further consideration in Phase 2, PSE would have evaluated these resources on a site-specific basis.*

increasingly scarce, ELCC returns from intermittent resources with common generation profiles diminish, and lithium-ion battery prices continue to drop, it is possible and potentially even likely that BESS resources will be better positioned to compete with other alternatives to meet PSE's peak capacity needs in future RFPs.

Solar resources:

Cost of energy declining; however, dual-value resources able to meet both capacity and renewable resource needs had higher portfolio values than solar

Capacity contribution of solar with storage options negated by Mid-C delivery

	Proposed	Phase 2
Solar only	16	8
Solar + battery	20	1
Solar + wind + battery	2	0

Solar resources

Solar project prices in the 2018 RFP continued to decrease on a cost-of-energy basis. As a result, a fairly large number of the proposed solar projects (8 of 16) performed well enough in the screening analysis to be selected for Phase 2 consideration. However, proposals featuring solar and BESS resources combined did not fare as well because most were delivered to Mid-C, negating the capacity value of the BESS. Many of the solar proposals were for early development projects proposed by smaller, less-experienced firms, which introduced more uncertainty and increased the potential for unknown development risks. Often, these proposals had yet to fully secure site control, apply for critical permits, or apply for interconnection and transmission service to initiate system operator studies that determine system and facility impacts.

Wind resources

Eight of the 17 wind proposals advanced for further due diligence in Phase 2. Three of the selected proposals were Montana wind proposals and four were located along the Columbia River Gorge (the "Gorge") in Oregon or Washington.

Wind resources:

Montana and Columbia Gorge wind projects benefitted in the analysis due to their ability to help meet renewable and capacity need

	Proposed	Phase 2
Wind only	17	8
Wind + solar + battery	2	0

Montana wind proposals, in particular, performed very well in the Phase 1 analysis, despite some general early development risks and the risks associated with certain transmission assumptions discussed earlier in this section (namely that PSE would be able to use its existing Colstrip Units 1&2 transmission rights for an intermittent resource). The higher expected capacity factors of these resources combined with seasonal and daily wind shapes that are expected to have a high level of correlation to PSE's load produced a high ELCC value relative to other intermittent resources. Montana resources ultimately benefitted in PSE's analysis from the dual values of contributing to the renewable resource and peak capacity needs established in the RFP. Three of the six proposed Montana wind projects were selected for further evaluation in Phase 2.

Wind projects located in the Columbia River Gorge (the "Gorge") area provided dual-value renewable and capacity contribution benefits similar to Montana wind projects, although the ELCC value was lower, due to a lower seasonal correlation between expected production and PSE's load. One Gorge wind project attempted to alleviate that concern by adding a winter-only, peak-hour capacity agreement to provide guaranteed firm energy delivered to PSE's system from a pool of the seller's other resources when PSE's load is assumed to be at its highest.

Additionally, PSE received a single offshore wind project, which was eliminated because it was extremely high cost and the proposal was underdeveloped. This project did not proceed to Phase 2.

Biomass resources

Of the three biomass projects proposed into the RFP, only one advanced to Phase 2. In general, the biomass projects were relatively expensive from an energy standpoint. However, the selected biomass resource is already operating and would provide baseload output, which resulted in a higher contribution to capacity value than the other biomass proposals. Similar to the Montana and Gorge wind proposals, the biomass resource selected for Phase 2 benefitted in PSE's analysis from its contribution to both the renewable resource and peak capacity needs defined in the RFP.

Biomass resources:

Selected proposal is an operating facility that would provide baseload output; project benefitted in the analysis due to its ability to help meet renewable and capacity need

	Proposed	Phase 2
Biomass	2	1
Biomass + battery	1	0

Demand response programs

PSE received a total of six demand response proposals in the 2018 RFP. Three targeted residential direct load control opportunities such as smart thermostat and smart water heater technologies, one targeted behavioral demand response technology for residential customers, and two others targeted commercial and industrial curtailment. The capacity offered by the demand response projects was generally modest compared to generation resources, ranging between 9 MW and 40 MW.

Demand response programs:

Selected proposal benefitted in Phase 1 analysis from a substantial T&D deferral value assumption that required further analysis in Phase 2

	Proposed	Phase 2
Demand response	6	1

ELCC value assumptions were updated in the RFP Phase 1 analysis to align with then-current draft 2019 IRP assumptions. This update resulted in a 40 percent lower demand response ELCC value than assumed in the 2017 IRP. As a result, only one of the demand response proposals performed well enough in the standalone portfolio analysis to be selected for consideration in Phase 2.[26]

[26] ELCC values were again updated in Phase 2 to align with the final 2019 IRP assumptions, resulting in an overall net reduction of about 50 percent compared to the 2017 IRP (from 77 percent in the 2017 IRP to 38 percent in the 2019 IRP). As a result of this

Most demand response vendors were unable to demonstrate sufficient experience in a market with a peak load profile similar to the Pacific Northwest, which made it challenging to evaluate the potential for risk in achieving expected results when demand side reductions are most needed. Additionally, PSE is in the process of rolling out advanced metering infrastructure ("AMI") and implementing a distributed energy resource management ("DERM") system to utilize the data. None of the demand response vendors had any experience integrating with a DERM system, which introduced potential risk for PSE customers.

Natural gas-fired generation resources

Natural gas-fired generation projects have historically represented a high percentage of proposals received in PSE's All Resources RFPs, averaging about 33 percent of the total proposals received since 2005. This cycle, only four of the 97 proposals received were for natural gas-fired resources. Two of the four advanced to Phase 2 based on their contribution to peak capacity value and their relatively lower cost compared to other capacity resource alternatives available in the RFP. One proposed an operational combined cycle project and the other proposed to install retrofitted aircraft engines at an existing PSE site. Risks for these resources included gas transportation concerns, future clean energy legislation compliance (the Clean Energy Transformation Act became Washington law during Phase 2), and significant reputational risks given changing public and municipal preferences. Additionally, the concept of a thermal expansion project co-located at an operational PSE gas plant site raised significant permitting feasibility questions for the development project and concerns that the operating permit for the existing facility could be reopened, putting existing operating limits at risk.

Natural gas-fired generation resources:

Relatively lower cost capacity option compared to storage; however, dual-value resources able to meet both capacity and renewable resource needs had higher portfolio values than gas-fired resources

	Proposed	Phase 2
Natural gas resources	4	2

Other resources

PSE received and assessed several other miscellaneous resource proposals in Phase 1, one run-of-river hydro, two geothermal, a system PPA capacity call option, and five unbundled REC proposals. The hydro proposal was selected to advance to Phase 2 because it is an operating plant with a potentially high contribution to capacity. The geothermal proposals were not selected for Phase 2 because they offered relatively expensive energy and little capacity value. The system PPA capacity call option was not selected

Other resources:

Selected resources included an operating run-of-river hydro plant with potentially high contribution to capacity and low cost RECs

	Proposed	Phase 2
Geothermal	2	0
Run-of-river hydro	1	1
Capacity call option	1	0
Unbundled RECs	5	3

change, the cost of demand response roughly doubled on a per megawatt basis (assuming no change to the pricing) over the course of the RFP because twice as much of the same resource would be required to achieve the same peak capacity contribution.

for Phase 2 because it delivered to Mid-C, which negated its contribution to capacity value. The unbundled REC proposals posed little general offtake risk, as many of the underlying projects were either operating or soon-to-be constructed. Of the six proposals (one was unsolicited), three proceeded to Phase 2 due to their relatively low costs and small sizes, two potentially valuable attributes for consideration in the Phase 2 portfolio optimization.

Phase 1 results: The "candidate" list

PSE completed its Phase 1 evaluation of proposals and presented an update to its Energy Management Committee ("EMC") in March 2019. At the conclusion of its preliminary screening, PSE selected a list of 25 "candidate" proposals for further evaluation in Phase 2. Selected proposals were generally those that ranked most favorably in the quantitative screening relative to one or both of the resource needs (as defined in the 2018 RFP) and had no known fatal flaws. Projects that provided a contribution to both resource needs were generally selected for Phase 2, due to the relatively high total portfolio benefit produced by the dual value streams. The detailed results of PSE's Phase 1 qualitative and quantitative analysis are provided in Appendix C.

Overall, the high number of renewable resource projects selected for Phase 2 consideration aligned well with public and state policy preferences and, specifically, the Clean Energy Transformation Act, which became Washington law during PSE's Phase 2 analysis. In addition to the selected renewables and a handful of low or non-emitting capacity resources, PSE also chose to include two natural gas-fired resources on its candidate list. This decision was made to ensure that there would be sufficient capacity resources in the Phase 2 candidate pool to meet PSE's physical reliability need. The gas resource proposals added potentially valuable resource and locational diversity to the mix, as well as substantially higher ELCC values than most other alternatives. However, they also carried potentially substantial risks that required additional scrutiny and careful consideration in Phase 2.

After eliminating proposals with prohibitively higher costs than alternatives, PSE recognized that it would have relatively few proposals with significant capacity contributions to compare in Phase 2 without including any thermal generation. The team also recognized that several of the selected candidates proposed development projects that have potentially material risks, which may or may not be acceptable to PSE. Additionally, the selected Montana wind resources, which were some of the most favorable in the Phase 1 quantitative analysis, were all proposing to use the same Colstrip 1&2 transmission rights to bring their power to PSE's load. In other words, they were mutually exclusive.

Table 6. ***Candidate List for Phase 2 evaluation***

ID	Project Name	Resource Type	Nameplate	Counterparty	State
18100	SPI Industrial	Biomass	17 MW	SPI	WA
18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA
18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
18139	[redacted]	Solar + BESS	[redacted] MW BESS	[redacted]	OR
18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
XXXXX	Transmission Redirect**	Transmission	100 MW	BPA Transmission	N/A
18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

The "transmission redirect option" in Table 6 refers to an assumption in the analysis that when Colstrip Units 1&2 shut down, the BPA transmission used to deliver the energy to PSE's load could be "redirected" from Garrison-PSEI, to Mid-C-PSEI. This option assumes that the transmission would be available beginning January 2022 for a 50-year term, thereby providing additional firm capacity for market purchases.

7. Optimization and due diligence process and results ("Phase 2")

The Phase 2 evaluation process took a more rigorous, in-depth look at the most promising RFP proposals, examining risks identified during Phase 1 and subjecting each proposal to further quantitative scrutiny. In Phase 1, PSE gave proposals the benefit of the doubt with regard to unknown or uncertain qualitative and quantitative risks; in Phase 2, we investigated those risks and verified or adjusted our assumptions. Phase 2 included an updated standalone portfolio analysis for each individual candidate proposal based on the most current information available to PSE. Phase 2 also included portfolio optimization analysis to identify the best combination of resources to meet the renewable and capacity resource needs established in the RFP at the lowest reasonable cost.

At the end of Phase 2, the RFP team considered together the results of the updated standalone portfolio analysis, the optimization analysis and the qualitative findings of its cross-functional evaluation team, and recommended to PSE's management a shortlist consistent with the optimized resource portfolio. Shortlisted resources advanced to the final phase of the 2018 RFP, negotiations with counterparties.

Revised candidate list for Phase 2 evaluation

At the end of Phase 1, PSE contacted respondents to provide an update on the status of their proposals. Subsequent to those notifications, PSE received several updates from respondents, adjusting the terms of their proposals. Four of the adjustments resulted in changes to the candidate list, as summarized below.

Added to the candidate list:

- Bonneville Power Administration adjusted the delivery point of its BPA Peak Capacity Product proposal (#18161) from the Mid-C to PSE's load (PSEI.SYSTEM), which allowed PSE to consider the project's contribution to the peak capacity need.
- [redacted] reduced the price of its [redacted] unbundled REC proposal (#UP002), which improved its relative ranking in the quantitative analysis. This proposal was originally submitted as an unsolicited proposal partway through the Phase 1 analysis.
- [redacted] reduced the price of its commercial and industrial curtailment proposal (#18205), which improved its relative ranking in the quantitative analysis.

Removed from the candidate list:

- [redacted] withdrew its [redacted] Solar proposal (#18112) for unspecified reasons at the beginning of Phase 2.

As a result of these changes, the total number of Phase 2 candidate proposals increased to 27.

REDACTED VERSION

Phase 2 qualitative analysis: Due diligence evaluation

The qualitative review began with a goal to investigate the risks and information gaps identified during Phase 1 for each Phase 2 proposal. Risks included development challenges that could delay the proposed commercial operation date of a resource, and issues that could cause operational or reputational harm to PSE, if the Company were to either acquire or enter into an offtake agreement for the proposed resource.

To clarify proposal details and develop a better understanding of perceived risks, the RFP team compiled a series of data requests developed by the subject matter experts (“SMEs”) who performed the Phase 1 qualitative screening. Data requests were organized into the following topics: commercial matters (e.g., counterparty considerations, schedule, proposal terms, etc.), energy delivery (i.e., interconnection and transmission), technical and operations (e.g., technology, operational characteristics, maintenance, etc.), permitting matters (or compliance for existing resources), site control and outreach.

Sample data requests:

- **Commercial** – Does seller intend to continue as the long-term owner and operator of the project after COD?
- **Energy Delivery** – Please provide a status update on the Interconnection Agreement negotiations.
- **Technology** – Please provide site suitability analysis documentation showing that the proposed turbine’s design parameters for average wind speed, turbulence, wind shear, etc. are a good fit for the site.
- **Permitting** – Please provide copies (or links) to all baseline environmental and background studies, permit applications/approvals, staff reports and permits that exist for the project.
- **Site Control** – Please provide copies of deeds, leases and easements necessary for the generation tie-line.
- **Outreach** – Detail any plans for government and key stakeholder outreach to garner support for the project.

SMEs also conducted independent investigations to assess the validity of development plans and risk mitigations using publicly available information sources. Examples of public information sources utilized during the evaluation include, but are not limited to, public permitting meetings (e.g., Oregon EFSC), media reports and information posted on transmission provider OASIS sites.

Phase 2 included weekly meetings, in which the RFP team met with evaluation team SMEs to discuss new information received through data request responses and independent investigation, assess its impact on the qualitative risk assessment of the proposals, and determine whether any additional data requests or other follow-up activities would be necessary to complete the qualitative review. On an as-needed basis, the RFP team sent supplemental data requests or arranged phone conversations between respondents and relevant SMEs to clarify or expand upon certain data request responses.

After completing the Phase 2 qualitative review, SME findings were aggregated and documented in a memorandum format. A summary of these findings is presented in the Executive Summary attached to Appendix D.

Key qualitative findings

At the close of the Phase 2 due diligence review, PSE's evaluation of the candidate proposals was substantially complete and documentation of the evaluation team's findings took a much more critical view of qualitative risks than it had in Phase 1. In general, existing projects without operational issues and development projects backed by experienced developers with bankable plans (e.g., site control achieved, permits secured, etc.) were considered to be substantially less risky than early development projects.

With the exception of the three unbundled REC proposals and the [redacted] Repower proposal (#18132), nearly all of the Phase 2 candidates presented some amount of material risk. Despite this, only two proposals were removed from consideration during Phase 2 based only on qualitative fatal flaws:

- [redacted] **Energy Center (#18105)** proposed by [redacted] proposed expanding PSE's existing [redacted] plant to include a new aeroderivative peaker. The evaluation team ultimately determined that additional thermal development at this site would be extremely risky for both the expansion project and the existing operational plant, particularly with regard to permitting and reputational risks. In addition to significant risks associated with the development project related to permitting, opposition and energy delivery; attempting to modify an existing site could reopen the operating permit for the [redacted] plant and place its existing operating limits under review.

- [redacted] **Unbundled RECs (#18190)** proposed by [redacted] Energy: PSE eliminated this proposal based on a variety of substantial qualitative concerns, including: interconnection uncertainties that could impact the total REC output of the underlying projects, substantial feasibility risks for the underlying projects, potential legal issues associated with the Energy Facility Siting Evaluation Council permitting decision ([redacted] County has applied for judicial review), counterparty risks, and concerns about local opposition related to siting the projects on commercial agricultural land.

These proposals were not included in the Phase 2 portfolio optimization analysis, which is described later in this section, beginning on page 37. Table 7 is an illustrative depiction of the qualitative results associated with the 27 Phase 2 proposals. A more detailed qualitative summary can be found in Appendix D.

REDACTED VERSION

Table 7. ***At-a-glance qualitative risk comparison***

Project Counterparty (Project ID)	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk
SPI Biomass PPA **Sierra Pacific Ind. (18100)**	Operating	BPAT. PSEI					
[redacted] **MT Wind PPA** [redacted] (18169)	Early Develop	[redacted]					
[redacted] **MT Wind PPA** [redacted] (18173)	Early Develop	[redacted]					
[redacted] **REC** [redacted] (18163)	Mature Develop	n/a					
[redacted] **REC** [redacted] (18165)	Mature Develop	n/a					
[redacted] (UP002)	Operating	n/a					
[redacted] **Solar** [redacted] (18111)	Early Develop	Mid-C*					
[redacted] **Solar** [redacted] (18125)	Early Develop	Mid-C					
[redacted] **Solar** [redacted] (18127)	Early Develop	[redacted]					
[redacted] **Solar** [redacted] (18135)	Early Develop	[redacted]					
BPA Peak Cap Sys PPA BPA (18161)	Operating	BPAT. PSEI					
[redacted] **Wind*** [redacted] (18132)	Mature Develop*	Mid-C					
[redacted] **Wind** [redacted] (18179)	Mature Develop	Mid-C					
Golden Hills Wind (shaped / unshaped) Avangrid (18170)	Mature Develop	BPAT.PSEI					
[redacted] (18105)	Early Develop	[redacted]					
[redacted] (18103)	Operating	BPAT.PSEI (or Busbar)					
[redacted] **Solar REC** [redacted] (18190)	Early Develop	n/a					
[redacted] **Solar** (opt. [redacted] 18163)	Early Develop	Busbar					
[redacted] **Solar** [redacted] (18114)	Early Develop	Mid-C					
[redacted] **Wind** [redacted] (18166)	Early Develop	Busbar					
[redacted] **Solar** [redacted] (18122)	Early Develop	Mid-C					
[redacted] **Wind** [redacted] (18175)	Early Develop	[redacted]					
[redacted] **Solar** [redacted] (18131)	Early Develop	BPAT.PSEI (or Busbar)					
[redacted] **Hydro Project** [redacted] (18107)	Operating	[redacted]					
[redacted] **MT Wind PPA** [redacted] (18176)	Early Develop	[redacted]					
[redacted] **Demand Response** (18201)	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D				
[redacted] **Demand Response** (18205)	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D				

Key	
	Low Risk
	Acceptable Risk
	Substantial Material Risk
	Fatal Flaw

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Phase 2 quantitative analysis: Individual proposal analysis and portfolio optimization

Similar to Phase 1, PSE used PSM III and the Aurora dispatch model to perform the quantitative analysis for Phase 2. PSE updated a variety of key assumptions in Phase 2 as new information became available, including its load forecast, gas and power price forecasts, effective load carrying capability ("ELCC") values, and generic resource costs. PSE also updated its pricing scenarios, adding three new scenarios to those it tested in Phase 1, which allowed PSE to stress test proposals in different potential future pricing environments. PSE's models, key assumptions and scenarios are all described in detail in Appendix E.

As shown in Table 8, PSE utilized six scenarios to help answer several key questions. For example, how might economic conditions and load growth affect resource decisions? What are the key decision points and most important uncertainties in the long-term planning horizon, and when should we make those decisions? What impact might very different levels of carbon prices have on resource decisions?

Table 8. ***Modeling scenarios used in Phase 2 analysis***

Scenarios	Phase	WECC /PSE Demand	Gas Price	Generic Resource Costs
1. No carbon tax	1 + 2	Base	Base	Base
2. CO2 (low societal $16/ton)	1 + 2	Base	Base	Base
3. CO2 (mid-societal $42/ton)	1 + 2	Base	Base	Base
4. CO2 (high societal $62/ton)	2	Base	Base	Base
5. No CO2 low load	2	Low	Low	Base
6. No CO2 updated pricing	2	Base	Update	Base

As shown, PSE's scenarios were designed to test a range of potential future carbon costs, from $0/ton to as high as $62/ton. This analysis offered insights into how portfolio costs might be affected by potential carbon legislation. The Scenario 2 low societal cost of carbon assumption ($16/ton) is based on a Washington state carbon tax proposed in Initiative 1631, which failed to pass at the ballot box in November 2018. The Scenario 3 mid-societal ($42/ton) and Scenario 4 high societal ($62/ton) cost of carbon assumptions are based on estimates from the United States Government Interagency Working Group's technical support document on the social cost of carbon, which was published in August 2016.[27] Scenario 6 reflects updated pricing as a result of California Senate Bill 100, which sets a statewide renewable energy requirement of 100 percent renewables by 2045.

In addition to updating its modeling assumptions and scenarios, PSE hired DNV GL to perform a reasonableness check of the net capacity factors for all Phase 2 wind and solar projects to ensure that

[27] *"Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866, Interagency Working Group on Social Cost of Greenhouse Gases," United States Government, Aug. 2016.*

proposed outputs were not overestimated by developers. Additionally, the consultant developed a stochastic analysis of the hourly outputs for PSE to use in resource adequacy and integration modeling. In general, DNV GL found that the net capacity factors provided by the respondents were reasonable with one exception. DNV GL's analysis indicated that the [redacted] Tribe presented a very optimistic view of the potential output from the proposed [redacted] Wind Project (#18176).

Updated economic analysis of individual proposals

In Phase 2, PSE updated its standalone portfolio analysis for each candidate proposal based on the most current information available to PSE at the time the analysis was conducted. Changes included updated assumptions and scenarios as described on page 37. PSE also included new proposal information received from respondents through data requests and other updates. Proposals were individually re-ranked in Phase 2 using the key metrics produced by PSM III: portfolio benefit, levelized net cost per kW or REC, levelized portfolio benefit per kW or REC, levelized cost, and portfolio benefit ratio. Overall, the standalone analysis process in Phase 2 was fundamentally the same as the Phase 1 process described in Section 6.

While this analysis is useful for the purposes of comparing and ranking proposals on a standalone basis, it does not consider the benefits of resource combinations to meet the combined resource needs of the RFP. It cannot take into account the efficiencies and economic benefits of pooling resources with complementing attributes or an optimally-sized solution to meet both the renewable and capacity resource needs. In other words, it does not account for the fact that a lower individually ranked resource (from a portfolio benefit perspective) could be part of a lowest reasonable cost, best-fit to need solution in the optimal portfolio because its unique "fit" provides economic savings when paired with other resources. For this reason, PSE uses a portfolio optimization approach to analyze and identify the optimal resource portfolio.

Updated standalone portfolio analysis results and rankings for Phase 2 proposals are presented in Appendix D. See also Appendix E for details about the 2018 RFP models, key assumptions, scenarios and metrics.

Portfolio optimization analysis

The Phase 2 quantitative evaluation included optimization analysis to identify the lowest reasonable cost, best-fit solution to meet PSE's renewable and capacity resource needs with a combination of RFP resources. In the standalone analysis, proposals were compared with each other only indirectly. In that analysis, the portion of any renewable or peak capacity need not supplied by the analyzed project were met with generic resources. In the portfolio optimization analysis, the renewable and peak capacity resource needs are fully met with RFP resources.

Six proposals were eliminated during Phase 2 prior to the optimization analysis. The [redacted] Energy Center (#18105) and [redacted] Unbundled REC (#18190) proposals were eliminated based on qualitative fatal flaws discussed on page 35. Four additional proposals were eliminated based on a combination of quantitative and qualitative findings, as described below:

- [redacted] **Montana Wind Project (#18176)** proposed by the [redacted] Tribe: As described above, this proposal was eliminated based on third-party review of net capacity factors

REDACTED VERSION

provided by the seller, which were determined to be unrealistic. PSE further determined that the seller had not yet erected meteorological towers on site to verify or support the proposed output. This proposal was removed from consideration and was not included in either the Phase 2 standalone portfolio analysis or the optimization analysis.

- [redacted] **Hydro (#18107)** proposed by [redacted] Energy: This proposal was eliminated prior to the optimization analysis because the RFP evaluation team determined that the run-of-river asset provided little capacity value and was not RPS-compliant. Furthermore, the proposal left what appeared to be a complex and potentially risky energy delivery strategy to PSE.

- [redacted] **Demand Response (#18201)** and [redacted] **Demand Response (#18205):** PSE updated certain assumptions in Phase 2 as new information became available, which substantially reduced ELCC and T&D deferral values for demand response proposals.[28] Over the course of the RFP, the ELCC value for demand response programs dropped by about 50 percent compared to the 2017 IRP (from 77 percent in the 2017 IRP to 38 percent in the 2019 IRP). This change reflects updates to align 2018 RFP assumptions with current 2019 IRP assumptions.[29] As a result of this change, the cost of demand response roughly doubled on a per megawatt basis (assuming no change to the pricing), because twice as much of the same resource would be required to achieve the same peak capacity contribution. Additionally, in Phase 1 PSE gave demand response programs a substantial T&D deferral benefit consistent with its "benefit of the doubt" approach to preliminary screening; however, the RFP team was unable to validate this benefit in its Phase 2 due diligence evaluation. As a result of these changes, demand response was determined not to be cost effective compared to alternatives in this RFP.

  In addition, the demand response proposals had qualitative risks, including uncertainties associated with integrating the programs with PSE's forthcoming distribution energy resource management ("DERM") system. The RFP team also had feasibility concerns about the aggressive ramping schedule of the [redacted] program (#18201) and counterparty concerns (i.e., experience and financial performance) with regard to the [redacted] proposal (#18205). The demand response proposals were, therefore, removed from consideration and were not included in either the Phase 2 standalone portfolio analysis or the optimization analysis.

This left 21 proposals for portfolio optimization, six of which were capacity proposals. Due to the limited number of projects featuring a substantial contribution to capacity, filling the peak capacity need was the primary constraint in the optimization analysis. The renewable resource need was filled coincidentally by projects with dual value renewable (RPS-compliant) and capacity attributes. Three of the four proposals selected in the optimal portfolio featured dual value attributes: the [redacted] Wind Project (#18169), the Golden Hills Shaped Wind Project (#18170), the SPI Burlington Biomass Cogen (#18100), and BPA's Peak Capacity Product (#18161).

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[28] *Key assumptions used in the RFP analysis, including ELCC and T&D deferral values, are presented in Appendix E.*
[29] *ELCC assumptions were updated twice during the RFP, first for Phase 1 to align with then-current draft 2019 IRP assumptions and second to align Phase 2 with final 2019 IRP assumptions.*

Optimization analysis results are presented in Appendix D. See also Appendix E for a detailed discussion of the optimization process, findings and results. This appendix also describes the models, key assumptions, scenarios and metrics used in the analysis.

Phase 2 Results: The short list

The RFP team completed its 2018 RFP analysis and presented a recommended shortlist to its Energy Management Committee ("EMC") in June 2019. At that meeting, the team sought and received officer approval to begin negotiations with the selected counterparties.

Table 9. ***Short List Resource Selections***

Project Counterparty (Project ID)	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk
SPI Biomass PPA **Sierra Pacific Ind. (18100)**	Operating	BPAT. PSEI					
[redacted] **MT Wind PPA** [redacted] (18169)	Early Develop	[redacted]					
BPA Peak Cap Sys PPA BPA (18161)	Operating	BPAT. PSEI					
Golden Hills Wind (shaped / unshaped) Avangrid (18170)	Mature Develop	BPAT.PSEI					

To mitigate risk exposure and maximize optionality during negotiations, four projects were selected as backup options. These proposals fared well in the analysis, but were not selected as part of the optimal portfolio. Backup options included [redacted] Montana Wind Project (#18173), [redacted] Power Project (#18103), [redacted] Project (#18132) and [redacted] Solar Project (#18131). The RFP team brought forward the [redacted] Power Project (#18103) as a backup in the case risks surrounding the Colstrip Transmission System are realized to an extent that delivery of Montana wind becomes impossible, or prohibitively expensive. These risks were to be realized, both [redacted] (#18169) and [redacted] (#18173) would be removed from consideration as they both plan to interconnect and deliver energy to PSE using this transmission path. Because [redacted] does not contribute to PSE's renewable need, [redacted] (#18132) and the [redacted] Solar (#18131) would be needed to meet the renewable resource need in the absence of Montana wind.

REDACTED VERSION

Independent Energy Assessment

Three of the four selected proposals were renewable energy projects featuring a contribution to peak capacity. The capacity value from the Golden Hills Wind Project (#18170) was guaranteed via the shaped product and the SPI Burlington Biomass Cogen (#18100) is a baseload resource with a strong operating history. This left [redacted] (#18169) as the only selected project featuring a strong promised contribution to peak capacity with little offered security beyond any guarantees that might be built into the agreement.

To obtain third-party verification of the seller's claims prior to signing agreements, PSE hired DNV GL to perform an independent wind resource assessment. Additionally, DNV GL would determine whether the [redacted] (#18169) wind shape matches analysis performed by [redacted], a subsidiary of the [redacted] parent company. DNV GL was chosen to perform this analysis based on their expertise in conducting bankable energy assessment reports. The deliverables for this analysis were:

- **Energy Assessment –** included to provide an estimation of long-term wind speed, virtual MET data, central estimate of wind speed and energy production, uncertainties and deviations,
- **Transmission Line Loss Estimate –** requested due to the abnormally long [redacted]-mile generation tie line, and
- **Stochastic Analysis –** included to provide understanding of uncertainty pertaining to the Energy Assessment; will be used as a basis for contractual guarantees.

The DNV GL analysis obtained in late-September 2019 largely corroborated [redacted] claims. [redacted] assessed a P50 net capacity factor of [redacted] percent; whereas, DNV GL's analysis resulted in a P50 net capacity factor of [redacted] percent.

8. Re-evaluation of resource alternatives ("Phase 2 Update")

Subsequent to receiving EMC approval to initiate negotiations discussions for the 2018 RFP shortlisted resources, PSE received two new unsolicited proposals:

- from [redacted] on August 29, 2019 (#UP005), an offer to either purchase their interest in the [redacted] natural gas-fired combined cycle facility ([redacted] percent)[30] or offtake power via a 7-year tolling PPA with delivery to BPA's [redacted] Substation, beginning September 1, 2022; and

- from Morgan Stanley Commodities Group ("MSCG") on October 23, 2019 (#UP006), a 3 to 5 year seasonally shaped, heavy load hour ("HLH") PPA with various product structure and pricing options, for up to 100 MW of system power delivered to BPAT.PSEI beginning January 1, 2022.[31]

PSE also received updated pricing for three of the 2018 RFP resources between August and November 2018: the [redacted] (#18173) (lower price), the BPA Peak Capacity Product (#18161) (higher price) and the SPI Burlington Biomass Project (#18100) (lower price).

PSE customarily considers new and unsolicited information and re-evaluates its resource decisions to ensure that the Company selects the lowest reasonable cost solutions to meet customer needs, consistent with resource acquisition prudence rules and policies including WAC 480-107. As such, PSE performed an updated optimization analysis of its resource alternatives between August and November 2019. To ensure that the lowest reasonable cost, best fit combination of alternatives available would be selected, PSE included in its updated analysis all of the original RFP Phase 2 optimization resources, the two new proposals and the pricing updates previously described.

Phase 2 Update: Optimization analysis

The optimization analysis process followed for the Phase 2 Update was fundamentally the same as the Phase 2 process described in Appendix E, using the same models and metrics, and many of the same assumptions as Phase 2. However, PSE did update certain assumptions on an as-needed basis to reflect the most current information available at the time of the analysis, including the following changes:

- updated peak capacity need consistent with PSE's revised 2019 IRP Progress Report filed December 10, 2019,

- updated Mid-C power price forecast (a 20 percent reduction from the previous forecast),[32]

[30] [redacted]. *The facility nameplate capacity is* [redacted] *MW (including 20 MW of duct firing).* [redacted] *51 percent share amounts to approximately* [redacted] *MW of nameplate capacity.*
[31] *MSCG is offering a 0 emissions (no RECs) system PPA.*
[32] *Updated power price forecast is consistent with the September 19, 2019 IRTAG #8 publication, which was presented to the 2019 IRP Technical Advisory Group, the public stakeholder group which helps to provide input and guidance to PSE's long-term resource planning process.*

REDACTED VERSION

- adjusted social cost of carbon assumptions based on guidance from WUTC docket U-190730, dated September 12, 2019 (2.5 percent discount rate scenario, 0.437/ton/MWh market purchase carbon intensity),
- assumed retirement of Colstrip units 1 and 2 by 2020, and
- considered the impact on the capacity need of the sale of Colstrip unit 4, which was announced in December 2019.

The Phase 2 Update optimization analysis results are presented in Appendix D. See also Appendix E for a detailed discussion of the optimization process and results, and the assumptions used in the re-evaluation analysis.

Revised short list

PSE completed its re-evaluation analysis in November 2019 and presented its revised recommended short list to the EMC on November 21, 2019. PSE presented the results of its 2018 RFP and re-evaluation to the WUTC on December 20, 2019. The results of the analysis confirmed the selection of the original Phase 2 shortlist and added one additional resource:

- [redacted] **Wind PPA (#18169),** a 25-year fixed price power purchase agreement ("PPA") delivering up to [redacted] MW[33] of the output from a Montana wind development project to the [redacted] Substation, beginning as early as December 2021;[34]
- **Golden Hills Shaped Wind PPA (#18170),** a 20-year fixed price power purchase agreement ("PPA") delivering to BPAT.PSEI the output from a 200 MW wind development project paired with shaped capacity up to [redacted] MW during winter peak hours[35], beginning in December 2021;
- **SPI Biomass PPA (#18100),** a 17-year fixed price power purchase agreement ("PPA") delivering 17 MW of firm capacity (and up to an additional 3 MW of variable energy) from a biomass project located on PSE's system to the Fredonia Substation, beginning in January 2021;
- **BPA Peak Capacity Product (#18161),** a 5-year capacity tolling agreement ("CTA") for firm capacity delivered to BPAT.PSEI that may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis, beginning in January 2022.
- (New) **Morgan Stanley System PPA (#UP006),** a 5-year fixed price system PPA for 100 MW of firm heavy load hour ("HLH")[36] energy delivered in Q1 and Q4 only, beginning in January 2022.[37]

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[33] *Actual contract capacity is expected to be dependent upon the outcome of required transmission studies.*
[34] *Actual contractual commercial operation date ("COD") may be later, depending upon the outcome of required transmission studies.*
[35] *Shaped schedule: November through February, hours ending ("HE")* [redacted] *and* [redacted].
[36] *Heavy load hour ("HLH") means hours ending ("HE") 7-11 Monday through Saturday except NERC holidays.*
[37] *MSCG is offering a 0 emissions (no RECs) system PPA.*

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PSE's analysis recommends adding the MSCG 5-year system power PPA (#UP006) as part of an optimal portfolio solution to help mitigate remaining need not met by the original short list, including need expected to result from the announced sale of Colstrip Unit 4. Additionally, MSCG offers benefits such as: (1) delivery to PSE's system, (2) seasonal shaping and heavy load hour shaping to help meet demand when capacity is most needed and minimize surplus off peak, and (3) a zero emission product (without RECs) that is consistent with Washington laws and policy preferences for low and no emission energy resources.

PSE's analysis shows that when combined with the Company's existing electric resource portfolio, the revised short list represents the most favorable combination of resources to best meet PSE's renewable and capacity needs at the lowest reasonable cost and risk.

9. Next steps

PSE has begun to negotiate with counterparties for selected resources. During negotiations, PSE will continue to update its economic and risk analysis on an as-needed basis to reflect any additional or revised factors that may impact the economics of a proposed resource.

At the conclusion of the RFP, the acquisition team intends to engage in a lessons learned analysis to consider how we might introduce new efficiencies, and improve processes and tools while maintaining a high standard of prudent decision-making. This is important because the 2018 RFP was the largest All Resources RFP to date with nearly double the number of proposals received than our next largest RFP. Our need for new resources is expected to grow substantially over the next two and a half decades, due to expected load growth, retiring resources and expiring contracts, and new requirements associated with the Clean Energy Transformation Act. As such, continually striving to increase our ability to make timely, prudent decisions related to resource acquisitions will continue to be a critical piece of our success in meeting the electric resource needs of our customers at the lowest reasonable cost.

PSE PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

Appendix A. Proposal List

2018 All Resources RFP Proposal List

Confidential

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Selected for Phase 2	18100	Biomass	SPI Burlington	Sierra Pacific Industries	Mt. Vernon	WA	Operating	3/1/07	1/1/21	12/31/37	17-yr Project PPA	17	n/a	28	Cogen facility based on McBurney boiler and Siemens ST and generator	Directly connected to PSE's Fredonia Sub	Same as POI
Not selected	18101	Biomass	[redacted]	[redacted]	[redacted]	WA	Operating	7/1/09	7/1/21	9/30/28	7-yr + 3 month Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Puget Sound Energy
Not selected	18102	Biomass + BESS	[redacted]	[redacted]	[redacted]	WA	Development	Q2 2022	6/30/2022	Unspecified	Project PPA (term length unspecified)	[redacted]	[redacted]	[redacted]	[redacted]	Unspecified- location in [redacted] potential POI	Unspecified
Selected for Phase 2	18103	Nat Gas Turbine CCCT	[redacted]	[redacted]	[redacted]	OR	Operating	8/1/02	9/1/22	8/31/32	10-yr Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 500kV	PSE service territory
Not selected	18104	Nat Gas Turbine CCCT	[redacted]	[redacted]	[redacted]	WA	Operating	12/31/08	2022	TBD	5/10-yr Tolling PPA / Asset Sale / 2022-2024 HR Call Option + Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA's [redacted] 230kV substation	Multiple
Selected for Phase 2	18105	Nat Gas Turbine SCCT	[redacted]	[redacted]	[redacted]	WA	Development	10/1/21	10/1/21	10/1/26	5-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]
Not selected	18106	Geothermal	[redacted]	[redacted]	[redacted]	NV	Construction	9/1/19	9/1/19	8/31/39	20-yr Project PPA for output from two projects	[redacted]	[redacted]	[redacted]	[redacted]	NV Energy North System	BPAT.PSEI tie point
Selected for Phase 2	18107	Hydro - Run-of-River	[redacted]	[redacted]	[redacted]	ID	Operating	4/1/93	1/1/19	1/1/39	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]		[redacted] Substation
Not selected	18108	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/15/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA [redacted] 230 kV line	BPAT.PSEI
Not selected	18109	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/15/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA [redacted] 115 kV line	BPAT.PSEI
Not selected	18110	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	8/1/2021	n/a	n/a	Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Selected for Phase 2	18111	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	Switch or tap on [redacted] 230kV line [redacted]	PSE System
Withdrawn in Phase 2	18112	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	12/1/22	12/1/47	25-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230 kV tx line	[redacted]
Not selected	18113	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	9/15/22	9/15/22	9/15/2037 or 9/15/42	15/20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	Busbar	
Selected for Phase 2	18114	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/1/21	12/1/21	12/1/41	20-yr Project PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	230 kV [redacted] Line Tap	PSE System
Not selected	18115	Solar - PV	[redacted]	[redacted]	[redacted]	MT	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] substation 230kV busbar	[redacted] substation 230kV busbar
Withdrawn in Phase 1	18116	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	12/1/22	12/1/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] ring buss switchyard adjacent to the [redacted] Substation	Point of Interconnection
Withdrawn in Phase 1	18117	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/31/20	12/31/20	12/31/40	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation	PSE System
Not selected	18118	Solar - PV	[redacted]	[redacted]	[redacted]	OR	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115kV transmission line	BPAT.PSE
Not selected	18119	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation 230kV busbar	Mid-C
Not selected	18120	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	230kV busbar of the [redacted] Substaiton	BPAT.PSE
Not selected	18121	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	12/1/22	12/1/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	Extension of existing 230kV equipment at the [redacted] Substation	Point of Interconnection
Selected for Phase 2	18122	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation 230 kV busbar	[redacted] Substation 230 kV busbar

REDACTED VERSION

2018 All Resources RFP Proposal List

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Not selected	18123	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation	[redacted] Substation
Withdrawn in Phase 1	18124	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	12/1/22	12/1/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	230kV Buss at the [redacted] Substation	Point of Interconnection
Selected for Phase 2	18125	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] substation	[redacted] substation
Withdrawn in Phase 1	18126	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	12/1/22	12/1/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115kV Dead-End adjacent to the [redacted] Substation	
Selected for Phase 2	18127	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/15/2037 or 12/15/2042	15/20-yr PPA	[redacted]	[redacted]	[redacted]	[redacted]	Busbar	
Not selected	18128	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	6/1/2022	6/1/2022	6/1/2047	25-year Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	PSE System [redacted]	On PSE System
Not selected	18129	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/28/20	12/28/20	12/28/40	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	PacifiCorp 230 kV [redacted] transmission line	Propose 3 options: busbar, 230 kV [redacted], substation, 230 kV [redacted] substation
Not selected	18130	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/15/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA's N. Bonneville - [redacted]	BPAT.PSEI
Selected for Phase 2	18131	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/47	25-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	Line-tap of BPA's [redacted] 115kV line	BPAT.PSEI
Selected for Phase 2	18132	Wind - on shore + Solar - PV + BESS options	[redacted]	[redacted]	[redacted]	OR	Development	12/1/2020 Wind, 9/30/2022 Solar + BESS	12/1/2020 Wind, 9/30/2022 Solar + BESS	11/30/2040 Wind, 9/29/2042 Solar + BESS	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation 230 kV bus	Mid-C Hub
Not selected	18133	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA [redacted] 115 kV Transmission Line	BPA [redacted] 115 kV Transmission Line
Not selected	18134	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/31/2022	1/1/2023	12/31/2042	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230kV tx line, located on site	High-side of the GSU transformer from 34.5kV to 230kV at on-site sub
Selected for Phase 2	18135	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation	
Not selected	18136	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	9/1/22	9/1/22	8/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]		115 kV [redacted] Line
Not selected	18137	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	9/1/22	9/1/22	8/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]		115 kV [redacted] Line

REDACTED VERSION

2018 All Resources RFP Proposal List

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Not selected	18138	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	MT	Development	1/1/22	1/1/22	12/31/42	20-yr Project PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	500kV bus at the [redacted] Substation	Same as the POI
Selected for Phase 2	18139	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	12/31/22	12/31/22	12/31/37	10/15-yr Project PPA (confirm offer term)	[redacted]	[redacted]	[redacted]	[redacted]	BPA 230 kV [redacted] (either circuit depending on studies) [redacted]	BPA 230 kV [redacted] (either circuit depending on studies) [redacted]
Not selected	18140	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/15/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA's [redacted] 115 kV line	BPAT.PSEI
Not selected	18141	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/29/47	25-yr take or pay PPA w purchase options / 25-yr fixed PPA	[redacted]	[redacted]	[redacted]	[redacted]	230 kV bus of [redacted] substation [redacted] WA	230 kV bus of [redacted] substation [redacted] WA
Not selected	18142	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	9/30/22	9/30/22	9/29/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation 230 kV bus	BPA [redacted] 230 kV
Not selected	18143	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	12/31/2020	n/a	n/a	Asset sale	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation	Point of Interconnection
Not selected	18144	Storage - battery	[redacted]	[redacted]	[redacted]	WA	Development	12/31/21	12/31/21	12/31/41	10/20-yr Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	230kV bus of the [redacted] Substation	230kV bus of the [redacted] Substation
Not selected	18145	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/30/42	20-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 100kV substation	[redacted] 100kV substation
Not selected	18146	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/2022	9/30/2022	9/30/2042	20-yr Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	115kV bus at [redacted] Substation	[redacted] Substation
Not selected	18147	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/1/22	9/1/22	8/31/32	10/20-yr Storage Capacity Contract	[redacted]	[redacted]	[redacted]	[redacted]	115 kV line in PSE service territory	115kV bus at [redacted] Substation
Not selected	18148	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	12/1/22	8/1/22	8/30/42	20-yr Capacity Agreement / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Collector 230 kV	[redacted] PSEI.SYSTEM. However,
Not selected	18149	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/23	9/30/23	9/30/42	20-25-year Storage Agreement	[redacted]	[redacted]	[redacted]	[redacted]	PSE	PSE [redacted]
Not selected	18150	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/23	9/30/23	9/30/42	20-yr StorageTolling PPA	[redacted]	[redacted]	[redacted]	[redacted]		Site of PSE Choice
Not selected	18151	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/2018	9/30/2018	9/30/2038	20-yr Storage Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	PSE's [redacted] Substation 115 kV bus	PSE's [redacted] Substation 115 kV bus
Not selected	18152	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/30/42	20-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230kV substation	[redacted] 230kV substation
Not selected	18153	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/23	9/30/23	9/30/42	20-25-year PPA	[redacted]	[redacted]	[redacted]	[redacted]		[redacted] Substation at Cogeneration Facility
Not selected	18154	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/2022 or 1/1/2023	9/30/2037 or 1/1/ 2038	15-yr Tolling PPA, Purchase Option in Yr 5	[redacted]	[redacted]	[redacted]	[redacted]		[redacted] Substation 115 kV
Not selected	18155	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/2022 or 1/1/2024	9/30/2037 or 1/1/ 2039	15-yr Tolling PPA, Purchase Option in Yr 6	[redacted]	[redacted]	[redacted]	[redacted]		[redacted] Substation 115 kV

REDACTED VERSION

2018 All Resources RFP Proposal List

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Not selected	18156	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/30/42	20-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115 kV Substation	[redacted] 115 kV Substation
Not selected	18157	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/30/42	20-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115 kV Substation	[redacted] 115 kV Substation
Not selected	18158	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	9/30/22	9/30/22	9/30/42	20-yr Tolling PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115 kV Substation	[redacted] 115 kV Substation
Not selected	18159	Storage - Pumped Hydro	[redacted]	[redacted]	[redacted]	WA	Development	10/1/2025	1/1/2026	12/31/2065	40-yr PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 500-kV yard, [redacted]	500kV [redacted] Substation
Not selected	18160	Storage - Pumped Hydro	[redacted]	[redacted]	[redacted]	MT	Development	3/1/2023	3/1/2023	3/1/2043	20-yr Project PPA / Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 500 kV substation between [redacted], Montana	Same as Point of Interconnection
Added to Phase 2 - new delivery point	18161	System PPA - Peak Capacity Product	BPA Peak Capacity Product	BPA	n/a	WA	n/a	n/a	1/1/22	12/31/26	5-year call option	100	n/a	n/a	n/a	n/a	Mid-C
Not selected	18162	Unbundled RECs	[redacted]	[redacted]	[redacted]	OR	Development	1/1/2022	1/1/2022	12/31/2031	10-year REC Purchase Agreement for 100,000 RECs per year	[redacted]	[redacted]	[redacted]	[redacted]	n/a	n/a
Selected for Phase 2	18163	Unbundled RECs	[redacted]	[redacted]	[redacted]	OR	Development	12/31/2019	1/1/2022	12/31/2038	17-year REC purchase agreement	[redacted]	[redacted]	[redacted]	[redacted]	n/a	various
Not selected	18164	Unbundled RECs	[redacted]	[redacted]	[redacted]	OR	Development	6/1/2017	1/1/2022	12/31/2038	17-year REC purchase agreement	[redacted]	[redacted]	[redacted]	[redacted]	n/a	Various
Selected for Phase 2	18165	Unbundled RECs	[redacted]	[redacted]	[redacted]	OR	Development	12/31/2019	1/1/2022	12/31/2038	17-year REC purchase agreement	[redacted]	[redacted]	[redacted]	[redacted]	n/a	[redacted] Substation
Selected for Phase 2	18166	Wind - on shore	[redacted]	[redacted]	[redacted]	OR	Development	12/31/20	12/31/20	12/31/45	Development Asset Purchase / BOT / 25-yr PPA / Prepaid PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] BPA substation located on the 230kV [redacted] transmission line	PSE System
Not selected	18167	Wind - off shore	[redacted]	[redacted]	[redacted]	WA	Development	12/31/2029	1/1/2030	12/31/2054	25-yr Project PPA / Asset purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] WA	[redacted] WA
Not selected	18168	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Operating	10/4/10	10/4/20	10/3/25	Assignment of existing PPA (last 5 years)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation	[redacted] Substation
Selected for Phase 2	18169	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	12/31/20	12/1/20	11/30/40	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	500 kV [redacted] substation	500 kV [redacted] substation
Selected for Phase 2	18170	Wind - on shore + System PPA	Golden Hills Wind + Winter System PPA	Avangrid Renewables	The Dalles	OR	Development	12/31/20	12/31/20	12/31/40	20-yr Project PPA + Winter System PPA	200 Wind + [redacted]	n/a	200	42 Vestas V150 4.2 MW Turbines + 9 Gamesa G114 2.625 MW Turbines	New Breaker at 230kV Biglow Canyon Substation	PSE System
Not selected	18171	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	12/31/21	12/31/21	12/31/41	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115 kV Switching Station	Four options: 1) BPAT.PSEI, 2) [redacted] PUD, 3) Mid-C, 4) Project Busbar
Not selected	18172	Wind - on shore	[redacted]	[redacted]	[redacted]	OR	Development	1/1/21	1/1/21	12/31/35	15-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA - [redacted] 230kV	BPAT.PSEI
Selected for Phase 2	18173	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] substation on the 500kV [redacted] Transmission Line between [redacted]	[redacted] substation on the 500kV [redacted] Transmission Line between [redacted]
Not selected	18174	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	12/1/20	12/1/20	12/31/50	Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230 kV system [redacted] substation.	[redacted] 230 kV system [redacted] substation.
Selected for Phase 2	18175	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	10/31/20	11/1/20	10/31/45	25-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA [redacted] 115 kV Substation	BPA [redacted] 115 kV Substation

REDACTED VERSION

REDACTED VERSION

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Selected for Phase 2	18176	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	12/31/22	12/31/22	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Not selected	18177	Wind - on shore + Solar - PV + BESS options	[redacted]	[redacted]	[redacted]	WA	Development	12/15/21	12/15/21	12/14/41	Development Asset Purchase / BOT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] point on BPA [redacted] 230kV	Preliminary: Mid-C
Not selected	18178	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	12/31/22	1/1/23	12/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA 115kV [redacted] substation	BPA 115kV [redacted] substation
Selected for Phase 2	18179	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	12/1/21	12/1/21	12/1/41	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	230 kV [redacted] Line Tap	PSE System
Not selected	18180	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	1/1/21	1/1/21	1/1/41	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]		busbar
Not selected	18181	Wind - on shore	[redacted]	[redacted]	[redacted]	OR	Development	12/31/20	n/a	n/a	Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	230kV [redacted] transmission or the 115/230kV [redacted] substation	BPAT.PSE
Not selected	18182	Wind - on shore	[redacted]	[redacted]	[redacted]	WA	Development	12/15/22	12/15/22	12/14/42	Development Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] point on BPA [redacted] 500kV	Preliminary: Mid-C
Not selected	18183	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	6/1/20	6/1/20	6/1/30	10-yr Project PPA / BOT Asset Purchase	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] on a 230 kV Line, where we will interlink with BPA to then deliver energy to PSE	BPA [redacted] 230kV
Not selected	18184	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	WA	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] substation	[redacted] substation
Not selected	18185	Wind - on shore	[redacted]	[redacted]	[redacted]	MT	Development	12/31/20	12/31/20	12/31/40	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230 kV substation	Mid-C
Not selected	18186	Geothermal	[redacted]	[redacted]	[redacted]	ID	Development	1/1/2024	1/1/2024	12/31/1943	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Substation, Idaho	BPAT.PSEI
Not selected	18187	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	10/31/22	10/31/22	10/31/42	20-yr Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 230 kV bus	[redacted] 230 kV bus
Not selected	18188	NatGas Turbine - Recip	[redacted]	[redacted]	[redacted]	WA	Development	4/15/21	n/a	n/a	Asset purchase - EPC offer	[redacted]	[redacted]	[redacted]	[redacted]		High side of GSU at your [redacted] power plant
Not selected	18189	Storage - Battery	[redacted]	[redacted]	[redacted]	WA	Development	8/1/20	8/1/20	7/31/40	20-yr Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 115 kV Substation [redacted]	[redacted] Substation
Selected for Phase 2	18190	Unbundled RECs	[redacted]	[redacted]	[redacted]	WA	Development	10/31/2019	10/31/19	10/31/29	10-year REC purchase agreement (from 5 solar farms totalling 25 MW ac)	[redacted]	[redacted]	[redacted]	[redacted]	Various	PSE distribution system
Unsolicited offer received in Phase 2 - Not cost competitive	New offer UP005	Solar - PV	[redacted]	[redacted]	[redacted]	WA	Development	12/2020	12/2020	12/2040	20-year Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	TBD - 115 kV [redacted] line [redacted] or BPA [redacted] Substation	POI
Not selected	UP001 Unsolicited Proposal	Storage - Pumped Hydro	[redacted]	[redacted]	[redacted]	WA	Development	2025-2026	Unspecified	Unspecified	Long-term Project PPA / Ownership	[redacted]	[redacted]	[redacted]	[redacted]	BPA or PSE	Unspecified
Added to Phase 2 - new lower price	UP002 Unsolicited Proposal	Unbundled RECs	[redacted]	[redacted]	[redacted]	ID	Operating	2/23/2017	2020	2029	10-year REC purchase agreement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	n/a
Unsolicited offer received in Phase 2 - Not cost competitive	UP003 Unsolicited Proposal	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	12/1/2022	12/1/22	12/1/47	25-year Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	500 kV BPA [redacted]	POI
Unsolicited offer received in Phase 2 - Not cost competitive	UP004 Unsolicited Proposal	Solar - PV + BESS	[redacted]	[redacted]	[redacted]	OR	Development	12/1/2022	12/1/22	12/1/47	25-year Project PPA	[redacted]	[redacted]	[redacted]	[redacted]	138 kV BPA [redacted] Substation	POI

REDACTED VERSION

2018 All Resources RFP Proposal List

Status	Project ID	Resource type (as proposed)*	Project name	RFP counterparty	City / County	State/ Province	Status	COD	Term Start Date	Term End Date	Commercial Structure	Capacity (MW)	Storage Resource Duration (MWh)	Facility Capacity (MW)	Generation Technology (make, model & # units)	Tx Interconnection	Tx Delivery Point
Received after Phase 2 - 08/20/19	UP005 Unsolicited Proposal	Nat Gas Turbine CCCT	[redacted]	[redacted]	[redacted]	WA	Operating	2002	9/1/22	9/1/29	Asset sale or 7-year Tolling PPA	[redacted]	[redacted]	[redacted]	[redacted]	BPA's [redacted] 230 kV Substation	POI
Received after Phase 2 - 10/23/19	UP006 Unsolicited Proposal	System PPA - Seasonal HLH (no carbon, no RECs)	MSCG System PPA - Carbon Free	Morgan Stanley Commodities Group	n/a	WA	n/a	n/a	1/1/22	12/31/26	3-5 year system PPA for carbon free (no RECs) firm flat seasonal shaped heavy load hour (HLH) delivery	50-100	n/a	100	n/a	n/a	BPAT.PSEI

REDACTED VERSION

Confidential

2018 Demand Response RFP Proposal List

Status	Project ID	Resource type	Project name	RFP counterparty	City	State/ Province	Term Start Date	Term End Date	Capacity (MW)
Not selected	18200	Direct Load Control	[redacted]	[redacted]	[redacted]	NC	2019	2023	[redacted]
Selected for Phase 2	18201a	Direct Load Control	[redacted]	[redacted]	[redacted]	WA	2023	2028	[redacted]
Not selected	18202	Direct Load Control	[redacted]	[redacted]	[redacted]	MN	2019	2028	[redacted]
Not selected	18203	Direct Load Control	[redacted]	[redacted]	[redacted]	CA	2019	2023	[redacted]
Not selected	18204	C&I Curtailment	[redacted]	[redacted]	[redacted]	Canada	2019	2023	[redacted]
Added to Phase 2 - reduced price	18205	C&I Curtailment	[redacted]	[redacted]	[redacted]	MA	2019	2023	[redacted]

REDACTED VERSION

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document:

Appendix B. Evaluation Criteria

Evaluation Criteria

PSE's evaluation of new long-term electric generation resources is based on an assessment of five primary criteria:

- Compatibility with resource need
- Cost minimization
- Risk management
- Public benefits
- Strategic and financial

Each criterion is further delineated into more detailed criteria elements, as described in the following tables.

1. Compatibility with Resource Need

Criteria Element	Description
1. Timing	PSE prefers proposals that offer: • energy and/or capacity in a time frame consistent with PSE's needs • substantial assurance of being commercially available according to the schedule proposed • flexibility in development schedule and/or contract start date to accommodate PSE's timing needs
2. Match to need through ownership	Proposals that offer generation from an underlying asset that closely matches PSE's annual capacity requirements, or that offer output which can be controlled by PSE are preferred to those that rely on shaping through short- or long-term arrangements.
3. Match to need through contract	PSE prefers proposals that provide a fixed annual price and closely match PSE's annual capacity requirements. PSE seeks proposals that provide fixed transmission capacity from BPA's system to PSE's system and closely match PSE's annual capacity requirements.

Criteria Element	Description
4. RPS requirement	Proposals in which qualified renewable generation and/or RECs are closely aligned with PSE's renewable need as mandated by the Energy Independence Act, Chapter 19.285 RCW.
5. Operational flexibility	PSE prefers proposals that offer control of project output whereby the Company may respond to seasonal and real-time fluctuations in load/resource balance and system reliability events. This includes, for example, dispatch or displacement of the project in real time and, for jointly-owned projects, the ability for PSE to elect to use generation output that would otherwise be displaced by the other owner for reliability purposes. Additionally, PSE prefers proposals that provide the ability to carry operating reserves.
6. Performance within existing PSE generation portfolio	Analyses will include such factors as: • impact on system reliability • system dispatch and displacement • location with respect to the regional transmission system and PSE's electric system • impacts on system reserves, load following, integration costs and other factors
7. Resource mix/diversity	The diversity of resource technology and fuel types will be considered in a manner consistent with PSE's *Integrated Resource Plan*.[1] Specific considerations shall include: • technology type • fuel supply type • fuel supply source • fuel supply reliability, including control and deliverability

[1] *PSE's most recent Integrated Resource Plan can be found at www.pse.com/irp.*

2. Cost Minimization

Criteria Element	Description
1. Resource cost	PSE prefers proposals that provide the lowest reasonable cost throughout the project life, taking into account the price of the proposal and other factors that impact PSE's overall cost. Such factors include, but are not limited to: • capital cost • financing cost • operation and maintenance cost • expected or potential carbon control or mitigation costs • fuel and fuel transportation cost • fixed and variable power purchase agreement cost • transmission cost • ancillary services • integration costs • transmission system upgrades • cost to rebalance debt/equity ratio for imputed debt and consolidated debt • cost of credit facilities • transaction costs and other management costs, etc. • cost to meet environmental compliance, including capital improvements and/or capacity limitations and restrictions • renewable energy credits or other environmental attributes
2. Transmission	PSE prefers long-term firm delivery of energy to its service area. In the absence of the assurance of firm delivery at the time of the proposal, PSE prefers proposals that provide a high likelihood of acquiring adequate transmission rights. Proposals that do not include long-term firm transmission to PSE's service area, that would produce congestion or increase PSE's transmission costs will be compared unfavorably with other proposals and/or will be assessed the additional cost to PSE as part of the evaluation process.
3. Portfolio cost impact	PSE prefers proposals and combinations of proposals that result in the lowest impact on PSE's revenue requirements and rates when included in PSE's existing generation resource portfolio.

3. Risk Management

Criteria Element	Description
1. Status and schedule	All else being equal, PSE prefers operating projects first, projects under construction second, and development projects third. With respect to development projects, PSE prefers proposals that demonstrate the respondent has the experience and financial resources to complete the project and has made significant progress in securing necessary permits, property rights, equipment, regulatory approvals, water rights, wastewater and disposal rights, project agreements and all other rights or arrangements necessary for a completely commercially operational project within the time frame proposed for commercial operation.
2. Price volatility	Proposals that provide significant long-term control of fixed and variable costs are preferred.
3. Resource flexibility and stability	PSE prefers proposals that provide flexibility for expansion to meet PSE's growing needs as required. Proposals that include project agreements and all other rights and arrangements coterminous with power purchase delivery periods or project life are preferred.
4. Resource Technology	Proposals based on commercially-proven technology with demonstrated long-term reliability and performance history are preferred. Proposals based on technologies whose output may be controlled are preferred.
5. Long-term flexibility	PSE prefers proposals that offer the Company the flexibility to adjust its position in a resource long term, up to and including termination.
6. Project risk	Proposals that minimize risk for timely plant completion within cost projections are preferred. Proposals that minimize exposure to environmental risk or other potential liability, including expected or potential carbon control or mitigation costs, are preferred.

Criteria Element	Description
7. Impact on PSE's overall risk position	Proposals and combinations of proposals will be evaluated to determine the impact of the proposal(s) on PSE's overall risk position with respect to PSE's generation portfolio. Risk scenarios will include factors such as hydroelectric production variation, wind generation variability, fuel price volatility, carbon control costs, and power market price volatility. Additional risk scenarios will examine the correlation between fuel prices and power market prices, and alternative market price scenarios. Other considerations will include exposure to transmission congestion and costs. All else being equal, PSE prefers proposals that result in lower generation portfolio performance risk.
8. Environmental and permitting risk	PSE's evaluation process will include an assessment of the following criteria: • status in acquiring needed permits • risk associated with future environmental regulation and taxes, including greenhouse gas emissions • compliance with state RPS • compliance with regional generator performance standards and import standards
9. Respondent risk	PSE will consider information requested in ***Section 4*** of the RFP document and ***Exhibit B*** in determining the risk associated with the financial condition and performance of a respondent and any third parties relied upon by the respondent. Lower-risk respondents are preferred.
10. Ability to deliver as proposed	PSE will use the information provided in response to ***Exhibit B*** to evaluate the experience and qualifications of the project team, an important consideration when judging a respondent's ability to deliver a commercially operable project in the time frame proposed. PSE prefers respondents with proven track records. Information submitted in response to ***Exhibit B***, which addresses project development status and schedule, will also be used to evaluate the respondent's ability to meet the proposed commercial operation date.

Criteria Element	Description
11. Status of transmission rights	The ability to transmit power from the project site to one or more points on PSE's electric system is a requirement (particularly to points on the system where the deliveries may be used to serve load with limited or no transmission congestion). PSE will use information provided in ***Exhibit B*** and, if necessary, the PowerWorld software tools, to assess whether and to what extent the required transmission will be available, and whether and to what extent the necessary transmission paths are constrained.
12. Security and control	Proposals that supply firm, fixed price fuel supply are preferred. Proposals that offer alternative methods of managing price volatility will be favorably considered. Proposals that supply firm energy and capacity are preferred.
13. Federal regulatory approvals	PSE will consider the effect of any federal regulatory approvals that would result from accepting the proposal, including, but not limited to, requirements under Sections 203 and 205 of the Federal Power Act. Proposals that eliminate or minimize the effect of any such federal regulatory approvals are preferred.

4. Public Benefits

Criteria Element	Description
1. Environmental impacts	Proposals that minimize environmental impacts are preferred. Environmental impacts refer to the full range of issues evaluated in an environmental impact statement or environmental assessment. PSE will consider information supplied in response to ***Exhibit B*** in its evaluation of the environmental impacts of a proposed acquisition.
2. Resource location	Proposed resources located such that they provide benefits to the regional and PSE transmission systems, or require minimal or no transmission upgrades are preferred. Proposals that are not dependent upon constrained transmission or fuel transportation paths are preferred. Proposed resources located within PSE's service territory are preferred.
3. Community impacts	Proposals that demonstrate support from public, local, state and federal government entities and Native American Tribes, if applicable, as well as other stakeholders, are preferred.

5. Strategic and Financial

Criteria Element	Description
1. Capital structure impacts	PSE's quantitative analysis will impute the anticipated equity cost needed to offset any adverse effects on its capital structure associated with accounting requirements (e.g., FASB ASC 810) that may require PSE to consolidate the respondent's balance sheet. All else being equal, PSE prefers proposals that avoid risks associated with a requirement to consolidate a respondent's financials with PSE's financials (e.g., pursuant to FASB ASC 810). All else being equal, proposals are preferred that would not increase PSE's exposure to adverse impacts on its financial position (e.g., by requiring PSE to impute debt, to account for the transaction as a capital lease (e.g., under FASB ASC 840), to account for or report the transaction as a financial derivative transaction (e.g., pursuant to FASB ASC 815), by otherwise adversely affecting PSE's financial leverage, operating leverage, credit rating, cash flow, income statement or balance sheet, or by imposing credit requirements or increasing liquidity risk).
2. Future exposure to environmental regulations and/or taxes	Proposals for resources with lower potential exposure to future environmental regulations and/or taxes are preferred.
3. Guarantees and security	PSE will consider information provided in response to ***Exhibit B*** to determine whether it will require any additional guarantees or credit support pursuant to ***Section 5*** of the RFP document. PSE's credit risk department may require the seller to provide performance assurance. PSE will expect sellers with sub-investment-grade credit ratings (or being of similar creditworthiness) to provide performance assurance acceptable to the Company. PSE will not accept collateral thresholds, credit ratings triggers, general adequate assurances language or similar language that might require the Company to provide performance assurance.

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

Appendix C. Phase 1 Results

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

C.1 Phase 1 Executive Summary

2018 RFP – Executive Summary*

Quantitative results are the product of analysis performed in PSM III version 25.10.

Candidate Short List: Proposals selected for Phase 2 optimization and due diligence (organized alphabetically by project name)

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18100 **SPI Burlington Biomass** Sierra Pacific Industries PPA Operational Biomass 17 MW nameplate PPA start: 01/01/2021 17 years capacity		• Relatively inexpensive • REC producing • Proportionally high contribution to the capacity need. • Existing operational site • Interconnected with PSE system • Minimal risks all-around	• Sierra Pacific Industries is a privately held company so less financial information is available than if it had been public	**Selected -** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the high levelized portfolio benefit over renewable energy credit ("REC") ranking, and due to the relatively high levelized portfolio benefit over kilowatt year ranking and low qualitative risks.

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***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
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DAS	Development asset sale
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PUGET SOUND ENERGY

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18103 [redacted] Ca[redacted] CTA or Asset Transfer Operational Combined Cycle [redacted] MW** or [redacted] MW Start: 06/01/2022 Term: 10 year (PPA)		• Second least expensive thermal proposal currently in RFP • Existing operational site (rather than new build) • Strong presence in the community • Expansion opportunity on adjacent land	• Would likely be impacted by carbon legislation currently being considered in Olympia • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, there would likely be considerable reputational risk. • Is not clear whether there is firm gas transport to plant, which would be required to count as a capacity resource	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
[redacted] CTA** and BTS [redacted] [redacted] MW** or [redacted] MW COD: 01/01/2022 5, 15, and 20** year term		• Least expensive thermal proposal in RFP • Expansion of existing site rather than a new thermal facility. • Technology is relatively site-agnostic and can potentially be designed to integrate with other sites. • [redacted] MW proposal could likely be facilitated with firm gas supply with existing facilities.	• Air permit path is complex and possibly not feasible. • The likely-to-be-required air permit modification could bring more operational constraints for the existing generation units. • PSE will experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's thermal generation portfolio. • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, the proposed schedule and general project feasibility seem to be in question.	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18107 [redacted] PPA Operational Hydro [redacted] MW start: 1/1/2021 (assumed) Term: 20 year (assumed)		• Existing operational site (rather than new build) • Clean energy (although not RPS compliant) • Run-of-river hydro can be less environmentally impactful than standard hydro Little to no permitting or real estate risk due to current operational status	• Not RPS complaint (although clean energy) • Proposal is missing important details regarding pricing, term length, term, etc. • Although PSE has worked with this counterparty before, possible risks remain	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18111 [redacted] PPA** or BTS Development solar Solar: [redacted] MWac COD: 12/31/2022 Term: 20 year (PPA)		• Relatively high quantitative score for solar project • Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Site control has been achieved • Permitting status is sufficient at this stage • Located on PSEs system in [redacted] County avoids community concerns in [redacted] County	• While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C however may be difficult given projects proximity to the [redacted] substation	**Selected – T**he RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18112 [redacted] PPA**, Optional BESS Development solar Solar: [redacted] MWac** BESS: [redacted] MWh / [redacted] MW / 2 HR COD: 12/31/2022 Term: 25 year		• Developer has solar development experience (primarily on a smaller scale) • Located on PSEs system in [redacted] County avoids community concerns in [redacted] County	• Developer has primarily small scale solar development experience and no experience in the northwest • Project acreage appears to be too small for proposed nameplate capacity • Permitting information provided is insufficient • While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C	**Not selected -** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18114 [redacted] PPA Solar Generation [redacted] MW_{AC} COD: Q4 2020 20 year term		• [redacted] is assessed to be a relatively strong parent company • Site as proposed doesn't have major implications on agricultural land • Long-term site control is secured	• Need specifics on parent company support, or financing otherwise • Solar facilities are under contention in [redacted] County • Permitting will require a transfer of an EFSEC permit, which will bring a viability and reputation risk to the project and PSE • Transmission and energy delivery may be overly expensive or otherwise not feasible	**Selected – T**he RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18122 [redacted] PPA**, Optional BESS Development Wind [redacted] MW_{AC}** & [redacted] MW 1 Hr BESS COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash. • Relatively inexpensive solar energy with potential for battery storage. • Long-term site control is secured	• Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Significant viability issues delivering to PSE • Solar development not positively looked at in this area • Site may block the view of a local real estate development.	**Selected –** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18125 [redacted] PPA Development Solar [redacted] MW_{AC} COD: 10/31/2022 Term: 15 year or 20 year**		• Strong counterparty with extensive renewable energy development experience • Site control appears to be more than adequate given proposed size of project	• While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to MidC • Site permitting is in a relatively early state of development • Minimal information provided regarding community relations and or support	**Selected –** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over renewable energy credit ("REC") ranking.
18127 [redacted] PPA Development Solar [redacted] MW_{AC} COD: 12/31/2022 Term: 15 year or 20 year**		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Location on existing project site may provide economy of scale in development and operation of project. • County has expressed support in the project	• May be siting concerns given proximity to wind turbines with required setbacks • Assumes use of PSE site control with current [redacted] landowners • CUP required to permit project	**Selected –** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18131 [redacted] PPA** or BTS Development Wind [redacted] MW** or [redacted] MW COD: 12/1/2022 25 year term		• Credit support in the form of a parent guarantee, letter of credit, or cash • Long-term site control secured • Permitting likely to meet proposed timeline • Community relations plan was strong when compared to other proposals	• Less experience when compared to other counterparties • [redacted] MW option would possibly run into available transmission capacity issues • [redacted] tribe may request compensation from project	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18132 [redacted] PPA** Development Wind**, Solar, BESS [redacted] MW** COD: 01/01/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Wind is an existing site, therefore little concern for site control or community relations	• May be concern for permitting required for a repower • MidC delivery negates any capacity value brought by the BESS Option • Repowered project may not create as much excitement given the lack of an incrementally new project	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18135 [redacted] PPA** or BTS Development Solar [redacted] MW** or [redacted] MW Solar Optional [redacted] MW 4 Hr BESS COD: 12/1/2022 20 year term PPA		• Large counterparty with experience all over the world • Letter of intent with an option to lease has been signed	• Minimal detail regarding creditworthiness or financing was included in the proposal • Transmission directly to PSE appears to be overly expensive or infeasible. Mid-C delivery with no contribution to peak capacity is likely the best offer configuration • Permitting plan is underdeveloped	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18139 [redacted] PPA Development Solar [redacted] MW Solar with optional [redacted] MW** or [redacted] MW 1.82 Hr BESS COD: 12/31/2022 10 year term PPA		• Large multi-national counterparty with greater-than-average renewable development experience	• Site control not-yet secured, and no indication of pending agreement was provided • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Permitting process has not yet begun, and presents minimal evidence that they have the ability to identify and secure all permits • Community relations was not covered sufficiently, and tribal support may be required	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18163 [redacted] Consulting REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2022 18 year term		• Interconnection at distribution voltage dictates that each as-generated MWh produce two Washington State RECs.	• Little detail regarding underlying solar facilities	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18165 [redacted] REC purchase Underlying solar project [redacted] RECS per year Start of term: 1/1/2022** or 2024 16 or 18** year term		• Not applicable	• Little detail regarding underlying solar facility	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18166 [redacted] DAS, BTS, or PPA** Development Wind [redacted] MW COD: 12/1/2020, 2021, or 2022** 25 year term		• Long-term site control established	• Significant concerns regarding the counterparty's ability to develop, finance, and construct the facility • Relatively small counterparty with inconclusive rights to the project's developmental assets • Timing of project is contingent on BPA infrastructure upgrades to enable transmission capacity • Project owner, [redacted] seemed uninterested in furthering project development via first-hand experience at 2/22/19 public hearing • Timeline as-proposed is likely not feasible and pricing is likely contingent on timing due to PTC safe harbor	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18169 [redacted] PPA** or 50% Ownership + PPA Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2020 or 2021** 20 or 25** year term		• Relatively cost efficient way to meet REC and contribution to peak capacity need • Large and experienced counterparty • Site control is reportedly achieved, but supporting documentation was not included in proposal • Public has been notified of the project as a [redacted] MW facility • Shape of wind based on 6 operating MET towers appears to fit well with PSE's needs	• Minimal experience in the Pacific Northwest • Large generation-tie transmission line is required • There is a potential issue with sage grouse habitat	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18170 **Golden Hills Wind** Avangrid Renewables PPA, PPA-shaped**, BTS Development Wind 200 MW** COD: 12/1/2020** Term: 20 year**		• Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Shaped product offers capacity contribution during peak winter months • Likely low risk to real estate given advanced level • Permitting well advanced with EFSC permit application already amended	• Complex energy delivery will require additional vetting • Complexity of shaped product will require additional vetting	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18173 [redacted] PPA** Development Wind [redacted] MW or [redacted] MW COD: 10/31/2022** Term: 20**		• Strong counterparty with extensive renewable energy development experience • May only need single landowner which would indicate little real estate challenges • Favorable state support, however local level of support unknown	• Possibly require DNRC land which could complicate site control and permitting • Permitting is relatively early in development, however there may be concerns for meeting scheduled COD • Use of [redacted] is under ongoing review, however may be problematic	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18175 [redacted] PPA, BTS, or WSPP Shaped** Development Wind [redacted] MW COD: 10/1/2020 25 year term		• Long-term site control is secured • Western Systems Power Pool ("WSPP") schedule C delivery is a unique value	• Counterparty and financing details will require data requests • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Mid-C delivery will likely be necessarily, which would negate a contribution to peak capacity • Permitting plan seems either underdeveloped or underrepresented in the proposal • Outreach plan is underdeveloped	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18176 [redacted] PPA** Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: N/A		• Indications of strong local, state and environmental support • Potential to partner with a local Native American tribe • Located near [redacted] and in the same County [redacted] • Counterparty has indicated a plan to partner and/or otherwise engage an experienced renewable energy developer on the project	• Counterparty does not have experience designing, financing, building, owning or operating a large scale renewable or other energy projects • Use of [redacted] is under ongoing review, however may be problematic • Additional detail needed regarding the real estate and permitting considerations necessary for the site	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18179 [redacted] PPA**, DBS Development Wind [redacted] MW** COD: 12/31/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Real estate appears adequate and relatively low risk • Project sizing has been altered in order to address some local viewshed concerns	• History of considerable local and County level opposition to the project • Counterparty bypassed the County permitting process by pursing permit approval through the state's EFSEC process	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18190 [redacted] LLC REC Offer [redacted] Underlying proposed solar facilities [redacted] RECs / year COD: 01/01/2022 12, 15**, or 20 years		• Inexpensive RECs • Site control is secured • EFSEC projects have been approved by Governor Inslee	• Realizing full REC-output of underlying projects is unlikely due to interconnection issues • [redacted] is currently in litigation with [redacted] over interconnection issues with the underlying projects • [redacted] County opposes the EFSEC decision and has applied for judicial review • Major feasibility concerns with some of the underlying projects, and schedule concerns for all • Projects sited in commercial agricultural land and many stakeholders in the County oppose development on these lands	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking. .

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18201 [redacted] Direct load control Bring your own thermostat, smart water heater [redacted] MW COD: 1/1/2023 Term: 6 years		• Industry leader by Navigant study • [redacted] PSE DR RFP finalist • Itron manages all program implementation • Strong financial, WA based • The [redacted] MW option makes it a small scale project to test out	• No convincing reason provided to suggest a ramp up in DR deployment just in a year in 2023	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
XXXXX [redacted] N/A Transmission Redirect [redacted] MW**, [redacted] MW COD: 01/01/2022 Term: 55 year book life		• If feasible, redirect to MidC would provide a strong capacity resource	• Increased exposure to market prices (for redirect to MidC) • Ambiguity regarding how much redirect is possible to MidC ([redacted] MW assumed), therefore how much would be required to redirect elsewhere on BPAs system • If greater than [redacted] MW were to be redirected, the amount above [redacted] MW would have to redirect to another PSEI node, e.g. PGE, etc. Source of energy at second redirect point unknown	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Resources eliminated during the Phase 1 screening (organized alphabetically by project name)

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18101 [redacted] PPA Operating Biomass [redacted] MW Start of Term: 07/01/2021 7.25 Year Term		• The project is already operational, and therefore has viability issues largely solved • Transmission and energy delivery options seem viable on initial review	• Local community is fairly charged and might lump this project in with the nearby [redacted] facility in their protests, even though it is a REC generating facility	**Not selected -** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18102 [redacted] PPA Proposed Biomass [redacted] to [redacted] MW Start of Term: 01/01/2022 Unknown term duration		• Site control is allegedly secured via reserved land on existing property	• Most qualitative details required to be addressed in the 2018 RFP, including counterparty, permitting, energy delivery, and community relations were not adequately covered in the proposal	**Not selected –** The RFP team does not recommend this project to proceed to Phase 2 of the 2018 RFP due to a significant lack of detail in the proposal that resulted in the inability to analyze the proposal on a quantitative or qualitative basis.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18104 [redacted] CTA, 50%** or 100% Asset Sale, or HRCO Operating CC Thermal Plant [redacted] MW to [redacted] MW Start of Term: 01/01/2022 3 to 10 Year Term		• This was one of two already-operating thermal facilities proposed into the 2018 RFP • Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Counterparty has strong renewable energy portfolio • Site control and permitting should not represent issues to PSE or [redacted]	• Heat rate call option ("HRCO") at [redacted] MMBTU represents a poor value requiring significant additional pipeline capacity • Energy delivery is expensive and complex • Singing a new deal with a thermal resource represents a potentially significant reputational risk with governmental agencies, NGOs, activists, as well as typical energy consumers • Combined cycle turbine starts up slower than other thermal proposals • Ownership would likely involve significant facility upgrades not included in phase 1 quantitative analysis	**Not selected -** The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking as well as the potentially significant reputational risk with signing a new long-term agreement with a thermal generation resource.
18106 [redacted] PPA** Development Geothermal [redacted] MW** COD: 09/01/2021** Term: 20 year**		• Geothermal asset may provide clean capacity product	• May not qualify for Washington State RPS due to location in Nevada, relatively far away from Washington.	**Not selected -** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18108 [redacted] PPA Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour BESS COD: 12/15/2022 15 or 20* year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Permitting timeline seems feasible for COD, but not for the proposed start of construction	• Site control is not established, and presents a feasibility risk to the project since the land is being sold via auction • Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • Solar proposals in [redacted] County present some reputational risk • [redacted] MW capacity seems to facilitate PURPA considerations	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18109 [redacted] PPA Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour BESS COD: 12/15/2022 15 or 20* year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Long-term site control is achieved • Permitting timeline seems feasible	• Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • [redacted] MW capacity seems to facilitate PURPA considerations	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18110 [redacted] BTS or DAS Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour BESS COD: 12/15/2022 15 or 20* year term		• Long-term site control is achieved	• Counterparty has minimal project development and construction experience • Project financing plan has very minimal detail • Expensive energy delivery to PSE or Mid-C due to available transmission capacity limitations • Minimal detail in community relations plan • Solar proposals in [redacted] County present some reputational risk	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18113 [redacted] PPA** Developmental Solar [redacted] MW** COD: 12/31/2022** 15** or 20 year term		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Site control has been achieved • ODOE certificate secured	• Complex delivery to PSE requires multiple transmission legs at additional cost	**Not selected –** The RFP evaluation team does not recommend [redacted] proposal for phase 2 consideration in the 2018 All Resource RFP due to its low quantitative score.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18115 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control is secured for a wind project, and can likely be altered to allow for Solar development	• Solar energy in Montana does not appear to provide the same cost efficiency, net capacity factor, or contribution to peak capacity when compared to the larger wind projects in the region • Energy delivery has been left to PSE and will be infeasible or expensive • Minimal details regarding a permitting plan of action	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18116 [redacted] PPA Development Solar [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.
18117 [redacted] 15-yr/20-yr PPA, Development Wind Up to [redacted] MW COD: 1/1/2021 Term:		• Project was [redacted] withdrawn from the 2018 All Resources RFP [redacted]	• Project [redacted] withdrawn from the 2018 All Resources RFP [redacted]	**Not selected** - Project [redacted] withdrawing from the 2018 All Resources RFP

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18118 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control has been secured via land leases • Permitting has been largely secured via Oregon EFSC in [redacted]	• Long-point to point transmission is unlikely to be feasible • Lack of cohesive community relations plan coupled with EFSC permit presents some reputational risk to the project and to PSE	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 All Resources RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18119 [redacted] PPA Developmental Solar [redacted] MW Solar with Optional [redacted] MW 1 Hr BESS COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control for the project is achieved • While energy delivery was largely left to PSE, on initial review, it appears to be feasible	• Generation-tie line still requires land-use rights • Relatively insufficient permitting plan • Potential issues with proximity to nearby airport • Minimal details regarding a community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18120 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control appears to be obtained imminently, however, minimal detail was included in the proposal	• BPA transmission would require significant network upgrades which indicate cost and schedule risk • Relatively insufficient permitting plan • Minimal details regarding a community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18121 [redacted] PPA Developmental Solar [redacted] MW COD: 12/1/2022 20** or 25 year term		• Letters of intent have been signed with potential lessors, and there should be plenty of time to finalize lease agreements • Community relations plan appears to be adequate	• Three of four proposals into the 2018 RFP were withdrawn due to infeasibility in January 2018 • Transmission plan is undeveloped and reliant on PSE being a network customer of BPA, which is not and will not be the case • Permitting plan is relatively insufficient and underdeveloped • [redacted], presents a risk to the ongoing operation of the site	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18123 [redacted] PPA Developmental Solar + BESS [redacted] MW Solar & optional [redacted] or [redacted] MW, 2, 4**, 6 Hr BESS COD: 10/31/2022 20** or 25 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Site control projected to be achieved by Q2 2019	• Generation-tie line not included in proposed site control • Interconnection queue position was described in the proposal, but could not be confirmed by RFP team • Relatively insufficient information provided in the proposal • [redacted] County generally interested in renewables, including solar, but some nearby communities have opposed development	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18124 [redacted] Operating Status & Offer PPA Development Solar [redacted] MW or [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18126 [redacted] PPA Development Solar [redacted] MW or [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.
18128 [redacted] PPA**, Optional BESS Development solar Solar: [redacted] MWac** BESS: [redacted] MWh / [redacted] MW / 2 HR COD: 06/01/2022 Term: 25 year		• Location in [redacted] County [redacted] relatively favorable location within the county. • Real estate appears to be of an advanced stage and sufficient for proposed project size	• Counterparty solar experience exclusively small scale. • While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C • Developer withholds the rights to pursue state EFSEC permitting process, which would circumvent the county/local concerns, possibly engendering local hostility to the project	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18129 [redacted] PPA** Development Solar [redacted] MWac** COD: 01/01/2021 or 01/01/2023** Term: 15 or 20** year term		• Developer appears to have experience in the solar industry developing utility scale solar projects • Relatively advanced stage of permitting with comprehensive permitting matrix provided by developer • Real estate appears to be more than sufficient for the proposed project size	• Proposed plan for energy delivery includes multiple transmission segments that would be costly	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18130 [redacted] PPA Development Solar + BESS [redacted] MW Solar & [redacted] MW 4 Hr BESS COD: 12/15/2022 15 or 20** year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions	• Long-term site control is not yet obtained • A BPA cluster study will likely be required to fixed point to point delivery to PSE's system, which brings cost and schedule variability • Permitting progress has not yet begun as of the date of proposal submission • Nameplate of [redacted] MW, a multiple of [redacted] MW, indicates developer consideration for PURPA eligibility	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18133 [redacted] PPA Development Solar + BESS [redacted] MW Solar & [redacted] or [redacted] MW, 2** or 4 Hr, BESS COD: 12/15/2022 15 or 20** year term		• Experienced renewable developer, especially with wind assets • Project expected to be financed on balance sheet • Long-term site control is achieved	• Proposed energy delivery plan is potentially not feasible, or overly expensive • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18134 [redacted] PPA Development Solar [redacted] MW COD: 1/1/2023 20 year term		• Financial support through [redacted] and other long-term debt partners • Long-term site control is not yet achieved, but is reportedly close	• [redacted] only has moderate renewable development, construction, and operational experience • Energy delivery plan as proposed is likely infeasible, and transmission will need to be wheeled through BPA and Mid-C • Community relations was not sufficiently covered in the proposal and solar development in [redacted] County is [redacted] unpopular	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18136 [redacted] PPA Development Solar + BESS [redacted] or [redacted] MW Solar & [redacted] or [redacted] MW, 4 Hr BESS COD: 9/31/2022 20 year term		• Long-term site control is achieved	• [redacted] is a newer company with minimal construction and operational experience • Transmission left to PSE (busbar delivery) and will likely route to Mid-C, removing any contribution to capacity • Relatively immature permitting plan • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18137 [redacted] PPA Development Solar + BESS [redacted] or [redacted] MW Solar & [redacted] or [redacted] MW, 4 Hr BESS COD: 9/31/2022 20 year term		• Long-term site control is achieved	• [redacted] is a newer company with minimal construction and operational experience • Transmission left to PSE (busbar delivery) and will likely route to Mid-C, removing any contribution to capacity • Relatively immature permitting plan • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as insufficient progress and level of detail provided when compared to other proposals in the RFP, especially regarding Transmission and Energy Delivery.
18138 [redacted] PPA Development Solar + BESS [redacted] or [redacted] MW Solar & [redacted] MW, 2**, 4, or 6 Hr BESS COD: 3/31/2022 20 year term		• Long-term site control is achieved • Significant efforts identifying and securing State and Federal permits	• [redacted] is listed as a primary partner to [redacted] has had ongoing issues meeting construction schedule commitments with an in-construction wind farm [redacted] • Solar energy in Montana does not appear to provide the same cost efficiency, net capacity factor, or contribution to peak capacity when compared to the larger wind projects in the region • Minimal time has apparently been spent regarding local County permits • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18140 [redacted] PPA Development Solar + BESS [redacted] MW Solar & [redacted] MW 4 Hr BESS COD: 12/15/2022 15 or 20** year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Long-term site control has been secured • Generic, but relatively comprehensive, community relations plan	• Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • The permitting plan is not far along and there are potential schedule issues with the permitting as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18141 [redacted] PPA** Development Solar + BESS [redacted] MW Solar** [redacted] MW / [redacted] MWh / 4 Hr BESS** COD: 9/30/2022** Term: 25 year**		• Located on existing [redacted] windfarm location may ease development efforts • Developer has experience in the region and with [redacted] • Purchase option (pricing undefined) offers some flexibility for asset purchase	• Developer does not provide much financial information therefore financial credit worthiness is difficult to assess. • Not apparent what value project brings with use of existing [redacted] • Little permitting work has been completed • Use of [redacted] transmission may be problematic and/or crowd out a future wind expansion at the site.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18142 [redacted] PPA Development Solar + BESS [redacted] or [redacted] MW Solar & [redacted] or [redacted] MW, 4 Hr BESS COD: 9/30/2022 20 or 25** year term		• Large publically traded counterparty with strong financial performance and much experience in renewable development, construction, and operation • [redacted] • Long-term site control is not yet achieved as of the proposal submission, but indications were that it would occur soon	• There is apparently insufficient transmission capacity to secure firm point-to-point capacity • Energy delivery plan as proposed requires PSE to be a network customer with BPA, which is not and will not be the case • Permitting will require amendments, and not enough specifics on the plan was included in the proposal • There was a relatively low amount of detail provided regarding the community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18143 [redacted] BTS Development BESS [redacted] MW, 2** or 4 Hr Lithium Ion or [redacted] MW, 4 or 6 Hr Flow BESS COD: 12/31/2020		• Long-term site control secured • [redacted] is a Seattle-based company that should be able to engage the local community effectively	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Newer developer who recently lost a court battle [redacted] regarding PURPA eligibility • Site is in a location that has medium risk for gopher indicator soils, which has caused issues for PSE in the past	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18144 [redacted] CTA Development BESS [redacted] MW, 4 Hr Lithium Ion BESS COD: 12/31/2021 10 or 20** year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Site is on Invenergy-owned land	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Transmission queue position with PSE has not yet been applied for • Firm available transmission capacity is likely not obtainable • Permitting process is relatively immature • Community relations was not covered in proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18145 [redacted] CTA or BTS Development BESS [redacted] MW, 2** or 4 Hr, Li-Ion BESS COD: 12/31/2021 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Long-term site control is not secured • Site appears to be part of an active gravel pit • Permitting process is early in development • Community relations is not discussed in proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18146 [redacted] CTA or BTS Development BESS [redacted] MW, 4 Hr, Li-Ion BESS COD: 09/30/2022 20 year term		• Large multinational counterparty with experience in renewable and green power • Strong financial performance and credit rating, and project would be financed on balance sheet	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Long-term site control is not yet secured • Project is not yet in transmission queue, and would likely require significant network upgrades • Community relations plan is lacking and is very necessary as the site is located in a commercial and industrial load center of PSE's service territory	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18147 [redacted] CTA Development BESS [redacted] or [redacted] MW, 4 Hr Li-Ion BESS COD: 09/30/2022 10 year term		• Not applicable	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • [redacted] is a newer company with minimal construction and operational experience • Site control has not yet been obtained • Project is not yet in transmission queue • Permitting for site is immature • Community relations was not addressed in proposal and will be required as the site is in a major suburban load center in PSE's service territory	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18148 [redacted] CTA or BTS** Development BESS [redacted] MW / [redacted] MWh / 2 hr BESS** COD: 08/01/2022** Term: 20 year (CTA)**		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Strong management team, with storage experience • Location on existing project site may provide economy of scale in development and operation of project. • Would be located on existing PSE owned property	• May be siting concerns given proximity to wind turbines with required setbacks • There may be permitting concerns at this location. • Relatively low risk regarding community engagement; optics would fit well at location given the existing wind, solar and visitors center	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18149 [redacted] CTA** or BTS Development BESS [redacted] or [redacted]** MW, 4 Hr Li-Ion BESS COD: 09/30/2022 20 or 25 year CTA term		• [redacted] would likely be excited about energy storage solutions	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Site is presumed to be located on PSE property, but the site may or may not be utilized by PSE system development in the future • Counterparty has defaulted on an agreement in the past with PSE • Interconnection and energy delivery plan is early on in process and contingent on PSE development • Permitting plan is early in development	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18150 [redacted] CTA** or BTS Development BESS [redacted] or [redacted]** MW, 4 Hr Li-Ion BESS COD: 09/30/2022 20 or 25 year CTA term		• Site is on developer-owned property • City of [redacted] would likely allow battery storage outright	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Counterparty has defaulted on an agreement in the past with PSE • Interconnection and energy delivery was left to PSE • Community relations was not addressed in proposal, and the existing BESS installed in area had technical and communications challenges	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18151 [redacted] CTA** Development BESS [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr COD: 09/31/2022 Term: 20 year		• Developer presents minimal relative risk, having previously developed large utility scale BESS systems • May be minor permitting risks	• It is unclear whether project is intended to by interconnected to PSE's [redacted] distribuiton substation (as stated) or BPA's [redacted] transmission substation (as depicted in the project documentation) • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18152 [redacted] CTA** or BTS Development BESS [redacted] or [redacted]** MW, 4 Hr Li-Ion BESS COD: 09/30/2022 20 or 25 year CTA term		• [redacted] is assessed to be a relatively strong parent company • Project is proposed to be located on PSE-owned land • Interconnection with [redacted] substation unlikely to cause major upgrades	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Permitting process is extremely immature, and it is unknown how the County will treat BESS projects • Community relations was not sufficiently covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18154 [redacted] CTA** Development BESS Multiple options: [redacted] MW / [redacted] MWh / 2 hr [redacted] MW / [redacted] MWh / 4 hr** [redacted] MW / [redacted] MWh / 4 hr COD: 01/01/2022 or 01/01/2023** Term: 16 year**		• Management team has a deep background and experience developing renewable energy projects • Site control should already be obtained • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any projects built or operational to date • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Possibly wetland concerns for the site	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18155 [redacted] CTA** Development BESS Multiple options: [redacted] MW / [redacted] MWh / 2 hr [redacted] MW / [redacted] MWh / 4 hr** [redacted] MW / [redacted] MWh / 4 hr COD: 01/01/2022 or 01/01/2023** Term: 16 year**		• Management team has a deep background and experience developing renewable energy projects • Site control currently in negotiations with land owner • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any projects built or operational to date • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Permitting is in an early stage, however relatively further along than other BESS proposals	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18156 [redacted] CTA** Development BESS Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr** COD: 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on PSE property • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any BESS experience or projects built to date • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18157 [redacted] CTA** Development BESS Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr** COD: 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on private property adjacent to PSE substation • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any BESS experience or projects built to date • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18158 [redacted] CTA** Development BESS Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr 100 MW / [redacted] MWh / 4 hr** [redacted] 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on PSE property • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any BESS experience or projects built to date • Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18159 [redacted] CTA** or BTS Development Pumped Hydro [redacted] or [redacted]** MW, 6.4 Hr daily storage COD: 03/30/2023 20 CTA term		• Counterparty has worked with reputable engineering firm for project development	• Capital costs are significant and financing will be difficult and complex • Technology is very new to PSE and North America and requires significant investigation • Significant issues involving permitting and ongoing operation of the facility • Transmission left to PSE would likely be very complex due to large capacity and bidirectional requirements • Site control status is unknown	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18160 [redacted] CTA** or BTS Development Pumped Hydro [redacted] MW, 8.5 Hr COD: 03/30/2023 20 CTA term		• Major permitting hurdles, including FERC licensing, have been secured • Long-term site control is achieved	• Technology is very new to PSE and North America and requires significant investigation • Transmission left to PSE would likely be very complex due to large capacity and bidirectional requirements • Interconnecting resource into [redacted] might drive limitations on renewable energy development in Montana serving PSE load	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18161 **BPA Peak Capacity** Bonneville Power Administration PPA** Operational portfolio of projects 1000 MW** COD: 01/01/2022** Term: 5 year**		• Counterparty is well known with existing ties to PSE and therefore very limited risk for this proposal • There are no permitting, real estate or community relations concerns as the proposal is based on currently operational projects	• Delivery to Mid-C presents a major concern as delivery to Mid-C negates any incremental capacity value, as energy would have to rely on current Mid-C BPAT.PSEI paths to get back to PSE system.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18162 [redacted] REC purchase Operational portfolio of projects [redacted] RECS per year Start of term: 1/1/2022 10 year term		• Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Underlying projects are operational therefore no real estate, permitting, or community relations concerns	• Other than low quantitative ranking, there are no major concerns with this proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18164 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2026 13 year term		• Full site control for underlying projects is assumed • Interconnection is secured • REC delivery through WREGIS	• Low-risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18167 [redacted] PPA Development Wind (Offshore) [redacted] MW COD: 12/31/2029 Term: 25 year		• Developer demonstrates a relative high level of acumen in offshore wind development on the west coast • West coast offshore wind could prove to be a viable resource in the future • Developer has conducted extensive community and tribal outreach for this project	• Considerable counterparty risk, including questionable ability to finance the project without considerable commitment and risk by PSE • Leases are through the federal BOEM with a long process for obtaining and uncertain outcome • Permitting is through the federal BOEM with a long process for obtaining and uncertain outcome • Interconnection and energy delivery would be complex and will require extensive vetting • Start of offer is well outside of the time scope of PSE's 2018 All Resource RFP	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18168 [redacted] AAA Operating Wind [redacted] MW COD: 10/4/2020 5-year term		• Project is operating	• Low-risk • Start of term and duration do not match PSE's need as stated in the IRP and RFP • Counterparty is potentially facing bankruptcy	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18171 [redacted] PPA Development Wind [redacted] MW COD: 12/31/2020** or 12/31/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Real estate and permitting appear to be sufficient at this stage of development	• Proposal has expired as per the original proposal documentation (expired on 1/1/2019) • Complicated delivery to PSE likely required	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18172 [redacted] PPA Developmental Wind [redacted] MW COD: 1/1/2021 15 or 20** year term		• [redacted] is a large publically traded company with a solid balance sheet and solid credit rating • Long-term site control is secured • Community relations was well addressed in the proposal and well-exceeds the EFSC requirements	• Relative to most of their endeavors, [redacted] is relatively inexperienced with renewable energy • Permitting schedule is aggressive and will be difficult to achieve as proposed • [redacted] has reportedly been a difficult interconnection counterparty to work with • Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18174 [redacted] PPA** or BTS Developmental Wind [redacted] or [redacted]** MW COD: 1/1/2020** or 2021 30 year term		• Long-term site control is secured • County will likely be supportive of wind development	• [redacted] is owned by [redacted] a vertically integrated company in [redacted] that has experienced significant financial issues • CTS option was not quantified, and energy delivery and REC creation will be difficult as proposed • Proposal does not adequately address permitting requirements • It is unclear as to whether proposer has engaged local land owners	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18177 [redacted] DAS or BTS Developmental Wind [redacted] MW COD: Q4 2020		• Long-term site control has been achieved • Mid-C delivery seems viable • Community relations was well-addressed in the proposal • The permitting process seemed relatively mature	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to quantitatively assess the project	**Not selected** – The RFP team does not recommend this proceed past Stage 1 of the RFP. There are several qualitative concerns evaluated in this proposal regarding the counterparty, financing, interconnection, and energy delivery. However, the primary fatal flaw is that capital and ongoing O&M costs are assumed to be facilitated directly by PSE, but no capital cost estimates were issued with the proposal. Without this information, the RFP team is unable to sufficiently assess the proposal quantitatively.
18178 [redacted] PPA Developmental Wind [redacted] MW COD: 12/31/2022 20 year term		• Balance sheet financing is great, assuming parent company is willing to guarantee the project • Long-term site control is secured • Interconnection studies through BPA are complete • Community relations plan seems sufficient, but requires more detail	• Energy delivery left to PSE and appears to be overly expensive or otherwise infeasible • Permitting plan requires significant development • Company is relatively unknown to PSE and not much background information was provided	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18180 [redacted] PPA Developmental Wind [redacted] MW COD: 1/1/2021 or 2022 20 year term		• Long-term site control is apparently secured • Interconnection studies through BPA are complete • Project received Washington State EFSEC in 2012 after a contentious permitting process	• This would be [redacted] first experience in the Pacific Northwest • Insufficient detail regarding company financial health and project financing strategy was included in the proposal • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Significant reputational issues with proximity to local fisheries as well as blocking a view of the Columbia River Gorge	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18181 [redacted] PPA** or BTS Developmental Wind [redacted] MW COD: 12/12/2020 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control is secured • Interconnection process with BPA is well underway • There are nearby wind farms, not many residential neighbors, and the RFP team believes the local community and government support solar development • Permitting plan has minimal detail and represents a schedule and feasibility risk for the project	• Long-term firm point-to-point transmission appears to not be feasible • Community relations was not addressed in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18182 [redacted] PPA**, DAS, or BTS Developmental Wind [redacted] MW COD: 12/01/2022 20 year term		• Long-term site control is secured • Permitting is early in process but presents little schedule or viability risk	• Insufficient data was provided regarding the counterparty background and financing plan • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Community and government relations is supposedly strong, but little detail was provided to support it	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18183 [redacted] PPA** Developmental Wind [redacted] MW COD: June 2020 10 or 15 year term		• Not applicable	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to quantitatively or qualitatively assess the project	**Not selected** – Beyond a discussion of potential agreement terms, the proposal did not include enough detail to sufficiently assess on either a qualitative or quantitative basis. The RFP team does not recommend this proposal move beyond the first phase of the RFP process.
18184 [redacted] PPA Developmental Solar + BESS [redacted] MW & optional [redacted] or [redacted]** MW, 2 or 4** Hr, BESS COD: 10/31/2022 20** or 25 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Site control projected to be achieved by Q2 2019	• RFP team could not confirm interconnection queue position asserted in the proposal • Energy delivery would likely need to be periodically curtailed • The permitting plan is largely underdeveloped, and there are potential issues with wetlands and Mazama Pocket Gophers that threaten project viability and schedule • There are potential glare issues with local roadway in the City of [redacted]	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18185 [redacted] PPA Developmental Wind [redacted] MW COD: 12/31/2020 20 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Letter of intents have indicated likely site control in the near future • Backup point of interconnection at [redacted] is likely a feasible energy delivery option • Permitting is in the early stages, but since only construction permits will be required it represents a low risk	• [redacted] intends to secure long-term firm point-to-point transmission with [redacted] and [redacted] but have not yet taken steps to secure it • Community and government relations was not adequately assessed in the proposal, but presents only a minor risk for the project as renewable energy is seen in a generally positive light	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

**This matrix summarizes key findings from PSE's Phase 1 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.*
***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
DAS	Development asset sale
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18186 [redacted] 15-yr/20-yr PPA, Development Wind Up to [redacted] MW COD: 1/1/2021 Term:		• Long-term site control is secured • Interconnection studies with BPA are complete, and an engineering and procurement agreement is soon to be secured • Real-time delivery to PSE will not be necessary to secure RECs since the project is within BPA's regional territory • Project appears to be fully permitted, with the exception of ministerial approvals	• Developer is relatively inexperienced at developing, permitting, construction, and operating generation sites • Impact to local prime agricultural land might cause some local tension	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18187 [redacted] PPA Developmental Solar + BESS [redacted] MW Solar & optional [redacted]** or [redacted] MW, 2** or 4 Hr, BESS COD: 10/31/2022 15 or 20** year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Long-term site control is secured	• Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility or cost risk • Permitting process has not appreciably started, but represents a slight schedule and feasibility risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18188 [redacted] EPC Development Reciprocating Thermal [redacted] MW Duel Fuel or [redacted]** MW Single Fuel COD: 4/15/2021		• Expansion of existing site rather than a new thermal facility. • Technology is relatively site-agnostic and can potentially be designed to integrate with other sites. • Project could likely be facilitated with firm gas supply with existing facilities.	• Air permit path is complex and possibly not feasible. • The likely-to-be-required air permit modification could bring more operational constraints for the existing generation units. • PSE will experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's thermal generation portfolio. • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, the proposed schedule and general project feasibility seem to be in question.	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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**Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18189 [redacted] CTA** Development BESS [redacted] MW / [redacted] MWh / 2 hr [redacted] MW / [redacted] MWh / 2 hr COD: 08/01/2020 Term: 20 year		• Developer has experience in BESS projects, particularly with integration and control software • Location at [redacted] site may offer development synergies, however permitting may be complicated with location [redacted]	• Similar to every other stand-alone BESS proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18200 [redacted] Direct load control Smart thermostat, smart water heater [redacted] MW COD: 1/1/2019 Term: 5 years		• Detailed project implementation plan and schedule provided • Minimum PSE engagement • Seamless customer interruption • Strong parent company financials • Past [redacted] program experience (90,000 units)	• Lack of demonstrated winter peaking experience	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18202 [redacted] Direct load control Smart water heater [redacted] MW COD: 1/1/2019 Term: 10 years		• Vendor can also monitor and control load control switches, EVs, Solar PV, energy storage, building controls, HVAC and other demand side assets	• Solution seems limited in its initial deployment • Seems optimistic as to resource availability • Lack of demonstrated program experience	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18203 [redacted] Behavioral demand response 100% Residential [redacted] MW COD: 1/1/2019 Term: 5 years		• Existing working relationship with PSE on other energy efficiency projects • Cumulative 1.5M utility customer • [redacted]	• Program is day-ahead and limits peak capacity contribution • Lack of demonstrated winter peaking experience • Aggressive program benefit assumption to roll out 375k customers to achieve [redacted] MW of savings	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18204 [redacted] EMIS and traditional demand response programs [redacted] MW COD: 1/1/2019 Term: 5 years		• EMIS technology and program has longer term impact and savings averaging 3.5% across the board due to behavioral changes • Experience with Winter DR programs ([redacted])	• Heavy PSE involvement for marketing, Data, Customer Service • Program is day-ahead and limits peak capacity contribution • High counter-party risk as being a small private consulting company	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18205 [redacted] Commercial & industrial direct install [redacted] MW, mixed Day-ahead, hour-ahead, and 10-min ready MWs COD: 1/1/2019 Term: 5 Years		• Utilize existing relationship ([redacted]) • [redacted] • Over [redacted] MW DR under management (self-claimed)	• Mixed program contribution to peak capacity could limit program effectiveness • Very expensive pricing	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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**Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results in Section C.2]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
UP001 [redacted] CTA or BTS** Development Pumped Hydro [redacted] or [redacted]* MW, 6.4 Hr daily storage COD: 03/30/2023 20 CTA term		• Not applicable	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to qualitatively assess the project • Insufficient data to quantitatively assess CTA	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
UP002 [redacted] Tru[redacted] REC purchase Underlying operating solar project [redacted] RECS per year Start of term: 2020 9-year or 14-year term		• Not applicable[1] *[1]Proposal was submitted late in Phase 1 (Feb. 7, 2018) when PSE was finalizing its Phase 1 results. PSE quantitatively screened the two offers, but neither offer was quantitatively competitive with PSE's other renewable resource alternatives. Had the proposal fared better in the quantitative analysis, an assessment of its qualitative merits and risks would have followed.*	• Price is higher and volume is smaller than other REC offers received in response this RFP.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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REDACTED VERSION

PSE PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

C.2 Phase 1 Standalone Portfolio Analysis Results

REDACTED
VERSION

2018 RFP Phase I Quantitative Results Summary - Renewable Resource (results as of 4/2/2019)

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18169	[redacted]	[redacted]	[redacted]	18	[redacted]	[redacted]	[redacted]	1	2	1	-7.9	-2.7	-1.6	9	39	103	[redacted]	[redacted]	[redacted]		4	3
18135	[redacted]	[redacted]	[redacted]	3	[redacted]	[redacted]	[redacted]	2	9	13	-6.7	-3.3	-1.5	10	37	112	[redacted]	[redacted]	[redacted]		9	10
18173	[redacted]	[redacted]	[redacted]	49	[redacted]	[redacted]	[redacted]	3	4	4	11.8	-4.8	-1.8	25	23		[redacted]	[redacted]	[redacted]		12	5
18132	[redacted]	[redacted]	[redacted]	13	[redacted]	[redacted]	[redacted]	4	11	26	-14.5	-4.0	-1.4	5	28		[redacted]	[redacted]	[redacted]		16	15
18176	[redacted]	[redacted]	[redacted]	34	[redacted]	[redacted]	[redacted]	5	5	24	158.8	-3.5	-3.2	20	36		[redacted]	[redacted]	[redacted]		6	62
18135	[redacted]	[redacted]	[redacted]	1	[redacted]	[redacted]	[redacted]	6	3	9	-10.8	-2.2	-1.4	8	43	114	[redacted]	[redacted]	[redacted]		2	6
18112	[redacted]	[redacted]	[redacted]	12	[redacted]	[redacted]	[redacted]	7	10	18	-12.8	-3.1	-1.4	6	38	118	[redacted]	[redacted]	[redacted]		7	8
18175	[redacted]	[redacted]	[redacted]	30	[redacted]	[redacted]	[redacted]	8	41	45	5.9	-6.4	-6.0	39	19		[redacted]	[redacted]	[redacted]		23	104
18132	[redacted]	[redacted]	[redacted]	10	[redacted]	[redacted]	[redacted]	9	17	43	-22.4	-4.6	-1.5	4	25	109	[redacted]	[redacted]	[redacted]		18	17
18163	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	10	42	132	7.0	5.6	1.8	33	73	135	[redacted]	[redacted]	[redacted]		111	180
18169	[redacted]	[redacted]	[redacted]	29	[redacted]	[redacted]	[redacted]	11	6	3	9.9	-3.6	-1.7	27	31		[redacted]	[redacted]	[redacted]		5	4
18173	[redacted]	[redacted]	[redacted]	52	[redacted]	[redacted]	[redacted]	12	1	2	5.0	-2.6	-1.5	43	40	108	[redacted]	[redacted]	[redacted]		3	2
18165	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	13	45	136	6.1	4.8	1.5	37	78	140	[redacted]	[redacted]	[redacted]		120	185
18165	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	14	29	137	6.1	5.3	1.4	36	76	144	[redacted]	[redacted]	[redacted]		119	184
18111	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	15	16	8	-54.2	-3.6	-1.4	1	33	113	[redacted]	[redacted]	[redacted]		14	7
18179	[redacted]	[redacted]	[redacted]	9	[redacted]	[redacted]	[redacted]	16	15	20	-38.8	-3.6	-1.4	3	34	115	[redacted]	[redacted]	[redacted]		11	11
18125	[redacted]	[redacted]	[redacted]	11	[redacted]	[redacted]	[redacted]	17	12	15	52.6	-3.6	-1.5	21	35	111	[redacted]	[redacted]	[redacted]		10	12
18122	[redacted]	[redacted]	[redacted]	14	[redacted]	[redacted]	[redacted]	18	13	14	27.2	-3.8	-1.5	22	30	105	[redacted]	[redacted]	[redacted]		15	13
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	19	84	133	5.7	4.4	1.7	41	86	137	[redacted]	[redacted]	[redacted]		112	181
18132	[redacted]	[redacted]	[redacted]	5	[redacted]	[redacted]	[redacted]	20	28	7	-47.3	-5.0	-1.5	2	22	110	[redacted]	[redacted]	[redacted]		20	19
18170	[redacted]	[redacted]	[redacted]	67	[redacted]	[redacted]	[redacted]	21	7	5	2.0	11.0	11.0	75	61	127	[redacted]	[redacted]	[redacted]		93	175
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	22	151	134	6.5	1.4	1.7	34	138	136	[redacted]	[redacted]	[redacted]		110	179
18131	[redacted]	[redacted]	[redacted]	47	[redacted]	[redacted]	[redacted]	23	54	49	3.3	-21.9	-1.8	51	7	91	[redacted]	[redacted]	[redacted]		37	39
18125	[redacted]	[redacted]	[redacted]	4	[redacted]	[redacted]	[redacted]	24	18	21	18.2	-4.3	-1.6	24	27	104	[redacted]	[redacted]	[redacted]		17	16
18127	[redacted]	[redacted]	[redacted]	6	[redacted]	[redacted]	[redacted]	25	19	37	22.0	-4.7	-1.6	25	24	[illegible]	[redacted]	[redacted]	[redacted]		19	28
18114	[redacted]	[redacted]	[redacted]	17	[redacted]	[redacted]	[redacted]	26	80	33	11.1	-4.4	-1.6	26	26	100	[redacted]	[redacted]	[redacted]		22	22
18127	[redacted]	[redacted]	[redacted]	7	[redacted]	[redacted]	[redacted]	27	14	17	8.7	-3.6	-1.5	29	32	106	[redacted]	[redacted]	[redacted]		13	14
18139	[redacted]	[redacted]	[redacted]	24	[redacted]	[redacted]	[redacted]	28	27	29	3.1	7.8	-3.2	55	65	39	[redacted]	[redacted]	[redacted]		98	67
18122	[redacted]	[redacted]	[redacted]	28	[redacted]	[redacted]	[redacted]	29	26	101	4.3	-11.8	-1.1	45	8	119	[redacted]	[redacted]	[redacted]		34	35
18166	[redacted]	[redacted]	[redacted]	63	[redacted]	[redacted]	[redacted]	30	35	31	4.5	-33.9	-1.9	44	5	82	[redacted]	[redacted]	[redacted]		39	36
18170	[redacted]	[redacted]	[redacted]	44	[redacted]	[redacted]	[redacted]	31	8	6	3.5	94.6	-2.7	49	55	54	[redacted]	[redacted]	[redacted]		84	43
18170	[redacted]	[redacted]	[redacted]	19	[redacted]	[redacted]	[redacted]	32	37	22	8.5	-9.8	-1.7	31	12	94	[redacted]	[redacted]	[redacted]		30	21
18121	[redacted]	[redacted]	[redacted]	22	[redacted]	[redacted]	[redacted]	33	24	110	6.3	-5.7	-4.5	35	21	30	[redacted]	[redacted]	[redacted]		21	111
18121	[redacted]	[redacted]	[redacted]	23	[redacted]	[redacted]	[redacted]	34	39	111	6.0	-8.4	-4.7	38	14	28	[redacted]	[redacted]	[redacted]		28	113
18139	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	[redacted]	35	33	35	9.4	-8.2	-1.7	28	15	95	[redacted]	[redacted]	[redacted]		27	27
18132	[redacted]	[redacted]	[redacted]	26	[redacted]	[redacted]	[redacted]	36	69	25	5.8	-6.2	-1.8	40	20	89	[redacted]	[redacted]	[redacted]		138	25
18135	[redacted]	[redacted]	[redacted]	79	[redacted]	[redacted]	[redacted]	37	68	56	2.8	4.7	-3.1	58	80	44	[redacted]	[redacted]	[redacted]		115	75
18171	[redacted]	[redacted]	[redacted]	21	[redacted]	[redacted]	[redacted]	38	44	34	8.6	-8.9	-1.5	30	13	107	[redacted]	[redacted]	[redacted]		29	18
18133	[redacted]	[redacted]	[redacted]	129	[redacted]	[redacted]	[redacted]	39	72	57	1.8	3.7	-3.6	83	92	36	[redacted]	[redacted]	[redacted]		132	84
18133	[redacted]	[redacted]	[redacted]	140	[redacted]	[redacted]	[redacted]	40	76	60	1.6	2.7	-5.1	89	110	26	[redacted]	[redacted]	[redacted]		148	102
18139	[redacted]	[redacted]	[redacted]	98	[redacted]	[redacted]	[redacted]	41	43	39	1.3	2.0	22.9	101	123	124	[redacted]	[redacted]	[redacted]		174	170
18109	[redacted]	[redacted]	[redacted]	31	[redacted]	[redacted]	[redacted]	42	62	36	2.5	20.5	-1.8	64	57	92	[redacted]	[redacted]	[redacted]		87	32
18135	[redacted]	[redacted]	[redacted]	83	[redacted]	[redacted]	[redacted]	43	21	32	1.8	6.0	-2.2	81	71	72	[redacted]	[redacted]	[redacted]		102	58
18142	[redacted]	[redacted]	[redacted]	45	[redacted]	[redacted]	[redacted]	44	48	44	2.5	-10.5	-1.7	65	9	97	[redacted]	[redacted]	[redacted]		33	31
18187	[redacted]	[redacted]	[redacted]	104	[redacted]	[redacted]	[redacted]	45	31	73	1.7	4.1	-14.3	84	90	4	[redacted]	[redacted]	[redacted]		96	125
18187	[redacted]	[redacted]	[redacted]	138	[redacted]	[redacted]	[redacted]	46	58	138	1.5	3.0	-17.5	91	103	2	[redacted]	[redacted]	[redacted]		105	117
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	47	87	135	5.4	4.3	1.6	42	87	138	[redacted]	[redacted]	[redacted]		113	182
18121	[redacted]	[redacted]	[redacted]	43	[redacted]	[redacted]	[redacted]	48	40	123	3.8	-8.0	-12.4	48	16	5	[redacted]	[redacted]	[redacted]		26	124
18171	[redacted]	[redacted]	[redacted]	20	[redacted]	[redacted]	[redacted]	49	65	28	7.7	-10.1	-1.6	32	11	98	[redacted]	[redacted]	[redacted]		35	20
18133	[redacted]	[redacted]	[redacted]	60	[redacted]	[redacted]	[redacted]	50	52	42	2.5	11.6	-2.5	66	60	63	[redacted]	[redacted]	[redacted]		91	59
18187	[redacted]	[redacted]	[redacted]	62	[redacted]	[redacted]	[redacted]	51	57	72	2.3	8.1	-3.2	67	64	38	[redacted]	[redacted]	[redacted]		89	82
18112	[redacted]	[redacted]	[redacted]	115	[redacted]	[redacted]	[redacted]	52	38	65	3.8	-6.6	-1.6	47	18	102	[redacted]	[redacted]	[redacted]		7	8
18111	[redacted]	[redacted]	[redacted]	112	[redacted]	[redacted]	[redacted]	53	51	54	1.1	2.6	-2.7	116	112	55	[redacted]	[redacted]	[redacted]		147	80
18140	[redacted]	[redacted]	[redacted]	85	[redacted]	[redacted]	[redacted]	54	95	150	1.2	1.6	N/A	109	130		[redacted]	[redacted]	[redacted]		167	78
18166	[redacted]	[redacted]	[redacted]	78	[redacted]	[redacted]	[redacted]	55	61	40	2.5	22.9	-2.1	63	56		[redacted]	[redacted]	[redacted]		85	48
18130	[redacted]	[redacted]	[redacted]	41	[redacted]	[redacted]	[redacted]	56	63	58	3.1	2,150.0	-1.9	52	54		[redacted]	[redacted]	[redacted]		83	49
18133	[redacted]	[redacted]	[redacted]	97	[redacted]	[redacted]	[redacted]	57	88	66	1.5	2.4	-5.3	93	115	22	[redacted]	[redacted]	[redacted]		149	107
18109	[redacted]	[redacted]	[redacted]	39	[redacted]	[redacted]	[redacted]	58	73	47	2.0	8.2	-1.9	72	63		[redacted]	[redacted]	[redacted]		92	40
18187	[redacted]	[redacted]	[redacted]	48	[redacted]	[redacted]	[redacted]	59	60	68	2.2	6.3	-3.6	70	69		[redacted]	[redacted]	[redacted]		100	90
18121	[redacted]	[redacted]	[redacted]	25	[redacted]	[redacted]	[redacted]	60	36	124	4.0	-7.5	-9.8	46	17		[redacted]	[redacted]	[redacted]		25	122
18128	[redacted]	[redacted]	[redacted]	51	[redacted]	[redacted]	[redacted]	61	50	59	3.1	-10.2	-1.8	54	10		[redacted]	[redacted]	[redacted]		32	41
18133	[redacted]	[redacted]	[redacted]	54	[redacted]	[redacted]	[redacted]	62	64	48	2.1	6.1	-2.9	71	70		[redacted]	[redacted]	[redacted]		101	69
18174	[redacted]	[redacted]	[redacted]	33	[redacted]	[redacted]	[redacted]	63	53	19	1.8	3.8	-2.7	82	91		[redacted]	[redacted]	[redacted]		137	52
18175	[redacted]	[redacted]	[redacted]	55	[redacted]	[redacted]	[redacted]	64	82	61	2.6	-163.9	-2.4	59	1	67	[redacted]	[redacted]	[redacted]		43	51
18164	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	65	122	141	2.5	1.6	0.1	61	131	152	[redacted]	[redacted]	[redacted]		157	191
18109	[redacted]	[redacted]	[redacted]	38	[redacted]	[redacted]	[redacted]	66	47	50	2.9	-46.1	-1.8	56	4	88	[redacted]	[redacted]	[redacted]		40	42
18140	[redacted]	[redacted]	[redacted]	66	[redacted]	[redacted]	[redacted]	67	97	153	1.0	1.4	N/A	124	137		[redacted]	[redacted]	[redacted]		172	88
18140	[redacted]	[redacted]	[redacted]	86	[redacted]	[redacted]	[redacted]	68	128	148	1.0	1.1	N/A	123	144		[redacted]	[redacted]	[redacted]		173	77
18109	[redacted]	[redacted]	[redacted]	42	[redacted]	[redacted]	[redacted]	69	49	52	2.9	-69.7	-1.8	57	2	87	[redacted]	[redacted]	[redacted]		41	44
18120	[redacted]	[redacted]	[redacted]	36	[redacted]	[redacted]	[redacted]	70	67	53	2.6	-65.7	-1.9	60	3	84	[redacted]	[redacted]	[redacted]		42	46
18174	[redacted]	[redacted]	[redacted]	37	[redacted]	[redacted]	[redacted]	71	56	12	1.5	3.4	-3.0	90	94		[redacted]	[redacted]	[redacted]		143	56
18171	[redacted]	[redacted]	[redacted]	58	[redacted]	[redacted]	[redacted]	72	89	55	2.2	4.8	-2.1	69	79		[redacted]	[redacted]	[redacted]		104	55
18133	[redacted]	[redacted]	[redacted]	113	[redacted]	[redacted]	[redacted]	73	93	71	1.2	1.8	-11.7	107	125	6	[redacted]	[redacted]	[redacted]		163	118
18130	[redacted]	[redacted]	[redacted]	32	[redacted]	[redacted]	[redacted]	74	81	77	1.7	4.3	-2.8	86	88		[redacted]	[redacted]	[redacted]		31	33
18166	[redacted]	[redacted]	[redacted]	64	[redacted]	[redacted]	[redacted]	75	74	46	2.2	16.1	-2.1	68	58		[redacted]	[redacted]	[redacted]		88	50
18181	[redacted]	[redacted]	[redacted]	106	[redacted]	[redacted]	[redacted]	76	34	38	1.0	3.2	-2.5	126	99	62	[redacted]	[redacted]	[redacted]		142	66
18119	[redacted]	[redacted]	[redacted]	53	[redacted]	[redacted]	[redacted]	77	75	76	1.9	10.8	-2.1	78	62		[redacted]	[redacted]	[redacted]		90	61

REDACTED VERSION

REDACTED VERSION

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18162	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	78	118	115	2.5	1.8	1.5	62	126	141	[redacted]	[redacted]	[redacted]	[redacted]	150	190
18134	[redacted]	[redacted]	[redacted]	57	[redacted]	[redacted]	[redacted]	79	90	82	1.9	5.8	-2.3	77	72		[redacted]	[redacted]	[redacted]	[redacted]	95	70
18109	[redacted]	[redacted]	[redacted]	103	[redacted]	[redacted]	[redacted]	80	66	67	1.5	4.5	-3.0	92	84		[redacted]	[redacted]	[redacted]	[redacted]	117	23
18187	[redacted]	[redacted]	[redacted]	101	[redacted]	[redacted]	[redacted]	81	77	84	1.9	2.3	-3.2	79	117	41	[redacted]	[redacted]	[redacted]	[redacted]	155	90
18187	[redacted]	[redacted]	[redacted]	77	[redacted]	[redacted]	[redacted]	82	78	81	1.3	2.7	-3.2	100	111	40	[redacted]	[redacted]	[redacted]	[redacted]	146	90
18129	[redacted]	[redacted]	[redacted]	88	[redacted]	[redacted]	[redacted]	83	104	96	2.0	3.0	-2.5	73	102	59	[redacted]	[redacted]	[redacted]	[redacted]	122	83
18109	[redacted]	[redacted]	[redacted]	105	[redacted]	[redacted]	[redacted]	84	59	70	1.5	4.5	-3.1	94	85		[redacted]	[redacted]	[redacted]	[redacted]	127	24
18134	[redacted]	[redacted]	[redacted]	59	[redacted]	[redacted]	[redacted]	85	91	85	1.9	5.5	-2.3	80	74		[redacted]	[redacted]	[redacted]	[redacted]	99	73
18135	[redacted]	[redacted]	[redacted]	69	[redacted]	[redacted]	[redacted]	86	20	30	1.9	7.5	-2.1	76	66		[redacted]	[redacted]	[redacted]	[redacted]	94	54
18109	[redacted]	[redacted]	[redacted]	81	[redacted]	[redacted]	[redacted]	87	71	74	1.4	3.3	-3.8	99	98		[redacted]	[redacted]	[redacted]	[redacted]	151	34
18135	[redacted]	[redacted]	[redacted]	122	[redacted]	[redacted]	[redacted]	88	79	75	1.0	2.0	-9.0	117	122	11	[redacted]	[redacted]	[redacted]	[redacted]	161	115
18174	[redacted]	[redacted]	[redacted]	111	[redacted]	[redacted]	[redacted]	89	22	10	1.2	6.3	-2.4	106	67	65	[redacted]	[redacted]	[redacted]	[redacted]	107	38
18137	[redacted]	[redacted]	[redacted]	56	[redacted]	[redacted]	[redacted]	90	92	80	1.2	2.1	-6.1	108	121	15	[redacted]	[redacted]	[redacted]	[redacted]	158	110
18174	[redacted]	[redacted]	[redacted]	114	[redacted]	[redacted]	[redacted]	91	46	11	1.1	5.0	-2.2	111	77	74	[redacted]	[redacted]	[redacted]	[redacted]	116	29
18174	[redacted]	[redacted]	[redacted]	126	[redacted]	[redacted]	[redacted]	92	22	16	1.0	6.3	-2.8	125	67	52	[redacted]	[redacted]	[redacted]	[redacted]	107	53
18140	[redacted]	[redacted]	[redacted]	82	[redacted]	[redacted]	[redacted]	93	116	156	0.8	1.0	N/A	139	151		[redacted]	[redacted]	[redacted]	[redacted]	178	101
18174	[redacted]	[redacted]	[redacted]	128	[redacted]	[redacted]	[redacted]	94	25	23	0.9	5.4	-2.8	127	75	50	[redacted]	[redacted]	[redacted]	[redacted]	118	57
18136	[redacted]	[redacted]	[redacted]	89	[redacted]	[redacted]	[redacted]	95	135	78	1.0	3.4	-2.1	122	96	75	[redacted]	[redacted]	[redacted]	[redacted]	97	63
18119	[redacted]	[redacted]	[redacted]	80	[redacted]	[redacted]	[redacted]	96	94	88	1.3	3.3	-3.0	102	97	47	[redacted]	[redacted]	[redacted]	[redacted]	124	89
UP002	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	97	152	108	3.1	2.2	0.8	53	120	148	[redacted]	[redacted]	[redacted]	[redacted]	44	186
18109	[redacted]	[redacted]	[redacted]	102	[redacted]	[redacted]	[redacted]	98	85	83	1.1	2.4	-5.2	115	116	25	[redacted]	[redacted]	[redacted]	[redacted]	127	106
18174	[redacted]	[redacted]	[redacted]	76	[redacted]	[redacted]	[redacted]	99	32	27	0.9	4.1	-4.9	130	89	27	[redacted]	[redacted]	[redacted]	[redacted]	139	96
18174	[redacted]	[redacted]	[redacted]	74	[redacted]	[redacted]	[redacted]	100	30	41	0.9	4.6	-4.7	129	82	29	[redacted]	[redacted]	[redacted]	[redacted]	126	99
18115	[redacted]	[redacted]	[redacted]	65	[redacted]	[redacted]	[redacted]	101	96	89	1.4	4.6	-2.3	96	81	68	[redacted]	[redacted]	[redacted]	[redacted]	103	74
18171	[redacted]	[redacted]	[redacted]	50	[redacted]	[redacted]	[redacted]	102	109	64	1.7	3.4	-2.2	85	93	73	[redacted]	[redacted]	[redacted]	[redacted]	114	60
18140	[redacted]	[redacted]	[redacted]	87	[redacted]	[redacted]	[redacted]	103	111	151	1.3	2.3	N/A	103	119		[redacted]	[redacted]	[redacted]	[redacted]	144	94
18140	[redacted]	[redacted]	[redacted]	90	[redacted]	[redacted]	[redacted]	104	120	147	1.3	1.7	N/A	105	128		[redacted]	[redacted]	[redacted]	[redacted]	154	93
18137	[redacted]	[redacted]	[redacted]	75	[redacted]	[redacted]	[redacted]	105	98	91	0.9	1.5	-14.7	132	134	3	[redacted]	[redacted]	[redacted]	[redacted]	165	121
18132	[redacted]	[redacted]	[redacted]	72	[redacted]	[redacted]	[redacted]	106	69	97	1.3	3.4	-3.4	104	95	37	[redacted]	[redacted]	[redacted]	[redacted]	24	95
18180	[redacted]	[redacted]	[redacted]	70	[redacted]	[redacted]	[redacted]	107	139	69	1.4	2.5	-2.5	97	114	61	[redacted]	[redacted]	[redacted]	[redacted]	109	68
18129	[redacted]	[redacted]	[redacted]	61	[redacted]	[redacted]	[redacted]	108	106	93	1.6	2.9	-2.7	87	105	57	[redacted]	[redacted]	[redacted]	[redacted]	130	85
18123	[redacted]	[redacted]	[redacted]	123	[redacted]	[redacted]	[redacted]	109	107	87	0.9	2.7	-5.7	131	109	18	[redacted]	[redacted]	[redacted]	[redacted]	135	71
18180	[redacted]	[redacted]	[redacted]	91	[redacted]	[redacted]	[redacted]	110	86	62	1.1	4.6	-2.5	113	83	64	[redacted]	[redacted]	[redacted]	[redacted]	106	65
18108	[redacted]	[redacted]	[redacted]	93	[redacted]	[redacted]	[redacted]	111	99	99	1.1	3.1	-2.8	110	101	51	[redacted]	[redacted]	[redacted]	[redacted]	125	97
18108	[redacted]	[redacted]	[redacted]	96	[redacted]	[redacted]	[redacted]	112	100	100	1.1	2.9	-2.9	114	104	48	[redacted]	[redacted]	[redacted]	[redacted]	129	98
18140	[redacted]	[redacted]	[redacted]	68	[redacted]	[redacted]	[redacted]	113	103	154	1.1	2.8	N/A	112	107		[redacted]	[redacted]	[redacted]	[redacted]	134	100
18123	[redacted]	[redacted]	[redacted]	109	[redacted]	[redacted]	[redacted]	114	105	86	1.0	2.8	-2.3	118	108	70	[redacted]	[redacted]	[redacted]	[redacted]	135	71
18113	[redacted]	[redacted]	[redacted]	107	[redacted]	[redacted]	[redacted]	115	108	105	1.0	2.6	-3.6	121	113	35	[redacted]	[redacted]	[redacted]	[redacted]	140	105
18118	[redacted]	[redacted]	[redacted]	35	[redacted]	[redacted]	[redacted]	116	55	51	3.4	-30.1	-1.9	50	6	86	[redacted]	[redacted]	[redacted]	[redacted]	38	45
18108	[redacted]	[redacted]	[redacted]	73	[redacted]	[redacted]	[redacted]	117	110	102	1.0	2.3	-3.6	119	118	33	[redacted]	[redacted]	[redacted]	[redacted]	145	103
18184	[redacted]	[redacted]	[redacted]	125	[redacted]	[redacted]	[redacted]	118	113	94	0.8	1.4	-5.2	138	136	24	[redacted]	[redacted]	[redacted]	[redacted]	152	86
18140	[redacted]	[redacted]	[redacted]	84	[redacted]	[redacted]	[redacted]	119	101	155	0.9	2.9	N/A	128	106		[redacted]	[redacted]	[redacted]	[redacted]	133	108
18129	[redacted]	[redacted]	[redacted]	95	[redacted]	[redacted]	[redacted]	120	141	116	1.0	1.0	-6.0	120	147	17	[redacted]	[redacted]	[redacted]	[redacted]	160	116
18184	[redacted]	[redacted]	[redacted]	120	[redacted]	[redacted]	[redacted]	121	121	95	0.8	1.7	-2.7	135	127	58	[redacted]	[redacted]	[redacted]	[redacted]	152	86
18108	[redacted]	[redacted]	[redacted]	132	[redacted]	[redacted]	[redacted]	122	115	104	0.7	1.2	112.7	140	141	123	[redacted]	[redacted]	[redacted]	[redacted]	171	168
18166	[redacted]	[redacted]	[redacted]	137	[redacted]	[redacted]	[redacted]	123	131	90	0.5	0.7	12.7	150	156	126	[redacted]	[redacted]	[redacted]	[redacted]	181	171
18108	[redacted]	[redacted]	[redacted]	92	[redacted]	[redacted]	[redacted]	124	123	109	0.8	1.6	-5.5	134	129	20	[redacted]	[redacted]	[redacted]	[redacted]	156	114
18179	[redacted]	[redacted]	[redacted]	141	[redacted]	[redacted]	[redacted]	125	130	117	0.4	0.7	5.9	151	158	129	[redacted]	[redacted]	[redacted]	[redacted]	182	173
18100	[redacted]	[redacted]	[redacted]	100	[redacted]	[redacted]	[redacted]	126	112	63	0.7	1.3	-7.0	141	140	14	[redacted]	[redacted]	[redacted]	[redacted]	170	109
18108	[redacted]	[redacted]	[redacted]	136	[redacted]	[redacted]	[redacted]	127	126	107	0.6	1.1	15.3	143	145	125	[redacted]	[redacted]	[redacted]	[redacted]	175	169
18177	[redacted]	[redacted]	[redacted]	99	[redacted]	[redacted]	[redacted]	128	119	98	0.8	1.5	-5.4	136	135	21	[redacted]	[redacted]	[redacted]	[redacted]	159	112
18136	[redacted]	[redacted]	[redacted]	127	[redacted]	[redacted]	[redacted]	129	150	130	0.8	0.7	-5.2	137	157	23	[redacted]	[redacted]	[redacted]	[redacted]	131	81
18135	[redacted]	[redacted]	[redacted]	148	[redacted]	[redacted]	[redacted]	130	129	112	0.3	0.4	1.1	158	165	146	[redacted]	[redacted]	[redacted]	[redacted]	190	192
18129	[redacted]	[redacted]	[redacted]	71	[redacted]	[redacted]	[redacted]	131	145	120	0.9	0.8	-10.8	133	154	9	[redacted]	[redacted]	[redacted]	[redacted]	164	123
18138	[redacted]	[redacted]	[redacted]	144	[redacted]	[redacted]	[redacted]	132	138	126	0.3	0.4	1.1	154	166	145	[redacted]	[redacted]	[redacted]	[redacted]	186	187
UP002	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	133	148	128	1.6	1.2	0.3	88	143	151	[redacted]	[redacted]	[redacted]	[redacted]	44	189
18185	[redacted]	[redacted]	[redacted]	46	[redacted]	[redacted]	[redacted]	134	117	79	1.4	13.9	-1.6	95	59	101	[redacted]	[redacted]	[redacted]	[redacted]	86	47
18178	[redacted]	[redacted]	[redacted]	143	[redacted]	[redacted]	[redacted]	135	125	103	0.6	1.2	-11.0	146	142	8	[redacted]	[redacted]	[redacted]	[redacted]	169	119
18113	[redacted]	[redacted]	[redacted]	110	[redacted]	[redacted]	[redacted]	136	136	121	0.6	1.0	-36.4	142	149	1	[redacted]	[redacted]	[redacted]	[redacted]	168	126
18108	[redacted]	[redacted]	[redacted]	124	[redacted]	[redacted]	[redacted]	137	127	106	0.5	1.0	10.0	147	148	128	[redacted]	[redacted]	[redacted]	[redacted]	176	172
18141	[redacted]	[redacted]	[redacted]	121	[redacted]	[redacted]	[redacted]	138	102	92	0.4	3.1	-2.4	152	100	66	[redacted]	[redacted]	[redacted]	[redacted]	121	79
18181	[redacted]	[redacted]	[redacted]	119	[redacted]	[redacted]	[redacted]	139	134	118	0.5	1.1	-8.9	149	146	12	[redacted]	[redacted]	[redacted]	[redacted]	166	120
18135	[redacted]	[redacted]	[redacted]	147	[redacted]	[redacted]	[redacted]	140	132	114	0.3	0.5	1.4	155	162	143	[redacted]	[redacted]	[redacted]	[redacted]	187	188
18108	[redacted]	[redacted]	[redacted]	133	[redacted]	[redacted]	[redacted]	141	137	119	0.3	0.7	2.8	157	155	132	[redacted]	[redacted]	[redacted]	[redacted]	180	178
18138	[redacted]	[redacted]	[redacted]	149	[redacted]	[redacted]	[redacted]	142	83	140	0.2	0.6	0.1	163	159	154	[redacted]	[redacted]	[redacted]	[redacted]	191	195
18110	[redacted]	[redacted]	[redacted]	139	[redacted]	[redacted]	[redacted]	143	144	125	0.2	0.4	1.5	162	167	139	[redacted]	[redacted]	[redacted]	[redacted]	185	183
18172	[redacted]	[redacted]	[redacted]	130	[redacted]	[redacted]	[redacted]	144	147	127	0.3	0.5	3.0	156	161	131	[redacted]	[redacted]	[redacted]	[redacted]	177	176
18172	[redacted]	[redacted]	[redacted]	135	[redacted]	[redacted]	[redacted]	145	149	131	0.3	0.5	2.2	160	164	133	[redacted]	[redacted]	[redacted]	[redacted]	179	177
18138	[redacted]	[redacted]	[redacted]	117	[redacted]	[redacted]	[redacted]	146	124	129	0.4	1.3	-8.5	153	139	13	[redacted]	[redacted]	[redacted]	[redacted]	162	30
18168	[redacted]	[redacted]	[redacted]	15	[redacted]	[redacted]	[redacted]	147	142	139	0.6	1.8	-0.2	144	124	121	[redacted]	[redacted]	[redacted]	[redacted]	123	76
18168	[redacted]	[redacted]	[redacted]	15	[redacted]	[redacted]	[redacted]	148	140	145	0.5	1.6	0.0	148	132	122	[redacted]	[redacted]	[redacted]	[redacted]	141	64
18138	[redacted]	[redacted]	[redacted]	108	[redacted]	[redacted]	[redacted]	149	146	113	0.3	0.9	-5.6	159	153	19	[redacted]	[redacted]	[redacted]	[redacted]	36	37
18138	[redacted]	[redacted]	[redacted]	142	[redacted]	[redacted]	[redacted]	150	143	146	0.1	0.5	1.9	166	160	134	[redacted]	[redacted]	[redacted]	[redacted]	183	26
18138	[redacted]	[redacted]	[redacted]	151	[redacted]	[redacted]	[redacted]	151	133	152	N/A	0.3	N/A		168		[redacted]	[redacted]	[redacted]	[redacted]	194	198
18172	[redacted]	[redacted]	[redacted]	145	[redacted]	[redacted]	[redacted]	152	153	142	N/A	N/A	0.1			153	[redacted]	[redacted]	[redacted]	[redacted]	188	193
18182	[redacted]	[redacted]	[redacted]	131	[redacted]	[redacted]	[redacted]	153	114	122	N/A	0.9	4.1		152	130	[redacted]	[redacted]	[redacted]	[redacted]	184	174
18172	[redacted]	[redacted]	[redacted]	146	[redacted]	[redacted]	[redacted]	154	154	143	N/A	N/A	0.1			155	[redacted]	[redacted]	[redacted]	[redacted]	189	194
18106	[redacted]	[redacted]	[redacted]	150	[redacted]	[redacted]	[redacted]	155	155	144	N/A	N/A	0.0			156	[redacted]	[redacted]	[redacted]	[redacted]	193	197
18101	[redacted]	[redacted]	[redacted]	134	[redacted]	[redacted]	[redacted]	156	156	149	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	[redacted]	192	196
18186	[redacted]	[redacted]	[redacted]	155	[redacted]	[redacted]	[redacted]	157	157	157	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	[redacted]	195	199
18167	[redacted]	[redacted]	[redacted]	163	[redacted]	[redacted]	[redacted]	158	159	158	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	[redacted]	197	200
18167	[redacted]	[redacted]	[redacted]	162	[redacted]	[redacted]	[redacted]	159	158	159	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	[redacted]	196	201

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	CO2 Fee $/REC	Societal $/REC	NO CO2 Rank	CO2 Fee Rank	Societal Rank	Portfolio Benefit Ratio NO CO2	CO2 Fee	Societal	NO CO2 Rank	CO2 Fee Rank	Societal Rank	Net Cost/REC NO CO2 $/REC	CO2 Fee $/REC	Societal $/REC	NO CO2 Rank	CO2 Fee Rank	Societal Rank
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18131	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18169	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18169	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18182	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18183	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18102	[redacted]		[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					

Notes
1. Ranking color scheme: green is high ranking, red is low ranking.
2. Grayed out lines at towards the bottom of the list indicate either withdrawn proposals or proposals with fatal flaws.
3. REC only proposals have N/A value for levelized cost because this is less meaningful metric for those proposals.
4. Some propsals have N/A value for portfolio benefit. The reason is that if the portfolio benefit results in a net cost, the portfolio benefit ratio calculation breaks down and is meaningless.

REDACTED VERSION

REDACTED VERSION

2018 RFP Phase I Quantitative Results Summary - Capacity Resource (results as of 4/2/2019)

REDACTED VERSION

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Project ID	Project	NAMEPLATE	Levelized Cost		Portfolio Benefit / kW-yr						Net Cost / kW-yr					
			All Scenarios $/MWh	Rank	NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank	NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank
18169	[redacted]	[redacted]	$ [redacted]	16	[redacted]	[redacted]	[redacted]	1	2	2	[redacted]	[redacted]	[redacted]	1	2	2
18169	[redacted]	[redacted]	$ [redacted]	27	[redacted]	[redacted]	[redacted]	2	3		[redacted]	[redacted]	[redacted]	10	3	3
18173	[redacted]	[redacted]	$ [redacted]	50	[redacted]	[redacted]	[redacted]	3	1		[redacted]	[redacted]	[redacted]	6	1	1
18176	[redacted]	[redacted]	$ [redacted]	32	[redacted]	[redacted]	[redacted]	4	4		[redacted]	[redacted]	[redacted]	3	4	6
18173	[redacted]	[redacted]	$ [redacted]	47	[redacted]	[redacted]	[redacted]	5	5		[redacted]	[redacted]	[redacted]	4	5	4
18100	[redacted]	[redacted]	$ [redacted]	98	[redacted]	[redacted]	[redacted]	6	6	6	[redacted]	[redacted]	[redacted]	46	28	7
18105	[redacted]	[redacted]	$ [redacted]	150	[redacted]	[redacted]	[redacted]	7	10		[redacted]	[redacted]	[redacted]	2	8	11
18105	[redacted]	[redacted]	$ [redacted]	162	[redacted]	[redacted]	[redacted]	8	9	15	[redacted]	[redacted]	[redacted]	5	12	18
XXXXX	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	9	8		[redacted]	[redacted]	[redacted]	7	9	9
18105	[redacted]	[redacted]	$ [redacted]	160	[redacted]	[redacted]	[redacted]	10	14	11	[redacted]	[redacted]	[redacted]	9	15	12
18105	[redacted]	[redacted]	$ [redacted]	152	[redacted]	[redacted]	[redacted]	11	11	12	[redacted]	[redacted]	[redacted]	12	11	15
18170	[redacted]	[redacted]	$ [redacted]	42	[redacted]	[redacted]	[redacted]	12	7	8	[redacted]	[redacted]	[redacted]	8	7	10
18105	[redacted]	[redacted]	$ [redacted]	161	[redacted]	[redacted]	[redacted]	13	13	16	[redacted]	[redacted]	[redacted]	13	16	19
18201	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	14	12	17	[redacted]	[redacted]	[redacted]	11	10	14
18103	[redacted]	[redacted]	$ [redacted]	25	[redacted]	[redacted]	[redacted]	15	17	20	[redacted]	[redacted]	[redacted]	15	6	24
18201	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	16	16	18	[redacted]	[redacted]	[redacted]	14	17	16
18104	[redacted]	[redacted]	$ [redacted]	117	[redacted]	[redacted]	[redacted]	17	21	25	[redacted]	[redacted]	[redacted]	17	25	13
18202	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	18	18	19	[redacted]	[redacted]	[redacted]	18	19	21
18104	[redacted]	[redacted]	$ [redacted]	114	[redacted]	[redacted]	[redacted]	19	24	26	[redacted]	[redacted]	[redacted]	16	22	29
18201	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	20	20	21	[redacted]	[redacted]	[redacted]	19	20	23
18105	[redacted]	[redacted]	$ [redacted]	151	[redacted]	[redacted]	[redacted]	21	23	23	[redacted]	[redacted]	[redacted]	20	24	25
18105	[redacted]	[redacted]	$ [redacted]	154	[redacted]	[redacted]	[redacted]	23	27	22	[redacted]	[redacted]	[redacted]	21	30	26
18105	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	24	26	24	[redacted]	[redacted]	[redacted]	23	27	27
18104	[redacted]	[redacted]	$ [redacted]	155	[redacted]	[redacted]	[redacted]	25	28	28	[redacted]	[redacted]	[redacted]	24	33	34
18104	[redacted]	[redacted]	$ [redacted]	92	[redacted]	[redacted]	[redacted]	26	31	29	[redacted]	[redacted]	[redacted]	22	32	32
18145	[redacted]	[redacted]	$ [redacted]	38	[redacted]	[redacted]	[redacted]	27	57	53	[redacted]	[redacted]	[redacted]	26	38	28
18104	[redacted]	[redacted]	$ [redacted]	156	[redacted]	[redacted]	[redacted]	29	37	27	[redacted]	[redacted]	[redacted]	25	40	33
18159	[redacted]	[redacted]	$ [redacted]	156	[redacted]	[redacted]	[redacted]	30	36	30	[redacted]	[redacted]	[redacted]	27	41	37
UP001	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	31	51	37	[redacted]	[redacted]	[redacted]	30	48	5
18203	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	32	46	34	[redacted]	[redacted]	[redacted]	28	47	40
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	33	45	59	[redacted]	[redacted]	[redacted]	29	46	42
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	34	44	61	[redacted]	[redacted]	[redacted]	32	52	43
18145	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	35	80	74	[redacted]	[redacted]	[redacted]	31	29	22
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	36	42	62	[redacted]	[redacted]	[redacted]	33	42	46
18188	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	37	52	36	[redacted]	[redacted]	[redacted]	35	56	49
18157	[redacted]	[redacted]	$ [redacted]	158	[redacted]	[redacted]	[redacted]	38	41	63	[redacted]	[redacted]	[redacted]	34	54	47
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	39	48	80	[redacted]	[redacted]	[redacted]	36	51	48
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	40	68	81	[redacted]	[redacted]	[redacted]	37	55	50
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	41	35	82	[redacted]	[redacted]	[redacted]	39	13	51
18145	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	42	95	71	[redacted]	[redacted]	[redacted]	48	31	20
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	43	62	83	[redacted]	[redacted]	[redacted]	41	59	52
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	44	34	56	[redacted]	[redacted]	[redacted]	40	37	30
18188	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	45	56	45	[redacted]	[redacted]	[redacted]	43	60	64
18157	[redacted]	[redacted]	$ [redacted]	159	[redacted]	[redacted]	[redacted]	46	38	58	[redacted]	[redacted]	[redacted]	42	39	31
18107	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	47	29	7	[redacted]	[redacted]	[redacted]	38	26	8
18144	[redacted]	[redacted]	$ [redacted]	114	[redacted]	[redacted]	[redacted]	48	53	42	[redacted]	[redacted]	[redacted]	44	49	53
18147	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	49	49	32	[redacted]	[redacted]	[redacted]	45	53	39
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	50	43	77	[redacted]	[redacted]	[redacted]	47	43	35
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	51	61	79	[redacted]	[redacted]	[redacted]	49	44	36
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	52	54	87	[redacted]	[redacted]	[redacted]	52	66	76
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	53	25	104	[redacted]	[redacted]	[redacted]	63	18	87
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	54	88	70	[redacted]	[redacted]	[redacted]	53	99	77
18200	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	55	59	33	[redacted]	[redacted]	[redacted]	51	64	61
18152	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	56	81	50	[redacted]	[redacted]	[redacted]	50	84	44
18147	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	57	58	38	[redacted]	[redacted]	[redacted]	54	62	54
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	58	30	97	[redacted]	[redacted]	[redacted]	55	36	66

REDACTED VERSION

REDACTED VERSION

Project ID	Project	NAMEPLATE	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / kW-yr NO CO2 $/kw-yr	Portfolio Benefit / kW-yr CO2 Fee $/kw-yr	Portfolio Benefit / kW-yr Societal $/kw-yr	Portfolio Benefit / kW-yr NO CO2 Rank	Portfolio Benefit / kW-yr CO2 Fee Rank	Portfolio Benefit / kW-yr Societal Rank	Net Cost / kW-yr NO CO2 $/kw-yr	Net Cost / kW-yr CO2 Fee $/kw-yr	Net Cost / kW-yr Societal $/kw-yr	Net Cost / kW-yr NO CO2 Rank	Net Cost / kW-yr CO2 Fee Rank	Net Cost / kW-yr Societal Rank
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	59	103	86	[redacted]	[redacted]	[redacted]	65	63	65
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	60	99	98	[redacted]	[redacted]	[redacted]	57	71	68
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	61	22	99	[redacted]	[redacted]	[redacted]	58	23	70
18147	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	62	60	39	[redacted]	[redacted]	[redacted]	60	65	55
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	63	93	72	[redacted]	[redacted]	[redacted]	70	77	67
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	64	97	100	[redacted]	[redacted]	[redacted]	61	73	72
18152	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	65	87	35	[redacted]	[redacted]	[redacted]	56	58	44
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	66	64	40	[redacted]	[redacted]	[redacted]	62	68	57
18205	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	67	72	49	[redacted]	[redacted]	[redacted]	59	72	71
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	68	65	41	[redacted]	[redacted]	[redacted]	64	69	60
18156 / 18158	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	69	19	95	[redacted]	[redacted]	[redacted]	66	21	56
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	70	96	96	[redacted]	[redacted]	[redacted]	69	61	58
18146	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	71	63	67	[redacted]	[redacted]	[redacted]	68	14	62
18145	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	72	40	68	[redacted]	[redacted]	[redacted]	67	92	17
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	73	71	44	[redacted]	[redacted]	[redacted]	71	74	63
18143	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	74	76	47	[redacted]	[redacted]	[redacted]	73	80	75
18151	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	75	83	65	[redacted]	[redacted]	[redacted]	72	85	84
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	76	75	46	[redacted]	[redacted]	[redacted]	74	79	69
18157	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	77	106	102	[redacted]	[redacted]	[redacted]	80	82	82
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	78	77	48	[redacted]	[redacted]	[redacted]	76	81	74
18152	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	79	90	57	[redacted]	[redacted]	[redacted]	75	94	86
18148	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	80	70	76	[redacted]	[redacted]	[redacted]	79	78	79
18146	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	81	79	69	[redacted]	[redacted]	[redacted]	77	34	73
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	82	82	51	[redacted]	[redacted]	[redacted]	78	87	78
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	83	86	52	[redacted]	[redacted]	[redacted]	81	93	81
18143	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	84	89	54	[redacted]	[redacted]	[redacted]	83	95	85
18152	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	85	66	43	[redacted]	[redacted]	[redacted]	82	67	59
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	86	84	55	[redacted]	[redacted]	[redacted]	84	91	83
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	87	92	60	[redacted]	[redacted]	[redacted]	86	98	88
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	88	91	64	[redacted]	[redacted]	[redacted]	88	97	89
18204	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	89	94	73	[redacted]	[redacted]	[redacted]	89	100	91
18149	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	90	67	101	[redacted]	[redacted]	[redacted]	91	75	94
18155	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	91	98	66	[redacted]	[redacted]	[redacted]	90	101	92
18149 / 18153	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	92	73	105	[redacted]	[redacted]	[redacted]	97	86	99
18154	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	93	100	75	[redacted]	[redacted]	[redacted]	92	102	93
18143	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	94	103	78	[redacted]	[redacted]	[redacted]	94	103	96
18149	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	95	55	90	[redacted]	[redacted]	[redacted]	93	57	95
18149	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	96	47	88	[redacted]	[redacted]	[redacted]	95	45	97
18160	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	97	104	93	[redacted]	[redacted]	[redacted]	96	106	105
18189	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	98	33	89	[redacted]	[redacted]	[redacted]	98	35	103
18149 / 18153	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	99	69	103	[redacted]	[redacted]	[redacted]	99	70	100
18150	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	100	78	85	[redacted]	[redacted]	[redacted]	100	83	101
18149 / 18153	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	101	105	106	[redacted]	[redacted]	[redacted]	101	89	102
18160	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	102	102	84	[redacted]	[redacted]	[redacted]	102	104	98
18150	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	103	74	91	[redacted]	[redacted]	[redacted]	103	76	80
18150	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	104	85	92	[redacted]	[redacted]	[redacted]	105	88	104
18189	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	105	50	94	[redacted]	[redacted]	[redacted]	104	50	106
18159	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	106	107	107	[redacted]	[redacted]	[redacted]	107	107	107
18161	BPA Peak Capacity Product	100 MW	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			
18143	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			

Notes
1. Ranking color scheme: green is high ranking, red is low ranking.
2. Grayed out lines at towards the bottom of the list indicate either withdrawn proposals or proposals with fatal flaws.
3. Energy storage proposals have N/A value for levelized cost since the energy storage proposal is net user of energy it does not have levelized cost in $/MWh.

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

Appendix D. Phase 2 Results and Phase 2 Update Results (the "Re-evaluation")

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2018 RFP Evaluation Process Document

D.1 Phase 2 Executive Summary

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2018 RFP – Executive Summary*

Quantitative results are the product of analysis performed in PSM III version 25.13.

Phase 2 Candidate Short List: Proposals selected for contracting phase of RFP

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18100 **SPI Burlington Biomass** Sierra Pacific Industries PPA Operational biomass 17 MW nameplate PPA start: 01/01/2021 Term: 17 years capacity	Levelized cost: $[redacted] / MWh Portfolio benefit: $14.132 M Levelized PB/REC: $[redacted]** Peak capacity PB / kW-Yr: ($[redacted]) Net cost PV: $33.613 M Peak capacity contribution (MW): 16.4 Annual REC contribution: [redacted])	• Existing/operating facility so no development risk • Biomass project is REC producing • High effective load-carrying capability (ELCC), i.e. contribution to peak capacity need • Interconnected onto PSE's system	• Sierra Pacific Industries is a privately held company, so less financial information is available than if it were public • A disruption of mill operations would likely impact long-term operation of the facility	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.

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***Indicates primary ranking criteria for particular proposal category.

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REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18161 **BPA Peak Capacity** Bonneville Power Administration PPA** Operational portfolio of projects 100 MW** PPA start: 01/01/2022** Term: 5 years**	Levelized cost: [redacted] Portfolio benefit: ($8.028 M) Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $25.426 M Peak capacity contribution (MW): 100 Annual REC contribution: 0	• Counterparty is well known with existing ties to PSE and, therefore, very limited risk for this proposal • There are no permitting, real estate or community relations concerns as the proposal is based on currently operational projects • As a response to data requests, Bonneville Power Administration (BPA) moved their delivery location from Mid-C to BPAT.PSEI		**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.
18169 [redacted] PPA** or 50% ownership+PPA Development wind [redacted] MW** or [redacted] MW COD: 12/31/2021** Term: 20 or 25** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $417.294 M Levelized PB/REC: $[redacted]** Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $24.422 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Relatively cost efficient way to contribute towards both the REC and contribution to peak capacity need • Large and experienced counterparty • Site control is reportedly achieved, but supporting documentation was not included in proposal • Public has been notified of the project as a [redacted] MW facility • Shape of wind based on 6 operating meteorological towers appears to fit well with PSE's needs	• Lengthy gen-tie line for which site-control has not yet been fully obtained • Transmission from [redacted] to PSE brings both schedule and cost risk to PSE as the potential energy offtaker • There is a potential permitting issue with sage grouse habitat	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted] and PSE, the [redacted] and [redacted] projects are considered mutually exclusive.
18170 **Golden Hills Wind** Avangrid Renewables [redacted] PPA-shaped or [redacted] Development wind 200 MW** COD: 12/31/2020** Term: 20 years**	Levelized cost: $[redacted] / MWh Portfolio benefit: $106.924 M Levelized PB/REC: $[redacted]** Net cost PV: $74.948 M Peak capacity contribution (MW): 51.6 Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Shaped product offers capacity contribution during peak winter months • Site control is achieved • Permitting well advanced with Oregon Energy Facility Siting Council (EFSC) permit application already amended	• Complex energy delivery will require additional vetting • Complexity of shaped product will require additional vetting	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable.

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REDACTED VERSION

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18173 [redacted] PPA** Development wind [redacted] MW or [redacted] MW COD: 10/31/2022** Term: 20 years**	Levelized cost: $[redacted] / MWh Portfolio benefit: $280.504 M Levelized PB/REC: $[redacted]** Peak capacity PB / kW-Yr: [redacted] Net cost PV: $116.358 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Project may be sited on a single landowner's property, which would likely minimize real estate complexity • Favorable state support; however, local level of support unknown	• Project site may include Montana Department of Natural Resources and Conservation (DNRC) land, which could complicate site control and permitting • Permitting is in a relatively early stage of development; risk of potential delay to scheduled COD • Assumed use of [redacted] brings both schedule and cost risk to PSE as the potential energy offtaker	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted] and PSE, the [redacted] and [redacted] projects are considered mutually exclusive.

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REDACTED VERSION

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PUGET SOUND ENERGY

Phase 2 proposals not selected for contracting phase of RFP

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18103 [redacted] CTA** or asset transfer Operational combined cycle [redacted] MW** or [redacted] MW Start: 06/01/2022 Term: 10 years	Levelized cost: $[redacted] / MWh Portfolio benefit: ($29.120 M) Peak capacity PB / kW-Yr: [redacted] Net cost PV: $163.748 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Existing/operating facility (rather than new build) therefore no development risk • Existing presence in the community with local opposition unlikely	• High social cost of carbon adversely impacts project economics in certain quantitative scenarios • In light of recently passed Clean Energy Transition Act (SB5116), advancement of this and other fossil fuel-based projects represents considerable reputational and financial risk • Lack of firm delivery of natural gas is a risk to the effective load-carrying capability (ELCC) of the project	**Not Selected –** Project not selected during portfolio optimization process.
18105 [redacted] CTA** or BTS [redacted] thermal expansion [redacted] MW** or [redacted] MW COD: 01/01/2022 Term: 5, 15, or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: ($16.898 M) Peak capacity PB / kW-Yr: [redacted] Net cost PV: $85.973 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposed expansion of existing [redacted] may bring O&M cost savings on a per-kW basis (versus an entirely new thermal facility) • Technology is relatively site-agnostic and can potentially be designed to integrate at other sites • [redacted] MW proposal would likely be facilitated with firm gas supply from existing facilities	• In light of recently passed Clean Energy Transition Act (Washington State Bill 5116), advancement of new fossil fuel-based projects represents considerable reputational and financial risk • Proposed project would require extensive integration with existing [redacted] the viability of which is unknown at this time • Would require review and likely modification of air permit for co-located generation facility. Process expected to be exceedingly difficult and the outcome uncertain, with possible impacts to existing facility operational permits • PSE will likely experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's CO_2 emitting portfolio • Strong likelihood of considerable delays to COD due to expected public protest, litigation and permit process	**Not Selected –** Project not selected due to qualitative risks.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18107 [redacted] PPA** Operational hydro [redacted] MW Start: 1/1/2021 (assumed) Term: 20 years (assumed)	Levelized cost: $[redacted] / MWh Portfolio benefit: ($36.163 M) Levelized PB/REC: ($[redacted] ** Net Cost PV: $38.677 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• No development risk; project is an existing operating facility • Clean energy (although not RPS compliant) • Run-of-river hydro can be less environmentally impactful than standard hydro • Little to no permitting or real estate risk due to current operational status	• Run-of-river asset provides little capacity value. • Not RPS complaint (although clean energy) • Energy delivery strategy has been left to PSE, and appears to be complex	**Not Selected –** Project not selected due to qualitative risks and did not show potential during standalone quantitative analysis.
18111 [redacted] PPA** Development solar Solar: [redacted] MWac COD: 12/31/2022 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $107.686 M Levelized PB/REC: $[redacted] ** Net cost PV: $51.359 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Relatively high quantitative score for solar project • Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Site control has been achieved • Permitting status is sufficient at this stage • Located on PSE's system in [redacted] County; avoids community concerns in [redacted] County	• While on PSE's system, complex delivery due to available transmission capacity (ATC) constraints in area. Delivery is possible to Mid-C; however, may be difficult given project's proximity to the Rocky Reach substation • Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18112 [redacted] PPA** Development solar Solar: n/a COD: n/a Term: n/a	Levelized cost: [redacted] Portfolio benefit: N/A Levelized PB/REC: [redacted] Net cost PV: N/A Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Project withdrawn by applicant	• Project withdrawn by applicant	**Not Selected -** Project withdrawn by applicant.

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REDACTED VERSION

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18114 [redacted] PPA Solar generation [redacted] MW_{AC} COD: 12/1/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $45.772 M Levelized PB/REC: $[redacted]** Net Cost PV: $36.011 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• [redacted] is assessed to be a relatively strong parent company	• Environmental permitting not yet begun. • Permitting will require the transfer of a Washington Energy Facility Site Evaluation Council (EFSEC) permit, which introduces a viability and reputational risk to the project and PSE • Transmission and energy delivery may be overly expensive or otherwise infeasible • Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Current site leases were executed for wind projects; it is not yet known whether or not land owners would be amenable to solar leases	**Not Selected –** Project not selected during portfolio optimization process.
18122 [redacted] PPA**, optional BESS Development Wind [redacted] MW_{AC}** & [redacted] MW 1 Hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $32.877 M Levelized PB/REC: $[redacted]** Net Cost PV: $35.687 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control for project site is secured	• Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Solar development is viewed with skepticism in this area; history of active local opposition • Site may block the view of a local real estate development • Contribution to the peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18125 [redacted] PPA Development solar [redacted] MW_{AC} COD: 1/1/2023 Term: 15 or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $55.283 M Levelized PB/REC: $[redacted]** Net Cost PV: $32.311 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience	• While interconnected to PSE's system, complex delivery due to available transmission capacity (ATC) constraints in the area • Site permitting is in a relatively early stage of development • Minimal information provided regarding community relations and or support	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18127 [redacted] PPA Development solar [redacted] MW_{AC} COD: 12/31/2022 Term: 15** or 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $119.579 M Levelized PB/REC: $[redacted]*** Net Cost PV: $60.272 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Extensive solar energy development experience; developed, currently owns and operates [redacted] solar installation in Washington State • Location on existing project site may provide economies of scale in developing and operating project • County has expressed support for the project	• Potential siting risks given proximity to wind turbines with required setbacks • Assumes use of [redacted] with current [redacted] landowners • Interconnection and energy delivery assume use of PSE existing infrastructure and analysis assumes no coincidental curtailment due to overproduction between existing wind and proposed solar • Conditional Use Permit (CUP) required to permit project	**Not Selected –** Project not selected during portfolio optimization process.
18131 [redacted] PPA** or BTS Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $11.525 M Levelized PB/REC: $[redacted]** Net Cost PV: $20.124 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposes to provide credit support in the form of a parent guarantee, letter of credit, or cash • Long-term site control for most of the site is secured • Community relations plan is strong compared to other proposals	• Less experienced than other counterparties • [redacted] MW offer configuration would likely exceed available transmission capacity • [redacted] tribe may request compensation from project	**Not Selected –** Project not selected during portfolio optimization process.
18132 [redacted] PPA** Development wind [redacted] MW COD: 01/01/2023 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $61.479 M Levelized PB/REC: $[redacted]** Net Cost PV: $20.702 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Repower of existing wind project; site control and community relations risks are unlikely • Oregon Energy Facility Siting Council (EFSC) amendment secured during Phase 2 of the RFP	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18135 [redacted] PPA** or BTS Development solar [redacted] MW or [redacted]** MW solar Optional [redacted] MW, 4-hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $123.395 M Levelized PB/REC: $[redacted]** Net Cost PV: $55.724 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty with experience all over the world • Letter of intent with an option to lease has been signed for project lands	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Permitting plan is underdeveloped • There is no site control for current generation-tie line alignment • Project is on irrigated farmland--mitigation strategy not included in proposal, but developer has retained a "Seattle PR firm" for support	**Not Selected –** Project not selected during portfolio optimization process.
18139 [redacted] PPA Development solar [redacted] MW solar* with optional [redacted] MW or [redacted] MW, 1.82-hr BESS COD: 1/1/2023 Term: 10 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $26.120 M Levelized PB/REC: $[redacted]** Net Cost PV: $15.659 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large multi-national counterparty with greater-than-average renewable development experience	• Site control not yet secured and copy of anticipated letter of intent has not been provided • Energy delivery has been left to PSE, appears to be complicated, and may pose a feasibility risk • Respondent provided little to no evidence of a successful permitting strategy • Community relations matters were not covered sufficiently, and tribal support may be required	**Not Selected –** Project not selected during portfolio optimization process.
18163 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2022 Term: 18 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $19.635 M Levelized PB/REC: $[redacted]** Net Cost PV: $2.412 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Interconnection at distribution voltage dictates that each as-generated MWh produces two Washington State RECs	• Little detail regarding underlying solar facilities	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18165 [redacted] REC purchase Underlying solar project [redacted] RECS per year Start of term: 1/1/2022** or 2024 Term: 16 or 18** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $13.181 M Levelized PB/REC: $[redacted]** Net Cost PV: $1.755 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Not applicable	• Little detail regarding underlying solar facility	**Not Selected –** Project not selected during portfolio optimization process.
18166 [redacted] Development asset sale, BTS or PPA** Development wind [redacted] MW COD: 12/1/2020, 2021*, or 2022 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $114.836 M Levelized PB/REC: $[redacted]** Net Cost PV: $121.737 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control established	• Significant concerns regarding the counterparty's ability to develop, finance, and construct the facility • Relatively small counterparty with inconclusive rights to the project's developmental assets • Timing of project is contingent on Bonneville Power Administration (BPA) infrastructure upgrades to enable transmission capacity • Project owner, [redacted], seemed uninterested in furthering project development via first-hand experience at [redacted] public hearing • Timeline as-proposed is likely infeasible and pricing is likely contingent on timing due to production tax credit (PTC) safe harbor	**Not Selected –** Project not selected during portfolio optimization process.
18175 [redacted] PPA, BTS**, or WSPP shaped Development wind [redacted] MW COD: 1/1/2021 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $176.514 M Levelized PB/REC: $[redacted]** Peak capacity PB / kW-Yr: $[redacted] Net Cost PV: $177.135 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control is secured • Western Systems Power Pool (WSPP) schedule C delivery is a unique value	• Counterparty and financing details will require data requests • Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Mid-C delivery will likely be necessary, which would negate a contribution to PSE's peak capacity • Permitting plan seems either underdeveloped or underrepresented in the proposal • Outreach plan is underdeveloped	**Not Selected –** Project not selected during portfolio optimization process.

This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
***Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
DAS	Development asset sale
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18176 [redacted] PPA** Development wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 20	Levelized cost: $[redacted] / MWh Portfolio benefit: $135,600 M Levelized PB/REC: $[redacted]** Peak capacity PB / kW-Yr: $75.00 Net Cost PV: $242524 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Indications of strong local, state and environmental support • Counterparty has indicated a plan to partner and/or otherwise engage an experienced renewable energy developer on the project • Potential to partner with a local Native American tribe • Located near [redacted] and in the same County [redacted]	• Counterparty does not have experience designing, financing, building, owning or operating a large scale renewable or other energy project • Assumed use of [redacted] may be problematic for full proposed output • Additional detail needed regarding the real estate and permitting considerations necessary for the site	**Not Selected –** Project not selected during portfolio optimization process.
18179 [redacted] PPA** or DBS Development wind [redacted] MW** COD: 12/31/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $70.371 M Levelized PB/REC: $[redacted]** Net Cost PV: $28,121 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Real estate appears adequate and relatively low risk • Project size has been altered to address some local viewshed concerns	• History of considerable local and county-level opposition to the project • Counterparty bypassed the County permitting process by pursing permit approval through the state's Washington Energy Facility Site Evaluation Council (EFSEC) process	**Not Selected –** Project not selected during portfolio optimization process.
18190 [redacted] REC purchase [redacted] underlying proposed solar facilities [redacted] RECs / year COD: 01/01/2022 Term: 12, 15, or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $46.975 M Levelized PB/REC: $[redacted]** Net Cost PV: $5.948 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Inexpensive RECs • Site control is secured • Washington Energy Facility Site Evaluation Council (EFSEC) projects have been approved by Governor Inslee	• Realizing full REC-output of underlying projects is unlikely due to interconnection issues • [redacted] is currently in litigation with [redacted] over interconnection issues with the underlying projects • [redacted] County opposes the EFSEC decision and has applied for judicial review • Major feasibility concerns with some and schedule concerns for all of the underlying projects • Projects sited on commercial agricultural land and many stakeholders in the county oppose development of these lands	**Not Selected –** Project not selected due to qualitative risks.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
DAS	Development asset sale
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18201 [redacted] Direct load control Bring your own thermostat, smart water heater [redacted] MW COD: 1/1/2023 Term: 6 years	Not applicable, please see selection recommendation & rational section to the right	• Described as an industry leader in a recent Navigant study • [redacted] • [redacted] manages all program implementation • Excellent financial strength, Washington based • The [redacted] MW option makes it a small scale project well suited for conceptual testing	• Proposal schedule includes significant ramp up of customer participation in first program year (2023); unclear if this is feasible • Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMs)	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
18205 [redacted] Commercial & industrial curtailment [redacted] MW COD: 1/1/2021 Term: 5 years	Not applicable, please see selection recommendation & rational section to the right	• Winter peak experience • Commercial and Industrial segment provides a diversification benefit	• Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMS) • Counterparty has only been established since 2016, and has not been financially profitable.	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
UP002 [redacted] REC purchase [redacted] RECs / year COD: 1/1/2020 Term: 15 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $4.502 M Levelized PB/REC: $[redacted]** Net Cost PV: $1.153 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Not applicable	• Price is higher and volume is smaller than other REC offers received in response this RFP.	**Not Selected –** Project not selected during portfolio optimization process.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
DAS	Development asset sale
PPA	Power purchase agreement
REC	Renewable energy credit

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
XXXXX **Colstrip Transmission System Redirect** Puget Sound Energy N/A Transmission redirect [redacted] MW**, [redacted] MW COD: 01/01/2022 Term: 55-year book life	Levelized cost: [redacted] Portfolio benefit: $57.274 M Peak Capacity PB / kW-Yr: ($[redacted]** Net Cost PV: $27.905 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• If feasible, redirect to Mid-C would provide a strong capacity resource	• Increased exposure to market prices (for redirect to Mid-C) • Redirects require Available Transmission Capacity (ATC) between the new points of receipt and delivery. With no ATC between Mid-C and BPAT.PSEI, a redirect to Mid-C is unfeasible. • Redirecting elsewhere on BPA's system would require appropriate ATC as well as an energy source at the redirect point, which may nullify contribution to peak capacity.	**Not Selected –** Proposal withdrawn from consideration due to lack of Available Transmission Capacity (ATC).

This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
***Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
DAS	Development asset sale
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

D.2 Phase 2 Standalone Portfolio Analysis Results

2018 RFP Phase II Quantitative Results Summary- CAPACITY PROPOSALS

As of July 23, 2019

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
		Capacity Proposals						Levelized PB /(Peak Capacity kW - YR)						Ranking Levelized PB / (Peak Capacity kW - YR)							Net Cost/KW-Yr					Ranking Net Cost/KW-Yr					
	ID	Project Name	Technology	Term Start	Book Life / Contract Term	Nameplate Capacity (MW)	Peak Capacity Credit	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal
1	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	78.8	[redacted]						5	1	2	4	1	1	[redacted]						8	8	5	4	5	4
2	18169	[redacted]	MT Wind	Dec-21	25	[redacted] MW	[redacted]	[redacted]						6	2	1	1	2	2	[redacted]						1	1	1	1	1	1
3	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	16.4	[redacted]						4	3	3	3	3	3	[redacted]						9	9	9	7	7	5
4	18173	[redacted]	MT Wind	Oct-22	20	[redacted] MW	[redacted]	[redacted]						3	4	4	2	4	4	[redacted]						4	6	3	3	3	3
5	18173	[redacted]	MT Wind	Oct-22	20	[redacted] MW	[redacted]	[redacted]						2	5	5	5	5	5	[redacted]						3	3	2	2	2	2
6	16161	BPA Peak Capacity Product	Capacity	Jan-22	5	100 MW	54.0	[redacted]						10	10	10	10	10	10	[redacted]						7	7	8	11	11	9
7	18105	[redacted]	Thermal	Jan-22	20	[redacted] W	[redacted]	[redacted]						7	7	6	7	6	7	[redacted]						2	2	4	6	8	6
8	18103	[redacted]	Thermal	Jun-22	10	[redacted] MW	[redacted]	[redacted]						9	8	7	9	9	9	[redacted]						6	4	6	9	10	8
9	18105	[redacted]	Thermal	Jan-22	20	[redacted] W	[redacted]	[redacted]						8	9	8	8	7	8	[redacted]						5	5	7	8	9	7
10	18201	[redacted]	DR	Jan-23	6	[redacted] W	[redacted]	[redacted]												[redacted]											
11	18205	[redacted]	DR	Jan-21	5	[redacted] W	[redacted]	[redacted]												[redacted]											
12	18190	[redacted]	MT Wind	Dec-22	20	[redacted] MW	[redacted]	[redacted]												[redacted]											
13	XXXXX	[redacted]				[redacted]	[redacted]	[redacted]												[redacted]											

Notes:
1. The metric shown-- Levelized PB /(Peak Capacity kW - YR)-- is the portfolio benefit attributable to peak capacity service divided by the average peak capacity.
2. Generation Resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 30% or higher were considered "Capacity Resources".
3. Generation Resources with Mid-C delivery are not considered Capacity resources regardless of ELCC.
4. Capacity-specific contracts and products such as Demand Response, Transmission Redirect, and BPA Capacity are considered alongside generation resources
5. None of the demand response projects in Phase II were selected, as there was no identifiable deferred T&D value that would have made it a cost effective solution. In addition, the providers' lack of experience in integrating with PSE's DERM (Distributed Energy Resource Management) system was deemed to be a critical hindrance to implementation.
6. Transmission Redirect has been eliminated as a viable option to meet capacity need.
7. All of the Demand Response projects were eliminated as viable options to meet capacity need.
8. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

REDACTED VERSION

REDACTED VERSION

2018 RFP Phase II Quantitative Results Summary- RENEWABLE PROPOSALS

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

As of July 23, 2019

	ID	Renewable Proposals: Project Name	A: Technology	B: Term Start	C: Book Life / Contract Term	D: Nameplate Capacity (MW)	Levelized PB / REC E: NO CO2 Low Load	F: NO CO2 Updated w/SB100	G: NO CO2	H: Low Societal	I: Mid Societal	J: High Societal	Ranking Levelized PB / REC K: NO CO2 Low Load	L: NO CO2 Updated w/SB100	M: NO CO2	N: Low Societal	O: Mid Societal	P: High Societal
1	18163	[redacted]	REC Only	Jan-22	18	[redacted]							1	1	3	24	34	36
2	18165	[redacted]	REC Only	Jan-22	18	[redacted]							2	2	4	23	35	35
3	18190	[redacted]	REC Only	Jan-20	20	[redacted]							3	3	1	20	33	33
4	18169	[redacted]	MT Wind	Dec-21	25	[redacted]							24	4	6	1	1	1
5	18190	[redacted]	REC Only	Jan-20	15	[redacted]							19	5	14	26	32	32
6	18190	[redacted]	REC Only	Jan-20	12	[redacted]							21	6	1	20	31	33
7	18173	[redacted]	MT Wind	Oct-22	20	[redacted]							30	7	18	13	4	2
8	18190	[redacted]	Wind	Dec-21	20	[redacted]							5	8	10	15	20	19
9	18135	[redacted]	Solar	Jan-23	20	[redacted]							7	9	5	3	7	6
10	18111	[redacted]	Solar	Dec-22	20	[redacted]							6	10	11	4	3	5
11	18127	[redacted]	Solar	Dec-22	15	[redacted]							11	11	24	6	8	7
12	18135	[redacted]	Solar	Jan-23	20	[redacted]							8	12	7	9	9	10
13	18125	[redacted]	Solar	Jan-23	20	[redacted]							10	13	8	10	10	11
14	18127	[redacted]	Solar	Dec-22	15	[redacted]							15	14	26	12	11	12
15	18132	[redacted]	Wind	Jan-23	20	[redacted]							4	15	12	2	5	4
16	18125	[redacted]	Solar	Jan-23	15	[redacted]							14	16	13	14	12	15
17	18173	[redacted]	MT Wind	Oct-22	20	[redacted]							27	17	23	19	14	13
18	18111	[redacted]	Solar	Dec-22	20	[redacted]							12	18	9	7	2	
19	18139	[redacted]	Solar	Jan-23	10	[redacted]							18	19	17	17	15	18
20	18132	[redacted]	Wind	Jan-22	20	[redacted]							9	20	15	5	13	14
21	18114	[redacted]	Solar	Dec-21	20	[redacted]							16	21	16	16	18	9
22	18179	[redacted]	Wind	Jan-21	25	[redacted]							31	22	31	29	25	23
23	18166	[redacted]	Wind	Jan-21	25	[redacted]							20	23	25	25	21	21
24	18132	[redacted]	Wind	Jan-21	20	[redacted]							13	24	20	11	16	17
25	18170	[redacted]	Wind	Dec-20	20	[redacted]							22	26	29	8	6	3
26	18122	[redacted]	Solar	Jan-23	20	[redacted]							17	27	21	18	19	20
27	18166	[redacted]	Wind	Jan-23	25	[redacted]							23	28	30	30	26	26
28	18131	[redacted]	Solar	Dec-22	25	[redacted]							35	29	22	22	22	22
29	18139	[redacted]	Solar + BES	Jan-23	10	[redacted]							26	30	28	27	24	25
30	18175	[redacted]	Wind	Jan-21	25	[redacted]							34	31	33	33	29	29
31	18166	[redacted]	Wind	Jan-22	25	[redacted]							25	32	32	32	27	27
32	18170	[redacted]	Wind	Dec-20	20	[redacted]							29	33	19	28	17	16
33	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	[redacted]						33	34	35	34	28	28
34	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	[redacted]						28	25	27	31	23	24
35	18139	[redacted]	Solar + BES	Jan-23	10	[redacted]							32	35	34	35	30	30
36	18107	[redacted]	Hydro-Run	Jan-21	20	[redacted]							36	36	36	36	36	31
	18190	[redacted]	MT Wind			[redacted]												

	ID	LEVELIZED $/REC Q: NO CO2 Low Load	R: NO CO2 Updated w/SB100	S: NO CO2	T: Low Societal	U: Mid Societal	V: High Societal	Ranking LEVELIZED $/REC W: NO CO2 Low Load	X: NO CO2 Updated w/SB100	Y: NO CO2	Z: Low Societal	AA: Mid Societal	AB: High Societal	Net Cost/REC AC: NO CO2 Low Load	AD: NO CO2 Updated w/SB100	AE: NO CO2	AF: Low Societal	AG: Mid Societal	AH: High Societal	Ranking Net Cost/REC AI: NO CO2 Low Load	AJ: NO CO2 Updated w/SB100	AK: NO CO2 base	AL: Low Societal	AM: Mid Societal	AN: High Societal
1	18163	[redacted]												[redacted]						8	3	15	26	32	31
2	18165	[redacted]												[redacted]						12	6	18	28	35	33
3	18190	[redacted]												[redacted]						7	2	13	24	31	29
4	18169	[redacted]						17	17	17	17	17	17	[redacted]						1	1	1	1	1	1
5	18190	[redacted]												[redacted]						9	4	16	27	33	32
6	18190	[redacted]												[redacted]						11	5	13	24	34	29
7	18173	[redacted]						26	26	26	26	26	26	[redacted]						22	20	19	10	4	2
8	18190	[redacted]						13	13	13	13	13	13	[redacted]						18	10	6	12	13	13
9	18135	[redacted]						2	2	2	2	2	2	[redacted]						3	11	2	2	6	6
10	18111	[redacted]						6	6	6	6	6	6	[redacted]						4	12	9	4	3	5
11	18127	[redacted]						5	5	5	5	5	5	[redacted]						10	15	24	6	7	8
12	18135	[redacted]						8	8	8	8	8	8	[redacted]						13	17	3	7	9	10
13	18125	[redacted]						10	10	10	10	10	10	[redacted]						14	18	4	8	10	11
14	18127	[redacted]						4	4	4	4	4	4	[redacted]						15	16	25	11	12	14
15	18132	[redacted]						11	11	11	11	11	11	[redacted]						2	7	8	3	5	4
16	18125	[redacted]						9	9	9	9	9	9	[redacted]						16	19	5	13	14	17
17	18173	[redacted]						21	21	21	21	21	21	[redacted]						24	22	21	18	15	12
18	18111	[redacted]						18	18	18	18	18	18	[redacted]						29	33	26	17	2	3
19	18139	[redacted]						1	1	1	1	1	1	[redacted]						17	14	10	19	20	20
20	18132	[redacted]						7	7	7	7	7	7	[redacted]						6	9	12	5	8	7
21	18114	[redacted]						12	12	12	12	12	12	[redacted]						19	21	7	14	16	18
22	18179	[redacted]						23	23	23	23	23	23	[redacted]						32	30	33	22	18	36
23	18166	[redacted]						22	22	22	22	22	22	[redacted]						23	25	27	23	24	23
24	18132	[redacted]						3	3	3	3	3	3	[redacted]						5	8	11	9	11	9
25	18170	[redacted]						15	15	15	15	15	15	[redacted]						20	13	17	15	17	15
26	18122	[redacted]						14	14	14	14	14	1	[redacted]						21	24	20	16	19	19
27	18166	[redacted]						29	29	29	29	29	2	[redacted]						28	29	31	32	27	24
28	18131	[redacted]						19	19	19	19	19	19	[redacted]						25	27	22	20	22	22
29	18139	[redacted]						16	16	16	16	16	16	[redacted]						27	26	28	29	25	25
30	18175	[redacted]						27	27	27	27	27	27	[redacted]						31	28	29	30	26	35
31	18166	[redacted]						28	28	28	28	28	28	[redacted]						30	31	32	33	29	27
32	18170	[redacted]						24	24	24	24	24	24	[redacted]						33	32	30	31	21	16
33	18100	[redacted]						30	30	30	30	30	30	[redacted]						35	34	34	34	28	26
34	18170	[redacted]						20	20	20	20	20	20	[redacted]						26	23	23	21	23	21
35	18139	[redacted]						25	25	25	25	25	25	[redacted]						34	35	35	35	30	28
36	18107	[redacted]						31	31	31	31	31	31	[redacted]						36	36	36	36	36	34
	18190	[redacted]												[redacted]											

Notes:
1. The metric shown-- Levelized PB / RECs-- is the portfolio benefit attributable divided by RECs generated.
2. For generation resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 3.2% or higher, the Renewable Portfolio Benefit was recomputed by isolating the portfolio benefit attributable to REC generation. Resources with Mid-C delivery are considered to have zero capacity value.
3. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

REDACTED VERSION

REDACTED VERSION

2018 RFP Evaluation Process Document

D.3 Phase 2 Portfolio Optimization Analysis Results

Portfolio Optimization Summary: as of 7.23.2019

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio: [redacted] MW + Renewables	(I) As Proposed Optimized Portfolio: [redacted] MW + Renewables	(J) Optimized Lowest Cost Portfolio to Solve for 0 Capacity Deficit with Generic Battery	(K) Backup Portfolio: [redacted] Renewables	(L) Contingency Portfolio: [redacted] No MT Wind	(M) Optimized Lowest Cost Portfolio with NO Carbon Costs Consideration	(N) Optimized Lowest Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	x	x	x	x			x
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	N/A	x	x	x	x	x		x
3a.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	x						
3b.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]		x	x			x	x
4a.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]				x			
4b.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
5a.	18170	Wind	Golden Hill Shaped	200 MW	77 MW	[redacted]	x	x	x	x			x
5b.	18170	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					x		
6	18132	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					x		x
7	18179	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
8	18166	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
9	18175	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
10	18125	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
11	18111	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
12	18127	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
13	18135	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
14	18139	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
15	18131	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					x		
16	18114	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
17	18122	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							x
18	18163	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
19	18165	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
20	UP-002	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
21	18103	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]					x	x	
22	XXXXX	Generic	Generic Peaker	237 MW	224 MW	N/A							
23	XXXXX	Generic	Generic Battery	61 MW	23 MW	N/A			x				x
24		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
25		Peak Capacity Surplus / (Deficit) in 2022[4]					[redacted] MW[4]	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
26		Total Annual RECs					2,139,656	1,986,862	1,986,862	1,773,109	1,044,255	1,216,764	6,481,035
27		Portfolio Benefits - $M					$408	$397	$273	$286	$275	$477	-$491
28													
29		With Consideration of Social Cost of Carbon:											
30		Portfolio Benefits w/ Carbon Costs as an Adder - $M[5]					$1,038	$934	$829	$716	-$42	$354	$2,024
31		Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M					$959	$937	$800	$605	$281	$667	$2,175

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.
2. The optimization model chose a portfolio with [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The 350MW option will have to be negotiated with NextEra. Current indicative results reflect pricing based on the 300MW offer.
3. The current project COD for [redacted] is Dec 2021. There has been perceived timing risks for PSE to secure long-term transmission rights to bring the energy home. If the COD is delayed to Dec 2022 to mitigate this risk, NPV of $35M increase in total PPA costs is projected. The next highest ranked portfolio ([redacted]) is $[redacted]M more expensive than the recommended portfolio, yet sharing the same timing risks on transmission.
4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by 1) short-term capacity purchase for $[redacted] per year; 2) a [redacted] MW battery for $[redacted] M.
5. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

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D.4 Phase 2 Update Portfolio Optimization Analysis Results

Portfolio Optimization Summary: as of 11.21.2019

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Recommended Portfolio: [redacted]+ Renewables	(I) Backup Portfolio: [redacted]+ Renewables	(J) Contingency Portfolio: No MT Wind	(K) Optimized Least Cost Portfolio with NO Carbon Costs Consideration	(L) Optimized Least Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X	X		X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X	X			X
3a.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	X			X	X
3b.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
4a.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]		X			
4b.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
5a.	18170	Wind	Golden Hills Shaped	200 MW	77 MW	[redacted]	X	X			X
5b.	18170	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		
6	xxxxx	Systerm PPA	Morgan Stanley Sys PPA	100 MW	81 MW	[redacted]	X	X	X		X
6	18132	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		
7	18179	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
8	18166	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
9	18175	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
10	18125	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
11	18111	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
12	18127	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
13	18135	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
14	18139	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		X
15	18131	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
16	18114	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
17	18122	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
18	18163	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
19	18165	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
20	UP-002	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
21	18103	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X	X	
22	XXXXX	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
23	XXXXX	Generic	Generic Peaker	237 MW	224 MW	N/A					
24	XXXXX	Generic	Generic Battery	175 MW	66 MW	N/A					
25		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
26		Total Annual RECs					2,189,656	1,773,109	1,297,005	1,419,568	2,406,449
27		Portfolio Benefits - $M					$679	$619	$739	$926	$658
28		Portfolio Benefits w/ Carbon Costs as an Adder - $M [2,3]					$1,179	$945	$827	$1,046	$1,206

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Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.
2. The social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.

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REDACTED VERSION

REDACTED VERSION

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Appendix E. Quantitative Evaluation Process

APPENDIX E. QUANTITATIVE EVALUATION PROCESS

2019 IRP update since completing the 2018 RFP:

PSE conducted its 2018 RFP evaluation between August 2018 and July 2019, in parallel with its 2019 integrated resource planning ("IRP") process. Many of the 2018 RFP modeling assumptions were updated to reflect 2019 IRP assumptions vetted by the IRPs public stakeholder groups, the IRP Advisory Group ("IRPAG") and the Technical Advisory Group ("IRTAG"). At the time, the 2019 IRP was expected to be filed in January 2020.

Subsequent to completing the 2018 RFPs, PSE was asked by the WUTC to withhold its next IRP until an upcoming rulemaking could incorporate Washington's new Clean Energy Transformation Act ("CETA") into Chapter 480-100-238 WAC ("the Integrated Resource Planning rule") and Chapter 480-107 WAC ("the Resource Acquisition rule"). This document reflects what PSE knew at the time the RFP evaluation was conducted.

PSE's 2018 RFP evaluation process includes a two-step approach designed to identify and evaluate the most promising proposals in the context of the utility's overall portfolio of assets. Each phase has a qualitative and a quantitative component, and each proposal is evaluated in a manner designed to consider the benefits, risks and costs of the proposal. This appendix describes the quantitative analysis components of the RFP evaluation process.

1. Models and Assumptions

Models and metrics

PSE used two primary models to perform the quantitative analysis for its 2018 RFP: PSE's portfolio screening and optimization model (PSM III) and the Aurora dispatch model. This section describes at a high level our models and metrics. For a more robust discussion of the models, how they interact and help us to evaluate resources, see Appendix N to the 2017 IRP.

Aurora dispatch model

The Aurora dispatch model analyzes the western power market to produce hourly electricity price forecasts of potential future market conditions and resource dispatch. PSE used Aurora to develop Mid-Columbia ("Mid-C") market power prices for its pricing scenarios (described on pages 6 and 7). Power prices were based on capacity expansion power price run modeled for the entire WECC region, which included assumptions for gas prices, regional load, renewable portfolio standards for multiple states, carbon taxes, resource assumptions and hydro shaping. The resulting prices were used in the Aurora input price run to isolate PSE's portfolio as a price taker.

The Aurora results provide several key inputs for PSM III, including estimates of energy output by resource, variable costs or dispatch costs (fuel and variable O&M), emissions, and market purchases and sales.

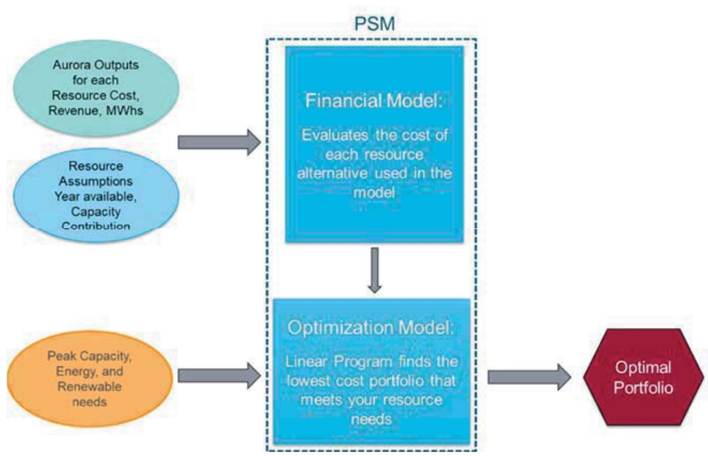
Portfolio Screening Model (PSM III)

Incremental cost includes: (i) the variable fuel cost and emissions for PSE's existing fleet, (ii) the variable cost of fuel emissions and operations and maintenance for new resources, (iii) the fixed depreciation and capital cost of investments in new resources, (iv) the market purchases or sales in hours when resources are deficient or surplus to PSE's need, and (v) end effects with replacement resources.

PSM III is a Microsoft Excel-based capacity expansion model developed by PSE to evaluate the incremental cost and risk of a wide variety of resource alternatives and portfolio strategies. At a high level, the model calculates the long-term revenue requirements of PSE's incremental generic power portfolio based on the 2017 IRP resource strategy and a current outlook on the Company's capacity, renewable and energy needs. Generic resources are then replaced in the model with a specific proposal or combination of proposals from the 2018 RFP to measure the impact on PSE's overall portfolio cost. Step 1 (individual proposal screening) evaluates the incremental cost and benefit impact on the portfolio of replacing a generic resource (or resources) with a single RFP proposal, and ranks the results for that proposal compared to all other RFP alternatives. Step 2 (portfolio optimization) evaluates the incremental impact on the portfolio of replacing all generic resources with a combination of RFP resources to meet the resource needs established in the RFP. The results of different combinations of resources are compared and the model identifies an optimal portfolio that best meets both the Company's RPS-driven renewable and capacity resource needs at the lowest reasonable cost.

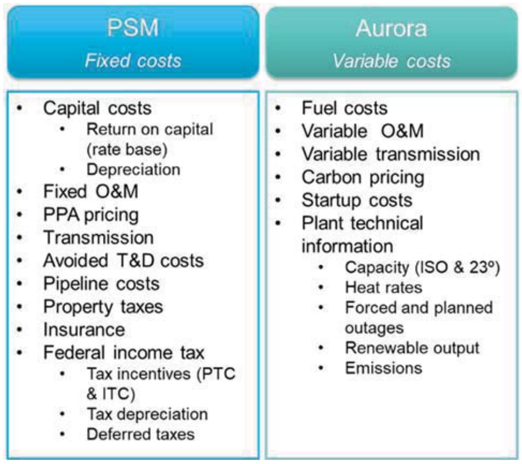
Figure 1 is a flow chart diagram depicting the information flow between PSM III and Aurora to calculate the optimal portfolio within PSM III. The diagram depicts both the financial component and the optimization component of PSM III. The financial component aggregates the cost and calculates the unique revenue requirement for each individual project. The optimization function identifies the optimal portfolio to meet PSE's resource needs at the lowest reasonable cost.

Figure 1. ***Information flow between PSM III and Aurora***



The interaction between PSM III and Aurora can also be described in terms of the costs they account for in the analysis. Figure 2 depicts the cost inputs analyzed by PSM III and Aurora.

Figure 2. ***Cost inputs analyzed by PSM III and Aurora***



Frontline Systems Risk Solver Platform

PSE's analysis is designed to produce a least-cost mix of resources using a linear programming, dual-simplex method that minimizes the present value of portfolio costs subject to meeting capacity and renewable portfolio standard constraints. PSE uses the Frontline Systems Risk Solver Platform ("Risk Solver") for the linear programming optimization. Risk Solver is an Excel add-in that pairs with PSM III. Key inputs used by Risk Solver include:

- Variable fuel cost, O&M and market value offset for output from existing and new resources (from Aurora)
- Fixed O&M
- Capital cost of new resources
- Book and Tax depreciation
- Transmission costs
- Gas transportation costs
- Social cost of carbon
- Peak capacity credit
- Renewable energy creit
- Market power purchases and sales
- Taxes and tax incentives for production tax credits and investment tax credits
- End effects after 20-year for resources added to the portfolio
- Financial assumptions (i.e., cost of capital, deprecation and escalation rates)
- Emissions

Specific details about the PSM III model are presented in Appendix N to the 2017 Integrated Resource Plan.

Screening model metrics

PSM III calculates five metrics used by PSE to assess the relative competiveness of individual proposals: portfolio benefit,[1] levelized cost, levelized portfolio benefit per kW-yr or REC, levelized net cost per kW-yr or REC. Figure 3 defines each of the five metrics used to screen and rank the proposals.

PSE's analysis relies on multiple metrics because each metric provides a slightly different perspective on the economic benefits associated the proposals. No one metric fully reflects all of the costs and benefits of an individual proposal, or allows us to compare resources with different attributes on an apples to apples basis. For example, levelized cost of energy is a traditional metric used by the industry to compare resource costs; however, this metric does not take into account a resource's contribution toward meeting PSE's physical capacity or renewable energy resource needs.

Figure 3. ***Key metrics produced by PSM III***

- **Portfolio Benefit ($):** difference between the net present value portfolio revenue requirement with the proposed project in the portfolio replacing an equivalent amount of generic resource, and the net present value portfolio revenue requirement of the all generic portfolio. (Higher is better. Useful for comparing projects with the same winter capacity value or the same contribution to meeting PSE's renewable energy target.)
- **Levelized Cost ($/MWh):** the net present value of the proposed project's revenue requirement divided by the net present value of the proposed project's generation. (Lower is better. Useful for comparing projects that have the same or similar operating characteristics.)
- **Levelized portfolio benefit per Renewable Energy Credit ($PB/REC):** a project's portfolio benefit divided by the net present value of the project's contribution to PSE's renewable energy target. (Higher is better. Useful for comparing different project sizes and technologies.)
- **Levelized portfolio benefit per unit of Levelized Peak Capacity ($PB/Peak Capacity kW-yr):** A project's portfolio benefit divided by the present value of the peak capacity contribution. (Higher is better. Useful for comparing different project sizes and technologies.)
- **Levelized net cost per Renewable Energy Credit ($/kW-yr or $/REC):** difference between the net present value project revenue requirement and the net present value market revenue of the project's generation divided by the net present value of the project's capacity contribution. If a renewable project is being considered, then the numerator is divided by the net present value of the project's contribution to PSE's renewable energy target. (Lower is better. Useful for comparing different project sizes and technologies.)

[1] PSE's analysis calculated the portfolio benefit with and without the social cost of carbon. Carbon cost assumptions are discussed on pages 9 and 10.

Key Assumptions

The Company filed its most recent integrated resource plan with the Washington Utilities and Transportation Commission ("WUTC") in November 2017 and performed its 2018 RFP analysis between August 2018 and June 2019. The RFP team performed its RFP analysis in parallel with the development of PSE's anticipated 2019 IRP. As a result, many of the modeling assumptions used in the RFP analysis evolved during the evaluation process. Subsequent to completing its RFP analysis in June and receiving management approval in July 2019 to begin negotiation discussions with selected, PSE received two new unsolicited proposals and several pricing updates from 2018 RFP respondents. PSE performed a re-evaluation of its resource alternatives between August and November 2019, which included updated optimization analysis, as shown in Figure 4.

PSE updated its modeling assumptions for each phase of the RFP evaluation to reflect then-current conditions. In general, key assumptions were refreshed on an as-needed basis prior to each phase of the RFP, although, some assumptions were updated during the phases as new information became available. Figure 4 depicts generally the timing and nature of these updates relative to the RFP timeline.

Figure 4. ***Timing of key assumptions updates during the RFP evaluation process***

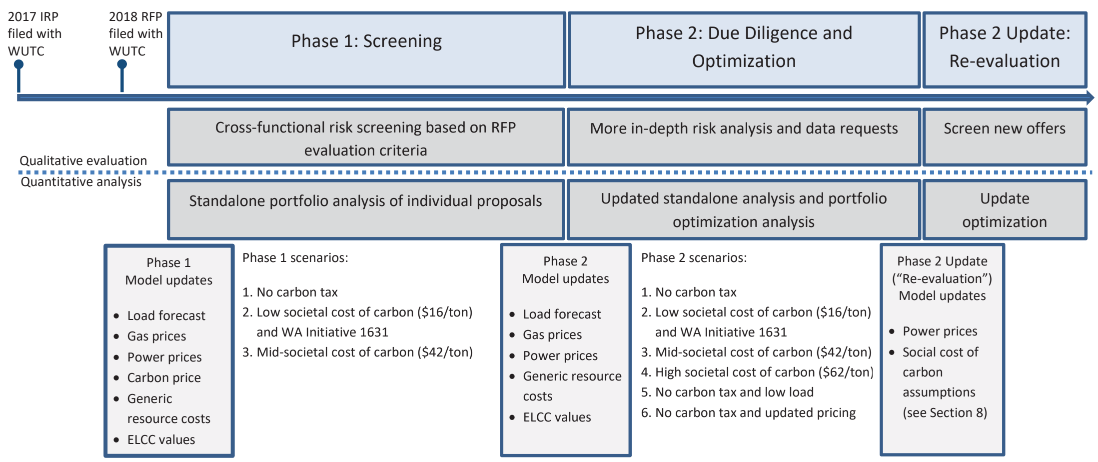


Table 1 shows how three key assumptions—gas prices, power prices and load forecasts—have changed since the 2017 IRP was filed. Forecast levelized Mid-C power prices dropped nearly $17/MWh between the 2017 IRP and completion of the RFP analysis. Forecast levelized gas prices dropped a little more than $0.50/mmbtu between the 2017 IRP and the end of the RFP. Overall, average annual load growth assumptions also dropped 0.2 percent between the 2017 IRP filing and the end of the RFP.

Table 1. ***Comparison of Key Modeling Assumptions: 2017 IRP and 2018 RFP***

Modeling Assumption	2017 IRP (filed Nov. 2017)	RFP Phase 1 (Aug. 2018 – Mar. 2019)	RFP Phase 2 (Apr. 2019 – Jul. 2019)	Phase 2 Update (Aug. 2019 – Nov. 2019)
Mid-C power prices levelized	$40.48/MWh	$33.92/MWh	$28.75/MWh	$23.66/MWh
Gas prices levelized	$4.02/mmbtu	$3.74/mmbtu	$3.50/mmbtu	No change
Annual average load growth	0.7%	0.5%	0.5%	No change

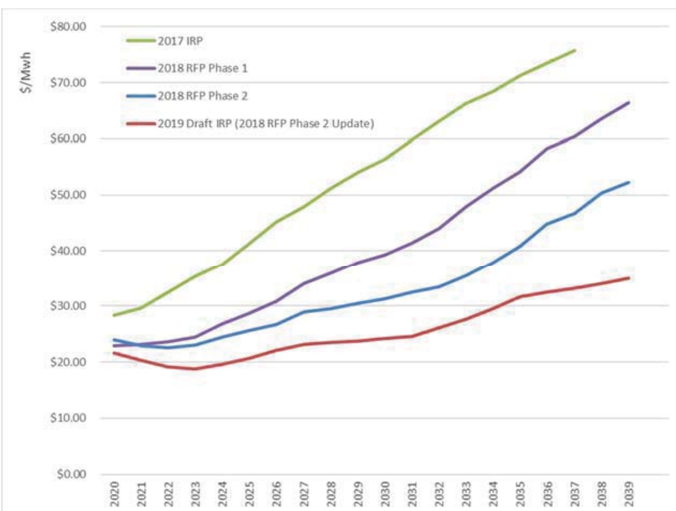
The underlying forecasts for these assumptions are presented in the discussion that follows. Additional assumptions discussed in this appendix include carbon costs, generic resource costs, generic peak capacity contributions by resource type and general location, transmission system deferral values assumed for storage and demand response proposals, and flexibility values assumed for storage resources.

Power Price Forecasts

As described on page 1 of this appendix, the 2018 RFP analysis uses the Aurora dispatch model to forecast wholesale power prices for the WECC region and the Mid-C. Power prices for the 2018 RFP were developed using the same methodology used by the Company in its integrated resource planning process. A description of this methodology is provided in Appendix N to PSE's 2017 IRP.

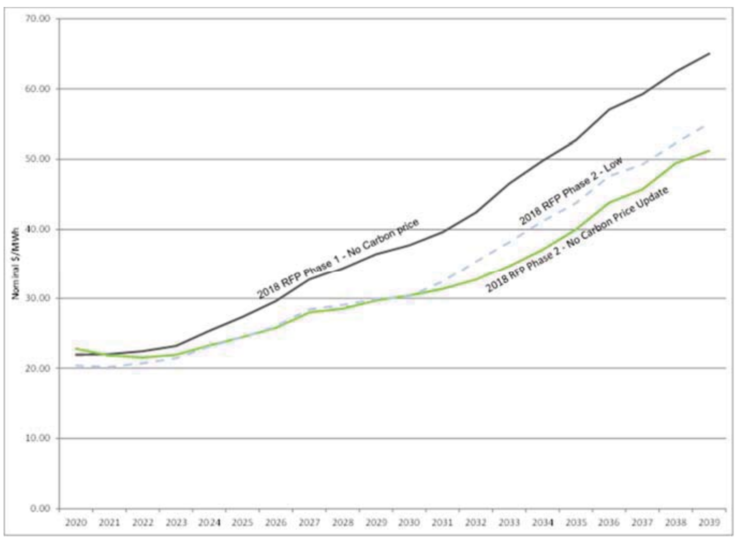
PSE updated its power prices subsequent to the 2017 IRP three times during the RFP analysis process: prior to Phase 1, prior to Phase 2 and again for its Phase 2 Update (the "re-evaluation"). The last forecast includes in its assumptions the adoption of Washington state SB 5116, the Clean Energy Transformation Act ("CETA"). Figure 5 compares the 2017 IRP forecast to those used in the RFP analyses.

Figure 5. ***Comparison of IRP and RFP power price assumptions***



In Phase 2, PSE added two additional power price forecasts to its base forecast to test the impact of different power prices on proposals. Figure 6 shows the range of Phase 2 power prices tested, which were consistent with then-current draft 2019 IRP power price assumptions. The *RFP Phase 1 – No Carbon* power price is consistent with the draft 2019 IRP *Base + No CO2* price scenario. The *RFP Phase 2 - Low* price is consistent with the draft 2019 IRP *Low* price scenario. The *RFP Phase 2 - No Carbon Price Update* includes updated natural gas prices and California Senate Bill 100 ("SB 100"), which mandates 100 percent renewable power generation in the state by 2045. The 2018 RFP prices assume a 50 percent renewable portfolio standard ("RPS") for California by 2030.

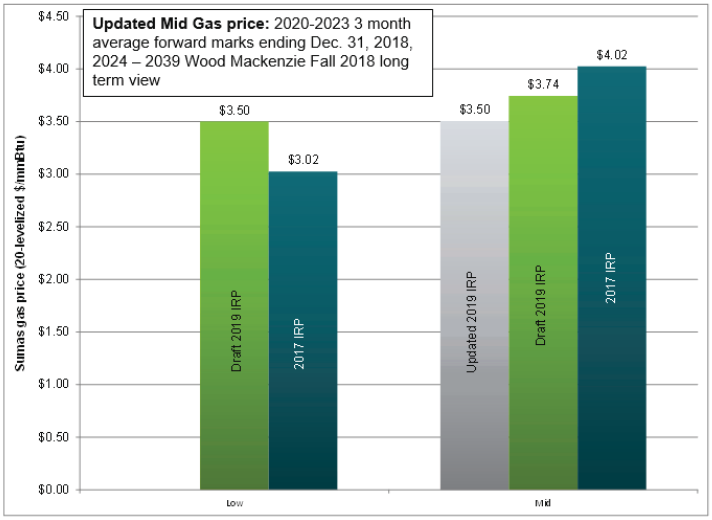
Figure 6. ***Range of power price forecasts tested in Phase 2***



Natural Gas Price Forecasts

The 2018 RFP analysis used Wood Mackenzie gas price forecasts. Gas prices were updated twice subsequent to the 2017 IRP filing, prior to RFP Phase 1 and again prior to RFP Phase 2. Figure 7 compares the 2017 IRP gas prices to the draft 2019 IRP gas prices, which were also used in the 2018 RFP analysis.

Figure 7. ***Comparison of 2017 and draft 2019 IRP gas prices***



PSE's RFP gas price assumptions were based on then-current 2019 IRP gas price forecasts as described below.

- The **2017 IRP gas prices** were based on 2018 to 2021 three-month average forward marks ending November 27, 2016, and on the 2022 to 2037 Wood Mackenzie Fall 2016 long-term forecast.

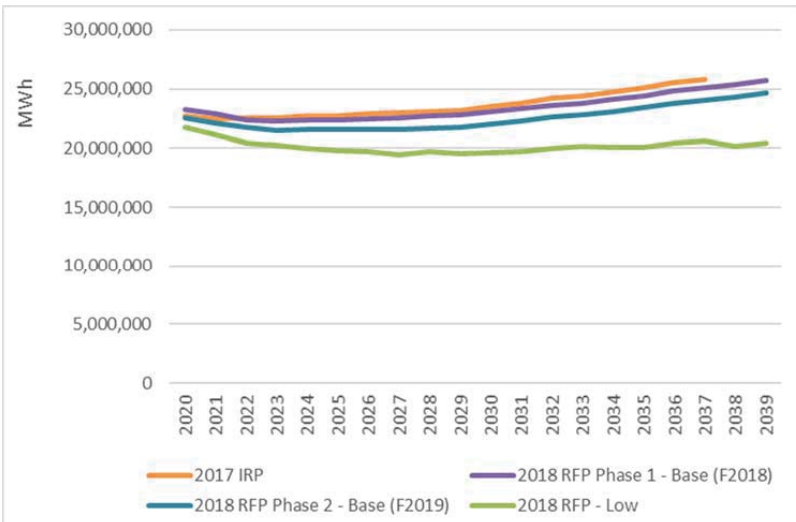
- The **2019 draft IRP gas prices (also used for RFP Phase 1)** were based on 2020 to 2023 three-month average forward marks ending June 29, 2018, and on the 2024 to 2039 Wood Mackenzie Spring 2018 long-term forecast.

- The **2019 IRP updated gas price (also used for RFP Phase 2)** was based on 2020 to 2023 three-month average forward marks ending December 31, 2018, and on the 2024 to 2039 Wood Mackenzie Fall 2018 long-term forecast.

Load forecasts

Load forecast modeling and methodologies are consistent with those described in Appendix E to PSE's 2017 IRP. Prior to each phase of the RFP, PSE updated its model to reflect the Company's most current load forecast information. PSE used the F2018 load forecast in its Phase 1 analysis and the F2019 load forecast in its Phase 2 analysis.

Figure 8. ***Load forecast assumptions***

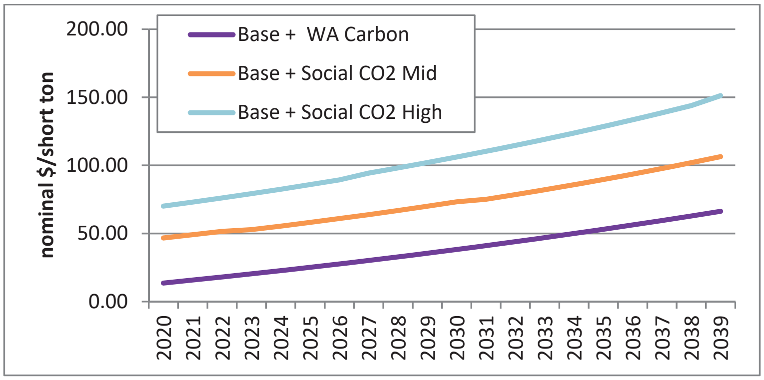


Carbon price forecasts

The carbon price forecasts used in the 2018 RFP are consistent with those used for the 2017 IRP. The Base + Washington Carbon forecast is based on a state carbon tax proposed in Initiative 1631, which failed to pass at the ballot box in November 2018. The Base + Social CO2 Mid forecast and Base + Social CO2 High forecasts are based on analysis presented in the U.S. Government's Interagency Working Group on Social Cost of Greenhouse Gases' 2016 report.[2]

[2] *"Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Greenhouse Gases," United States Government, Aug. 2016.*

Figure 9. ***2018 RFP carbon price assumptions***



PSE updated its social cost of cabon assumptions in its Phase 2 Update analysis (the "re-evaluation"), which was conducted between August and November 2019. These updates were made to incorporate Washington Utilities and Transportation Commission ("WUTC") guidance in WUTC docket U-190730, dated September 12, 2019.

The updates include a 2.5 percent discount rate scenario and 0.437 ton/MWh market purchase carbon intensity, consistent with guidance from the U.S. Government's 2016 *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*. Figure 10 is an excerpt from the technical support document (originally Figure ES-1). The highlighted column reflects assumptions used in re-evaluation analysis.

Figure 10. ***Social Cost f CO_2, 2010 – 2050 (in $2007 per metric ton of CO_2)***

Year	5% Average	**3% Average**	2.5% Average	High Impact (95th Pct at 3%)
2010	10	**31**	50	86
2015	11	**36**	56	105
2020	12	**42**	62	123
2025	14	**46**	68	138
2030	16	**50**	73	152
2035	18	**55**	78	168
2040	21	**60**	84	183
2045	23	**64**	89	197
2050	26	**69**	95	212

Generic resource cost assumptions

Generic resource capital costs are updated biennially as part of PSE's integrated resource planning process. The planning team hired HDR to perform a cost analysis to develop generic resource costs for its 2019 IRP. HDR produced its report (referred to in tables 2 and 3 below as the "draft report") prior to the beginning of the 2018 RFP. The RFP Phase 1 generic resource cost assumptions are based on the costs reflected in this report. Table 2 compares the generic resource costs assumed in the 2017 IRP to those assumed in draft 2019 IRP (also used for Phase 1 of the 2018 RFP).

Table 2. *Generic resource costs: 2017 IRP vs. draft 2019 IRP (also used for RFP Phase 1)*

	2017 IRP			Draft 2019 IRP			Cost change from 2017 IRP to Draft 2019 IRP		
2018 $/kW	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	All in Costs
CCCT	$1,020	$358	$1,378	$898	$269	$1,167	($122)	($89)	($211)
Frame Peaker (Fuel Fuel)	$526	$172	$698	$554	$271	$825	$28	$99	$127
Recip Engine (NG only)	$1,030	$312	$1,341	$842	$350	$1,192	($188)	$38	($149)
WA Wind	$1,548	$656	$2,204	$1,656	$386	$2,042	$108	($270)	($162)
MT Wind	$1,471	$1,312	$2,783	$1,633	$1,111	$2,744	$162	($201)	($39)
Solar	$1,497	$874	$2,371	$1,352	$570	$1,922	($145)	($304)	($449)
Biomass	$4,084	$207	$4,291	$7,036	$2,659	$9,695	$2,952	$2,452	$5,404
Offshore Wind	$5,717	$1,795	$7,512	$5,000	$1,547	$6,547	($717)	($248)	($965)
Li-Ion Battery 2-hr	$1,313	$342	$1,655	$1,331	$599	$1,930	$18	$257	$275
Li-Ion Battery 4-hr	$2,116	$552	$2,668	$2,346	$708	$3,054	$230	$156	$386
Flow Battery 4-hr	$1,870	$674	$2,544	$1,493	$618	$2,111	($377)	($56)	($433)
Flow Battery 6-hr	$2,447	$882	$3,329	$2,050	$708	$2,758	($397)	($174)	($571)
Pumped Storage	$2,503	$127	$2,630	$1,800	$879	$2,679	($703)	$752	$49

The HDR report was subsequently presented to the IRP advisory group ("IRPAG"), a group of external stakeholders representing various interest groups, WUTC staff and PSE subject matter experts who participate in PSE's long-term resource planning process. Based on feedback from the IRPAG, HDR updated certain costs (shown in Table 3) in a revised final report. PSE updated the generic resource cost assumptions in its RFP Phase 2 analysis to reflect these changes.

Table 3. *Comparison of RFP Phase 1 and Phase 2 generic resource costs*

	Solar capital cost ($/kW)	MT wind capital cost ($/kW)	WA wind capital cost ($/kW)	Frame Peaker FOM[3] ($/kW-yr)
RFP Phase 1 *(draft HDR report)*	$1,922	$2,744	$2,042	$3.93
RFP Phase 2 *(final HDR report)*	$1,614	$1,617	$1,633	$11.40[4]

Electric load carrying capability assumptions

Effective load carrying capability ("ELCC") is an approach to comparing the relative peak capacity contribution of resources with different operating characteristics. The ELCC, or peak capacity benefit, is defined as the relative contribution of a resource to meeting a utility's peak capacity need, compared to

[3] *Fixed O&M costs ("FOM")*

[4] *HDR's updated frame peaker FOM assumption ($11.40/kw-yr) shown in Table 3 above includes $3.93/kw-yr FOM + $7.47/kw-yr for 48 hours of oil stored on site.*

that of a gas-fired peaking plant with an equivalent nameplate capacity. Because ELCC values are highly dependent on the load characteristics and mix of resources owned by a utility, they are unique to each utility.

Given the large volume of offers received, PSE's Phase 1 screening applied generic ELCC value assumptions to RFP resources based on the resource type, nameplate capacity and general location.[5] ELCC values used in Phase 1 of the 2018 RFP are generally consistent with 2017 IRP assumptions,[6] with the exception of the values used for storage and demand response resources. Values for these resources were updated to align with draft 2019 IRP assumptions, because the new values for these resources had dropped materially compared to the 2017 assumptions.

In Phase 2, PSE updated its generic ELCC value assumptions for all resource types (shown in Table 4) to align with expected 2019 IRP assumptions.

Table 4. ***Updated Phase 2 generic ELCC modeling assumptions by resource type***

Resource	Nameplate (MW)	IRP **2017** Peak Capacity Solve to 5% LOLP Relative to New Peaker	IRP **2019** Peak Capacity Solve to 5% LOLP Relative to Perfect Capacity
Existing Wind	823	11%	9.7%
Skookumchuck	131	40%	36.0%
Generic Montana Wind	100	49%	51.4%
Generic Washington Wind	100	16%	6.4%
Generic Offshore WA Wind	100	51%	47.6%
Generic Washington Solar	100	0%	1.0%
Lund Hill Solar	150	N/A	2.4%

Storage Resources	Nameplate (MW)	IRP 2017 Peak Capacity EUE at 5% LOLP	IRP 2019 Peak Capacity EUE at 5% LOLP
Lithium-Ion 2 hr, 82% RT efficiency	25	60%	19.2%
Lithium-Ion 4 hr, 87% RT efficiency	25	88%	38.4%
Flow 4 hr, 73% RT efficiency	25	76%	36.0%
Flow 6 hr, 73% RT efficiency	25	N/A	46.4%
Demand Response	100	77%	38.2%

[5] *Because peak capacity resources must be available when and where needed, PSE's analysis considered the characteristics of the resource, the proposed delivery point and the likely availability of "firm" delivery to PSE's system when determining the application of ELCC values for resources.*

[6] *The 2018 RFP ELCC values included one small change related to the solar ELCC. The 2017 IRP assumed an ELCC of 0 percent for a 50 MW Washington solar facility. The All Resources RFP assumed an ELCC of 2 percent for a 50 MW Washington solar facility.*

Storage Resources	Nameplate (MW)	IRP 2017 Peak Capacity EUE at 5% LOLP	IRP 2019 Peak Capacity EUE at 5% LOLP
3 hr duration, 6 hr delay, 10 calls per year			

In addition to updating its generic ELCC value assumptions, PSE applied a more critical eye to each proposal that advanced to Phase 2 and developed a project-specific ELCC value for each resource based on its unique attributes. The RFP team began its Phase 2 due diligence review by requesting missing data from respondents, clarifying uncertainties and obtaining an independent reasonableness assessment of wind and solar production values (via third-party consultant DNV-GL). The team used this information to study the proposals and determine the ELCC value, or peak capacity benefit, of each Phase 2 project. Project-specific ELCC values are presented and discussed in Section 3.

Additional value stream assumptions for storage and demand response resources

Transmission system deferral value

The transmission system deferral value is an avoided cost metric representing the mitigation benefit of neither building nor retrofitting transmission assets as a result of adding either the operational flexibility of a battery or peak savings from demand response resources. PSE's analysis assumed a generic deferral value of $26/kW-yr escalated at 2.5 percent annually based on a proxy value used for regional planning in the Northwest Power and Conservation Council's *Seventh Power Plan*.[7] This proxy value was applied to all proposed battery energy storage systems ("BESS") located on PSE's system and proposed demand response programs in the preliminary quantitative screening. This is conceptually similar to the "benefit of the doubt" approach applied throughout Phase 1.

No on-system BESS proposals were selected for further consideration in Phase 2 due to their higher costs compared to other capacity alternatives, even with the assumed transmission system deferral value. If any of these resources had been selected for Phase 2 analysis, PSE would have evaluated these resources on a site-specific basis.

PSE did select two demand response proposals for Phase 2 analysis. As part of its due diligence review, the RFP team took a closer look at the transmission system deferral value assumed for demand response proposals in Phase 1 and ultimately determined that it could not confirm the validity of the assumption. The net result of this change combined with the updated ELCC value (described in the previous section), meant that the cost to acquire the same level of peak demand response roughly doubled on a per megawatt basis (assuming no change to the pricing). Demand response proposals were subsequently eliminated from Phase 2 consideration.

[7] *"Appendix J: Demand Response Resources - Background Information*," Seventh Northwest Conservation and Electric Power Plan*, Feb. 2016, p. J-4.*

Flexibility value

The flexibility value quantifies the sub-hourly benefits of adding a generation asset to the transmission system. These benefits, which apply to both pumped hydro and battery energy storage resources, include: regulation up and down, voltage control, frequency control, spinning reserves, non-spinning reserves and supplemental reserves. Storage resources with higher maximum output capacities and longer durations offered greater flexibility benefits.

Scenarios

PSE's Phase 1 screening analyzed each project on a standalone basis and, using the metrics from PSM III, compared the incremental portfolio cost and benefit impact in three potential future pricing scenarios. Each of the scenarios was constructed using base demand and gas price forecasts, as well as base generic resource cost assumptions; however, carbon costs varied as follows:

- Scenario 1: No carbon tax
- Scenario 2: Low societal cost of carbon ($16/ton)[8]
- Scenario 3: Mid-societal cost of carbon ($42/ton)[9]

The Phase 2 evaluation included an update of the standalone analysis to test the incremental impact of individual RFP proposals on the power portfolio. Phase 2 also included optimization analysis to test the incremental impact of combinations of proposals on the portfolio. In this phase, PSE added three new scenarios to those it tested in Phase 1, allowing PSE to stress test the proposals in different future pricing environments. Table 5 summarizes the key assumptions associated with each of the six scenarios tested.

Table 5. ***Modeling scenarios used in both phases of the RFP analysis***

Scenarios	Phase	WECC /PSE Demand	Gas Price	Generic Resource Costs
1. No carbon tax	1 + 2	Base	Base	Base
2. CO2 (low societal $16/ton)	1 + 2	Base	Base	Base
3. CO2 (mid-societal $42/ton)	1 + 2	Base	Base	Base
4. CO2 (high societal $62/ton)	2	Base	Base	Base
5. No CO2 low load	2	Low	Low	Base
6. No CO2 updated pricing	2	Base	Update	Base

[8] *The Scenario 2 low societal cost of carbon assumption ($16/ton) is based on a Washington state carbon tax proposed in Initiative 1631, which failed to pass at the ballot box in November 2018.*
[9] *Source of Scenario 3 mid-societal cost of carbon assumption ($42/ton): "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866, Interagency Working Group on Social Cost of Greenhouse Gases," United States Government, Aug. 2016.*

As shown, PSE's scenarios were designed to test a range of potential future carbon costs, from $0/ton to as high as $62/ton. This analysis offered insights into how portfolio costs might be affected by carbon legislation. Scenario 6 also reflects updated pricing as result of California Senate Bill 100 ("SB 100"), which mandates 100 percent renewable power generation in the state by 2045.

This analysis allows PSE to ask key questions. For example, how might economic conditions and load growth affect resource decisions? What are the key decision points and most important uncertainties in the long-term planning horizon, and when should we make those decisions? What impact might very different levels of carbon prices have on resource decisions? In this way, PSE can use this analysis to quantify how sensitive portfolio and resource costs and benefits are to our planning assumptions.

2. Phase 1: Screening Analysis

Standalone portfolio analysis for each individual proposal

The RFP process began with a Phase 1 preliminary analysis designed to screen and rank proposals on an individual economic basis, eliminate resources with prohibitively high cost or risk, and identify a list of the most promising candidates for more focused scrutiny in Phase 2. Altogether, PSE received 97 proposals representing a combined total of 13,589 MW of operating capacity. Many proposals offered a variety of offer options, varying features and terms, such as start date or commercial operation date, contract term duration, maximum capacity, energy delivery point, offer structure (e.g., ownership, development assets, offtake agreement, etc.) or pricing structure (e.g., fixed or escalating). Some proposals also offered combinations of resources, pairing renewable generation with battery energy storage to better align generation output with PSE's peak capacity need. In all, PSE analyzed more than 282 offer options in its Phase 1 analysis.

The RFP team used PSM III to analyze each RFP proposal on a standalone basis in three potential future pricing scenarios, using the five key metrics produced by the model (presented in Figure 3 on page 4). As described in Section 1, the model calculates the long-term revenue requirements for PSE's incremental generic power portfolio based on the 2017 IRP resource strategy and a current outlook on the Company's capacity, renewable and energy needs. Generic resources are then replaced in the model with a proposal from the 2018 RFP to measure the impact on PSE's overall portfolio cost. Individual RFP offer results can then be compared to the cost of generic resources and each other.

PSE's analysis considered each proposal's ability to help meet the Company's physical reliability need ("capacity need"), renewable resource need ("RPS need"), or both. To compare and rank individual proposal results, the RFP team compiled the results for all RFP proposals into two categories: (1) those that helped meet the RPS need, and (2) those that help meet peak capacity need. In general, most proposals offered either peak capacity or renewable attributes. Most renewable resources had very little impact on PSE's peak capacity need and, therefore, only appear on the renewable ranking list. However, in several cases renewable resources offered a significant contribution toward meeting PSE's peak capacity. Some examples of this include Montana and Columbia Gorge wind, and biomass resources. In such cases, the resource appeared on both lists.

The detailed results of PSE's Phase 1 quantitative analysis are provided in Appendix C. The RFP team primarily used the portfolio benefit per kW-yr metric to rank capacity proposals and the portfolio benefit per REC metric to rank renewable proposals. Proposals with a positive portfolio benefit ranked more favorably than a generic resource. Proposals with a negative portfolio benefit ranked less favorably than a generic resource.

The Candidate List

At the end of Phase 1, the RFP team identified a "candidate list" of the most promising resources for further due diligence and optimization analysis in Phase 2. Selected proposals were generally those that ranked most favorably in the quantitative screening relative to one or both of the resource needs and had no known fatal flaws. Projects that provided a contribution to both resource needs were generally selected, due to the relatively high total portfolio benefit produced by the dual value streams.

Table 6. ***Candidate List for Phase 2 Evaluation***

ID	Project Name	Resource Type	Nameplate	Counterparty	State
18100	SPI Industrial	Biomass	17 MW	SPI	WA
18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
18131	[redacted] [redacted]	Solar	[redacted] MW	[redacted]	WA
18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA
18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
18139	[redacted]	Solar + BESS	[redacted] + [redacted] MW BESS	[redacted]	OR
18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
XXXXX	[redacted]**	Transmission	[redacted] MW	[redacted]	N/A
18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

REDACTED VERSION

3. Phase 2: Due Diligence and Optimization Analysis

As PSE transitioned to the second phase of its evaluation, it was important to consider not only the individual risks and merits of each proposal, but also the portfolio impacts of potential resource combinations. With this goal in mind, PSE updated its standalone portfolio analysis of individual proposals and performed an optimization analysis to identify the best combination of proposals to best meet the Company's resource needs at the lowest reasonable cost.

Phase 2 also involved a more in-depth assessment of the most favorable proposals from Phase 1. Whereas Phase 1 generally gave proposals the benefit of the doubt with regard to uncertainties or minor omissions, Phase 2 took a more critical view of each individual proposal, closely examining the details, seeking clarification or supplemental information when needed, and updating or validating our modeling assumptions as needed.

Adjustments to the candidate list

Early in Phase 2, PSE received a number of proposal updates from respondents. Four of the updates resulted in changes to the candidate list. These changes are summarized in Table 7.

Table 7. ***Changes to Candidate List in early Phase 2***

ID	Project name	Resource Type	Nameplate	Counterparty	State	Summary of change
Added to Phase 2 candidate list						
18161	BPA Peak Capacity Product	Call option/ Sys PPA	100 MW	BPA	WA	Adjusted delivery point from Mid-C to PSEI.SYSTEM
UP002	[redacted]	REC Only	[redacted] RECs	[redacted]	ID	Price reduction
18205	[redacted]	Demand Response	[redacted] MW	[redacted]	WA	Price reduction
Removed from Phase 2 candidate list						
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA	Withdrawn by seller

Updated standalone portfolio analysis for each individual proposal

In this phase, PSE updated its standalone portfolio analysis and individually re-ranked each candidate proposal using the same models (Aurora and PSM III) and metrics (see Figure 3 on page 4) that were used in Phase 1. While the tools and processes were fundamentally the same, PSE did update its models to reflect new proposal information received from respondents and updates to PSE's assumptions (presented in detail in Section 1) including, but not limited to, gas and power price forecasts, load forecasts, generic resource cost assumptions and ELCC values. To ensure that Phase 2 modeling assumptions would be as current as possible, the team delayed completion of its evaluation

[10] Commercial and industrial customers ("C&I")

and resource selection to incorporate a new lower natural gas price scenario (Scenario 6 in Table 5 on page 14) and the Company's new F2019 load forecast.

In addition to updating its generic ELCC assumptions, PSE also took a closer look at the specific capacity contributions of each individual RFP proposals. In Phase 1, the analysis applied a generic ELCC proxy value to the proposals based on each project's resource type, nameplate capacity and general location. In Phase 2, PSE's planning group performed a study to determine the ELCC of each individual RFP project, based on its unique characteristics and attributes, its nameplate capacity and its specific location. Table 8 summarizes the project-specific ELCCs generated for the Phase 2 intermittent renewable generation resources.

Table 8. ***Phase 2 project-specific ELCCs for intermittent generation resources***

Resource	Peak Capacity [MW]	Nameplate [MW]	ELCC
[redacted]			45.00%
			5.40%
			44.90%
			1.71%
			31.92%
			1.82%
			0.69%
			1.49%
			46.07%
			2.00%
			0.75%
			1.56%
			19.90%
			16.00%
			1.00%
			1.13%

Because peak capacity resources must be available when and where needed, both phases of PSE's analysis also considered the proposed delivery point and the likely availability of "firm" delivery to PSE's system when determining the application of ELCC values for resources. Not all proposals listed in Table 8 received the benefit of an ELCC value in PSE's analysis. Proposals delivering to Mid-C that assumed use of PSE's existing transmission resources did not receive an ELCC value. This existing transmission capacity is currently used for short-term resources to meet peak need in high demand scenarios. Because a new resource proposing to leverage this transmission would supplant an existing capacity resource (market purchases), the proposed resource's contribution to capacity cannot be considered an incremental benefit to PSE's power portfolio. Additionally, proposals featuring busbar delivery (typically a project's point of interconnection) were analyzed on a case-by-case basis to identify the most applicable delivery point, and the likelihood and costs of securing firm point-to-point

REDACTED VERSION

transmission service to PSE's system. Projects unable to deliver generation output to PSE's system on a firm basis did not receive an ELCC benefit in PSE's analysis. For more on this topic, see Section 6 of the 2018 RFP Evaluation Process Document.

PSE also updated its pricing scenarios to stress test proposals in different potential pricing environments. The Phase 2 analysis included three new scenarios (for a total of six, as shown in Table 5 on pages 14) to those it tested in Phase 1, including: a scenario to test the impact of higher carbon costs ($62 per ton) compared to those in tested in phase 1 (a range of $0 to $42 per ton), a scenario to test the impact of lower load and gas prices, and a scenario to test the impact of the updated draft 2019 gas price.

While this standalone portfolio analysis is useful for comparing and ranking proposals on an individual basis, it does not consider the benefits of resource combinations to meet the combined resource needs of the RFP. It cannot take into account the efficiencies and economic benefits of pooling resources with complementing attributes or an optimally-sized solution to meet both the renewable and capacity resource needs. In other words, it does not account for the fact that a lower individually ranked resource (from a portfolio benefit perspective) could be part of a lowest reasonable cost, best-fit to need solution in the optimal portfolio because its unique "fit" provides economic savings when paired with other resources. For this reason, PSE uses a portfolio optimization approach to analyze and identify the optimal resource portfolio.

Updated standalone portfolio analysis results and rankings for Phase 2 proposals are presented in Appendix D.

Proposals included in the optimization analysis

The RFP team eliminated six proposals during the Phase 2 evaluation prior to the optimization analysis. Proposals were eliminated for a variety of quantitative and qualitative reasons, as described in Section 7 of the 2018 RFP Evaluation Process Document. This left a total of 21 proposals for portfolio optimization analysis, six of which were capacity resources.

Portfolio optimization analysis

In both RFP phases, the RFP team analyzed and individually ranked proposals using five metrics, including the benefit per kw-year metric for projects providing a peak capacity contribution, and the portfolio benefit per REC metric for projects providing a renewable energy credit ("REC") contribution. This analysis is useful for comparing resources on a standalone basis; however, combining the highest ranked capacity resource and the highest ranked renewable resource will not necessarily result in an optimal solution to meet both resource needs at the most substantial cost savings to customers. In fact, this simple approach could result in the selection of either too much or too little resources to meet PSE's needs.[11]

Instead, the RFP team used the PSM III financial model and the Risk Solver optimizing module (described in Section 1) to analyze combinations of candidate proposals to determine the best resource solution to meet both of PSE resource needs at the lowest reasonable cost, while accounting for various constraints. Due to the limited number of proposals featuring a substantial contribution to capacity (6 total), filling the peak capacity need was the primary constraint in the optimization analysis. Additionally, the model took other constraints and considerations into account. For example, there were three Montana wind projects all ranking relatively highly on a standalone basis at the end of Phase 2; however, all three Montana wind developers proposed to interconnect their projects to the Colstrip Transmission System ("CTS"), which had limited available transmission capacity. As a result, only one of three Montana wind projects could be selected in the optimized portfolio. In another example, Avangrid proposed two offers to offtake power from its Golden Hills wind project (#18170): (1) [redacted] and (2) an as-produced wind product paired with winter peak capacity. While both offer options were evaluated in Phase 2, they relied on wind output from the same project and were mutually exclusive; only one of the two offers could be selected in the optimized portfolio.

The model creates optimal, integrated portfolios for each scenario considered in the analysis. In this case, optimization was performed in two market price scenarios, (1) market with social cost of carbon and (2) market without social cost of carbon. A portfolio with a high portfolio benefit in the market without social cost of carbon scenario may not perform well in the market with social cost of carbon scenario, and vice versa. This occurred in the 2018 RFP analysis with a portfolio that included a combined cycle natural gas plant. Due to its high peak capacity contribution compared to renewable resources, the portfolio performed well in the market with no social cost of carbon scenario; however, the portfolio costs increased significantly when carbon costs were introduced. A different situation occurred with the portfolio that provided the highest portfolio benefit in the market with social cost of carbon scenario. In this case, the model selected an unnecessary solar project in excess of PSE's RPS-driven renewable need because it was speculating on the price of RECs and the value of selling excess RECs into the market, potentially reducing overall portfolio costs.

Once the model identified the optimal portfolio, the RFP team assessed the portfolio's combined ELCC value to identify any diversification benefits or saturation reductions caused by similarities or differences in the expected generation profiles of the selected resources. For example, two 100 MW Washington wind projects, on an individual basis, are assumed to each provide 16 MW of peak capacity credit (for a total of 32 MW of peak capacity value); however, on a combined portfolio basis, the same two Washington wind projects would only provide 30 MW of total peak capacity credit, due to the value erosion caused by the similarity of their generation profiles.

Optimization analysis results are presented in Appendix D.

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[11] See Section 2 of the RFP Evaluation Process Document for a discussion of the peak capacity and renewable (RPS-compliant) resource needs defined in the 2018 RFP.

REDACTED VERSION

The optimal portfolio

PSE completed Phase 2 in July 2019 and presented an optimal portfolio of four proposals to its Energy Management Committee ("EMC"): (1) a 17-year PPA to offtake power from the SPI Biomass facility (#18100) offered by Sierra Pacific Industries, (2) a 25-year PPA to offtake power from the [redacted] wind project (#18169) in Montana offered by [redacted] (3) a 20-year PPA to offtake power from the Golden Hills wind project (#18170) in Oregon paired with a winter peak shaping product offered by Avangrid, and a 5-year peak capacity call option (#18161) for system resources offered by BPA. Table 9 shows the optimal portfolio, including its portfolio benefit, contribution to peak capacity and contribution to meet RPS requirements.

Table 9. ***Optimal portfolio as determined by Phase 2 optimization analysis***

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio	(I) As Proposed Optimized Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X	X
3	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]	X	
4	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]		X
5	18170	Wind	Golden Hill Shaped	200 MW	77 MW	[redacted]	X	X
6		**Total Peak Capacity Credits - MWs**					[redacted] MW	[redacted] MW
7		**Peak Capacity Surplus / (Deficit) in 2022 [4]**					[redacted] MW	[redacted] MW
8		**Total Annual RECs**					2,189,656	1,986,862
9		**Portfolio Benefits - $M**					$408	$397
10								
11		**With Consideration of Social Cost of Carbon:**						
12		**Portfolio Benefits w/ Carbon Costs as an Adder - $M [5]**					$1,038	$934
13		**Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M**					$959	$937

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

Table notes:

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.

2. The optimization model chose a portfolio with [redacted] MW from [redacted] (#18169). [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The 350 MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted] Current indicative results reflect pricing based on the [redacted] MW offer.

3. The current project COD for [redacted] (#18169) is Dec 2021. There has been perceived timing risks for PSE to secure long-term transmission rights to bring the energy home. If the commercial operation date is delayed to Dec 2022 to mitigate this risk, the net present value of the PPA cost will increase by up to $35M. Without [redacted] (#18169), the next lowest cost portfolio is $123M more expensive than the recommended portfolio and it would have the same timing risks related to transmission, because the next lowest cost portfolio includes the [redacted] project (#18173), which uses the same Colstrip transmission path.

4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by (1) short-term capacity purchase for $720k per year; or (2) a 20 MW battery for $41M.

5. The social cost of carbon at $62/metric ton in 2020 dollars plus escalation is added to total portfolio costs as a fixed cost.

REDACTED VERSION

All four resources selected by the model included a substantial capacity benefit. Three of the four selected proposals—SPI biomass (#18100), [redacted] wind (#18169) and Golden Hills shaped wind (#18170)—offered a contribution to help meet both the renewable and capacity needs. The fourth proposal for the BPA peak capacity product (#18161), offered a call option in winter peak months for BPA system resources, which are primarily non-emitting hydro resources.

PSE's EMC approved for negotiation a short list composed of the four resources selected in the model as the optimal portfolio at its July 2019 meeting.

4. Phase 2 Update: The re-evaluation process

Subsequent to the EMC approving the RFP short list in July 2019, PSE received two new proposals and three pricing updates from RFP respondents. To ensure selection of the best-fit combination of renewable and capacity resources to meet customer needs at the lowest reasonable cost, PSE ran an updated optimization analysis to reflect these changes. This updated analysis is alternately referred to in PSE's documentation as "the re-evaluation process" and "the Phase 2 Update".

Table 10 summarizes the RFP proposal updates and new unsolicited proposals received after the completion of Phase 2.

Table 10. ***Offer updates and new unsolicited proposals received after short list selection***

Date Received	Project name	Resource Type	Nameplate Capacity	Counterparty	State	Summary of change
New unsolicited proposals						
8/29/19	[redacted] (#UP005)	Asset sale/ 7-year project PPA	[redacted] MW	[redacted]	WA	New proposal for power from [redacted] share of natural gas-fired CCCT facility (51%) delivered to PSEI.SYS beginning Sept. 1, 2022
10/23/19	MSCG System PPA (#UP006)	3 to 5-year system PPA	100 MW	Morgan Stanley Capital Group ("MSCG")	WA	New proposal for 0 emissions (no RECs) system power delivered to PSEI.SYS in Q1 and Q4 HLH beginning Jan. 1, 2022
RFP proposal updates						
9/9/19	BPA Peak Capacity Product (#18161)	5-year system PPA	100 MW	Bonneville Power Association ("BPA")	WA	Increased price by email
8/29/19	[redacted] (#18173)	20-year sroject PPA	300 MW	[redacted]	MT	Lowered price by email
10/30/19	SPI Burlington Biomass Project (#18100)	17-year project PPA	17 MW	Sierra Pacific Industries ("SPI")	WA	Lowered price verbally during a meeting

Portfolio optimization analysis

The Phase 2 Update optimization analysis process was fundamentally the same as the Phase 2 process described in Section 3. PSE used the same models and metrics, and many of the same assumptions used in Phase 2. However, PSE did update certain assumptions on an as-needed basis to reflect the most current information available at the time the analysis was performed, including the following changes:

- updated peak capacity need consistent with PSE's revised 2019 IRP Progress Report filed December 10, 2019,

REDACTED VERSION

- updated Mid-C power price forecast (a 20 percent reduction from the previous forecast),[12]
- adjusted social cost of carbon assumptions based on guidance from WUTC docket U-190730, dated September 12, 2019 (2.5 percent discount rate scenario, 0.437 ton/MWh market purchase carbon intensity),
- assumed retirement of Colstrip units 1 and 2 by 2020, and
- considered the impact on the capacity need of the sale of Colstrip unit 4, which was announced in December 2019 (shown in Table 12 below).

The optimal portfolio

PSE completed its re-evaluation analysis in November 2019, resulting in a revised optimal portfolio. The revised results confirmed the selection of the original Phase 2 short list resources and added one additional resource, the MSCG system power PPA (#UP006). Table 11 shows how the updated assumptions impacted the Phase 2 optimal portfolio. Detailed optimization results are presented in Appendix D.

Table 11. ***Updated portfolio optimization***[13]

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
List	Project ID	Resource	Project	Nameplate	Peak Capacity Credit	RECs[1]	Recommended Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X
3	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]	X
4	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]	
5	18170	Wind	Golden Hills Shaped	200 MW	77 MW	[redacted]	X
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW	[redacted]	X
7		Total Peak Capacity Credits - MWs					[redacted] MW
8		Total Annual RECs					2,189,656
9		Portfolio Benefits - $M					$679
10		Portfolio Benefits w/ Carbon Costs as an Adder - $M [2,3]					$1,179

[12] *Updated power price forecast is consistent with the September 19, 2019 IRTAG #8 publication, which was presented to the 2019 IRP Technical Advisory Group, the public stakeholder group which helps to provide input and guidance to PSE's long-term resource planning process.*

[13] *The notes on this table mean the following:*

Note 1: The portfolio benefit change includes the benefits compared to the re-established baseline generic portfolio when key assumptions were changed.

Note 2: In addition to note 1, the portfolio benefit with carbon costs change reflects updated social cost of carbon pricing and market purchase carbon intensity, per UTC docket U-190730, dated 9-12-2019.

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Table 12 shows the updated peak capacity need, less the original shortlist, less the newly added MSCG System PPA, with and without the announced sale of Colstrip Unit 4.

Table 12. ***Updated portfolio capacity need with revised short list resources***[14]

Peak Capacity Need 2022-2026	2022	2023	2024	2025	2026
Need before Colstrip Transaction	299 MW	292 MW	358 MW	477 MW	1124 MW
July EMC Resources Contributed Peak Capacity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Need / (Surplus) without MSCG	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MSCG Contributed Peak Capacity	79 MW	79 MW	79 MW	79 MW	79 MW
Need / (Surplus) with MSCG	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Additional Need from Colstrip Transaction	95 MW	95 MW	95 MW	95 MW	0 MW
Peak Need / (Surplus) after Resources	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

As shown in Table 12, the addition of the MSCG 5-year system power PPA (#UP006) is expected to help meet a portion of PSE's resource needs in 2025 and 2026 not met by the original short list. Additionally, the MSCG System PPA would help mitigate need resulting from the announced sale of Colstrip Unit 4. MSCG offers additional benefits such as delivery to PSE's system, seasonal shaping to help meet need in Q1 and Q4 during heavy load hours, and a 0 emission product (without RECs. The seasonal and heavy load hour shaping helps to meet deficits in the hours and months when capacity is most needed while minimizing surplus off peak. The zero emission product is consistent with Washington laws and policy preferences for emission reductions from energy resources.

PSE presented the revised optimization results to its EMC in November 2019 and recommended adding MSCG to its short list for negotiation.

[14] *Table 2 provides a snapshot of the resource need between 2022 and 2026. Once the Colstrip 4 transaction is approved, resource need will increase by 95 MW from 2020 to 2025.*

PSE PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

Appendix F. Presentations

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

F.1 Presentations to PSE's Energy Management Committee ("EMC")

2018 All Resources and Demand Response RFP

PUGET SOUND ENERGY

EMC Informational

September 20, 2018

Cindy Song

Manager Business Initiatives

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Nearly 100 proposals received

Resource type	# Proposals	Size range (MW / RECs, roughly)
Solar	36	35 – 290 MW
Wind	20	45 – 500 MW
Storage – battery	17	10 – 200 MW / 30 – 800 MWh
Storage – pumped hydro	2	330 – 500 MW
Biomass	3	10 – 55 MW
Natural Gas-fired Gen.	4	50 – 620 MW
Geothermal	2	15-25 MW
Hydro - run of river	1	40 MW
System PPA / Call Option	1	100 MW
Unbundled RECs	4	35,000 - 130,000 RECs
Demand Response	6	20-40 MW
Total	**96**	

[redacted]

Largest response to an All Source RFP to date

As of 9/20/2018

	2018 All Resource and Demand Response RFPs		Past RFP's: 2017 Renewables Only RFP (Green Direct 2.0)[1]		2011 All Source RFP		2010 All Source RFP		2008 All Source RFP		2005 All Source RFP	
Resource Type	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW[1]	# Proposals	Max Cap MW
Solar - PV	16	2240	17	574	2	24	1	10				
Solar - PV + BESS	20	2848										
Wind - Off Shore	1	400										
Wind On Shore	16	3303	20	2601	4	369	21	3776	8	862	10	1165
Wind + Winter Sys PPA	1	371										
Wind + Solar and/or BESS	2	464	4	339								
Storage - Battery ("BESS")	17	1265			2	251						
Storage - Pumped Hydro	2	900										
Biomass	2	72			3	61	9	590				
Biomass + BESS	1	15										
Natural Gas-fired Generation[2]	4	1377			10	2624	18	5342	10	2588	17	4307
Geothermal	2	43									1	48
Hydro - Run of River	1	38	2	4	1	77	2	105	3	165	3	139
System PPA / Call Option	1	100			4	400	10	n/a	9	1675	7	400
Unbundled RECs	4						2	n/a				
Demand Response	6	154					1	80			1	34
Coal - Traditional + IGCC					1	500			1	100	6	4950
Cold Fusion					1	1880						
Distributed Generation											1	5
Waste-to-Energy / Landfill Gas					1	23					1	5
TOTAL	**96**	**13,590**	**43**	**3,518**	**29**	**6,209**	**64**	**9,903**	**31**	**5,390**	**47**	**11,053**

[1] The 2017 Green Direct RFP sought large and small (<5 MW) renewable resources to serve multiple voluntary green power programs.
[2] Natural gas-fired generation may include CCCTs, SCCTs, reciprocating engines, combined heat and power facilities and gas turbine equipment sales.

92% of proposals offered a PPA option, 29% of proposals offered an ownership option

Resource Type	# Proposals	Max Cap MW[1]	Offer Structure(s)		
			Own	PPA/Toll/ Other Agmt	Both
Solar - PV	16	2,240	1	14	1
Solar - PV + BESS	20	2,848		18	2
Wind - Off Shore	1	400			1
Wind On Shore	16	3,303	3	11	2
Wind + Winter Sys PPA	1	371		1	
Wind + Solar + BESS	2	464	1	1	
Storage - Battery ("BESS")	17	1,265	1	8	8
Storage - Pumped Hydro	2	900			2
Biomass	2	72		2	
Biomass + BESS	1	15		1	
Natural Gas CCCT	2	1,020		1	1
Natural Gas SCCT	1	245			1
Natural Gas Recip	1	112	1		
Geothermal	2	43			2
Hydro - Run of River	1	38		1	
System PPA / Call Option	1	100		1	
Unbundled RECs	4	n/a		4	
DR Direct Load Control	4	109		4	
DR C&I Curtailment[2]	2	44		2	
TOTAL	**96**	**13,589**	**7**	**69**	**20**

[1] MW column reflects total combined potential capacity.
[2] Commercial & Industrial Curtailment (C&I Curtailment).

- 90% of proposed projects are in development stage
- Many proposals included multiple offer options, such as:
  - Multiple structure options:
    - development rights
    - asset purchase
    - PPA, Toll or other agreement
  - Fixed/escalating PPA pricing
  - Various term lengths and/ or start dates
  - Hybrid options to include storage, or to pair solar with wind
  - Transmission delivery points

70% of projects proposed are located in Washington

[redacted]

PUGET SOUND ENERGY

REDACTED VERSION

2018 RFP timeline

Mar 29, 2018	Jun 28, 2018	Aug 17, 2018	Feb/Mar 2019	Q2 2019
Draft RFP Filed with WUTC	WUTC Approved All Resource & Demand Response RFP	Proposals are due to PSE	Complete Phase 1 evaluation, select candidate list for Phase 2 evaluation	Complete Phase 2 evaluation, select final short list

EMC Touchpoints

Pre-file Informational ✓ Feb 15, 2018 ✓ Mar 22, 2018 ✓ May 24, 2018		Sep 20, 2018 Informational update on proposals received	Feb/Mar 2019 Informational update at the end of Phase 1	Q2 2019 Decisional to get approval to start negotiations

RFP Phase 1 Results

PUGET SOUND ENERGY

EMC Informational

March 21, 2019

Cindy Song

Manager Business Initiatives

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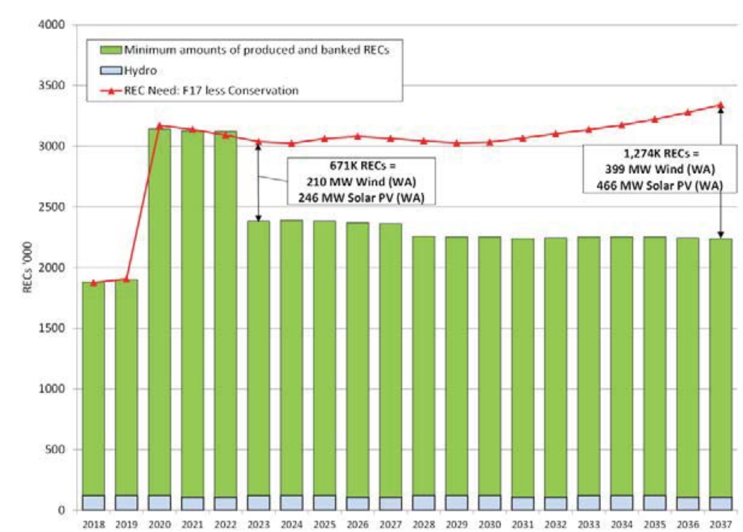
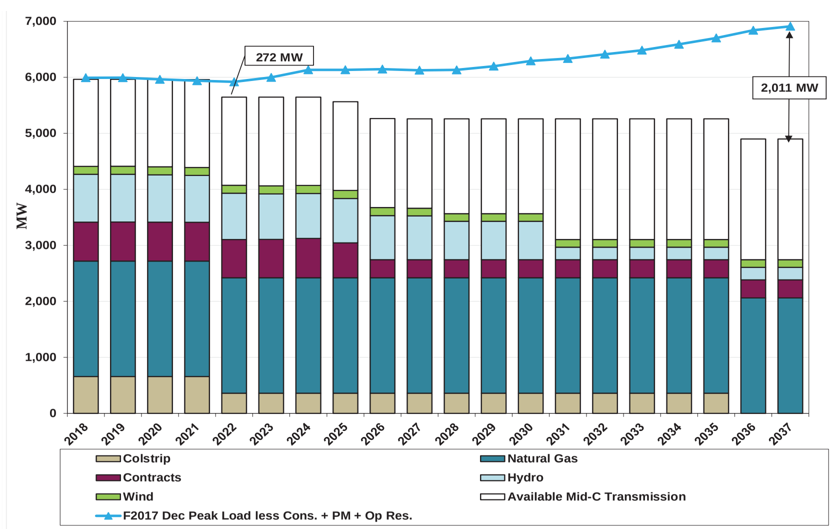
PSE filed RFPs for capacity and renewable resources in June 2018

- RFPs were filed to meet renewable energy credit (REC) and capacity needs beginning in 2021 and 2022 respectively
- Proposals were due August 2018
- RFPs produced a record response with nearly 100 proposals received in a wide variety of resource and technology options

REC need



Capacity need



Observations from Phase 1

- Solar prices have dramatically declined compared to other resource types
- Battery storage prices have also considerably declined and show potential, but are not yet competitive with alternatives available to PSE in this RFP
- Of 97 total proposals, 40 included battery storage configurations, while only 4 offered gas-fired generation
- Phase 1 analysis suggests many renewables are beating our current projections for Mid-C transmission redirects

Proposals selected for Phase 2 evaluation reflect resource and technology diversity

As of 3/18/19

	Proposals Received[1]		Phase 2 Candidate List	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	8	1050
Solar - PV + BESS	20	2848	1	100
Wind - Off Shore	1	400	0	0
Wind On Shore	16	3303	7	1642
Wind + Winter Sys PPA	1	371	1	200
Wind + Solar and/or BESS	2	464	0	0
Storage - Battery ("BESS")	17	1265	0	0
Storage - Pumped Hydro	2	900	0	0
Biomass	2	72	1	17
Biomass + BESS	1	15	0	0
Natural Gas-fired Generation	4	1377	2	348
Geothermal	2	43	0	0
Hydro - Run of River	1	38	1	38
System PPA / Call Option	1	100	0	0
Unbundled RECs	5	n/a	3	n/a
Demand Response	6	154	1	8.7
TOTAL	**97**	**13,590**	**25**	**3,404**

[1]PSE also received two unsolicited proposals during Phase 1, one REC-only and one pumped hydro storage. While the proposals are not included in the table count above, they were evaluated as part of the Phase 1 analysis.

Candidate list for Phase 2
(results are a snap shot in time, subject to change)

ID	Project Name	Resource Type	Nameplate	Counterparty	State
18100	SPI Industrial	Biomass	17 MW	SPI	WA
18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA
18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
18139	[redacted]	Solar + BESS	[redacted] + [redacted] MW BESS	[redacted]	OR
18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
XXXXX	[redacted]	Transmission	[redacted] MW	[redacted]	N/A
18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

Proposals shown here are best offers from each proposal.

* Numbers shown are rounded to the nearest 5MW.

** Reflects a redirect of 100MW of BPA transmission from [redacted] available January, 2022 for a 50-year term, and using Mid-C forecast for energy pricing. [redacted] MW may be available for redirect on BPA's system, however it is likely only [redacted] MW is possible for redirect to Mid-C. Redirects are assessed given the most current data and are a snap shot of the present system. The results are subject to change and may vary in the future based on updated ATC calculations and flow gate constraints within BPA's network. While redirect of the remaining [redacted] MW is feasible, the location, source and cost of this redirect remains under review, therefore not included in this analysis.

Phase 2 next steps

March 2019 Phase 1 evaluation completed; notifications and data requests sent to respondents	March 27, 2019 Phase 2 kickoff meeting for RFP evaluation team	April 2, 2019 Present Phase 1 results to WUTC staff	April 5, 2019 First round data requests due from respondents	June 2019 Complete Phase 2 evaluation, select final short list
EMC Touchpoints				
March 19, 2019 Informational update on Phase 1 results (detailed results to follow)				June 2019 Decisional to receive approval to begin negotiations

Phase 2 considerations:

- Detailed, cross-functional due diligence to evaluate costs, risks and merits of each proposal
- Additional scenario testing in portfolio screening model
- Update ELCC assumptions to match most current IRP assumptions
- Potential impacts of Clean Energy Bill (anticipated April 2019)

RFP Phase 1 Results:

Appendix to EMC informational presentation on March 21, 2019

EMC Informational
April 5, 2019

PUGET SOUND ENERGY

Cindy Song
Manager Business Initiatives

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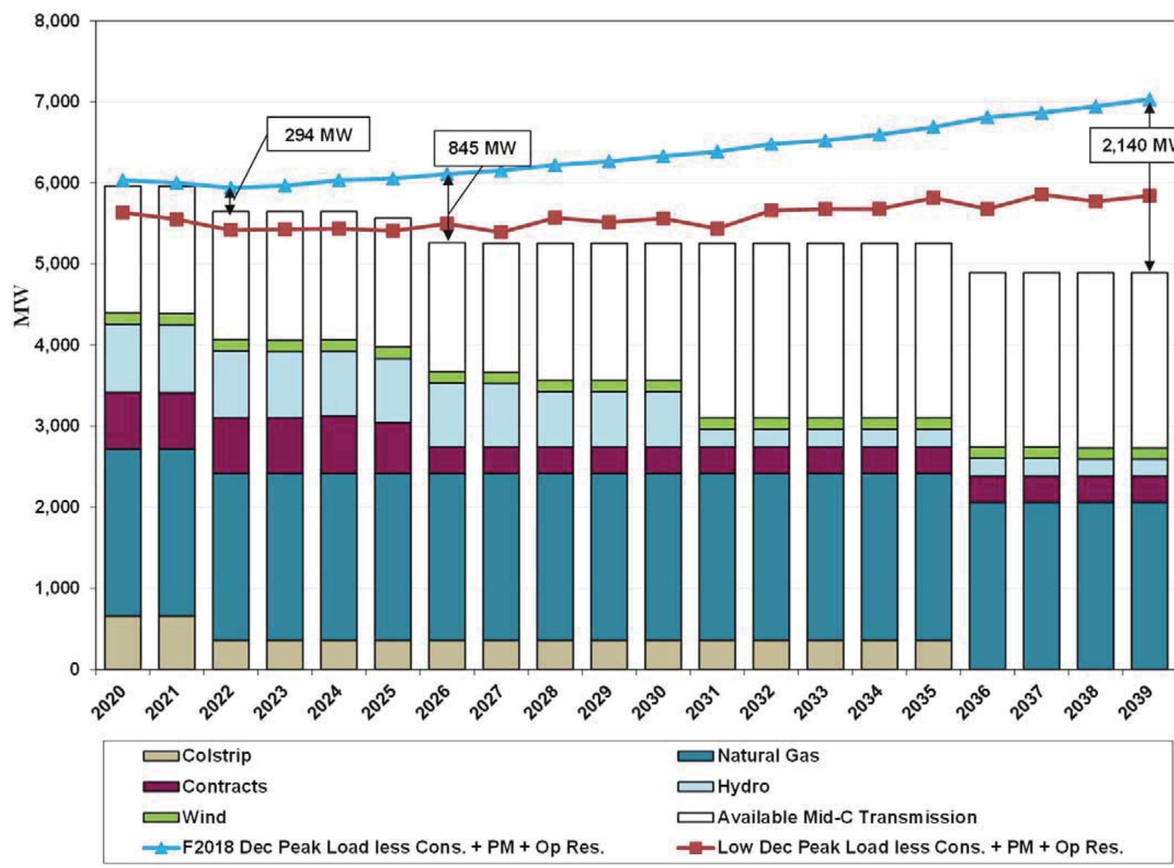
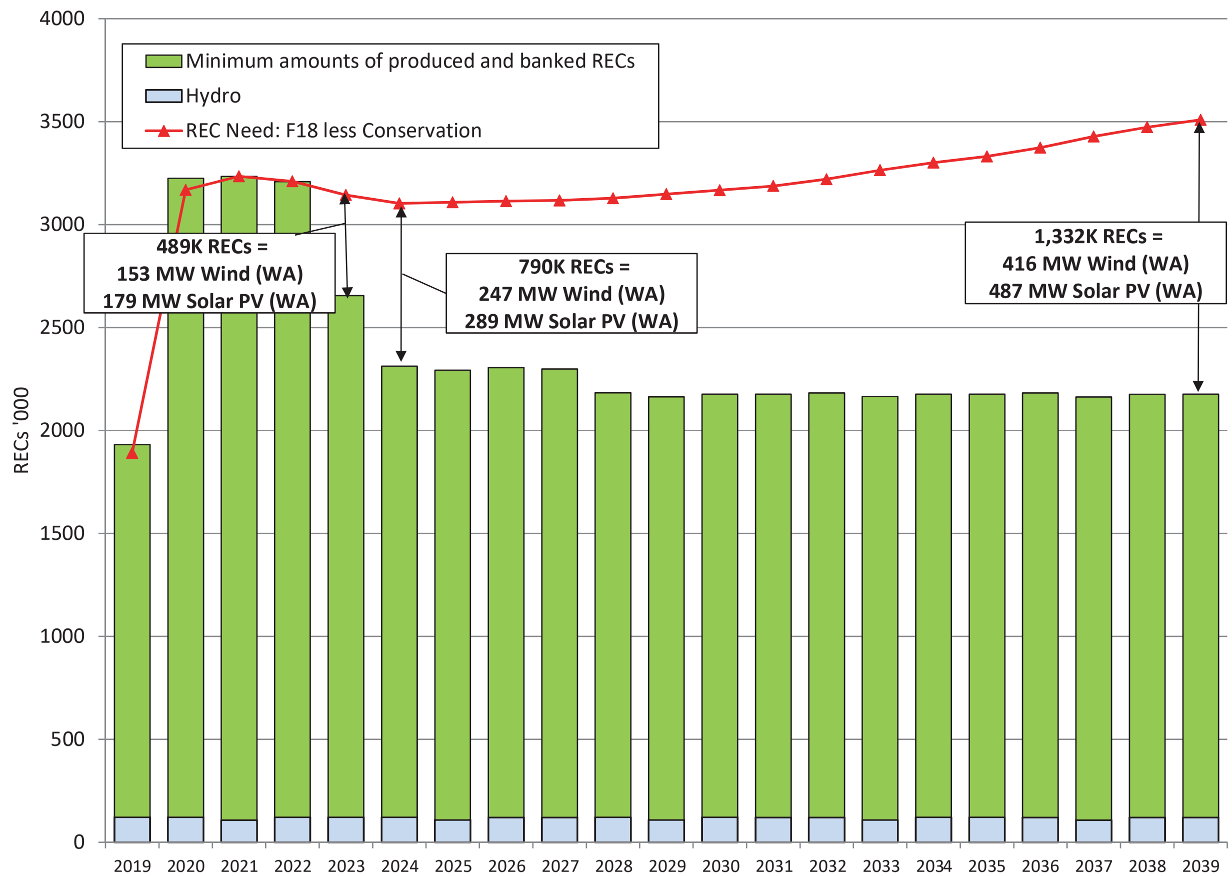
Appendix

- Phase 1 resource need assumption
- Quantitative screening metrics definitions
- Phase 1 price scenarios
- Phase 1 detailed results
  - Quantitative analysis results
  - Executive summary of qualitative results

Phase 1: Peak need updated to F2018 demand forecast



Phase 1: Renewable need updated to F2018 demand forecast



Source: 2017 IRP renewable need forecast updated based on F2018 demand forecast (August 2018)

Quantitative screening metrics allow PSE to compare and rank resources with different characteristics and capacities

Metric	Description
Portfolio benefit ($) *Useful for comparing projects with the same winter capacity value*	Difference between net present value portfolio revenue requirement of proposed project (replaces a generic resource), and the net present portfolio revenue requirement of the generic portfolio strategy.
Levelized cost ($/MWh-REC) *Useful for comparing projects with the same or similar operating characteristics*	A resource's net present value revenue requirement of the 20-year period with end effects, divided by the net present value generation.
Portfolio benefit/REC ($/MWh-REC) *Useful for comparing projects with the same or similar operating characteristics*	Provides a slightly different view than the above metric by taking the portfolio benefit divided by RECs.
Levelized portfolio benefit/Unit of contribution to need ($PB/kW-yr): *Useful for comparing different capacity resource types and sizes*	A project's portfolio benefit divided by the present value of the project's capacity contribution.

Additional screening metrics

Net cost/REC
($/MWh-REC)
Useful for comparing renewable projects of different sizes

Present value of the cost less the market value of the energy divided by the RECs.

Portfolio benefit ratio
Useful for comparing projects with the same or similar operating characteristics; removes size bias

Portfolio benefit divided by the net present value of the proposed revenue requirement. Allows projects of different capacities to be by eliminating bias for size.

Net cost/peak capacity credit **($/kW)**
Useful for comparing cost of peak capacity credit across technologies

Present value of the cost less the market value of the energy divided peak capacity credit.

Phase 1 price scenarios

1. **No carbon tax** – Base case from the 2017 IRP with no carbon tax
2. **CO2 (Initiative 1631)** – Scenario 1 + $16/ton carbon price
3. **CO2 (WECC-wide social cost)** – Scenario 1 + $42/ton carbon price

2018 RFP Phase I Quantitative Results Summary - Renewable Resource (results as of 4/2/2019)

REDACTED VERSION

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18169	[redacted]	[redacted]	$ [redacted]	18	[redacted]	[redacted]	[redacted]	1	2	1	-7.9	-2.7	-1.6	9	39	103	[redacted]	[redacted]	[redacted]	[redacted]	4	3
18135	[redacted]	[redacted]	$ [redacted]	3	[redacted]	[redacted]	[redacted]	2	9	13	-6.7	-3.3	-1.5	10	37	112	[redacted]	[redacted]	[redacted]	[redacted]	9	10
18173	[redacted]	[redacted]	$ [redacted]	49	[redacted]	[redacted]	[redacted]	3	4	4	11.8	-4.8	-1.8	25	23	90	[redacted]	[redacted]	[redacted]	[redacted]	12	5
18132	[redacted]	[redacted]	$ [redacted]	13	[redacted]	[redacted]	[redacted]	4	11	26	-14.5	-4.0	-1.4	5	28	116	[redacted]	[redacted]	[redacted]	[redacted]	16	15
18176	[redacted]	[redacted]	$ [redacted]	34	[redacted]	[redacted]	[redacted]	5	5	24	158.8	-3.5	-3.2	20	36	42	[redacted]	[redacted]	[redacted]	[redacted]	6	62
18135	[redacted]	[redacted]	$ [redacted]	1	[redacted]	[redacted]	[redacted]	6	3	9	-10.8	-2.2	-1.4	8	43	114	[redacted]	[redacted]	[redacted]	[redacted]	2	6
18112	[redacted]	[redacted]	$ [redacted]	12	[redacted]	[redacted]	[redacted]	7	10	18	-12.8	-3.1	-1.4	6	38	118	[redacted]	[redacted]	[redacted]	[redacted]	7	8
18175	[redacted]	[redacted]	$ [redacted]	30	[redacted]	[redacted]	[redacted]	8	41	45	5.9	-6.4	-6.0	39	19	16	[redacted]	[redacted]	[redacted]	[redacted]	23	104
18132	[redacted]	[redacted]	$ [redacted]	10	[redacted]	[redacted]	[redacted]	9	17	43	-22.4	-4.6	-1.5	4	25	109	[redacted]	[redacted]	[redacted]	[redacted]	18	17
18163	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	10	42	132	7.0	5.6	1.8	33	73	135	[redacted]	[redacted]	[redacted]	[redacted]	111	180
18169	[redacted]	[redacted]	$ [redacted]	29	[redacted]	[redacted]	[redacted]	11	6	3	9.9	-3.6	-1.7	27	31	96	[redacted]	[redacted]	[redacted]	[redacted]	5	4
18173	[redacted]	[redacted]	$ [redacted]	52	[redacted]	[redacted]	[redacted]	12	1	2	5.0	-2.6	-1.5	43	40	108	[redacted]	[redacted]	[redacted]	[redacted]	3	2
18165	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	13	45	136	6.1	4.8	1.5	37	78	140	[redacted]	[redacted]	[redacted]	[redacted]	120	185
18165	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	14	29	137	6.1	5.3	1.4	36	76	144	[redacted]	[redacted]	[redacted]	[redacted]	119	184
18111	[redacted]	[redacted]	$ [redacted]	8	[redacted]	[redacted]	[redacted]	15	16	8	-54.2	-3.6	-1.4	1	33	113	[redacted]	[redacted]	[redacted]	[redacted]	14	7
18179	[redacted]	[redacted]	$ [redacted]	9	[redacted]	[redacted]	[redacted]	16	15	20	-38.8	-3.6	-1.4	3	34	115	[redacted]	[redacted]	[redacted]	[redacted]	11	11
18125	[redacted]	[redacted]	$ [redacted]	11	[redacted]	[redacted]	[redacted]	17	12	15	52.6	-3.6	-1.5	21	35	111	[redacted]	[redacted]	[redacted]	[redacted]	10	12
18122	[redacted]	[redacted]	$ [redacted]	14	[redacted]	[redacted]	[redacted]	18	13	14	27.2	-3.8	-1.5	22	30	105	[redacted]	[redacted]	[redacted]	[redacted]	15	13
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	19	84	133	5.7	4.4	1.7	41	86	137	[redacted]	[redacted]	[redacted]	[redacted]	112	181
18132	[redacted]	[redacted]	$ [redacted]	5	[redacted]	[redacted]	[redacted]	20	28	7	-47.3	-5.0	-1.5	2	22	110	[redacted]	[redacted]	[redacted]	[redacted]	20	19
18170	[redacted]	[redacted]	$ [redacted]	67	[redacted]	[redacted]	[redacted]	21	7	5	2.0	11.0	11.0	75	61	127	[redacted]	[redacted]	[redacted]	[redacted]	93	175
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	22	151	134	6.5	1.4	1.7	34	138	136	[redacted]	[redacted]	[redacted]	[redacted]	110	179
18131	[redacted]	[redacted]	$ [redacted]	47	[redacted]	[redacted]	[redacted]	23	54	49	3.3	-21.9	-1.8	51	7	91	[redacted]	[redacted]	[redacted]	[redacted]	37	39
18125	[redacted]	[redacted]	$ [redacted]	4	[redacted]	[redacted]	[redacted]	24	18	21	18.2	-4.3	-1.6	24	27	104	[redacted]	[redacted]	[redacted]	[redacted]	17	16
18127	[redacted]	[redacted]	$ [redacted]	6	[redacted]	[redacted]	[redacted]	25	19	37	22.0	-4.7	-1.6	23	24	99	[redacted]	[redacted]	[redacted]	[redacted]	19	28
18114	[redacted]	[redacted]	$ [redacted]	17	[redacted]	[redacted]	[redacted]	26	80	33	11.1	-4.4	-1.6	26	26	100	[redacted]	[redacted]	[redacted]	[redacted]	22	22
18127	[redacted]	[redacted]	$ [redacted]	7	[redacted]	[redacted]	[redacted]	27	14	17	8.7	-3.6	-1.5	29	32	106	[redacted]	[redacted]	[redacted]	[redacted]	13	14
18139	[redacted]	[redacted]	$ [redacted]	24	[redacted]	[redacted]	[redacted]	28	27	29	3.1	7.8	-3.2	55	65	39	[redacted]	[redacted]	[redacted]	[redacted]	98	67
18122	[redacted]	[redacted]	$ [redacted]	28	[redacted]	[redacted]	[redacted]	29	26	101	4.3	-11.8	-1.1	45	8	119	[redacted]	[redacted]	[redacted]	[redacted]	34	35
18166	[redacted]	[redacted]	$ [redacted]	63	[redacted]	[redacted]	[redacted]	30	35	31	4.5	-33.9	-1.9	44	5	82	[redacted]	[redacted]	[redacted]	[redacted]	39	36
18170	Golden Hill -Shaped	200 MW	$ [redacted]	44	[redacted]	[redacted]	[redacted]	31	8	6	3.5	94.6	-2.7	49	55	54	[redacted]	[redacted]	[redacted]	[redacted]	84	43
18170	[redacted]	[redacted]	$ [redacted]	19	[redacted]	[redacted]	[redacted]	32	37	22	8.5	-9.8	-1.7	31	12	94	[redacted]	[redacted]	[redacted]	[redacted]	30	21
18121	[redacted]	[redacted]	$ [redacted]	22	[redacted]	[redacted]	[redacted]	33	24	110	6.3	-5.7	-4.5	35	21	30	[redacted]	[redacted]	[redacted]	[redacted]	21	111
18121	[redacted]	[redacted]	$ [redacted]	23	[redacted]	[redacted]	[redacted]	34	39	111	6.0	-8.4	-4.7	38	14	23	[redacted]	[redacted]	[redacted]	[redacted]	28	113
18139	[redacted]	[redacted]	$ [redacted]	2	[redacted]	[redacted]	[redacted]	35	33	35	9.4	-8.2	-1.7	28	15	95	[redacted]	[redacted]	[redacted]	[redacted]	27	27
18132	[redacted]	[redacted]	$ [redacted]	26	[redacted]	[redacted]	[redacted]	36	69	25	5.8	-6.2	-1.8	40	20	89	[redacted]	[redacted]	[redacted]	[redacted]	138	25
18135	[redacted]	[redacted]	$ [redacted]	79	[redacted]	[redacted]	[redacted]	37	68	56	2.8	4.7	-3.1	58	80	44	[redacted]	[redacted]	[redacted]	[redacted]	115	75
18171	[redacted]	[redacted]	$ [redacted]	21	[redacted]	[redacted]	[redacted]	38	44	34	8.6	-8.9	-1.5	30	13	107	[redacted]	[redacted]	[redacted]	[redacted]	29	18
18133	[redacted]	[redacted]	$ [redacted]	129	[redacted]	[redacted]	[redacted]	39	72	57	1.8	3.7	-3.6	83	92	36	[redacted]	[redacted]	[redacted]	[redacted]	132	84
18133	[redacted]	[redacted]	$ [redacted]	140	[redacted]	[redacted]	[redacted]	40	76	60	1.6	2.7	-5.1	89	110	25	[redacted]	[redacted]	[redacted]	[redacted]	148	102
18139	[redacted]	[redacted]	$ [redacted]	98	[redacted]	[redacted]	[redacted]	41	43	39	1.3	2.0	22.9	101	123	124	[redacted]	[redacted]	[redacted]	[redacted]	174	170
18109	[redacted]	[redacted]	$ [redacted]	31	[redacted]	[redacted]	[redacted]	42	62	36	2.5	20.5	-1.8	64	57	92	[redacted]	[redacted]	[redacted]	[redacted]	87	32
18135	[redacted]	[redacted]	$ [redacted]	83	[redacted]	[redacted]	[redacted]	43	21	32	1.8	6.0	-2.2	81	71	72	[redacted]	[redacted]	[redacted]	[redacted]	102	58
18142	[redacted]	[redacted]	$ [redacted]	45	[redacted]	[redacted]	[redacted]	44	48	44	2.5	-10.5	-1.7	65	9	97	[redacted]	[redacted]	[redacted]	[redacted]	33	31
18187	[redacted]	[redacted]	$ [redacted]	104	[redacted]	[redacted]	[redacted]	45	31	73	1.7	4.1	-14.3	84	90	4	[redacted]	[redacted]	[redacted]	[redacted]	96	125
18187	[redacted]	[redacted]	$ [redacted]	138	[redacted]	[redacted]	[redacted]	46	58	138	1.5	3.0	-17.5	91	103	2	[redacted]	[redacted]	[redacted]	[redacted]	105	117
18190	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	47	87	135	5.4	4.3	1.6	42	87	138	[redacted]	[redacted]	[redacted]	[redacted]	113	182
18121	[redacted]	[redacted]	$ [redacted]	43	[redacted]	[redacted]	[redacted]	48	40	123	3.8	-8.0	-12.4	48	16	3	[redacted]	[redacted]	[redacted]	[redacted]	26	124
18171	[redacted]	[redacted]	$ [redacted]	20	[redacted]	[redacted]	[redacted]	49	65	28	7.7	-10.1	-1.6	32	11	98	[redacted]	[redacted]	[redacted]	[redacted]	35	20
18133	[redacted]	[redacted]	$ [redacted]	60	[redacted]	[redacted]	[redacted]	50	52	42	2.5	11.6	-2.5	66	60	63	[redacted]	[redacted]	[redacted]	[redacted]	91	59
18187	[redacted]	[redacted]	$ [redacted]	62	[redacted]	[redacted]	[redacted]	51	57	72	2.3	8.1	-3.2	67	64	38	[redacted]	[redacted]	[redacted]	[redacted]	89	82
18112	[redacted]	[redacted]	$ [redacted]	115	[redacted]	[redacted]	[redacted]	52	38	65	3.8	-6.6	-1.6	47	18	102	[redacted]	[redacted]	[redacted]	[redacted]	7	8
18111	[redacted]	[redacted]	$ [redacted]	112	[redacted]	[redacted]	[redacted]	53	51	54	1.1	2.6	-2.7	116	112	55	[redacted]	[redacted]	[redacted]	[redacted]	147	80
18140	[redacted]	[redacted]	$ [redacted]	85	[redacted]	[redacted]	[redacted]	54	95	150	1.2	1.6	N/A	109	130		[redacted]	[redacted]	[redacted]	[redacted]	167	78
18166	[redacted]	[redacted]	$ [redacted]	78	[redacted]	[redacted]	[redacted]	55	61	40	2.5	22.9	-2.1	63	56	77	[redacted]	[redacted]	[redacted]	[redacted]	85	48
18130	[redacted]	[redacted]	$ [redacted]	41	[redacted]	[redacted]	[redacted]	56	63	58	3.1	2,150.0	-1.9	52	54	83	[redacted]	[redacted]	[redacted]	[redacted]	83	49
18133	[redacted]	[redacted]	$ [redacted]	97	[redacted]	[redacted]	[redacted]	57	88	66	1.5	2.4	-5.3	93	115	22	[redacted]	[redacted]	[redacted]	[redacted]	149	107
18109	[redacted]	[redacted]	$ [redacted]	39	[redacted]	[redacted]	[redacted]	58	73	47	2.0	8.2	-1.9	72	63	85	[redacted]	[redacted]	[redacted]	[redacted]	92	40
18187	[redacted]	[redacted]	$ [redacted]	48	[redacted]	[redacted]	[redacted]	59	60	68	2.2	6.3	-3.6	70	69	34	[redacted]	[redacted]	[redacted]	[redacted]	100	90
18121	[redacted]	[redacted]	$ [redacted]	25	[redacted]	[redacted]	[redacted]	60	36	124	4.0	-7.5	-9.8	46	17	10	[redacted]	[redacted]	[redacted]	[redacted]	25	122
18128	[redacted]	[redacted]	$ [redacted]	51	[redacted]	[redacted]	[redacted]	61	50	59	3.1	-10.2	-1.8	54	10	93	[redacted]	[redacted]	[redacted]	[redacted]	32	41
18133	[redacted]	[redacted]	$ [redacted]	54	[redacted]	[redacted]	[redacted]	62	64	48	2.1	6.1	-2.9	71	70	49	[redacted]	[redacted]	[redacted]	[redacted]	101	69
18174	[redacted]	[redacted]	$ [redacted]	33	[redacted]	[redacted]	[redacted]	63	53	19	1.8	3.8	-2.7	82	91	56	[redacted]	[redacted]	[redacted]	[redacted]	137	52
18175	[redacted]	[redacted]	$ [redacted]	55	[redacted]	[redacted]	[redacted]	64	82	61	2.6	-163.9	-2.4	59	1	67	[redacted]	[redacted]	[redacted]	[redacted]	43	51
18164	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	65	122	141	2.5	1.6	0.1	61	131	152	[redacted]	[redacted]	[redacted]	[redacted]	157	191
18109	[redacted]	[redacted]	$ [redacted]	38	[redacted]	[redacted]	[redacted]	66	47	50	2.9	-46.1	-1.8	56	4	88	[redacted]	[redacted]	[redacted]	[redacted]	40	42
18140	[redacted]	[redacted]	$ [redacted]	66	[redacted]	[redacted]	[redacted]	67	97	153	1.0	1.4	N/A	124	137		[redacted]	[redacted]	[redacted]	[redacted]	172	88
18140	[redacted]	[redacted]	$ [redacted]	86	[redacted]	[redacted]	[redacted]	68	128	148	1.0	1.1	N/A	123	144		[redacted]	[redacted]	[redacted]	[redacted]	173	77
18109	[redacted]	[redacted]	$ [redacted]	42	[redacted]	[redacted]	[redacted]	69	49	52	2.9	-69.7	-1.8	57	2	87	[redacted]	[redacted]	[redacted]	[redacted]	41	44
18120	[redacted]	[redacted]	$ [redacted]	36	[redacted]	[redacted]	[redacted]	70	67	53	2.6	-65.7	-1.9	60	3	84	[redacted]	[redacted]	[redacted]	[redacted]	42	46
18174	[redacted]	[redacted]	$ [redacted]	37	[redacted]	[redacted]	[redacted]	71	56	12	1.5	3.4	-3.0	90	94	45	[redacted]	[redacted]	[redacted]	[redacted]	143	56
18171	[redacted]	[redacted]	$ [redacted]	58	[redacted]	[redacted]	[redacted]	72	89	55	2.2	4.8	-2.1	69	79	79	[redacted]	[redacted]	[redacted]	[redacted]	104	55
18133	[redacted]	[redacted]	$ [redacted]	113	[redacted]	[redacted]	[redacted]	73	93	71	1.2	1.8	-11.7	107	125	6	[redacted]	[redacted]	[redacted]	[redacted]	163	118
18130	[redacted]	[redacted]	$ [redacted]	32	[redacted]	[redacted]	[redacted]	74	81	77	1.7	4.3	-2.8	86	88	53	[redacted]	[redacted]	[redacted]	[redacted]	31	33
18166	[redacted]	[redacted]	$ [redacted]	64	[redacted]	[redacted]	[redacted]	75	74	46	2.2	16.1	-2.1	68	58	78	[redacted]	[redacted]	[redacted]	[redacted]	88	50
18181	[redacted]	[redacted]	$ [redacted]	106	[redacted]	[redacted]	[redacted]	76	34	38	1.0	3.2	-2.5	126	99	62	[redacted]	[redacted]	[redacted]	[redacted]	142	66
18119	[redacted]	[redacted]	$ [redacted]	53	[redacted]	[redacted]	[redacted]	77	75	76	1.9	10.8	-2.1	78	62	81	[redacted]	[redacted]	[redacted]	[redacted]	90	61

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

CONFIDENTIAL

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18162	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	78	118	115	2.5	1.8	1.5	62	126	141	[redacted]	[redacted]	[redacted]		150	190
18134	[redacted]	[redacted]	$ [redacted]	57	[redacted]	[redacted]	[redacted]	79	90	82	1.9	5.8	-2.3	77	72	71	[redacted]	[redacted]	[redacted]		95	70
18109	[redacted]	[redacted]	$ [redacted]	103	[redacted]	[redacted]	[redacted]	80	66	67	1.5	4.5	-3.0	92	84	46	[redacted]	[redacted]	[redacted]		117	23
18187	[redacted]	[redacted]	$ [redacted]	101	[redacted]	[redacted]	[redacted]	81	77	84	1.9	2.3	-3.2	79	117	41	[redacted]	[redacted]	[redacted]		155	90
18187	[redacted]	[redacted]	$ [redacted]	77	[redacted]	[redacted]	[redacted]	82	78	81	1.3	2.7	-3.2	100	111	40	[redacted]	[redacted]	[redacted]		146	90
18129	[redacted]	[redacted]	$ [redacted]	88	[redacted]	[redacted]	[redacted]	83	104	96	2.0	3.0	-2.5	73	102	59	[redacted]	[redacted]	[redacted]		122	83
18109	[redacted]	[redacted]	$ [redacted]	105	[redacted]	[redacted]	[redacted]	84	59	70	1.5	4.5	-3.1	94	85	43	[redacted]	[redacted]	[redacted]		127	24
18134	[redacted]	[redacted]	$ [redacted]	59	[redacted]	[redacted]	[redacted]	85	91	85	1.9	5.5	-2.3	80	74	69	[redacted]	[redacted]	[redacted]		99	73
18135	[redacted]	[redacted]	$ [redacted]	69	[redacted]	[redacted]	[redacted]	86	20	30	1.9	7.5	-2.1	76	66	80	[redacted]	[redacted]	[redacted]		94	54
18109	[redacted]	[redacted]	$ [redacted]	81	[redacted]	[redacted]	[redacted]	87	71	74	1.4	3.3	-3.8	99	98	31	[redacted]	[redacted]	[redacted]		151	34
18135	[redacted]	[redacted]	$ [redacted]	122	[redacted]	[redacted]	[redacted]	88	79	75	1.0	2.0	-9.0	117	122	11	[redacted]	[redacted]	[redacted]		161	115
18174	[redacted]	[redacted]	$ [redacted]	111	[redacted]	[redacted]	[redacted]	89	22	10	1.2	6.3	-2.4	106	67	65	[redacted]	[redacted]	[redacted]		107	38
18137	[redacted]	[redacted]	$ [redacted]	56	[redacted]	[redacted]	[redacted]	90	92	80	1.2	2.1	-6.1	108	121	15	[redacted]	[redacted]	[redacted]		158	110
18174	[redacted]	[redacted]	$ [redacted]	114	[redacted]	[redacted]	[redacted]	91	46	11	1.1	5.0	-2.2	111	77	74	[redacted]	[redacted]	[redacted]		116	29
18174	[redacted]	[redacted]	$ [redacted]	126	[redacted]	[redacted]	[redacted]	92	22	16	1.0	6.3	-2.8	125	67	52	[redacted]	[redacted]	[redacted]		107	53
18140	[redacted]	[redacted]	$ [redacted]	82	[redacted]	[redacted]	[redacted]	93	116	156	0.8	1.0	N/A	139	151		[redacted]	[redacted]	[redacted]		178	101
18174	[redacted]	[redacted]	$ [redacted]	128	[redacted]	[redacted]	[redacted]	94	25	23	0.9	5.4	-2.8	127	75	50	[redacted]	[redacted]	[redacted]		118	57
18136	[redacted]	[redacted]	$ [redacted]	89	[redacted]	[redacted]	[redacted]	95	135	78	1.0	3.4	-2.1	122	96	75	[redacted]	[redacted]	[redacted]		97	63
18119	[redacted]	[redacted]	$ [redacted]	80	[redacted]	[redacted]	[redacted]	96	94	88	1.3	3.3	-3.0	102	97	47	[redacted]	[redacted]	[redacted]		124	89
UP002	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	97	152	108	3.1	2.2	0.8	53	120	148	[redacted]	[redacted]	[redacted]		44	186
18109	[redacted]	[redacted]	$ [redacted]	102	[redacted]	[redacted]	[redacted]	98	85	83	1.1	2.4	-5.2	115	116	75	[redacted]	[redacted]	[redacted]		127	106
18174	[redacted]	[redacted]	$ [redacted]	76	[redacted]	[redacted]	[redacted]	99	32	27	0.9	4.1	-4.9	130	89	27	[redacted]	[redacted]	[redacted]		139	96
18174	[redacted]	[redacted]	$ [redacted]	74	[redacted]	[redacted]	[redacted]	100	30	41	0.9	4.6	-4.7	129	82	29	[redacted]	[redacted]	[redacted]		126	99
18115	[redacted]	[redacted]	$ [redacted]	65	[redacted]	[redacted]	[redacted]	101	96	89	1.4	4.6	-2.3	96	81	68	[redacted]	[redacted]	[redacted]		103	74
18171	[redacted]	[redacted]	$ [redacted]	50	[redacted]	[redacted]	[redacted]	102	109	64	1.7	3.4	-2.2	85	93	73	[redacted]	[redacted]	[redacted]		114	60
18140	[redacted]	[redacted]	$ [redacted]	87	[redacted]	[redacted]	[redacted]	103	111	151	1.3	2.3	N/A	103	119		[redacted]	[redacted]	[redacted]		144	94
18140	[redacted]	[redacted]	$ [redacted]	90	[redacted]	[redacted]	[redacted]	104	120	147	1.3	1.7	N/A	105	128		[redacted]	[redacted]	[redacted]		154	93
18137	[redacted]	[redacted]	$ [redacted]	75	[redacted]	[redacted]	[redacted]	105	98	91	0.9	1.5	-14.7	132	134	3	[redacted]	[redacted]	[redacted]		165	121
18132	[redacted]	[redacted]	$ [redacted]	72	[redacted]	[redacted]	[redacted]	106	69	97	1.3	3.4	-3.4	104	95	37	[redacted]	[redacted]	[redacted]		24	95
18180	[redacted]	[redacted]	$ [redacted]	70	[redacted]	[redacted]	[redacted]	107	139	69	1.4	2.5	-2.5	97	114	61	[redacted]	[redacted]	[redacted]		109	68
18129	[redacted]	[redacted]	$ [redacted]	61	[redacted]	[redacted]	[redacted]	108	106	93	1.6	2.9	-2.7	87	105	57	[redacted]	[redacted]	[redacted]		130	85
18123	[redacted]	[redacted]	$ [redacted]	123	[redacted]	[redacted]	[redacted]	109	107	87	0.9	2.7	-5.7	131	109	18	[redacted]	[redacted]	[redacted]		135	71
18180	[redacted]	[redacted]	$ [redacted]	91	[redacted]	[redacted]	[redacted]	110	86	62	1.1	4.6	-2.5	113	83	64	[redacted]	[redacted]	[redacted]		106	65
18108	[redacted]	[redacted]	$ [redacted]	93	[redacted]	[redacted]	[redacted]	111	99	99	1.1	3.1	-2.8	110	101	51	[redacted]	[redacted]	[redacted]		125	97
18108	[redacted]	[redacted]	$ [redacted]	96	[redacted]	[redacted]	[redacted]	112	100	100	1.1	2.9	-2.9	114	104	48	[redacted]	[redacted]	[redacted]		129	98
18140	[redacted]	[redacted]	$ [redacted]	68	[redacted]	[redacted]	[redacted]	113	103	154	1.1	2.8	N/A	112	107		[redacted]	[redacted]	[redacted]		134	100
18123	[redacted]	[redacted]	$ [redacted]	109	[redacted]	[redacted]	[redacted]	114	105	86	1.0	2.8	-2.3	118	108	70	[redacted]	[redacted]	[redacted]		135	71
18113	[redacted]	[redacted]	$ [redacted]	107	[redacted]	[redacted]	[redacted]	115	108	105	1.0	2.6	-3.6	121	113	35	[redacted]	[redacted]	[redacted]		140	105
18118	[redacted]	[redacted]	$ [redacted]	35	[redacted]	[redacted]	[redacted]	116	55	51	3.4	-30.1	-1.9	50	6	86	[redacted]	[redacted]	[redacted]		38	45
18108	[redacted]	[redacted]	$ [redacted]	73	[redacted]	[redacted]	[redacted]	117	110	102	1.0	2.3	-3.6	119	118	33	[redacted]	[redacted]	[redacted]		145	103
18184	[redacted]	[redacted]	$ [redacted]	125	[redacted]	[redacted]	[redacted]	118	113	94	0.8	1.4	-5.2	138	136	24	[redacted]	[redacted]	[redacted]		152	86
18140	[redacted]	[redacted]	$ [redacted]	84	[redacted]	[redacted]	[redacted]	119	101	155	0.9	2.9	N/A	128	106		[redacted]	[redacted]	[redacted]		133	108
18129	[redacted]	[redacted]	$ [redacted]	95	[redacted]	[redacted]	[redacted]	120	141	116	1.0	1.0	-6.0	120	147	17	[redacted]	[redacted]	[redacted]		160	116
18184	[redacted]	[redacted]	$ [redacted]	120	[redacted]	[redacted]	[redacted]	121	121	95	0.8	1.7	-2.7	135	127	58	[redacted]	[redacted]	[redacted]		152	86
18108	[redacted]	[redacted]	$ [redacted]	132	[redacted]	[redacted]	[redacted]	122	115	104	0.7	1.2	112.7	140	141	123	[redacted]	[redacted]	[redacted]		171	168
18166	[redacted]	[redacted]	$ [redacted]	137	[redacted]	[redacted]	[redacted]	123	131	90	0.5	0.7	12.7	150	156	126	[redacted]	[redacted]	[redacted]		181	171
18108	[redacted]	[redacted]	$ [redacted]	92	[redacted]	[redacted]	[redacted]	124	123	109	0.8	1.6	-5.5	134	129	20	[redacted]	[redacted]	[redacted]		156	114
18179	[redacted]	[redacted]	$ [redacted]	141	[redacted]	[redacted]	[redacted]	125	130	117	0.4	0.7	5.9	151	158	129	[redacted]	[redacted]	[redacted]		182	173
18100	SPI Industrial Biomass	17 MW	$ [redacted]	100	[redacted]	[redacted]	[redacted]	126	112	63	0.7	1.3	-7.0	141	140	14	[redacted]	[redacted]	[redacted]		170	109
18108	[redacted]	[redacted]	$ [redacted]	136	[redacted]	[redacted]	[redacted]	127	126	107	0.6	1.1	15.3	143	145	125	[redacted]	[redacted]	[redacted]		175	169
18177	[redacted]	[redacted]	$ [redacted]	99	[redacted]	[redacted]	[redacted]	128	119	98	0.8	1.5	-5.4	136	135	21	[redacted]	[redacted]	[redacted]		159	112
18136	[redacted]	[redacted]	$ [redacted]	127	[redacted]	[redacted]	[redacted]	129	150	130	0.8	0.7	-5.2	137	157	23	[redacted]	[redacted]	[redacted]		131	81
18135	[redacted]	[redacted]	$ [redacted]	148	[redacted]	[redacted]	[redacted]	130	129	112	0.3	0.4	1.1	158	165	146	[redacted]	[redacted]	[redacted]		190	192
18129	[redacted]	[redacted]	$ [redacted]	71	[redacted]	[redacted]	[redacted]	131	145	120	0.9	0.8	-10.8	133	154	9	[redacted]	[redacted]	[redacted]		164	123
18138	[redacted]	[redacted]	$ [redacted]	144	[redacted]	[redacted]	[redacted]	132	138	126	0.3	0.4	1.1	154	166	145	[redacted]	[redacted]	[redacted]		186	187
UP002	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	133	148	128	1.6	1.2	0.3	88	143	151	[redacted]	[redacted]	[redacted]		44	189
18185	[redacted]	[redacted]	$ [redacted]	46	[redacted]	[redacted]	[redacted]	134	117	79	1.4	13.9	-1.6	95	59	101	[redacted]	[redacted]	[redacted]		86	47
18178	[redacted]	[redacted]	$ [redacted]	143	[redacted]	[redacted]	[redacted]	135	125	103	0.6	1.2	-11.0	146	142	8	[redacted]	[redacted]	[redacted]		169	119
18113	[redacted]	[redacted]	$ [redacted]	110	[redacted]	[redacted]	[redacted]	136	136	121	0.6	1.0	-36.4	142	149	1	[redacted]	[redacted]	[redacted]		168	126
18108	[redacted]	[redacted]	$ [redacted]	124	[redacted]	[redacted]	[redacted]	137	127	106	0.5	1.0	10.0	147	148	128	[redacted]	[redacted]	[redacted]		176	172
18141	[redacted]	[redacted]	$ [redacted]	121	[redacted]	[redacted]	[redacted]	138	102	92	0.4	3.1	-2.4	152	100	66	[redacted]	[redacted]	[redacted]		121	79
18181	[redacted]	[redacted]	$ [redacted]	119	[redacted]	[redacted]	[redacted]	139	134	118	0.5	1.1	-8.9	149	146	12	[redacted]	[redacted]	[redacted]		166	120
18135	[redacted]	[redacted]	$ [redacted]	147	[redacted]	[redacted]	[redacted]	140	132	114	0.3	0.5	1.4	155	162	143	[redacted]	[redacted]	[redacted]		187	188
18108	[redacted]	[redacted]	$ [redacted]	133	[redacted]	[redacted]	[redacted]	141	137	119	0.3	0.7	2.8	157	155	132	[redacted]	[redacted]	[redacted]		180	178
18138	[redacted]	[redacted]	$ [redacted]	149	[redacted]	[redacted]	[redacted]	142	83	140	0.2	0.6	0.1	163	159	154	[redacted]	[redacted]	[redacted]		191	195
18110	[redacted]	[redacted]	$ [redacted]	139	[redacted]	[redacted]	[redacted]	143	144	125	0.2	0.4	1.5	162	167	139	[redacted]	[redacted]	[redacted]		185	183
18172	[redacted]	[redacted]	$ [redacted]	130	[redacted]	[redacted]	[redacted]	144	147	127	0.3	0.5	3.0	156	161	131	[redacted]	[redacted]	[redacted]		177	176
18172	[redacted]	[redacted]	$ [redacted]	135	[redacted]	[redacted]	[redacted]	145	149	131	0.3	0.5	2.2	160	164	133	[redacted]	[redacted]	[redacted]		179	177
18138	[redacted]	[redacted]	$ [redacted]	117	[redacted]	[redacted]	[redacted]	146	124	129	0.4	1.3	-8.5	153	139	13	[redacted]	[redacted]	[redacted]		162	30
18168	[redacted]	[redacted]	$ [redacted]	15	[redacted]	[redacted]	[redacted]	147	142	139	0.6	1.8	-0.2	144	124	121	[redacted]	[redacted]	[redacted]		123	76
18168	[redacted]	[redacted]	$ [redacted]	15	[redacted]	[redacted]	[redacted]	148	140	145	0.5	1.6	0.0	148	132	122	[redacted]	[redacted]	[redacted]		141	64
18138	[redacted]	[redacted]	$ [redacted]	108	[redacted]	[redacted]	[redacted]	149	146	113	0.3	0.9	-5.6	159	153	19	[redacted]	[redacted]	[redacted]		36	37
18138	[redacted]	[redacted]	$ [redacted]	142	[redacted]	[redacted]	[redacted]	150	143	146	0.1	0.5	1.9	166	160	134	[redacted]	[redacted]	[redacted]		183	26
18138	[redacted]	[redacted]	$ [redacted]	151	[redacted]	[redacted]	[redacted]	151	133	152	N/A	0.3	N/A		168		[redacted]	[redacted]	[redacted]		194	198
18172	[redacted]	[redacted]	$ [redacted]	145	[redacted]	[redacted]	[redacted]	152	153	142	N/A	N/A	0.1			153	[redacted]	[redacted]	[redacted]		188	193
18182	[redacted]	[redacted]	$ [redacted]	131	[redacted]	[redacted]	[redacted]	153	114	122	N/A	0.9	4.1		152	130	[redacted]	[redacted]	[redacted]		184	174
18172	[redacted]	[redacted]	$ [redacted]	146	[redacted]	[redacted]	[redacted]	154	154	143	N/A	N/A	0.1			155	[redacted]	[redacted]	[redacted]		189	194
18106	[redacted]	[redacted]	$ [redacted]	150	[redacted]	[redacted]	[redacted]	155	155	144	N/A	N/A	0.0			156	[redacted]	[redacted]	[redacted]		193	197
18101	[redacted]	[redacted]	$ [redacted]	134	[redacted]	[redacted]	[redacted]	156	156	149	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]		192	196
18186	[redacted]	[redacted]	$ [redacted]	155	[redacted]	[redacted]	[redacted]	157	157	157	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]		195	199
18167	[redacted]	[redacted]	$ [redacted]	163	[redacted]	[redacted]	[redacted]	158	159	158	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]		197	200
18167	[redacted]	[redacted]	$ [redacted]	162	[redacted]	[redacted]	[redacted]	159	158	159	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]		196	201

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18116	[redacted]	[redacted]	[redacted]		[redacted]						N/A	N/A	N/A				[redacted]					
18116											N/A	N/A	N/A									
18131											N/A	N/A	N/A									
18116											N/A	N/A	N/A									
18116											N/A	N/A	N/A									
18116											N/A	N/A	N/A									
18116											N/A	N/A	N/A									
18126											N/A	N/A	N/A									
18126											N/A	N/A	N/A									
18126											N/A	N/A	N/A									
18126											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18124											N/A	N/A	N/A									
18169											N/A	N/A	N/A									
18169											N/A	N/A	N/A									
18182											N/A	N/A	N/A									
18183											N/A	N/A	N/A									
18102											N/A	N/A	N/A									

Notes
1. Ranking color scheme: green is high ranking, red is low ranking.
2. Grayed out lines at towards the bottom of the list indicate either withdrawn proposals or proposals with fatal flaws.
3. REC only proposals have N/A value for levelized cost because this is less meaningful metric for those proposals.
4. Some propsals have N/A value for portfolio benefit. The reason is that if the portfolio benefit results in a net cost, the portfolio benefit ratio calculation breaks down and is meaningless.

REDACTED
VERSION

2018 RFP Phase I Quantitative Results Summary - Capacity Resource (results as of 4/2/2019)

Project ID	Project	NAMEPLATE	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / kW-yr NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank	Net Cost / kW-yr NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank
18169	[redacted]	[redacted] MW	$ [redacted]	16	[redacted]	[redacted]	[redacted]	1	2	2	[redacted]	[redacted]	[redacted]	1	2	2
18169	[redacted]	[redacted] MW	$ [redacted]	27	[redacted]	[redacted]	[redacted]	2	3	3	[redacted]	[redacted]	[redacted]	10	3	3
18173	[redacted]	[redacted] MW	$ [redacted]	50	[redacted]	[redacted]	[redacted]	3	1	1	[redacted]	[redacted]	[redacted]	6	1	1
18176	[redacted]	[redacted] MW	$ [redacted]	32	[redacted]	[redacted]	[redacted]	4	4	5	[redacted]	[redacted]	[redacted]	3	4	6
18173	[redacted]	[redacted] MW	$ [redacted]	47	[redacted]	[redacted]	[redacted]	5	5	4	[redacted]	[redacted]	[redacted]	4	5	4
18100	SPI Industrial Biomass	17 MW	$ [redacted]	98	[redacted]	[redacted]	[redacted]	6	6	6	[redacted]	[redacted]	[redacted]	46	28	7
18105	[redacted]	[redacted] MW	$ [redacted]	150	[redacted]	[redacted]	[redacted]	7	10	10	[redacted]	[redacted]	[redacted]	2	8	11
18105	[redacted]	[redacted] MW	$ [redacted]	162	[redacted]	[redacted]	[redacted]	8	9	15	[redacted]	[redacted]	[redacted]	5	12	18
XXXXX	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	9	8	9	[redacted]	[redacted]	[redacted]	7	9	9
18105	[redacted]	[redacted] MW	$ [redacted]	160	[redacted]	[redacted]	[redacted]	10	14	11	[redacted]	[redacted]	[redacted]	9	15	12
18105	[redacted]	[redacted] MW	$ [redacted]	152	[redacted]	[redacted]	[redacted]	11	11	12	[redacted]	[redacted]	[redacted]	12	11	15
18170	Golden Hill -Shaped	200 MW	$ [redacted]	42	[redacted]	[redacted]	[redacted]	12	7	8	[redacted]	[redacted]	[redacted]	8	7	10
18105	[redacted]	[redacted] MW	$ [redacted]	161	[redacted]	[redacted]	[redacted]	13	13	16	[redacted]	[redacted]	[redacted]	13	16	19
18201	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	14	12	17	[redacted]	[redacted]	[redacted]	11	10	14
18103	[redacted]	[redacted] MW	$ [redacted]	25	[redacted]	[redacted]	[redacted]	15	17	20	[redacted]	[redacted]	[redacted]	15	6	24
18201	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	16	16	18	[redacted]	[redacted]	[redacted]	14	17	16
18104	[redacted]	[redacted] MW	$ [redacted]	117	[redacted]	[redacted]	[redacted]	17	21	25	[redacted]	[redacted]	[redacted]	17	25	13
18202	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	18	18	19	[redacted]	[redacted]	[redacted]	18	19	21
18104	[redacted]	[redacted] MW	$ [redacted]	114	[redacted]	[redacted]	[redacted]	19	24	26	[redacted]	[redacted]	[redacted]	16	22	29
18201	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	20	20	21	[redacted]	[redacted]	[redacted]	19	20	23
18105	[redacted]	[redacted] MW	$ [redacted]	151	[redacted]	[redacted]	[redacted]	21	23	23	[redacted]	[redacted]	[redacted]	20	24	25
18105	[redacted]	[redacted] MW	$ [redacted]	154	[redacted]	[redacted]	[redacted]	23	27	22	[redacted]	[redacted]	[redacted]	21	30	26
18105	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	24	26	24	[redacted]	[redacted]	[redacted]	23	27	27
18104	[redacted]	[redacted] MW	$ [redacted]	155	[redacted]	[redacted]	[redacted]	25	28	28	[redacted]	[redacted]	[redacted]	24	33	34
18104	[redacted]	[redacted] MW	$ [redacted]	92	[redacted]	[redacted]	[redacted]	26	31	29	[redacted]	[redacted]	[redacted]	22	32	32
18145	[redacted]	[redacted] MW	$ [redacted]	38	[redacted]	[redacted]	[redacted]	27	57	53	[redacted]	[redacted]	[redacted]	26	38	28
18104	[redacted]	[redacted] MW	$ [redacted]	156	[redacted]	[redacted]	[redacted]	29	37	27	[redacted]	[redacted]	[redacted]	25	40	33
18159	[redacted]	[redacted] MW	$ [redacted]	156	[redacted]	[redacted]	[redacted]	30	36	30	[redacted]	[redacted]	[redacted]	27	41	37
UP001	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	31	51	37	[redacted]	[redacted]	[redacted]	30	48	5
18203	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	32	46	34	[redacted]	[redacted]	[redacted]	28	47	40
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	33	45	59	[redacted]	[redacted]	[redacted]	29	46	42
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	34	44	61	[redacted]	[redacted]	[redacted]	32	52	43
18145	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	35	80	74	[redacted]	[redacted]	[redacted]	31	29	22
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	36	42	62	[redacted]	[redacted]	[redacted]	33	42	46
18188	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	37	52	36	[redacted]	[redacted]	[redacted]	35	56	49
18157	[redacted]	[redacted] MW	$ [redacted]	158	[redacted]	[redacted]	[redacted]	38	41	63	[redacted]	[redacted]	[redacted]	34	54	47
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	39	48	80	[redacted]	[redacted]	[redacted]	36	51	48
18157	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	40	68	81	[redacted]	[redacted]	[redacted]	37	55	50
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	41	35	82	[redacted]	[redacted]	[redacted]	39	13	51
18145	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	42	95	71	[redacted]	[redacted]	[redacted]	48	31	20
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	43	62	83	[redacted]	[redacted]	[redacted]	41	59	52
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	44	34	56	[redacted]	[redacted]	[redacted]	40	37	30
18188	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	45	56	45	[redacted]	[redacted]	[redacted]	43	60	64
18157	[redacted]	[redacted] MW	$ [redacted]	159	[redacted]	[redacted]	[redacted]	46	38	58	[redacted]	[redacted]	[redacted]	42	39	31
18107	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	47	29	7	[redacted]	[redacted]	[redacted]	38	26	8
18144	[redacted]	[redacted] W	$ [redacted]	114	[redacted]	[redacted]	[redacted]	48	53	42	[redacted]	[redacted]	[redacted]	44	49	53
18147	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	49	49	32	[redacted]	[redacted]	[redacted]	45	53	39
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	50	43	77	[redacted]	[redacted]	[redacted]	47	43	35
18157	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	51	61	79	[redacted]	[redacted]	[redacted]	49	44	36
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	52	54	87	[redacted]	[redacted]	[redacted]	52	66	76
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	53	25	104	[redacted]	[redacted]	[redacted]	63	18	87
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	54	88	70	[redacted]	[redacted]	[redacted]	53	99	77
18200	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	55	59	33	[redacted]	[redacted]	[redacted]	51	64	61
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	56	81	50	[redacted]	[redacted]	[redacted]	50	84	44
18147	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	57	58	38	[redacted]	[redacted]	[redacted]	54	62	54

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Project ID	Project	NAMEPLATE	Levelized Cost		Portfolio Benefit / kW-yr						Net Cost / kW-yr					
			All Scenarios $/MWh	Rank	NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank	NO CO2 $/kw-yr	CO2 Fee $/kw-yr	Societal $/kw-yr	NO CO2 Rank	CO2 Fee Rank	Societal Rank
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	58	30	97	[redacted]	[redacted]	[redacted]	55	36	66
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	59	103	86	[redacted]	[redacted]	[redacted]	65	63	65
18157	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	60	99	98	[redacted]	[redacted]	[redacted]	57	71	68
18156 / 18158	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	61	22	99	[redacted]	[redacted]	[redacted]	58	23	70
18147	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	62	60	39	[redacted]	[redacted]	[redacted]	60	65	55
18157	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	63	93	72	[redacted]	[redacted]	[redacted]	70	77	67
18157	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	64	97	100	[redacted]	[redacted]	[redacted]	61	73	72
18152	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	65	87	35	[redacted]	[redacted]	[redacted]	56	58	44
18155	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	66	64	40	[redacted]	[redacted]	[redacted]	62	68	57
18205	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	67	72	49	[redacted]	[redacted]	[redacted]	59	72	71
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	68	65	41	[redacted]	[redacted]	[redacted]	64	69	60
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	69	19	95	[redacted]	[redacted]	[redacted]	66	21	56
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	70	96	96	[redacted]	[redacted]	[redacted]	69	61	58
18146	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	71	63	67	[redacted]	[redacted]	[redacted]	68	14	62
18145	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	72	40	68	[redacted]	[redacted]	[redacted]	67	92	17
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	73	71	44	[redacted]	[redacted]	[redacted]	71	74	63
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	74	76	47	[redacted]	[redacted]	[redacted]	73	80	75
18151	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	75	83	65	[redacted]	[redacted]	[redacted]	72	85	84
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	76	75	46	[redacted]	[redacted]	[redacted]	74	79	69
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	77	106	102	[redacted]	[redacted]	[redacted]	80	82	82
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	78	77	48	[redacted]	[redacted]	[redacted]	76	81	74
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	79	90	57	[redacted]	[redacted]	[redacted]	75	94	86
18148	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	80	70	76	[redacted]	[redacted]	[redacted]	79	78	79
18146	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	81	79	69	[redacted]	[redacted]	[redacted]	77	34	73
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	82	82	51	[redacted]	[redacted]	[redacted]	78	87	78
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	83	86	52	[redacted]	[redacted]	[redacted]	81	93	81
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	84	89	54	[redacted]	[redacted]	[redacted]	83	95	85
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	85	66	43	[redacted]	[redacted]	[redacted]	82	67	59
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	86	84	55	[redacted]	[redacted]	[redacted]	84	91	83
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	87	92	60	[redacted]	[redacted]	[redacted]	86	98	88
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	88	91	64	[redacted]	[redacted]	[redacted]	88	97	89
18204	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	89	94	73	[redacted]	[redacted]	[redacted]	89	100	91
18149	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	90	67	101	[redacted]	[redacted]	[redacted]	91	75	94
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	91	98	66	[redacted]	[redacted]	[redacted]	90	101	92
18149 / 18153	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	92	73	105	[redacted]	[redacted]	[redacted]	97	86	99
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	93	100	75	[redacted]	[redacted]	[redacted]	92	102	93
18143	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	94	101	78	[redacted]	[redacted]	[redacted]	94	103	96
18149	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	95	55	90	[redacted]	[redacted]	[redacted]	93	57	95
18149	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	96	47	88	[redacted]	[redacted]	[redacted]	95	45	97
18160	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	97	104	93	[redacted]	[redacted]	[redacted]	96	106	105
18189	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	98	33	89	[redacted]	[redacted]	[redacted]	98	35	103
18149 / 18153	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	99	69	103	[redacted]	[redacted]	[redacted]	99	70	100
18150	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	100	78	85	[redacted]	[redacted]	[redacted]	100	83	101
18149 / 18153	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	101	105	106	[redacted]	[redacted]	[redacted]	101	89	102
18160	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	102	102	84	[redacted]	[redacted]	[redacted]	102	104	98
18150	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	103	74	91	[redacted]	[redacted]	[redacted]	103	76	80
18150	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	104	85	92	[redacted]	[redacted]	[redacted]	105	88	104
18189	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]	105	50	94	[redacted]	[redacted]	[redacted]	104	50	106
18159	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	106	107	107	[redacted]	[redacted]	[redacted]	107	107	107
18161	BPA Peak Capacity Product	100 MW	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			
18143	[redacted]	[redacted] W	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			

Notes
1. Ranking color scheme: green is high ranking, red is low ranking.
2. Grayed out lines at towards the bottom of the list indicate either withdrawn proposals or proposals with fatal flaws.
3. Energy storage proposals have N/A value for levelized cost since the energy storage proposal is net user of energy it does not have levelized cost in $/MWh.

2018 RFP – Executive Summary*

Quantitative results are on pages 8-12 herein.

Candidate Short List: Proposals selected for Phase 2 optimization and due diligence (organized alphabetically by project name)

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18100 **SPI Burlington Biomass** Sierra Pacific Industries Power Purchase Agreement ("PPA") Operational Biomass 17 MW nameplate Commercial Operation Date ("COD"): 01/01/2021 17 years capacity		• Relatively inexpensive • REC producing • Proportionally high contribution to the capacity need. • Existing operational site • Interconnected with PSE system • Minimal risks all-around	• Sierra Pacific Industries is a privately held company so less financial information is available than if it had been public	**Selected -** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the high levelized portfolio benefit over renewable energy credit ("REC") ranking, and due to the relatively high levelized portfolio benefit over kilowatt year ranking and low qualitative risks.
18103 [redacted] Capacity Tolling Agreement ("CTA") or Asset Transfer Operational Combined Cycle [redacted] MW** or [redacted] MW Start: 06/01/2022 Term: 10 year (PPA)		• Second least expensive thermal proposal currently in RFP • Existing operational site (rather than new build) • Strong presence in the community • Expansion opportunity on adjacent land	• Would likely be impacted by carbon legislation currently being considered in Olympia • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, there would likely be considerable reputational risk. • Is not clear whether there is firm gas transport to plant, which would be required to count as a capacity resource	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
****Indicates primary ranking criteria for particular proposal category.*

REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18105 [redacted] CTA** and Build to Sell ("BTS") [redacted] Thermal Expansion [redacted] MW** or [redacted] MW COD: 01/01/2022 5, 15, and 20** year term		• Least expensive thermal proposal in RFP • Expansion of existing site rather than a new thermal facility. • Technology is relatively site-agnostic and can potentially be designed to integrate with other sites. • [redacted] MW proposal could likely be facilitated with firm gas supply with existing facilities.	• Air permit path is complex and possibly not feasible. • The likely-to-be-required air permit modification could bring more operational constraints for the existing generation units. • PSE will experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's thermal generation portfolio. • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, the proposed schedule and general project feasibility seem to be in question.	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18107 [redacted] PPA Operational Hydro [redacted] MW start: 1/1/2021 (assumed) Term: 20 year (assumed)		• Existing operational site (rather than new build) • Clean energy (although not Renewable Portfolio Standard ("RPS") compliant) • Run-of-river hydro can be less environmentally impactful than standard hydro Little to no permitting or real estate risk due to current operational status	• Not RPS complaint (although clean energy) • Proposal is missing important details regarding pricing, term length, term, etc. • Although PSE has worked with this counterparty before, possible risks remain	**Selected -** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18111 [redacted] PPA** or BTS Development solar Solar: [redacted] MWac COD: 12/31/2022 Term: 20 year (PPA)		• Relatively high quantitative score for solar project • Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Site control has been achieved • Permitting status is sufficient at this stage • Located on PSEs system in [redacted] County avoids community concerns in [redacted] County	• While on PSE's system, complex delivery due to available transmission capacity ("ATC") constrains in area. Delivery is possible to Mid-C however may be difficult given projects proximity to the [redacted] substation	**Selected – The** RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18112 [redacted] PPA** and Optional Energy Storage System Development solar Solar: [redacted] MWac** Storage: [redacted] MWh / [redacted] MW / 2 HR COD: 12/31/2022 Term: 25 year		• Developer has solar development experience (primarily on a smaller scale) • Located on PSE's syste[redacted] County avoids community concerns in [redacted] County	• Developer has primarily small scale solar development experience and no experience in the northwest • Project acreage appears to be too small for proposed nameplate capacity • Permitting information provided is insufficient • While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C	**Not selected** - The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18114 [redacted] PPA Solar Generation [redacted] MW_{AC} COD: Q4 2020 20 year term		• [redacted] is assessed to be a relatively strong parent company • Site as proposed doesn't have major implications on agricultural land • Long-term site control is secured	• Need specifics on parent company support, or financing otherwise • Solar facilities are under contention in [redacted] County • Permitting will require a transfer of an Energy Facility Site Evaluation Council ("EFSEC") permit, which will bring a viability and reputation risk to the project and PSE • Transmission and energy delivery may be overly expensive or otherwise not feasible	**Selected – T**he RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18122 [redacted] PPA**, Optional Energy Storage System Development Wind [redacted] MW_{AC}** & [redacted] MW 1 Hr Energy Storage System COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash. • Relatively inexpensive solar energy with potential for battery storage. • Long-term site control is secured	• Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Significant viability issues delivering to PSE • Solar development not positively looked at in this area • Site may block the view of a local real estate development.	**Selected –** The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
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REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18125 [redacted] PPA Development Solar [redacted] MW_{AC} COD: 10/31/2022 Term: 15 year or 20 year**		• Strong counterparty with extensive renewable energy development experience • Site control appears to be more than adequate given proposed size of project	• While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C • Site permitting is in a relatively early state of development • Minimal information provided regarding community relations and or support	**Selected –** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over renewable energy credit ("REC") ranking.
18127 [redacted] PPA Development Solar [redacted] MW_{AC} COD: 12/31/2022 Term: 15 year or 20 year**		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Location on existing project site may provide economy of scale in development and operation of project. • County has expressed support in the project	• May be siting concerns given proximity to wind turbines with required setbacks • Assumes use of [redacted] with current [redacted] landowners • CUP required to permit project	**Selected –** The RFP team recommends this project proceed to the next phase of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over renewable energy credit ("REC") ranking.
18131 [redacted] PPA** or BTS Development Wind [redacted] MW** or [redacted] MW COD: 12/1/2022 25 year term		• Credit support in the form of a parent guarantee, letter of credit, or cash • Long-term site control secured • Permitting likely to meet proposed timeline • Community relations plan was strong when compared to other proposals	• Less experience when compared to other counterparties • [redacted] MW option would possibly run into available transmission capacity issues • [redacted]ribe may request compensation from project	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18132 [redacted] PPA** Development Wind**, Solar, Energy Storage System [redacted] MW** COD: 01/01/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Wind is an existing site, therefore little concern for site control or community relations	• May be concern for permitting required for a repower • Mid-C delivery negates any capacity value brought by the Energy Storage System Option • Repowered project may not create as much excitement given the lack of an incrementally new project	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18135 [redacted] PPA** or BTS Development Solar [redacted] MW** or [redacted] MW Solar Optional [redacted] MW 4 Hr Energy Storage System COD: 12/1/2022 20 year term PPA		• Large counterparty with experience all over the world • Letter of intent with an option to lease has been signed	• Minimal detail regarding creditworthiness or financing was included in the proposal • Transmission directly to PSE appears to be overly expensive or infeasible. Mid-C delivery with no contribution to peak capacity is likely the best offer configuration • Permitting plan is underdeveloped	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18139 [redacted] PPA Development Solar [redacted] MW Solar with optional [redacted] MW** or [redacted] MW 1.82 Hr Energy Storage System COD: 12/31/2022 10 year term PPA		• Large multi-national counterparty with greater-than-average renewable development experience	• Site control not-yet secured, and no indication of pending agreement was provided • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Permitting process has not yet begun, and presents minimal evidence that they have the ability to identify and secure all permits • Community relations was not covered sufficiently, and tribal support may be required	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18163 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2022 18 year term		• Minimal risk regarding underlying projects • Interconnection at distribution voltage dictates that each as-generated MWh produce two Washington State RECs.	• Little detail regarding underlying solar facilities	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18165 [redacted] REC purchase Underlying solar project [redacted] RECS per year Start of term: 1/1/2022** or 2024 16 or 18** year term		• Minimal risk regarding underlying project	• Little detail regarding underlying solar facility	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18166 [redacted] Developmental Asset Sale ("DAS"), BTS, or PPA** Development Wind [redacted] MW COD: 12/1/2020, 2021, or 2022** 25 year term		• Long-term site control established	• Significant concerns regarding the counterparty's ability to develop, finance, and construct the facility • Relatively small counterparty with inconclusive rights to the project's developmental assets • Timing of project is contingent on BPA infrastructure upgrades to enable transmission capacity • Project owner, [redacted], seemed uninterested in furthering project development via first-hand experience at [redacted] public hearing • Timeline as-proposed is likely not feasible and pricing is likely contingent on timing due to PTC safe harbor	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18169 [redacted] PPA** or 50% Ownership + PPA Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2020 or 2021** 20 or 25** year term		• Relatively cost efficient way to meet REC and contribution to peak capacity need • Large and experienced counterparty • Site control is reportedly achieved, but supporting documentation was not included in proposal • Public has been notified of the project as a [redacted] MW facility • Shape of wind based on 6 operating MET towers appears to fit well with PSE's needs	• Minimal experience in the Pacific Northwest • Large generation-tie transmission line is required • There is a potential issue with sage grouse habitat	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18170 **Golden Hills Wind** Avangrid Renewables PPA, PPA-shaped**, BTS Development Wind 200 MW** COD: 12/1/2020** Term: 20 year**		• Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Shaped product offers capacity contribution during peak winter months • Likely low risk to real estate given advanced level • Permitting well advanced with Oregon Energy Facility Siting Council ("EFSC") permit application already amended	• Complex energy delivery will require additional vetting • Complexity of shaped product will require additional vetting	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18173 [redacted] PPA** Development Wind [redacted] MW or [redacted]** MW COD: 10/31/2022** Term: 20**		• Strong counterparty with extensive renewable energy development experience • May only need single landowner which would indicate little real estate challenges • Favorable state support, however local level of support unknown	• Possibly require DNRC land which could complicate site control and permitting • Permitting is relatively early in development, however there may be concerns for meeting scheduled COD • Use of Colstrip Transmission System is under ongoing review, however may be problematic	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18175 [redacted] PPA, BTS, or WSPP Shaped** Development Wind [redacted] MW COD: 10/1/2020 25 year term		• Long-term site control is secured • Western Systems Power Pool ("WSPP") schedule C delivery is a unique value	• Counterparty and financing details will require data requests • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Mid-C delivery will likely be necessarily, which would negate a contribution to peak capacity • Permitting plan seems either underdeveloped or underrepresented in the proposal • Outreach plan is underdeveloped	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18176 [redacted] PPA** Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: N/A		• Indications of strong local, state and environmental support • Potential to partner with a local Native American tribe • Located near [redacted] and in the same County [redacted] • Counterparty has indicated a plan to partner and/or otherwise engage an experienced renewable energy developer on the project	• Counterparty does not have experience designing, financing, building, owning or operating a large scale renewable or other energy projects • Use of [redacted] is under ongoing review, however may be problematic • Additional detail needed regarding the real estate and permitting considerations necessary for the site	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
18179 [redacted] PPA**, BTS Development Wind [redacted] MW** COD: 12/31/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Real estate appears adequate and relatively low risk • Project sizing has been altered in order to address some local viewshed concerns	• History of considerable local and County level opposition to the project • Counterparty bypassed the County permitting process by pursing permit approval through the state's EFSEC process	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18190 [redacted] REC Offer [redacted] Underlying proposed solar facilities [redacted] RECs / year COD: 01/01/2022 12, 15**, or 20 years		• Inexpensive RECs • Site control is secured • EFSEC projects have been approved by Governor Inslee	• Realizing full REC-output of underlying projects is unlikely due to interconnection issues • [redacted] is currently in litigation with PSE over interconnection issues with the underlying projects • [redacted] County opposes the EFSEC decision and has applied for judicial review • Major feasibility concerns with some of the underlying projects, and schedule concerns for all • Projects sited in commercial agricultural land and many stakeholders in the County oppose development on these lands	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking. .
18201 [redacted] Direct load control Bring your own thermostat, smart water heater [redacted] MW COD: 1/1/2023 Term: 6 years		• Industry leader by Navigant study • 2016 PSE Demand Response ("DR") RFP finalist • Itron manages all program implementation • Strong financial, WA based • The [redacted] MW option makes it a small scale project to test out	• No convincing reason provided to suggest a ramp up in DR deployment just in a year in 2023	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.
XXXXX [redacted] N/A Transmission Redirect [redacted] MW**, [redacted] MW COD: 01/01/2022 Term: 55 year book life		• If feasible, redirect to Mid-C would provide a strong capacity resource	• Increased exposure to market prices (for redirect to Mid-C) • Ambiguity regarding how much redirect is possible to Mid-C ([redacted] MW assumed), therefore how much would be required to redirect elsewhere on BPAs system • If greater than [redacted] MW were to be redirected, the amount above [redacted] MW would have to redirect to another PSEI node, e.g. PGE, etc. Source of energy at second redirect point unknown	**Selected** – The RFP team recommends this project proceed to the next of the 2018 all-resource RFP due to the relatively high levelized portfolio benefit over kilowatt year ranking.

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REDACTED VERSION

REDACTED VERSION

Resources eliminated during the Phase 1 screening (organized alphabetically by project name)

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18101 [redacted] PPA Operating Biomass [redacted] MW Start of Term: 07/01/2021 7.25 Year Term		• The project is already operational, and therefore has viability issues largely solved • Transmission and energy delivery options seem viable on initial review	• Local community is fairly charged and might lump this project in with the nearby [redacted] facility in their protests, even though it is a REC generating facility	**Not selected -** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18102 [redacted] PPA Proposed Biomass [redacted] to [redacted] MW Start of Term: 01/01/2022 Unknown term duration		• Site control is allegedly secured via reserved land on existing property	• Most qualitative details required to be addressed in the 2018 RFP, including counterparty, permitting, energy delivery, and community relations were not adequately covered in the proposal	**Not selected –** The RFP team does not recommend this project to proceed to Phase 2 of the 2018 RFP due to a significant lack of detail in the proposal that resulted in the inability to analyze the proposal on a quantitative or qualitative basis.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18104 [redacted] CTA, 50%** or 100% Asset Sale, or HRCO Operating CC Thermal Plant [redacted] MW to [redacted] MW Start of Term: 01/01/2022 3 to 10 Year Term		• This was one of two already-operating thermal facilities proposed into the 2018 RFP • Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Counterparty has strong renewable energy portfolio • Site control and permitting should not represent issues to PSE or Invenergy	• Heat rate call option ("HRCO") at [redacted] MMBTU represents a poor value requiring significant additional pipeline capacity • Energy delivery is expensive and complex • Singing a new deal with a thermal resource represents a potentially significant reputational risk with governmental agencies, NGOs, activists, as well as typical energy consumers • Combined cycle turbine starts up slower than other thermal proposals • Ownership would likely involve significant facility upgrades not included in phase 1 quantitative analysis	**Not selected -** The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking as well as the potentially significant reputational risk with signing a new long-term agreement with a thermal generation resource.
18106 [redacted] PPA** Development Geothermal [redacted] MW** COD: 09/01/2021** Term: 20 year**		• Geothermal asset may provide clean capacity product	• May not qualify for Washington State RPS due to location in Nevada, relatively far away from Washington.	**Not selected -** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18108 [redacted] PPA Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour Energy Storage System COD: 12/15/2022 15 or 20* year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Permitting timeline seems feasible for COD, but not for the proposed start of construction	• Site control is not established, and presents a feasibility risk to the project since the land is being sold via auction • Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • Solar proposals in [redacted] County present some reputational risk • [redacted] MW capacity seems to facilitate Public Utility Regulatory Policies Act ("PURPA") considerations	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18109 [redacted] PPA Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour Energy Storage System COD: 12/15/2022 15 or 20* year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Long-term site control is achieved • Permitting timeline seems feasible	• Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • [redacted] MW capacity seems to facilitate PURPA considerations	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18110 [redacted] BTS or DAS Developmental Solar [redacted] MW Solar* and optional [redacted] MW 4 Hour Energy Storage System COD: 12/15/2022 15 or 20* year term		• Long-term site control is achieved	• Counterparty has minimal project development and construction experience • Project financing plan has very minimal detail • Expensive energy delivery to PSE or Mid-C due to available transmission capacity limitations • Minimal detail in community relations plan • Solar proposals in [redacted] County present some reputational risk	**Not selected –** The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18113 [redacted] PPA** Developmental Solar [redacted] MW** COD: 12/31/2022** 15** or 20 year term		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Site control has been achieved • ODOE certificate secured	• Complex delivery to PSE requires multiple transmission legs at additional cost	**Not selected –** The RFP evaluation team does not recommend [redacted] proposal for phase 2 consideration in the 2018 All Resource RFP due to its low quantitative score.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18115 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control is secured for a wind project, and can likely be altered to allow for Solar development	• Solar energy in Montana does not appear to provide the same cost efficiency, net capacity factor, or contribution to peak capacity when compared to the larger wind projects in the region • Energy delivery has been left to PSE and will be infeasible or expensive • Minimal details regarding a permitting plan of action	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18116 [redacted] PPA Development Solar [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.
18117 [redacted] 15-yr/20-yr PPA, Development Wind Up to [redacted] MW COD: 1/1/2021 Term:		• Project was [redacted] and withdrawing from the 2018 All-Resource RFP	• Project was [redacted] and withdrawing from the 2018 All-Resource RFP	**Not selected -** [redacted] and withdrawing from the 2018 All-Resource RFP

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18118 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control has been secured via land leases • Permitting has been largely secured via Oregon EFSC in February 2018	• Long-point to point transmission is unlikely to be feasible • Lack of cohesive community relations plan coupled with EFSC permit presents some reputational risk to the project and to PSE	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18119 [redacted] PPA Developmental Solar [redacted] MW Solar with Optional [redacted] MW 1 Hr Energy Storage System COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control for the project is achieved • While energy delivery was largely left to PSE, on initial review, it appears to be feasible	• Generation-tie line still requires land-use rights • Relatively insufficient permitting plan • Potential issues with proximity to nearby airport • Minimal details regarding a community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18120 [redacted] PPA Developmental Solar [redacted] MW COD: 12/31/2022 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control appears to be obtained imminently, however, minimal detail was included in the proposal	• BPA transmission would require significant network upgrades which indicate cost and schedule risk • Relatively insufficient permitting plan • Minimal details regarding a community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18121 [redacted] PPA Developmental Solar [redacted] MW COD: 12/1/2022 20** or 25 year term		• Letters of intent have been signed with potential lessors, and there should be plenty of time to finalize lease agreements • Community relations plan appears to be adequate	• [redacted] proposals into the 2018 RFP were withdrawn due to infeasibility in January 2018 • Transmission plan is undeveloped and reliant on PSE being a network customer of BPA, which is not and will not be the case • Permitting plan is relatively insufficient and underdeveloped • Recent fires in this area, in close proximity to Interstate 90, presents a risk to the ongoing operation of the site	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18123 [redacted] PPA Developmental Solar + Energy Storage System [redacted] MW Solar & optional [redacted] **, or [redacted] MW, 2, 4**, 6 Hr Energy Storage System COD: 10/31/2022 20** or 25 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Site control projected to be achieved by Q2 2019	• Generation-tie line not included in proposed site control • Interconnection queue position was described in the proposal, but could not be confirmed by RFP team • Relatively insufficient information provided in the proposal • [redacted] County generally interested in renewables, including solar, but some nearby communities have opposed development	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18124 [redacted] Operating Status & Offer PPA Development Solar [redacted]** MW or [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18126 [redacted] PPA Development Solar [redacted]* MW or [redacted] MW COD: 12/1/2022 20** or 25 year term		• This proposal was removed from consideration by the developer on January 11th 2018.	• This proposal was removed from consideration by the developer on January 11th 2018.	**Not selected –** This proposal was removed from consideration by the developer on January 11th 2018.
18128 [redacted] PPA**, Optional Energy Storage System Development solar Solar: [redacted] MWac** Storage: [redacted] MWh / [redacted] MW / 2 HR COD: 06/01/2022 Term: 25 year		• Location in [redacted] relatively favorable location within the county. • Real estate appears to be of an advanced stage and sufficient for proposed project size	• Counterparty solar experience exclusively small scale. • While on PSE's system, complex delivery due to ATC constrains in area. Delivery is possible to Mid-C • Developer withholds the rights to pursue state EFSEC permitting process, which would circumvent the county/local concerns, possibly engendering local hostility to the project	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18129 [redacted] PPA** Development Solar [redacted] MWac** COD: 01/01/2021 or 01/01/2023** Term: 15 or 20** year term		• Developer appears to have experience in the solar industry developing utility scale solar projects • Relatively advanced stage of permitting with comprehensive permitting matrix provided by developer • Real estate appears to be more than sufficient for the proposed project size	• Proposed plan for energy delivery includes multiple transmission segments that would be costly	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18130 [redacted] PPA Development Solar + Energy Storage System [redacted] MW Solar & [redacted] MW 4 Hr Energy Storage System COD: 12/15/2022 15 or 20** year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions	• Long-term site control is not yet obtained • A BPA cluster study will likely be required to fixed point to point delivery to PSE's system, which brings cost and schedule variability • Permitting progress has not yet begun as of the date of proposal submission • Nameplate of [redacted] MW, a multiple of [redacted] MW, indicates developer consideration for PURPA eligibility	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as feasibility concerns regarding Transmission and Energy Delivery.
18133 [redacted] PPA Development Solar + Energy Storage System [redacted] MW Solar & [redacted]** or [redacted] MW, 2** or 4 Hr, Energy Storage System COD: 12/15/2022 15 or 20** year term		• Experienced renewable developer, especially with wind assets • Project expected to be financed on balance sheet • Long-term site control is achieved	• Proposed energy delivery plan is potentially not feasible, or overly expensive • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18134 [redacted] PPA Development Solar [redacted] MW COD: 1/1/2023 20 year term		• Financial support through [redacted] and other long-term debt partners • Long-term site control is not yet achieved, but is reportedly close	• [redacted] only has moderate renewable development, construction, and operational experience • Energy delivery plan as proposed is likely infeasible, and transmission will need to be wheeled through BPA and Mid-C • Community relations was not sufficiently covered in the proposal and solar development in [redacted] County is currently unpopular	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18136 [redacted]) PPA Development Solar + Energy Storage System [redacted] or [redacted] MW Solar & [redacted] or [redacted]** MW, 4 Hr Energy Storage System COD: 9/31/2022 20 year term		• Long-term site control is achieved	• [redacted] is a newer company with minimal construction and operational experience • Transmission left to PSE (busbar delivery) and will likely route to Mid-C, removing any contribution to capacity • Relatively immature permitting plan • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18137 [redacted]) PPA Development Solar + Energy Storage System [redacted] or [redacted] MW Solar & [redacted] or [redacted]** MW, 4 Hr Energy Storage System COD: 9/31/2022 20 year term		• Long-term site control is achieved	• [redacted] is a newer company with minimal construction and operational experience • Transmission left to PSE (busbar delivery) and will likely route to Mid-C, removing any contribution to capacity • Relatively immature permitting plan • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking as well as insufficient progress and level of detail provided when compared to other proposals in the RFP, especially regarding Transmission and Energy Delivery.
18138 [redacted]) PPA Development Solar + Energy Storage System [redacted]** or [redacted] MW Solar & [redacted] MW, 2**, 4, or 6 Hr Energy Storage System COD: 3/31/2022 20 year term		• Long-term site control is achieved • Significant efforts identifying and securing State and Federal permits	• [redacted] is listed as a primary partner to [redacted]) and [redacted] has had ongoing issues meeting construction schedule commitments with an in-construction wind farm [redacted]) • Solar energy in Montana does not appear to provide the same cost efficiency, net capacity factor, or contribution to peak capacity when compared to the larger wind projects in the region • Minimal time has apparently been spent regarding local County permits • Community relations was not covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18140 [redacted] PPA Development Solar + Energy Storage System [redacted] MW Solar & [redacted] MW 4 Hr Energy Storage System COD: 12/15/2022 15 or 20** year term		• [redacted] is an experienced renewable energy developer, specifically in the solar production • Seller promises letter of credit and has experience obtaining financing with many major banks and financial institutions • Long-term site control has been secured • [redacted], but relatively comprehensive, community relations plan	• Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk • The permitting plan is not far along and there are potential schedule issues with the permitting as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18141 [redacted] PPA** Development Solar + Energy Storage System [redacted] MW Solar** [redacted] MW / [redacted] MWh / 4 Hr Energy Storage System** COD: 9/30/2022** Term: 25 year**		• Located on [redacted] location may ease development efforts • Developer has experience in the region [redacted] • Purchase option (pricing undefined) offers some flexibility for asset purchase	• Developer does not provide much financial information therefore financial credit worthiness is difficult to assess. • Not apparent what value project brings with use of existing [redacted]. • Little permitting work has been completed • Use of [redacted] transmission may be problematic and/or crowd out a future wind expansion at the site.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18142 [redacted] PPA Development Solar + Energy Storage System [redacted] or [redacted] MW Solar & [redacted] or [redacted] MW, 4 Hr Energy Storage System COD: 9/30/2022 20 or 25** year term		• Large publically traded counterparty with strong financial performance and much experience in renewable development, construction, and operation • Project would be financed on balance sheet • Long-term site control is not yet achieved as of the proposal submission, but indications were that it would occur soon	• There is apparently insufficient transmission capacity to secure firm point-to-point capacity • Energy delivery plan as proposed requires PSE to be a network customer with BPA, which is not and will not be the case • Permitting will require amendments, and not enough specifics on the plan was included in the proposal • There was a relatively low amount of detail provided regarding the community relations plan	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18143 [redacted] BTS Development Energy Storage System [redacted] MW, 2** or 4 Hr Lithium Ion or [redacted] MW, 4 or 6 Hr Flow Energy Storage System COD: 12/31/2020		• Long-term site control secured • [redacted] is a Seattle-based company that should be able to engage the local community effectively	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Newer developer who recently lost a court battle [redacted] regarding PURPA eligibility • Site is in a location that has medium risk for gopher indicator soils, which has caused issues for PSE in the past	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18144 [redacted] CTA Development Energy Storage System [redacted] MW, 4 Hr Lithium Ion Energy Storage System COD: 12/31/2021 10 or 20** year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Site is on [redacted] land	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Transmission queue position with PSE has not yet been applied for • Firm available transmission capacity is likely not obtainable • Permitting process is relatively immature • Community relations was not covered in proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18145 [redacted] CTA or BTS Development Energy Storage System [redacted] MW, 2** or 4 Hr, Li-Ion Energy Storage System COD: 12/31/2021 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Long-term site control is not secured • Site appears to be part of an active gravel pit • Permitting process is early in development • Community relations is not discussed in proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18146 [redacted] CTA or BTS Development Energy Storage System [redacted] MW, 4 Hr, Li-Ion Energy Storage System COD: 09/30/2022 20 year term		• Large multinational counterparty with experience in renewable and green power • Strong financial performance and credit rating, and project would be financed on balance sheet	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Long-term site control is not yet secured • Project is not yet in transmission queue, and would likely require significant network upgrades • Community relations plan is lacking and is very necessary as the site is located in a commercial and industrial load center of PSE's service territory	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18147 [redacted] CTA Development Energy Storage System [redacted], [redacted] or [redacted]** MW, 4 Hr Li-Ion Energy Storage System COD: 09/30/2022 10 year term		• Not applicable	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • [redacted] is a newer company with minimal construction and operational experience • Site control has not yet been obtained • Project is not yet in transmission queue • Permitting for site is immature • Community relations was not addressed in proposal and will be required as the site is in a major suburban load center in PSE's service territory	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18148 [redacted] CTA or BTS** Development Energy Storage System [redacted] MW / [redacted] MWh / 2 hr Energy Storage System ** COD: 08/01/2022** Term: 20 year (CTA)**		• Extensive solar energy development experience including having developed, currently owning and operating [redacted] solar project in Washington State. • Strong management team, with storage experience • Location on existing [redacted] may provide economy of scale in development and operation of project. • Would be located on [redacted] property	• May be siting concerns given proximity to wind turbines with required setbacks • There may be permitting concerns at this location. • Relatively low risk regarding community engagement; optics would fit well at location given the existing [redacted]	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18149 [redacted] CTA** or BTS Development Energy Storage System [redacted] or [redacted]** MW, 4 Hr Li-Ion Energy Storage System COD: 09/30/2022 20 or 25 year CTA term		• City of [redacted] would likely be excited about energy storage solutions	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Site is presumed to be located on PSE property, but the site may or may not be utilized by PSE system development in the future • Counterparty has defaulted on an agreement in the past with PSE • Interconnection and energy delivery plan is early on in process and contingent on PSE development • Permitting plan is early in development	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18150 [redacted] CTA** or BTS Development Energy Storage System [redacted] or [redacted]** MW, 4 Hr Li-Ion Energy Storage System COD: 09/30/2022 20 or 25 year CTA term		• Site is on developer-owned property • City of [redacted] would likely allow battery storage outright	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Counterparty has defaulted on an agreement in the past with PSE • Interconnection and energy delivery was left to PSE • Community relations was not addressed in proposal, and the existing Energy Storage System installed in area had technical and communications challenges	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18151 [redacted] CTA** Development Energy Storage System [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr COD: 09/31/2022 Term: 20 year		• Developer presents minimal relative risk, having previously developed large utility scale Energy Storage System systems • May be minor permitting risks	• It is unclear whether project is intended to by interconnected to PSE's [redacted] distribution substation (as stated) or BPA's [redacted] transmission substation (as depicted in the project documentation) • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18152 [redacted] CTA** or BTS Development Energy Storage System [redacted] or [redacted] MW, 4 Hr Li-Ion Energy Storage System COD: 09/30/2022 20 or 25 year CTA term		• [redacted] is assessed to be a relatively strong parent company • Project is proposed to be located on PSE-owned land • Interconnection with [redacted] substation unlikely to cause major upgrades	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Permitting process is extremely immature, and it is unknown how the County will treat Energy Storage System projects • Community relations was not sufficiently covered in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18154 [redacted] CTA** Development Energy Storage System Multiple options: [redacted] MW / [redacted] MWh / 2 hr [redacted] MW / [redacted] MWh / 4 hr** [redacted] MW / [redacted] MWh / 4 hr COD: 01/01/2022 or 01/01/2023** Term: 16 year**		• Management team has a deep background and experience developing renewable energy projects • Site control should already be obtained • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any projects built or operational to date • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Possibly wetland concerns for the site	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18155 [redacted] CTA** Development Energy Storage System Multiple options: [redacted] MW / [redacted] MWh / 2 hr [redacted] MW / [redacted] MWh / 4 hr** [redacted] MW / [redacted] MWh / 4 hr COD: 01/01/2022 or 01/01/2023** Term: 16 year**		• Management team has a deep background and experience developing renewable energy projects • Site control currently in negotiations with land owner • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any projects built or operational to date • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Permitting is in an early stage, however relatively further along than other Energy Storage System proposals	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18156 [redacted] CTA** Development Energy Storage System Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr** COD: 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on PSE property • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any Energy Storage System experience or projects built to date • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18157 [redacted] CTA** Development Energy Storage System Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr** COD: 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on private property adjacent to PSE substation • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any Energy Storage System experience or projects built to date • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18158 [redacted] CTA** Development Energy Storage System Multiple options: [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr [redacted] MW / [redacted] MWh / 4 hr** COD: 09/30/2022** Term: 20 year**		• Management team has a deep background and experience developing renewable energy projects • Located on PSE property • Interconnected onto PSE's system • Likely local support for the project	• Company is relatively new and does not have any Energy Storage System experience or projects built to date • Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed • Cycle count limitations are exceptionally restrictive on potential operations	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18159 [redacted] CTA** or BTS Development Pumped Hydro [redacted] or [redacted]** MW, 6.4 Hr daily storage COD: 03/30/2023 20 CTA term		• Counterparty has worked with reputable engineering firm for project development	• Capital costs are significant and financing will be difficult and complex • Technology is very new to PSE and North America and requires significant investigation • Significant issues involving permitting and ongoing operation of the facility • Transmission left to PSE would likely be very complex due to large capacity and bidirectional requirements • Site control status is unknown	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18160 [redacted] CTA** or BTS Development Pumped Hydro [redacted] MW, 8.5 Hr COD: 03/30/2023 20 CTA term		• Major permitting hurdles, including FERC licensing, have been secured • Long-term site control is achieved	• Technology is very new to PSE and North America and requires significant investigation • Transmission left to PSE would likely be very complex due to large capacity and bidirectional requirements • Interconnecting resource into Colstrip Transmission System might drive limitations on renewable energy development in Montana serving PSE load	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18161 **BPA Peak Capacity** Bonneville Power Administration PPA** Operational portfolio of projects 1000 MW** COD: 01/01/2022** Term: 5 year**		• Counterparty is well known with existing ties to PSE and therefore no risk for this proposal • There are no permitting, real estate or community relations concerns as the proposal is based on currently operational projects	• Delivery to Mid-C presents a major concern as delivery to Mid-C negates any incremental capacity value, as energy would have to rely on current Mid-C BPAT.PSEI paths to get back to PSE system.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18162 [redacted] REC purchase Operational portfolio of projects [redacted] RECS per year Start of term: 1/1/2022 10 year term		• Strong counterparty with extensive renewable energy development experience with existing contractual relationships with PSE • Underlying projects are operational therefore no real estate, permitting, or community relations concerns	• Other than low quantitative ranking, there are no major concerns with this proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18164 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2026 13 year term		• Full site control for underlying projects is assumed • Interconnection is secured • REC delivery through WREGIS	• Low-risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18167 [redacted] PPA Development Wind (Offshore) [redacted] MW COD: 12/31/2029 Term: 25 year		• Developer demonstrates a relative high level of acumen in offshore wind development on the west coast • West coast offshore wind could prove to be a viable resource in the future • Developer has conducted extensive community and tribal outreach for this project	• Considerable counterparty risk, including questionable ability to finance the project without considerable commitment and risk by PSE • Leases are through the federal BOEM with a long process for obtaining and uncertain outcome • Permitting is through the federal BOEM with a long process for obtaining and uncertain outcome • Interconnection and energy delivery would be complex and will require extensive vetting • Start of offer is well outside of the time scope of PSE's 2018 All Resource RFP	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18168 [redacted] AAA Operating Wind [redacted] MW COD: 10/4/2020 5-year term		• Project is operating	• Low-risk • Start of term and duration do not match PSE's need as stated in the IRP and RFP • Counterparty is potentially facing bankruptcy	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18171 [redacted] PPA Development Wind [redacted] MW COD: 12/31/2020** or 12/31/2021 Term: 20 year		• Strong counterparty with extensive renewable energy development experience • Real estate and permitting appear to be sufficient at this stage of development	• Proposal has expired as per the original proposal documentation (expired on 1/1/2019) • Complicated delivery to PSE likely required	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18172 [redacted] PPA Developmental Wind [redacted] MW COD: 1/1/2021 15 or 20** year term		• [redacted] is a large publically traded company with a solid balance sheet and solid credit rating • Long-term site control is secured • Community relations was well addressed in the proposal and well-exceeds the EFSC requirements	• Relative to most of their endeavors, [redacted] is relatively inexperienced with renewable energy • Permitting schedule is aggressive and will be difficult to achieve as proposed • [redacted] has reportedly been a difficult interconnection counterparty to work with • Transmission capacity to PSE's system will likely be contingent on a BPA cluster study, with the results presenting a cost and feasibility risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18174 [redacted] PPA** or BTS Developmental Wind [redacted] or [redacted]** MW COD: 1/1/2020** or 2021 30 year term		• Long-term site control is secured • County will likely be supportive of wind development	• [redacted] is owned by [redacted], a vertically integrated company in [redacted] that has experienced significant financial issues • Colstrip Transmission System option was not quantified, and energy delivery and REC creation will be difficult as proposed • Proposal does not adequately address permitting requirements • It is unclear as to whether proposer has engaged local land owners	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18177 [redacted] DAS or BTS Developmental Wind [redacted] MW COD: Q4 2020		• Long-term site control has been achieved • Mid-C delivery seems viable • Community relations was well-addressed in the proposal • The permitting process seemed relatively mature	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to quantitatively assess the project	**Not selected** – The RFP team does not recommend this proceed past Stage 1 of the RFP. There are several qualitative concerns evaluated in this proposal regarding the counterparty, financing, interconnection, and energy delivery. However, the primary fatal flaw is that capital and ongoing O&M costs are assumed to be facilitated directly by PSE, but no capital cost estimates were issued with the proposal. Without this information, the RFP team is unable to sufficiently assess the proposal quantitatively.
18178 [redacted] PPA Developmental Wind [redacted] MW COD: 12/31/2022 20 year term		• Balance sheet financing is great as long as parent company is willing to guarantee the project • Long-term site control is secured • Interconnection studies through BPA are complete • Community relations plan seems sufficient, but requires more detail	• Energy delivery left to PSE and appears to be overly expensive or otherwise infeasible • Permitting plan requires significant development • Company is relatively unknown to PSE and not much background information was provided	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18180 [redacted] PPA Developmental Wind [redacted] MW COD: 1/1/2021 or 2022 20 year term		• Long-term site control is apparently secured • Interconnection studies through BPA are complete • Project received Washington State EFSEC in 2012 after a contentious permitting process	• This would be [redacted] first experience in the Pacific Northwest • Insufficient detail regarding company financial health and project financing strategy was included in the proposal • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Significant reputational issues with proximity to local fisheries as well as blocking a view of the [redacted] River [redacted]	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18181 [redacted] PPA** or BTS Developmental Wind [redacted] MW COD: 12/12/2020 20 year term		• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control is secured • Interconnection process with BPA is well underway • There are nearby wind farms, not many residential neighbors, and the RFP team believes the local community and government support solar development • Permitting plan has minimal detail and represents a schedule and feasibility risk for the project	• Long-term firm point-to-point transmission appears to not be feasible • Community relations was not addressed in the proposal	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18182 [redacted] PPA**, DAS, or BTS Developmental Wind [redacted] MW COD: 12/01/2022 20 year term		• Long-term site control is secured • Permitting is early in process but presents little schedule or viability risk	• Insufficient data was provided regarding the counterparty background and financing plan • Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility risk • Community and government relations is supposedly strong, but little detail was provided to support it	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18183 [redacted] PPA** Developmental Wind [redacted] MW COD: June 2020 10 or 15 year term		• Not applicable	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to quantitatively or qualitatively assess the project	**Not selected** – Beyond a discussion of potential agreement terms, the proposal did not include enough detail to sufficiently assess on either a qualitative or quantitative basis. The RFP team does not recommend this proposal move beyond the first phase of the RFP process.
18184 [redacted] PPA Developmental Solar + Energy Storage System [redacted] MW & optional [redacted] or [redacted]** MW, 2 or 4** Hr, Energy Storage System COD: 10/31/2022 20** or 25 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Site control projected to be achieved by Q2 2019	• RFP team could not confirm interconnection queue position asserted in the proposal • Energy delivery would likely need to be periodically curtailed • The permitting plan is largely underdeveloped, and there are potential issues with wetlands and Mazama Pocket Gophers that threaten project viability and schedule • There are potential glare issues with local roadway in the City of [redacted]	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18185 [redacted] PPA Developmental Wind [redacted] MW COD: 12/31/2020 20 year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Letter of intents have indicated likely site control in the near future • Backup point of interconnection at [redacted] is likely a feasible energy delivery option • Permitting is in the early stages, but since only construction permits will be required it represents a low risk	• [redacted] intends to secure long-term firm point-to-point transmission with [redacted] but have not yet taken steps to secure it • Community and government relations was not adequately assessed in the proposal, but presents only a minor risk for the project as renewable energy is seen in a generally positive light	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

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18186 [redacted] 15-yr/20-yr PPA, Development Wind Up to [redacted] MW COD: 1/1/2021 Term:		• Long-term site control is secured • Interconnection studies with BPA are complete, and an engineering and procurement agreement is soon to be secured • Real-time delivery to PSE will not be necessary to secure RECs since the project is within BPA's regional territory • Project appears to be fully permitted, with the exception of [redacted] approvals	• Developer is relatively inexperienced at developing, permitting, construction, and operating generation sites • Impact to local prime agricultural land might cause some local tension	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18187 [redacted] PPA Developmental Solar + Energy Storage System [redacted] MW Solar & optional [redacted]** or [redacted] MW, 2** or 4 Hr, Energy Storage System COD: 10/31/2022 15 or 20** year term		• Apparently strong counterparty with extensive experience in the development, construction, and operation of renewable generation • Long-term site control is secured	• Energy delivery has been left to PSE and appears to be complicated, and might pose a feasibility or cost risk • Permitting process has not appreciably started, but represents a slight schedule and feasibility risk	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.
18188 [redacted] EPC Development Reciprocating Thermal [redacted] MW Duel Fuel or [redacted]** MW Single Fuel COD: 4/15/2021		• Expansion of existing [redacted] facility. • Technology is relatively site-agnostic and can potentially be designed to integrate with other sites. • Project could likely be facilitated with firm gas supply with existing facilities.	• Air permit path is complex and possibly not feasible. • The likely-to-be-required air permit modification could bring more operational constraints for the existing generation units. • PSE will experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's thermal generation portfolio. • Given the ongoing social controversy surrounding greenhouse gas ("GHG"), including the contribution to climate change from the local natural gas system and electric generation, the proposed schedule and general project feasibility seem to be in question.	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

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18189 [redacted] CTA** Development Energy Storage System 25 MW / 50 MWh / 2 hr 50 MW / 100 MWh / 2 hr COD: 08/01/2020 Term: 20 year		• Developer has experience in Energy Storage System projects, particularly with integration and control software • Location at an existing site may offer development synergies, however permitting may be complicated with location at existing gas plant	• Similar to every other stand-alone Energy Storage System proposal in the 2018 RFP, the transmission and distribution investment-deferral value is currently unknown for the point of interconnection as proposed	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18200 [redacted] Direct load control Smart thermostat, smart water heater 9-36 MW COD: 1/1/2019 Term: 5 years		• Detailed project implementation plan and schedule provided • Minimum PSE engagement • Seamless customer interruption • Strong parent company financials • [redacted]	• Lack of demonstrated winter peaking experience	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18202 [redacted] Direct load control Smart water heater 1-22 MW COD: 1/1/2019 Term: 10 years		• Vendor can also monitor and control load control switches, electric vehicles, solar photo voltaic, energy storage, building controls, heating, ventilation, air conditioning, and other demand side assets	• Solution seems limited in its initial deployment • Seems optimistic as to resource availability • Lack of demonstrated program experience	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

This matrix summarizes key findings from PSE's Phase 1 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
****Indicates primary ranking criteria for particular proposal category.*

REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
18203 [redacted] Behavioral demand response 100% Residential [redacted] MW COD: 1/1/2019 Term: 5 years		• Existing working relationship with [redacted] on other energy efficiency projects • Cumulative 1.5M utility customer • Claim to be the [redacted] company, [redacted]	• Program is day-ahead and limits peak capacity contribution • Lack of demonstrated winter peaking experience • Aggressive program benefit assumption to roll out 375k customers to achieve [redacted] of savings	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18204 [redacted] EMIS and traditional demand response programs [redacted] MW COD: 1/1/2019 Term: 5 years		• EMIS technology and program has longer term impact and savings averaging 3.5% across the board due to behavioral changes • Experience with Winter DR programs [redacted]	• Heavy PSE involvement for marketing, Data, Customer Service • Program is day-ahead and limits peak capacity contribution • High counter-party risk as being a small private consulting company	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
18205 [redacted] Commercial & industrial direct install [redacted] MW, mixed Day-ahead, hour-ahead, and 10-min ready MWs COD: 1/1/2019 Term: 5 Years		• Utilize existing relationship [redacted] • [redacted] • Over 1000MW DR under management (self-claimed)	• Mixed program contribution to peak capacity could limit program effectiveness • Very expensive pricing	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.

*This matrix summarizes key findings from PSE's Phase 1 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered
***Indicates primary ranking criteria for particular proposal category.

REDACTED VERSION

Project	Quantitative Results** [See quantitative results, pages 8-12 herein.]	Qualitative Advantages (+)	Qualitative Risks (-)	Selection recommendation & Rationale
UP001 [redacted] CTA or BTS** Development Pumped Hydro [redacted] or [redacted]** MW, 6.4 Hr daily storage COD: 03/30/2023 20 CTA term		• Not applicable	• Insufficient data was provided regarding the counterparty background and financing plan • Insufficient data was provided to qualitatively assess the project • Insufficient data to quantitatively assess CTA	**Not selected** – The RFP team does not recommend this project proceed to the next of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over kilowatt year ranking.
UP002 [redacted] REC purchase Underlying operating solar project [redacted] RECS per year Start of term: 2020 9-year or 14-year term		• Not applicable[1] *[1]Proposal was submitted late in Phase 1 (Feb. 7, 2018) when PSE was finalizing its Phase 1 results. PSE quantitatively screened the two offers, but neither offer was quantitatively competitive with PSE's other renewable resource alternatives. Had the proposal fared better in the quantitative analysis, an assessment of its qualitative merits and risks would have followed.*	• Price is higher and volume is smaller than other REC offers received in response this RFP.	**Not selected** – The RFP team does not recommend this project proceed to the next phase of the 2018 all-resource RFP due to the relatively low levelized portfolio benefit over renewable energy credit ("REC") ranking.

**This matrix summarizes key findings from PSE's Phase 1 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.*
***Some proposals contain multiple offers. The quantitative results shown in the table represent the best offer from each proposal in the no CO2 scenario. PSE also considered*
****Indicates primary ranking criteria for particular proposal category.*

REDACTED VERSION

2018 All Resources RFP
Phase 2 update

PUGET SOUND ENERGY

EMC Informational

June 20, 2019

Cindy Song

Business Initiatives Manager

CONFIDENTIAL

Informational

<u>Intended recommendation</u>: at the July EMC meeting ask for approval with projects selected from the RFP and approval to proceed with negotiations.

RFP timeline

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
✓	June 28, 2018	WUTC approved Demand Response and All Resource RFPs
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
✓	March 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
	July 2019	Complete Phase 2 evaluation, select final short list
	To follow	Notify respondents; contract negotiations

Capacity resource need updated to 299MW in 2022 and REC need updated to 233,449 RECs in 2023

Resource need forecasts updated in Phase 2 analysis to reflect draft 2019 IRP need assessments and F2019 load forecast*

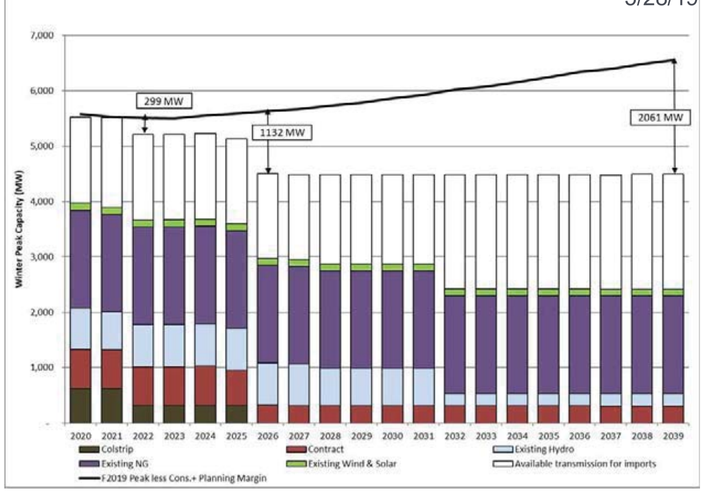
2018 RFP Capacity Need – Phase 2 update

- PSE seeks 299 MW capacity by end of 2022
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably
- Need based on F2019 forecast net conservation, 2019 IRP resource adequacy

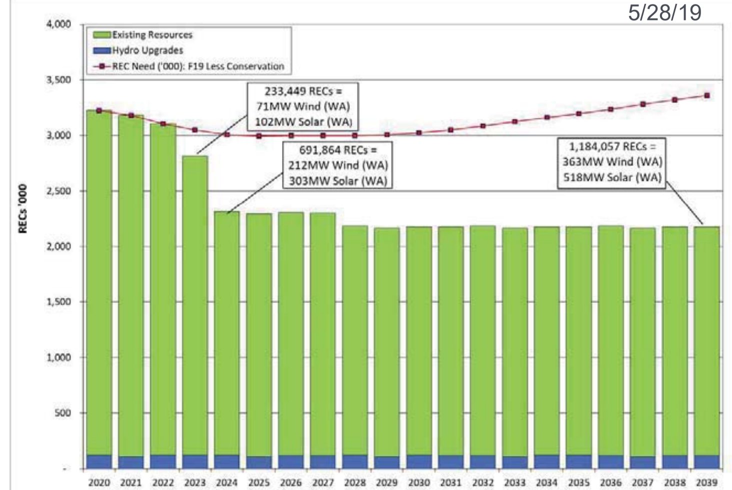
2018 RFP REC Need – Phase 2 update**

- REC need is driven by the increase in the RPS from 9% to 15% in 2020
- Projected need to meet the RPS is 233,449 RECs by 2023
- PSE's inventory of banked RECs delays need until 2023

5/28/19



5/28/19



*Original RFP issued to fill 272 MW capacity need in 2022 and 671,000 REC renewable need in 2023. See appendix A for memorandum on how the capacity need changed from 272 MW to 299 MW.

**REC need reflects renewable need driven by RCW 19.285 (RPS). It does not reflect the impact of SB 5116 (Clean Energy Transformation Act).

Total of 97 proposals received in 2018 RFPs; 25 proposals advanced to Phase 2 for further analysis

Proposals selected for Phase 2 evaluation reflect resource and technology diversity

Updated 6/20/19	Proposals Received*		Phase 2 Candidate List		Revised Phase 2 Candidate List **	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	8	1050	7	890
Solar - PV + BESS	20	2848	1	100	1	100
Wind - Off Shore	1	400	0	0	0	0
Wind On Shore	16	3303	7	1642	7	1642
Wind + Winter Sys PPA	1	371	1	200	1	200
Wind + Solar and/or BESS	2	464	0	0	0	0
Storage - Battery ("BESS")	17	1265	0	0	0	0
Storage - Pumped Hydro	2	900	0	0	0	0
Biomass	2	72	1	17	1	17
Biomass + BESS	1	15	0	0	0	0
Natural Gas-fired Generation	4	1377	2	348	2	348
Geothermal	2	43	0	0	0	0
Hydro - Run of River	1	38	1	38	1	38
System PPA / Call Option	1	100	0	0	1	100
Unbundled RECs	5	n/a	3	n/a	4	n/a
Demand Response	6	154	1	8.7	2	33.7
TOTAL	**97**	**13,590**	**25**	**3,404**	**27**	**3,369**

Revised candidate list reflects the following changes:

- 1 solar proposal withdrawn by the respondent (removed)
- 1 unsolicited REC and 1 demand response proposal reduced pricing (added)
- 1 system PPA/call option moved delivery point to BPAT.PSEI (added)

** In addition to the 97 RFP proposals shown above, PSE also received two unsolicited proposals during Phase 1 (a pumped hydro and a REC-only proposal) and three unsolicited proposals during Phase 2 (all solar). None of these offers were competitive with the RFP proposals. However, the REC-only proposal price was reduced in Phase 2 and the proposal was added to the revised candidate list.*
*** See appendix B for full list of proposals evaluated in Phase 2.*

14 proposals selected for Phase 2 optimization analysis

Optimization list reflects a snapshot in time and is subject to change

- Updated scenario analysis in Phase 2 reflects current IRP assumptions and new information provided by respondents*
- Phase 2 proposals with a combination of the most favorable quantitative results across scenarios and no qualitative fatal flaws advanced for optimization analysis**

As of 6/20/19

	ID	Project Name	Resource Type	Nameplate	Counterparty	State
1	18100	SPI Industrial	Biomass	17 MW	SPI	WA
2	18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
3	18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
4	18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
5	18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
6	UP002	[redacted]	REC Only	[redacted] REC	[redacted]	ID
7	18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
8	18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
9	18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
10	18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
11	18161	[redacted]	Sys PPA/Call Opt.	[redacted] MW	[redacted]	OR
12	18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
13	18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
14	18170	Golden Hills Wind - Shaped / Unshaped	Wind	200 MW	Avangrid	OR

* Updated Phase 2 assumptions include, but are not limited to, capacity and renewable need forecasts, power and gas price forecasts, and generic resource costs. See Appendix C for scenarios used in Phase 2 quantitative analysis and stand-alone proposal ranking results.

** Three proposals were eliminated in Phase 2 for qualitative reasons: Garfield Peak MT Wind (#18176) (insufficient met data to support capacity factor; substantial development risks), and the two Phase 2 demand response proposals (#18201 and #18205) (incompatible with PSE's Distributed Energy Resource Management System implementation). See RFP executive summary and proposal memos for detailed qualitative assessment.

REDACTED VERSION

At-a-glance qualitative assessment for projects selected for optimization analysis* *(results as of Jun. 20, 2019 subject to change)*

Key	
🟢	Low Risk
🟡	Acceptable Risk
🟠	Substantial Material Risk
🔴	Fatal Flaw

	Project Counterparty (Project ID)	REC contribution (RECs/yr)	MW Capacity contribution	Term start / length	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk	Other considerations*
1	**SPI Biomass PPA** Sierra Pacific Ind. (18100)	[redacted]	16	1/2021 17 yrs	Operating	BPAT. PSEI	🟢	🟢	🟢	🟢	🟢	Offers renewable resource diversity to portfolio
2	[redacted]			12/2021 25 yrs	Early Develop	BPAT. PSEI	🟢	🟡	🟡	🟡	🟡	MT proposals are mutually exclusive
3				10/2022 20 yrs	Early Develop	BPAT. PSEI	🟢	🟡	🟡	🟡	🟡	MT proposals are mutually exclusive
4				1/2022 18 yrs	Mature Develop	n/a	🟢	🟢	🟢	🟢	🟢	Screening model selects RECs for arbitrage benefit, not to meet RPS
5				1/2022 18 yrs	Mature Develop	n/a	🟢	🟢	🟢	🟢	🟢	Screening model selects RECs for arbitrage benefit, not to meet RPS
6				1/2020 15 yrs	Operating	n/a	🟢	🟢	🟢	🟢	🟢	Screening model selects RECs for arbitrage benefit, not to meet RPS
7				12/2022 20 yrs	Early Develop	Mid-C*	🟢	🟢	🟡	🟡	🟡	Mid-C delivery due to lack of transmission ATC
8				12/2022 20 yrs	Early Develop	Mid-C	🟢	🟡	🟡	🟡	🟡	
9				12/2022 20 yrs	Early Develop	[redacted]	🟠	🟢	🟡	🟠	🟢	Proposes independently operated solar co-located with [redacted]
10				12/2022 20 yrs	Early Develop	[redacted]	🟢	🟡	🟡	🟡	🟡	
11	**BPA Peak Cap Sys PPA** BPA (18161)	0	54	1/2022 5 yrs	Operating	BPAT. PSEI	🟢	🟢	🟢	🟢	🟢	
12	[redacted]			12/2022 20 yrs	Mature Develop*	Mid-C	🟢	🟢	🟢	🟢	🟢	Operational project subject to repower
13				12/2021 20 yrs	Mature Develop	Mid-C*	🟢	🟢	🟢	🟡	🟠	Mid-C delivery due to lack of transmission ATC
14	**Golden Hills Wind** (shaped / unshaped) Avangrid (18170)	[redacted]	79	12/2021 25 yrs	Early Develop	BPAT. PSEI	🟢	🟢	🟢	🟠	🟡	Full transmission may not be firm

*Table summarizes certain key qualitative findings of most favorable Phase 2 resources. See RFP Executive Summary and proposal memos for detailed findings.

Draft **portfolio optimization** results

(results as of Jun. 20, 2019, subject to change)

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Term Start	(F) Term	(G) Nameplate	(H) Peak Capacity Credit	(I) RECs[1]	(J) Recommended Portfolio: As Proposed MT Wind - [redacted] MW	(K) Recommended Portfolio: Preferred MT Wind - [redacted] MW
1	18100	Biomass	SPI	1/1/2021	17	17 MW	16 MW	[redacted]	x	x
2	18161	Call Option	BPA Peak Capacity Product	1/1/2022	5	100 MW	54 MW	[redacted]	x	x
3a.	18169	MT Wind	[redacted]	12/31/2021	25	[redacted] MW	150 MW	[redacted]		x
3b.	18169	MT Wind	[redacted]	12/31/2021	25	[redacted] MW	135 MW	[redacted]	x	
4a.	18173	MT Wind	[redacted]	10/31/2022	20	[redacted] MW	136 MW	[redacted]		
4b.	18173	MT Wind	[redacted]	10/31/2022	20	[redacted] MW	100 MW	[redacted]		
5a.	18170	Wind	Golden Hill Shaped	12/31/2021	20	200 MW	79 MW	[redacted]	x	x
5b.	18170	Wind	[redacted]	12/31/2021	20	[redacted] MW	52 MW	[redacted]		
6	18132	Wind	[redacted]	1/1/2023	20	[redacted] MW	0 MW	[redacted]		
7	18179	Wind	[redacted]	12/1/2021	20	[redacted] MW	0 MW	[redacted]		
8	18125	Solar	[redacted]	10/31/2022	20	[redacted] MW	0 MW	[redacted]		
9	18111	Solar	[redacted]	12/31/2022	20	[redacted] MW	0 MW	[redacted]		
10	18127	Solar	[redacted]	12/15/2022	20	[redacted] MW	0 MW	[redacted]		
11	18135	Solar	[redacted]	12/31/2022	20	[redacted] MW	0 MW	[redacted]		
12	18163	REC-only	[redacted]	1/1/2022	17	[redacted] MW	0 MW	[redacted]		
13	18165	REC-only	[redacted]	1/1/2022	17	[redacted] MW	0 MW	[redacted]		
14	UP002	REC-only	[redacted]	1/1/2020	10	[redacted] MW	0 MW	[redacted]		
15		Total MWs							[redacted] MW	[redacted] MW
16		Peak Capacity Surplus / (Deficit) in 2022							[redacted] MW)	[redacted] MW
17		Total RECs							1,986,862	2,189,656
18		Total Portfolio Benefits - $ millions							$375	$369
19		Sensitivity Analysis with Social Cost of Carbon:								
20		Total Portfolio Benefits with Social Cost of Carbon as Planning Adder - $ millions[3]							$678	$726
21		Total Portfolio Benefits with Social Cost of Carbon as Dispatch Adder - $ millions							$909	$991

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	[redacted] MW	[redacted] MW	[redacted] MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.
2. The optimization model chose a portfolio with [redacted] MW from [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted] Current indictive results reflect pricing based on the
3. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

7

REDACTED VERSION

REDACTED VERSION

APPENDIX A

Resource need memo: evolution of need from 2017 IRP to 2018 all resources RFP Phase 2

PUGET SOUND ENERGY

Memorandum

TO: PSE EMC Committee Members

FROM: Elizabeth Hossner

SUBJECT: Updates to peak capacity need since the 2017 IRP and draft 2019 IRP

DATE: June 20, 2019

Introduction

Physical need refers to the resources required to ensure reliable operation of the system. It is an operational requirement that includes three components: customer demand, planning margins and operating reserves. The word "load" – as in "PSE must meet load obligations" – specifically refers to customer demand plus planning margins plus operating reserve obligations. The planning margin and operating reserves are amounts over and above customer demand that ensure the system has enough flexibility to handle balancing needs and unexpected events such as variations in temperature, hydro and wind generation; equipment failure; or transmission interruption with minimal interruption of service.

When we compare physical need with the peak capacity value of existing resources, the resulting gap identifies resource need. PSE incorporates a planning margin in its description of resource need in order to achieve a 5 percent loss of load probability (LOLP). The 5 percent LOLP is an industry standard resource adequacy metric used to evaluate the ability of a utility to serve its load, and one that is used by the Pacific Northwest Resource Adequacy Forum.

2017 IRP

In the 2017 IRP, using the LOLP methodology, we determined that we needed 123 MW of resources by December 2020 before conservation which became a surplus 121 MW after all cost effective conservation, and a surplus 73 MW in December 2018. The 2017 IRP was filed on November 15, 2017 and used the F2016 demand forecast. Given that the demand forecast was updated and we found some errors in the calculation, the peak capacity need was updated to a deficit of 103 MW in December 2018.

Updates to 2017 IRP

Given that the demand forecast was updated and we found some errors in the calculation, the peak capacity need was updated to a deficit of 103 MW in December 2018. The following table documents the changes and updates to December 2022 peak capacity calculation.

Table 1 - Changes to 2022 Peak Capacity Need to the 2017 IRP

(Deficit)/Surplus – Peak MW	Total December 2022 Peak Need w/o DSR	Total December 2022 Peak Need w/ DSR
2017 IRP	(621)	(192)
1. Updated to F2017 forecast and added 100 MW Mid-C transmission	(341)	(7)
2. Removed spinning reserves. The spinning reserves (50% of contingency reserves) were being removed from the hydro resources and that capacity was turned into available mid-C transmission. This increased the Mid-C transmission, but we were still counting the full amount of contingency reserves, so it was being double counted. This adjustment resulted in less available transmission to Mid-C	(610)	(272)* *Published number from 2018 RFP
3. Updated to F2018 Forecast	(704)	(294)* *Currently in Phase 1 of the RFP
4. Removed PSEI transmission from calculation. We previously assumed that Sch. 449 only used 300 MW, so that left 150 MW of free transmission. Wild Horse peak capacity is 30 MW, so that left 120 MW of available Mid-C transmission. As published on PSE OASIS, Sch. 449 has firm rights for all 450 MW.	(828)	(417)
5. Add 94 MW transmission from Garrison, removed BPA loss return, updated Wells percent share.	(808)	(397)

Given all the changes since the 2017 IRP, the peak need in 2022 went from a deficit of 192 MW to a deficit of 397 MW. The final peak deficit in December 2018 is 103 MW and was presented as part of the winter peak plan in the October 25 EMC.

The table below is the breakdown of peak need for December 2022.

Table 2 – Breakdown of 2022 Peak Need from Updates to 2017 IRP

	December 2022 w/o DSR	December 2022 w/ DSR
Peak Demand	5,228 MW	5,228 MW
Planning Margin	13.5%	13.5%
Normal Peak Load + PM	5,932 MW	5,932 MW
Operating Reserves	406 MW	394 MW
Total Capacity Need	6,337 MW	6,325 MW
Total Resources	(4,012) MW	(4,399) MW
Available Mid-C Transmissions	(1,541) MW	(1,541) MW
Total	**784 MW**	**386 MW**
Operating Reserves on new resources	24 MW	12 MW
Total Resource (Deficit)/Surplus	**(808) MW**	**(397) MW**

Draft 2019 IRP

The updated peak need before conservation for the Draft 2019 IRP is a deficit of 685 MW in December 2022 which translates to a 16.5% planning margin, including operating reserves. This is up from the 13.5% in the 2017 IRP where operating reserves was calculated as a separate number. The change in peak need from the 2017 IRP of 123 MW in 2020 to 685 MW in 2022 the 2019 IRP has to do with the updates in the resource adequacy model. Below is a table documenting the updates and the changes to the peak need.

Table 3 – Changes to 2022 Peak Capacity Need in Draft 2019 IRP

Revisions	MW Needed for 5 % LOLP	Incremental Change	Total Change
2017 IRP, Study Period Oct 2020-Sep 2021			
Resource need	123		
2019 IRP, Study Period Oct 2022-Sep 2023			
2017 IRP resource need, Colstrip 1&2 retired	503	380	380
Model updates			
• Improved sampling of outage and renewable generation scenarios, temporarily disabled NWPP reserve sharing and wholesale market purchase risk	490	(13)	367
• Full coverage of all hydro × temperature years for synchronization with GENESYS	636	146	513
• Updated transmission access model	972	336	849
• Updated operating reserve definition	804	(168)	681
• Redeveloped logic for calling on contingency reserves, including the NWPP reserve sharing group	717	(87)	594

F18 load forecast	539	(178)	416
Expansion of scenarios from 77 to 88 temperature years – from 6160 to 7040 simulations	531	(8)	408
Updated draws for PSE wind resources	497	(34)	374
Updated available transmission to Mid-C (additional transmission contract award)	389	(108)	266
Updated outage draws and resource capabilities (corrected outage rates on PSE resources)	535	146	412
Updated hydro year forecast, BPA 2016 Rate Case	535	0	412
Updated contract interchange	546	11	423
Updated third-party load reserve obligations	548	2	425
Updated loss return calculation	558	10	435
Updated balancing reserves	601	43	478
Included Green Direct 2 resource, 150 MW solar	576	(25)	453
Updated available transmission to Mid-C (corrected portion of access rights)	706	130	583
Updated wholesale market purchase risk model (GENESYS base for PSE: 3400 MW SW import maximum, updated PSE resource capabilities, embed Green Direct 2 resources into GENESYS)	750	44	627
Corrected outage rates on PSE resources	688	(62)	565
Corrected modeling for Canadian entitlement and loss returns at Mid-C	779	91	656
Corrected available transmission to Mid-C (increased total transmission amount)	680	(99)	557
Corrected PSE share of Mid-C hydro projects	679	(1)	556
Corrected transmission contract on Goldendale	688	9	565
Corrected existing Columbia River gorge wind data	753	65	630
Corrected Northwest Power Pool logic	744	(9)	621
Corrected logic for release of operating reserves	738	(6)	615
Corrected transmission access for Wild Horse	759	21	636
Analysis of random seed impact: 500 simulations, mean of resource need results Closest seeds to mean results chosen	748	(11)	625
Corrected minor error in hydro data	748	0	625
Updated wind data to ensure correlations are captured for Columbia River gorge wind, Skookumchuck, and hypothetical new resources	755	7	632
Adaptation to perfect capacity, instead of peaker-equivalent capacity	703	(52)	580
Implemented hydro peaking model for Columbia River hydro generation	682	(21)	559
Updated all data for existing and future contracted renewable generation using new data from DNV GL analysis Average of 5 runs (**Resource Need**)	**685**	3	562

The table below is the breakdown of peak need for December 2022 before conservation comparing the 2017 IRP, the 2018 RFP phase I, winter peak plan, and the 2019 IRP.

Table 4 – Comparison of how 2022 Peak Need Changes over Time

	2017 IRP	2018 RFP Phase I	Winter Peak Plan	Draft 2019 IRP
Peak Demand	5,301 MW	5,228 MW	5,228 MW	5,064 MW
Planning Margin	13.5%	13.5%	13.5%	16.5%
Normal Peak Load + PM	6,001 MW	5,922 MW	5,932 MW	5,897 MW
Operating Reserves	410 MW	407 MW	406 MW	
Total Capacity Need	6,415 MW	6,330 MW	6,337 MW	5,897 MW
Total Resources	(4,072) MW	(4,072) MW	(4,012) MW	(3,671) MW
Available Mid-C Transmissions	(1,741) MW	(1,574) MW	(1,541) MW	(1,541) MW
Total	**602 MW**	**684 MW**	**784 MW**	**685 MW**
Operating Reserves on new resources	18 MW	21 MW	24 MW	
Total Resource (Deficit)/Surplus	**(620) MW**	**(704) MW**	**(808) MW**	**(685) MW**

The total capacity contribution from resources has been updated based on the 2019 IRP ELCC. The 2019 IRP updated the approach to look at "perfect" capacity as the comparison instead of a NG plant. With this approach, all resources now have an ELCC. The table below is the update to the peak capacity contribution of resources.

Table 5 – Update to Peak Capacity Contribution of Resources

	Winter Peak Plan	Draft 2019 IRP
Colstrip 3&4	360	314
Encogen	173	167
Ferndale w/ DF	285	240
Frederickson 1&2	168	146
Freddy 1	124	124
Fredonia 1&2	234	194
Fredonia 3&4	126	102
Goldendale w/ DF	315	254
Mint Farm w/ DF	320	257
Sumas	148	130
Whitehorn 2&3	168	146

Lund Hill Solar (Green Direct)	-	4
Hopkins Ridge	17	15
Klondike III	6	5
LSR	38	33
Skookumchuck wind (Green Direct)	52	47
Wild Horse	30	26
Priest Rapids	5	5
Rock Island	137	137
Rocky Reach	311	311
Wanapum	5	5
Wells	95	95
Lower Baker	64	88
Upper Baker	94	89
Snoqualmie Falls	39	39
Contracts	698	696
Total Resources	**4,012 MW**	**3,671 MW**

6/5/2019 Updated Peak Need for RFP Phase II

An update on the peak need was made on June 5, 2019 for the RFP phase II, to reflect the demand forecast update to the F2019. The Draft 2019 IRP uses a version of the F2018 demand forecast where the conservation targets are applied through 2019, but no new conservation starting Jan. 1, 2020. The Draft 2019 IRP evaluates for new conservation starting in 2020. The Draft 2019 IRP has a peak demand of 5,064 in 2022 and the updated F2019 gross conservation has a peak demand of 5,107 MW, a difference of (47) MW. With the updated demand forecast, the total peak need deficit in 2022 is 630 MW before conservation, or 299 MW after conservation.

Table 6 – Breakdown of 2022 Peak Need from Updated Peak Need for RFP Phase II

	December 2022 w/o DSR	December 2022 w/ DSR
Peak Demand	5,017 MW	5,017 MW
Planning Margin	16.5%	16.5%
Normal Peak Load + PM	5,842 MW	5,842 MW
Total Resources	(3,671) MW	(4,002) MW
Available Mid-C Transmissions	(1,541) MW	(1,541) MW
Total Resource (Deficit)/Surplus	**(630) MW**	**(299) MW**

APPENDIX B

Phase 2 Candidate List

Phase 2 candidate list[1]

As of 6/20/19

	ID	Project Name	Resource Type	Nameplate	Counterparty	State
1	18100	SPI Industrial	Biomass	17 MW	SPI	WA
2	18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
3	18205	[redacted]	Demand Response	[redacted] MW	[redacted]	MA
4	18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
5	18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
6	18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
7	18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
8	18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
9	18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
10	UP002	[redacted]	REC Only	[redacted] REC	[redacted]	ID
11	18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
12	18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
13	18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
14	18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
15	18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
16	18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
17	18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18	18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
19	18139	[redacted]	Solar + BESS	[redacted] MW BESS	[redacted]	OR
20	18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
21	18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
22	18161	BPA Peak Capacity Product	Sys PPA/Call Opt.	100 MW	BPA	OR
23	XXXXX	[redacted]	Transmission	[redacted] MW	[redacted]	N/A
24	18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
25	18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
26	18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
27	18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
28	18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

* Numbers shown are rounded to the nearest 5 MW.

** Assumes a redirect of 100MW of BPA transmission from [redacted] to Mid-C to PSEI, available January, 2022 for a 50-year term, and using Mid-C forecast for energy pricing. Redirect originally under consideration was removed during Phase 2, as the available ATC associated with the assumption has already been included as an existing resource in the current capacity need assessment (shown on slide 5) and does not represent an incremental solution.

*** [redacted] (#18111)

[1] The candidate list reflects the best offer from each proposal. The list was revised early in Phase 2 to remove the [redacted] proposal (#18112) (withdrawn developer), and to add the BPA Peak Capacity Product (#16161) (adjusted original delivery point from Mid-C to BPAT.PSEI), the [redacted] proposal (#18205) (repriced after Phase 1 elimination) and the unsolicited [redacted] proposal (#UP002) (repriced after Phase 1 elimination).

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APPENDIX C

2018 All Resources RFP Phase 2 quantitative analysis scenarios and stand-alone proposal ranking results

PUGET SOUND ENERGY

RFP Phase 2 price scenarios

Scenarios	Phase	WECC /PSE Demand	Gas Price	Generic Resource Costs
1. No carbon tax	1 + 2	Base	Base	Base
2. CO2 (low societal $16/ton)	1 + 2	Base	Base	Base
3. CO2 (mid-societal $42/ton)	1 + 2	Base	Base	Base
4. CO2 (high societal $62/ton)	2	Base	Base	Base
5. No CO2 low load	2	Low	Low	Base
6. No CO2 updated w/CA SB100	2	Base	Update	Base

2018 RFP Phase II Preliminary Quantitative Results Summary- CAPACITY PROPOSALS

Preliminary Figures Only- Subject to Change

As of June 12, 2019

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

	ID	Capacity Proposals – Project Name	A – Technology	B – Term Start	C – Book Life / Contract Term	D – Nameplate Capacity (MW)	E – Peak Capacity Credit
1	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	78.8
2	18169	[redacted]	MT Wind	Dec-21	25	[redacted] MW	[redacted]
3	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	16.4
4	18173	[redacted]	MT Wind	Oct-22	20	[redacted] MW	[redacted]
5	18173		MT Wind	Oct-22	20	MW	
6	18105		Thermal	Jan-22	20	MW	
7	18103		Thermal	Jun-22	10	MW	
8	18105		Thermal	Jan-22	20	W	
9	16161	*BPA Peak Capacity (Footnote 9)*	*Capacity*	*Jan-22*	*5*	*100 MW*	*54.0*
10	18201	[redacted]	DR	Jan-23	6	[redacted] MW	[redacted]
11	18205		DR	Jan-21	5	MW	
12	18190		MT Wind	Dec-22	20	MW	

	ID	Levelized PB /(Peak Capacity kW - YR): F – NO CO2 Low Load	G – NO CO2 Updated w/SB100	H – NO CO2	I – Low Societal	J – Mid Societal	K – High Societal	Ranking Levelized PB / (Peak Capacity kW - YR): L – NO CO2 Low Load	M – NO CO2 Updated w/SB100	N – NO CO2	O – Low Societal	P – Mid Societal	Q – High Societal
1	18170	[redacted]						1	1	2	1	2	1
2	18169							6	2	1	2	1	2
3	18100							5	3	3	4	3	3
4	18173							4	4	4	3	4	4
5	18173							3	5	5	5	5	5
6	18105							7	7	6	7	6	7
7	18103							9	8	7	9	9	9
8	18105							8	9	8	8	7	8
9	16161							*10*	*10*	*10*	*10*	*10*	*10*
10	18201												
11	18205												
12	18190												

	ID	Net Cost/KW-Yr: R – NO CO2 Low Load	S – NO CO2 Updated w/SB100	T – NO CO2	U – Low Societal	V – Mid Societal	W – High Societal	Ranking Net Cost/KW-Yr: X – NO CO2 Low Load	Y – NO CO2 Updated w/SB100	Z – NO CO2	AA – Low Societal	AB – Mid Societal	AC – High Societal
1	18170	[redacted]						8	8	7	4	5	4
2	18169							1	1	1	1	1	1
3	18100							9	9	9	7	6	5
4	18173							4	6	3	3	3	3
5	18173							3	3	2	2	2	2
6	18105							2	2	4	6	7	6
7	18103							6	4	5	9	9	8
8	18105							5	5	6	8	8	7
9	16161							*7*	*7*	*8*	*10*	*10*	*9*
10	18201												
11	18205												
12	18190												

Notes:

1. The metric shown-- Levelized PB /(Peak Capacity kW - YR)-- is the portfolio benefit attributable to peak capacity service divided by the average peak capacity.

2. Generation Resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 30% or higher were considered "Capacity Resources".

3. Generation Resources with Mid-C delivery are not considered Capacity resources regardless of ELCC.

4. Capacity-specific contracts and products such as Demand Response, Transmission Redirect, and BPA Capacity are considered alongside generation resources

5. None of the demand response projects in Phase II were selected, as there was no identifiable deferred T&D value that would have made it a cost effective solution. In addition, the providers' lack of experience in integrating with PSE's DERM (Distributed Energy Resource Management) system was deemed to be a critical hindrance to implementation.

6. Transmission Redirect has been eliminated as a viable option to meet capacity need.

7. All of the Demand Response projects were eliminated as viable options to meet capacity need.

8. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

9. BPA's Peak Capacity product, highlighted in green, is included in the optimization modelling even though it ranks low when compared to other long-term projects (generally 20+ years) in the RFP. The product has a unique profile in that it is a short term product (5 years) with a high ELCC of 54% and qualitatively appropriate for implementation.

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2018 RFP Phase II Preliminary Quantitative Results Summary- RENEWABLE PROPOSALS

Preliminary Figures Only- Subject to Change

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

As of June 12, 2019

	ID	Renewable Proposals: Project Name	Technology (A)	Term Start (B)	Book Life / Contract Term (C)	Nameplate Capacity (MW) (D)	Levelized PB / REC: NO CO2 Low Load (E)	NO CO2 Updated w/SB100 (F)	NO CO2 (G)	Low Societal (H)	Mid Societal (I)	High Societal (J)	Ranking Levelized PB / REC: NO CO2 Low Load (K)	NO CO2 Updated w/SB100 (L)	NO CO2 (M)	Low Societal (N)	Mid Societal (O)	High Societal (P)
1	18163	[redacted]	REC Only	Jan-22	18	[redacted] REC	[redacted]						1	1	1	22	31	33
2	18165	[redacted]	REC Only	Jan-22	18	[redacted] REC	[redacted]						2	2	2	21	32	32
3	18169	[redacted]	MT Wind	Dec-21	25	[redacted] MW	[redacted]						21	3	4	1	1	
4	18173	[redacted]	MT Wind	Oct-22	20	[redacted] MW	[redacted]						27	4	17	13	4	2
5	18190	[redacted]	Wind	Dec-21	20	[redacted] MW	[redacted]						4	5	12	24	20	31
6	18135	[redacted]	Solar	Jan-23	20	[redacted] MW	[redacted]						6	6	3	3	7	
7	18111	[redacted]	Solar	Dec-22	20	[redacted] MW	[redacted]						5	7	8	4	3	
8	18127	[redacted]	Solar	Dec-22	15	[redacted] MW	[redacted]						10	8	23	6	8	
9	18135	[redacted]	Solar	Jan-23	20	[redacted] MW	[redacted]						7	9	5	9	9	10
10	18125	[redacted]	Solar	Jan-23	20	[redacted] MW	[redacted]						9	10	6	10	10	11
11	18127	[redacted]	Solar	Dec-22	15	[redacted] MW	[redacted]						14	11	25	12	11	12
12	18132	[redacted]	Wind	Jan-23	20	[redacted] MW	[redacted]						3	12	9	2	5	
13	18125	[redacted]	Solar	Jan-23	15	[redacted] MW	[redacted]						13	13	10	15	12	15
14	18173	[redacted]	MT Wind	Oct-22	20	[redacted] MW	[redacted]						25	14	22	19	14	13
15	18111	[redacted]	Solar	Dec-22	20	[redacted] MW	[redacted]						11	15	7	7	2	
16	18139	[redacted]	Solar	Jan-23	10	[redacted] MW	[redacted]						17	16	15	17	15	18
17	18132	[redacted]	Wind	Jan-22	20	[redacted] MW	[redacted]						8	17	13	5	13	14
18	18114	[redacted]	Solar	Dec-21	20	[redacted] MW	[redacted]						15	18	14	16	18	9
19	18166	[redacted]	Wind	Jan-21	25	[redacted] MW	[redacted]						18	19	24	23	21	20
20	18179	[redacted]	Wind	Jan-21	25	[redacted] MW	[redacted]						28	20	29	27	24	23
21	18132	[redacted]	Wind	Jan-21	20	[redacted] MW	[redacted]						12	21	19	11	16	17
22	18170	[redacted]	Wind	Dec-20	20	[redacted] MW	[redacted]						19	22	27	8	6	3
23	18122	[redacted]	Solar	Jan-23	20	[redacted] MW	[redacted]						16	23	20	18	19	19
24	18166	[redacted]	Wind	Jan-23	25	[redacted] MW	[redacted]						20	24	28	28	26	25
25	18131	[redacted]	Solar	Dec-22	25	[redacted] MW	[redacted]						32	25	21	20	22	21
26	18139	[redacted]	Solar + BES	Jan-23	10	[redacted] MW BESS	[redacted]						24	26	26	25	23	24
27	18175	[redacted]	Wind	Jan-21	25	[redacted] MW	[redacted]						31	27	16	30	29	28
28	18166	[redacted]	Wind	Jan-22	25	[redacted] MW	[redacted]						23	28	30	29	27	26
29	18170	[redacted]	Wind	Dec-20	20	[redacted] MW	[redacted]						26	29	18	26	17	16
30	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	[redacted]						30	30	32	31	28	27
31	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	[redacted]						22	31	11	14	25	22
32	18139	[redacted]	Solar + BES	Jan-23	10	[redacted] MW BESS	[redacted]						29	32	31	32	30	29
33	18107	[redacted]	Hydro-Run	Jan-21	20	[redacted] MW	[redacted]						33	33	33	33	33	30
34	18190	[redacted]	MT Wind	Dec-22	20	[redacted] MW	[redacted]											
35	18190	[redacted]	REC Only	Jan-20	20	[redacted] REC	[redacted]											
36	18190	[redacted]	REC Only	Jan-20	15	[redacted] REC	[redacted]											
37	18190	[redacted]	REC Only	Jan-20	12	[redacted] REC	[redacted]											

	ID	LEVELIZED $/REC: NO CO2 Low Load (Q)	NO CO2 Updated w/SB100 (R)	NO CO2 (S)	Low Societal (T)	Mid Societal (U)	High Societal (V)	Ranking LEVELIZED $/REC: NO CO2 Low Load (W)	NO CO2 Updated w/SB100 (X)	NO CO2 (Y)	Low Societal (Z)	Mid Societal (AA)	High Societal (AB)	Net Cost/REC: NO CO2 Low Load (AC)	NO CO2 Updated w/SB100 (AD)	NO CO2 (AE)	Low Societal (AF)	Mid Societal (AG)	High Societal (AH)	Ranking Net Cost/REC: NO CO2 Low Load (AI)	NO CO2 Updated w/SB100 (AJ)	NO CO2 base (AK)	Low Societal (AL)	Mid Societal (AM)	High Societal (AN)
1	18163	[redacted]												[redacted]						7	2	12	23	31	28
2	18165	[redacted]												[redacted]						9	3	15	25	32	30
3	18169	[redacted]						17	17	18	18	17	18	[redacted]						1	1	1	1	1	1
4	18173	[redacted]						26	26	26	26	26	26	[redacted]						19	17	16	10	4	2
5	18190	[redacted]						13	13	1	1	13	1	[redacted]						15	7	13	24	13	29
6	18135	[redacted]						2	2	3	3	2	3	[redacted]						3	8	2	2	6	6
7	18111	[redacted]						6	6	7	7	6	7	[redacted]						4	9	8	4	3	5
8	18127	[redacted]						5	5	6	6	5	6	[redacted]						8	12	20	6	7	8
9	18135	[redacted]						8	8	9	9	8	9	[redacted]						10	14	3	7	9	10
10	18125	[redacted]						10	10	11	11	10	11	[redacted]						11	15	4	8	10	11
11	18127	[redacted]						4	4	5	5	4	5	[redacted]						12	13	21	11	12	13
12	18132	[redacted]						11	11	12	12	11	12	[redacted]						2	4	7	3	5	4
13	18125	[redacted]						9	9	10	10	9	10	[redacted]						13	16	5	12	14	16
14	18173	[redacted]						21	21	22	22	21	22	[redacted]						21	19	18	17	15	12
15	18111	[redacted]						18	18	19	19	18	19	[redacted]						26	30	23	16	2	3
16	18139	[redacted]						1	1	2	2	1	2	[redacted]						14	11	9	18	20	19
17	18132	[redacted]						7	7	8	8	7	8	[redacted]						6	6	11	5	8	7
18	18114	[redacted]						12	12	13	13	12	13	[redacted]						16	18	6	13	16	17
19	18166	[redacted]						22	22	23	23	22	23	[redacted]						20	22	24	22	23	22
20	18179	[redacted]						23	23	14	14	23	14	[redacted]						29	27	30	21	18	33
21	18132	[redacted]						3	3	4	4	3	4	[redacted]						5	5	10	9	11	9
22	18170	[redacted]						15	15	16	16	15	16	[redacted]						17	10	14	14	17	14
23	18122	[redacted]						14	14	15	15	14	15	[redacted]						18	20	17	15	19	18
24	18166	[redacted]						29	29	29	29	29	29	[redacted]						25	26	28	29	27	23
25	18131	[redacted]						19	19	20	20	19	20	[redacted]						22	24	19	19	22	20
26	18139	[redacted]						16	16	17	17	16	17	[redacted]						24	23	25	26	25	24
27	18175	[redacted]						27	27	27	27	27	27	[redacted]						28	25	26	27	26	32
28	18166	[redacted]						28	28	28	28	28	28	[redacted]						27	28	29	30	29	26
29	18170	[redacted]						24	24	24	24	24	24	[redacted]						30	29	27	28	21	15
30	18100	[redacted]						30	30	30	30	30	30	[redacted]						32	31	31	31	28	25
31	18170	[redacted]						20	20	21	21	20	21	[redacted]						23	21	22	20	24	21
32	18139	[redacted]						25	25	25	25	25	25	[redacted]						31	32	32	32	30	27
33	18107	[redacted]						31	31	31	31	31	31	[redacted]						33	33	33	33	33	31
34	18190	[redacted]												[redacted]											
35	18190	[redacted]												[redacted]											
36	18190	[redacted]												[redacted]								13	24		29
37	18190	[redacted]												[redacted]											

Notes:
1. The metric shown-- Levelized PB / RECs-- is the portfolio benefit attributable divided by RECs generated.
2. For generation resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 3.2% or higher, the Renewable Portfolio Benefit was recomputed by isolating the portfolio benefit attributable to REC generation. Resources with Mid-C delivery are considered to have zero capacity value.
3. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

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2018 All Resources RFP:

Phase 2 results and recommended shortlist

PUGET SOUND ENERGY

EMC Decisional

July 23, 2019

Cindy Song

Business Initiatives Manager

Decisional

Recommendation: Approve projects selected from the RFP (slide #5) and authorize RFP team to proceed with contract negotiations.

RFP timeline and next steps

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
✓	June 28, 2018	WUTC approved Demand Response and All Resource RFPs
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
✓	March 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
✓	July 2019	Complete Phase 2 evaluation, select final short list
	July/August 2019	Notify respondents; begin contract negotiations
	To follow	Seek EMC/board approval prior to executing negotiated contracts

Capacity resource need updated to 299 MW in 2022 and REC need updated to 233,449 RECs in 2023

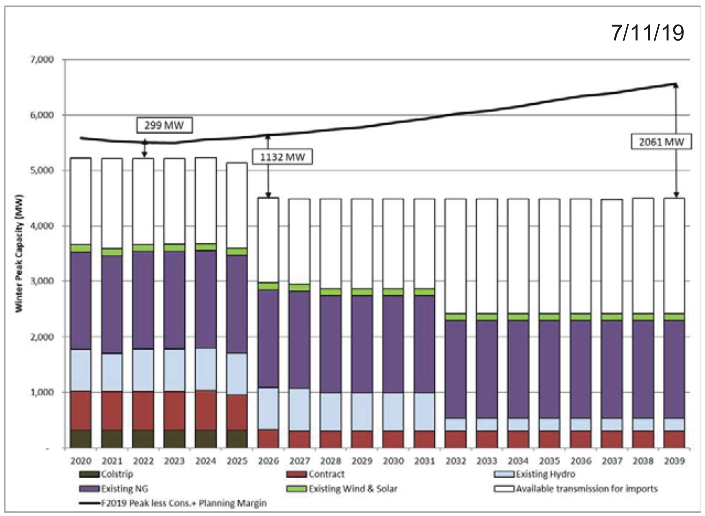
Resource need forecasts updated in Phase 2 analysis to reflect draft 2019 IRP need assessments and F2019 load forecast (net conservation)*

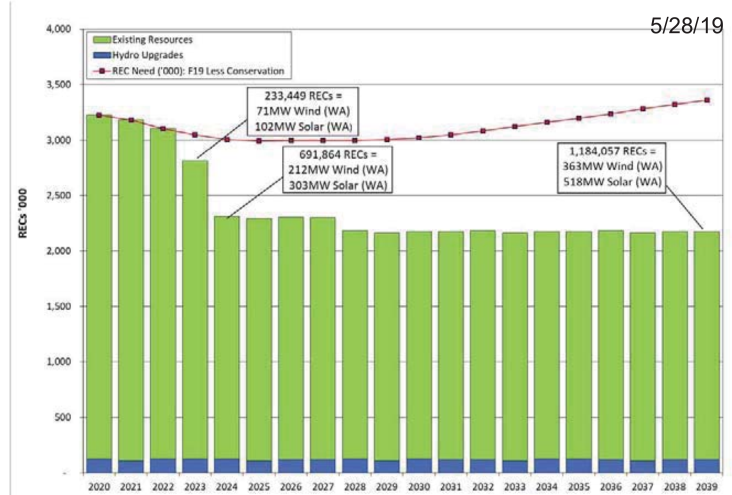
2018 RFP Capacity Need – Phase 2 update

- PSE seeks 299 MW capacity by end of 2022; near-term gap in 2020-2021 to be filled by short-term RFP
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably

2018 RFP REC Need – Phase 2 update**

- REC need is driven by the increase in the RPS from 9% to 15% in 2020
- Projected need to meet the RPS is 233,449 RECs by 2023
- PSE's inventory of banked RECs delays need until 2023





*Original RFP issued to fill 272 MW capacity need in 2022 and 671,000 REC renewable need in 2023.
**REC need reflects renewable need driven by RCW 19.285 (RPS). It does not reflect the impact of SB 5116 (Clean Energy Transformation Act).

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Portfolio optimization results*

(results as of July 23, 2019)

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio	(I) As Proposed Optimized Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW		X	X
3	18169	MT Wind	[redacted]	350 MW	[redacted]		X	
4	18169	MT Wind		300 MW				X
5	18170	Wind	Golden Hill Shaped	200 MW	77 MW		X	X
6		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW
7		Peak Capacity Surplus / (Deficit) in 2022 [4]					[redacted] MW	[redacted] MW
8		Total Annual RECs					2,189,656	1,986,862
9		Portfolio Benefits - $M					$408	$397
10								
11		With Consideration of Social Cost of Carbon:						
12		Portfolio Benefits w/ Carbon Costs as an Adder - $M [5]					$1,038	$934
13		Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M					$959	$937

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Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.

2. The optimization model chose a portfolio with [redacted] MW from [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted] Current indicative results reflect pricing based on the [redacted] MW offer.

3. The current project COD for [redacted] is Dec 2021. There has been perceived timing risks for PSE to secure long-term transmission rights to bring the energy home. If the COD is delayed to Dec 2022 to mitigate this risk, NPV of PPA cost will increase by up to $35M. Without [redacted] the next lowest cost portfolio is $123M more expensive than the recommended portfolio. However it would have the same timing risks on transmission because the new lowest cost portfolio includes the [redacted] project, which uses the same Colstrip transmission path.

4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by 1) short-term capacity purchase for $720k per year; 2) a 20MW battery for $41M.

5. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

[redacted]

PSE SOUND ENERGY

Detailed optimization results for Phase 2 proposals are presented in Appendix E. Detailed scenario analysis and standalone proposal ranking results are presented in Appendix C.

RFP short list – selected four projects to go out and start negotiations

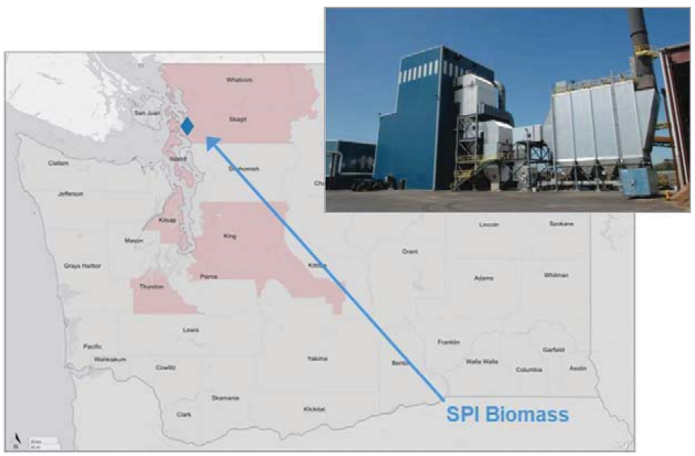
1. SPI Biomass (Sierra Pacific Industries) 17-year PPA
2. ([redacted]) Montana wind ([redacted]) 25-year PPA
3. Golden Hills Oregon wind (Avangrid) 20-year PPA
4. BPA peak capacity product (BPA) 5-year call option

Selected proposal: SPI Biomass PPA

Proposed terms are subject to change

Seller:
- Sierra Pacific Industries (SPI)

Product:
- Delivery of 17 MW of firm capacity (24/7)
- Delivery of up to 20 MW worth of energy (3 MW is variable)
- Minimum availability: [redacted] (92% historic)
- Contribution to Peak Capacity: 16 MW



* *The SPI Burlington lumber mill began operating in 2001. The biomass cogeneration facility was added in 2007. Facility is subject to an existing contract with a broker to sell the output through 2020.*

*** Levelized cost of energy is $*[redacted]

Term:
- Start: Jan. 1, 2021*
- 17 years

Point of Delivery:
- SPI.CABO.GEN at Fredonia Substation
  (also Point of Interconnection)

Price**:

Calendar Year	Contract Year	Energy Price ($/MWh	Expected Energy Output (MWh/year)
2021	1	[redacted]	
2022	2		
2023	3		
2024	4		
2025	5		
2026	6		
2027	7		
2028	8		
2029	9		
2030	10		
2031	11		
2032	12		
2033	13		
2034	14		
2035	15		
2036	16		
2037	17		

REDACTED VERSION

SPI Biomass PPA: Key risks and benefits

Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Availability or production risk	PSE	PSE peak capacity need would be unmet in the short term	Liquidated Damages assessed on counterparty; Trade floor purchases short-term market capacity

Benefits:

- Operational status, solid operating history, reliable fuel supply and interconnection to PSE's system
- High-yield capacity contribution from a renewable resource
- No known community or reputational risks
- Consistent with Washington State's clean energy goals
- Strong counterparty with no project subsidiary
- Counterparty appears motivated to work with PSE to negotiate mutually acceptable PPA terms
- Quantitative analysis demonstrates that SPI Biomass performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution

Selected proposal: [redacted] Wind PPA

Proposed terms are subject to change

Seller:

- [redacted]

Product:

- Nameplate Capacity: Proposed [redacted]
- NCF: [redacted]%
- Expected Output: [redacted] MWh/year

Term:

- COD: Proposed 12/31/2021**
- Term: 25 years

Point of Delivery:

- [redacted] Substation 500 kV (*also Point of Interconnection*)

**Preferred size [redacted] MW (no offer yet)*

***To be determined based on timing of transmission availability*

[redacted]

Price (based on 300 MW PPA)***:

		PPA	
Calendar Year	Contract Year	Flat Energy Price	Expected Energy Output (MWh/year)
2022	1	[redacted]	
2023	2		
2024	3		
2025	4		
2026	5		
2027	6		
2028	7		
2029	8		
2030	9		
2031	10		
2032	11		
2033	12		
2034	13		
2035	14		
2036	15		
2037	16		
2038	17		
2039	18		
2040	19		
2041	20		
2042	21		
2043	22		
2044	23		
2045	24		
2046	25		

****Price does not include delivery to PSE's system. Levelized cost of energy is [redacted].*

PSE SOUND ENERGY

REDACTED VERSION

REDACTED VERSION

[redacted] Wind PPA: Key risks and benefits

Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Commercial operation delayed - site control - permitting - construction	[redacted]	Short-term capacity deficit	Liquidated Damages assessed on counterparty; Trade floor purchases short-term market capacity
[redacted] network upgrades complete later than expected	PSE	Insufficient long-term available transmission capacity (ATC)	PSE purchases available short-term transmission capacity; remaining output curtailed

Benefits:

- Relatively inexpensive large-scale wind project
- Expected capacity factor and wind shape indicate a high-yield capacity contribution from a renewable resource
- Consistent with Washington State's clean energy goals
- Strong counterparty with a parent guarantee
- Quantitative analysis demonstrates [redacted] performs well compared to alternatives on a standalone basis and was the linchpin to meet the RPS and peak capacity needs during portfolio optimization

PSE SOUND ENERGY

REDACTED VERSION

Selected proposal: Golden Hills Wind (Shaped)

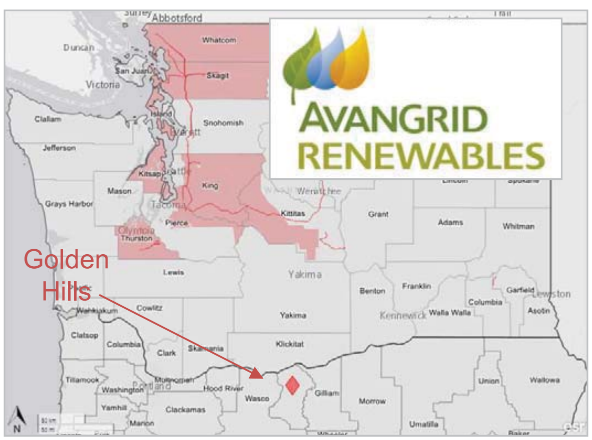
Proposed terms are subject to change

Seller:

- Avangrid Renewables, Inc.

Product:

- Nameplate Capacity: 200 MW
- NCF: [redacted]
- Expected Output: [redacted] MWh/year
- Shaped Capacity: up to [redacted] MW
- Shaped Schedule: Nov - Feb
- Shaped Hours: HE 9-11, 18-21



Term:

- COD: 12/31/2021
- Term: 20 years

Point of Delivery:

- BPAT.PSEI

Price*:

**Levelized cost of energy is $[redacted] MWh.*

		PPA		Winter-Peaking Capacity	
Calendar Year	Contract Year	Flat Energy Price ($/MWh)	Expected Energy Output (MWh/year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]	[redacted]	[redacted]	[redacted]
2023	2	[redacted]	[redacted]	[redacted]	[redacted]
2024	3	[redacted]	[redacted]	[redacted]	[redacted]
2025	4	[redacted]	[redacted]	[redacted]	[redacted]
2026	5	[redacted]	[redacted]	[redacted]	[redacted]
2027	6	[redacted]	[redacted]	[redacted]	[redacted]
2028	7	[redacted]	[redacted]	[redacted]	[redacted]
2029	8	[redacted]	[redacted]	[redacted]	[redacted]
2030	9	[redacted]	[redacted]	[redacted]	[redacted]
2031	10	[redacted]	[redacted]	[redacted]	[redacted]
2032	11	[redacted]	[redacted]	[redacted]	[redacted]
2033	12	[redacted]	[redacted]	[redacted]	[redacted]
2034	13	[redacted]	[redacted]	[redacted]	[redacted]
2035	14	[redacted]	[redacted]	[redacted]	[redacted]
2036	15	[redacted]	[redacted]	[redacted]	[redacted]
2037	16	[redacted]	[redacted]	[redacted]	[redacted]
2038	17	[redacted]	[redacted]	[redacted]	[redacted]
2039	18	[redacted]	[redacted]	[redacted]	[redacted]
2040	19	[redacted]	[redacted]	[redacted]	[redacted]
2041	20	[redacted]	[redacted]	[redacted]	[redacted]

PSE SOUND ENERGY

REDACTED VERSION

The uniquely shaped output during winter months yields higher peak capacity contribution

- "As generated" Golden Hills Wind has an ELCC of 26%, therefore a peak capacity contribution of 52MW.
- Avangrid Renewables has offered a synthetic peak capacity output profile for winter months (Nov-Feb) that reshapes the wind output in those months to optimize the coincidence to PSE's load profile.
- This reshaped wind product offers an ELCC of 39%, therefore a peak capacity contribution of 79MW.
- PSE has an opportunity to optimize the shaped product, and analysis is ongoing.

[redacted]

REDACTED VERSION

Golden Hills PPA: Key risks and benefits

Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Commercial operation delayed - construction	Avangrid	Short-term capacity deficit	Liquidated Damages assessed on counterparty; Trade floor purchases short-term market capacity
Available long-term firm transmission ([redacted] MW) is less than project nameplate capacity (200 MW)	Avangrid	Possible impact to energy delivery in excess of [redacted] MW	Confirm use of short-term firm redirects
Shaped product resource pool may not be 100% renewable	PSE	May misalign with CETA requirements	May require some offset purchases starting in 2030

Benefits:

- Incremental wind asset with shaped capacity product provides contribution to both RPS and capacity needs identified in RFP
- Consistent with Washington State's clean energy goals
- Strong counterparty with a parent guarantee
- Shaped hours are negotiable, allowing optimization to need.
- Quantitative analysis demonstrates that Golden Hills PPA (shaped) performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution

PSE SOUND ENERGY

REDACTED VERSION

Selected proposal: BPA Capacity Tolling Agreement (CTA)

Proposed terms are subject to change

Seller:

- Bonneville Power Administration (BPA)

Product:

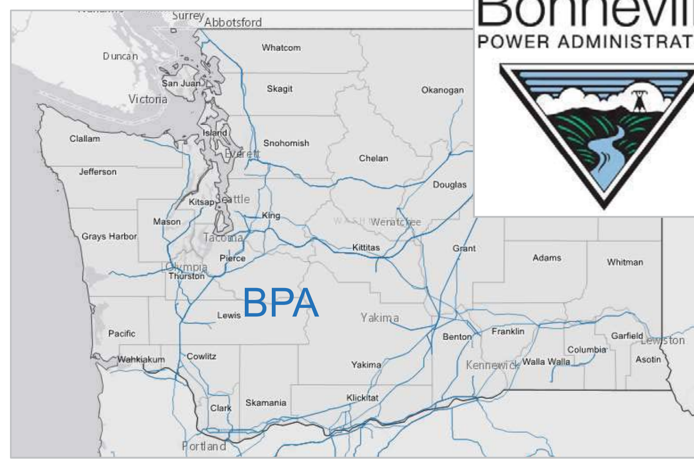
- Capacity: 100 MW
- Firm Capacity which may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis
- Western Systems Power Pool (WSPP) Schedule C, Heavy Load Hour, Low Carbon Firm Energy

Term:

- Start: 01/01/2022
- Term: 5 years

Point of Delivery:

- BPAT.PSEI
- PSE Covington 230 kV Substation



Price*:

Calendar Year	Contract Year	Energy Price ($/MWh)	Possible Energy Output (MWh/year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]	[redacted]	[redacted]	100
2023	2	[redacted]	[redacted]	[redacted]	100
2024	3	[redacted]	[redacted]	[redacted]	100
2025	4	[redacted]	[redacted]	[redacted]	100
2026	5	[redacted]	[redacted]	[redacted]	100

** Powerdex hourly Mid-Columbia index for each hour MWh are delivered*

REDACTED VERSION

PSE SOUND ENERGY

BPA Capacity CTA: Key risks and benefits

Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed mitigation
Increased market exposure	PSE	Potentially higher energy costs	Trade floor implements hedging strategy

Benefits:

- Very strong counterparty with minimal risk of default
- No development risk
- Consistent with Washington State's clean energy goals
- Energy delivered from BPA's system will be certified as an Asset Controlling Supplier (ACS) product, typically 95% carbon free*
- Quantitative analysis demonstrates that BPA Capacity CTA performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution

** As reported to the California Air Resources Board (CARB)*

Appendix A

RFP modeling assumptions

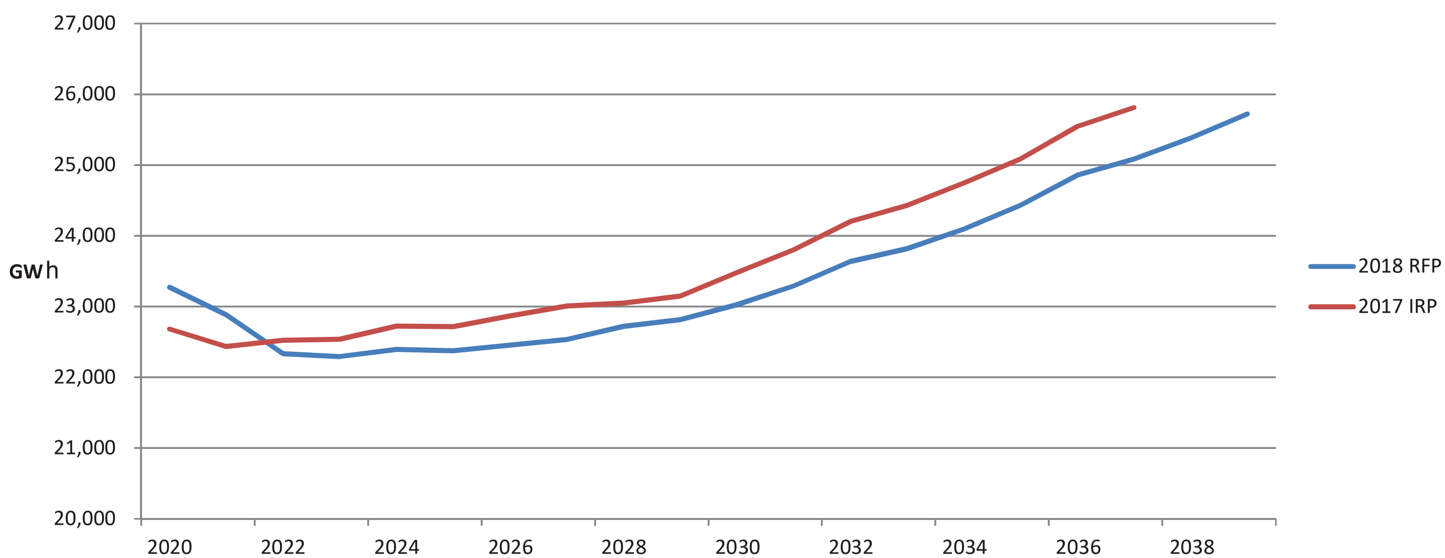
PSE updated key Phase 2 modeling assumptions to reflect current draft 2019 IRP assumptions*

	RFP Phase 2	RFP Phase 1	2017 IRP
Mid-C power prices (Levelized)	$28.75 / MWh	$33.92 / MWh	$40.48 / MWh
Gas prices (Levelized)	$3.50 / mmbtu	$3.74 / mmbtu	$4.02 / mmbtu
Load growth	0.4%	0.5%	0.7%
Effective load carrying capability (ELCC)	See appendix.		

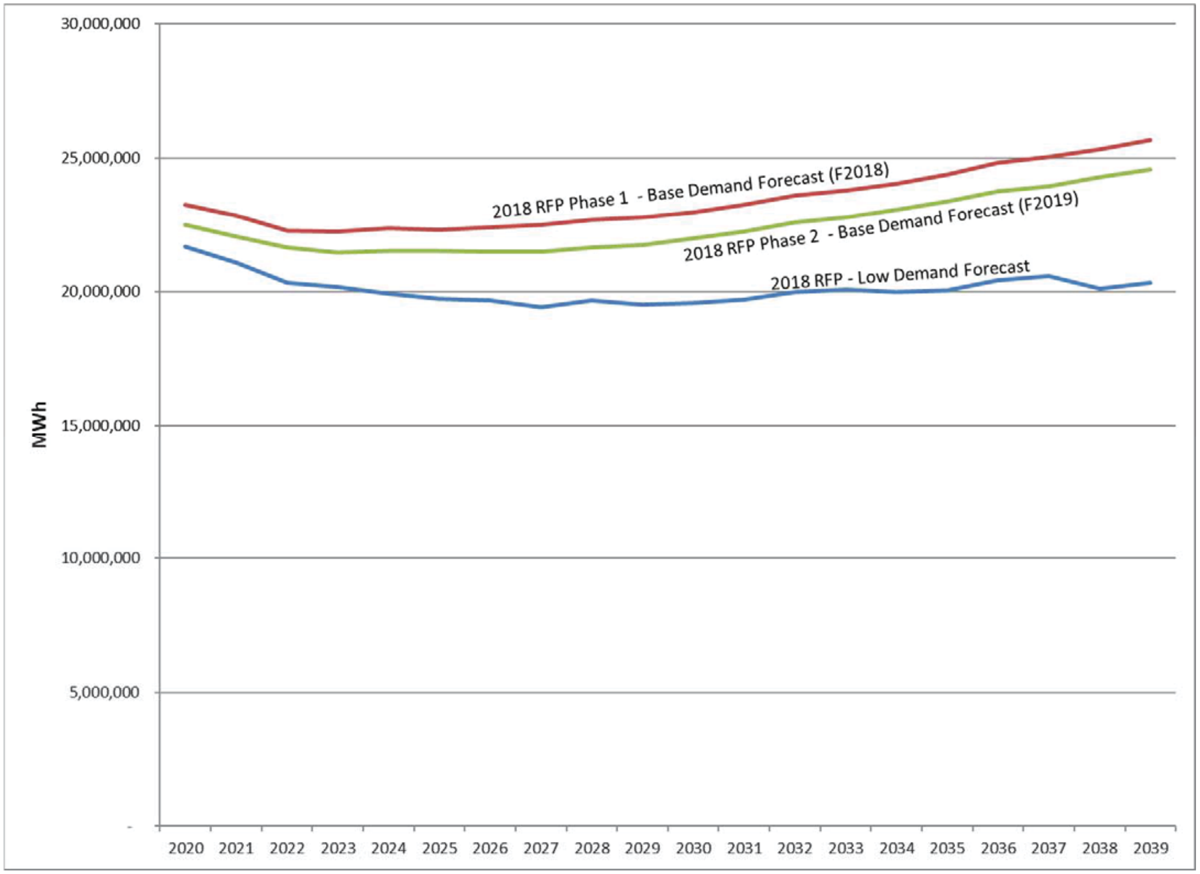
** This is not intended to be a complete list of all model updates. Certain additional Phase 2 modeling assumptions are described in the appendix.*

PSE SOUND ENERGY

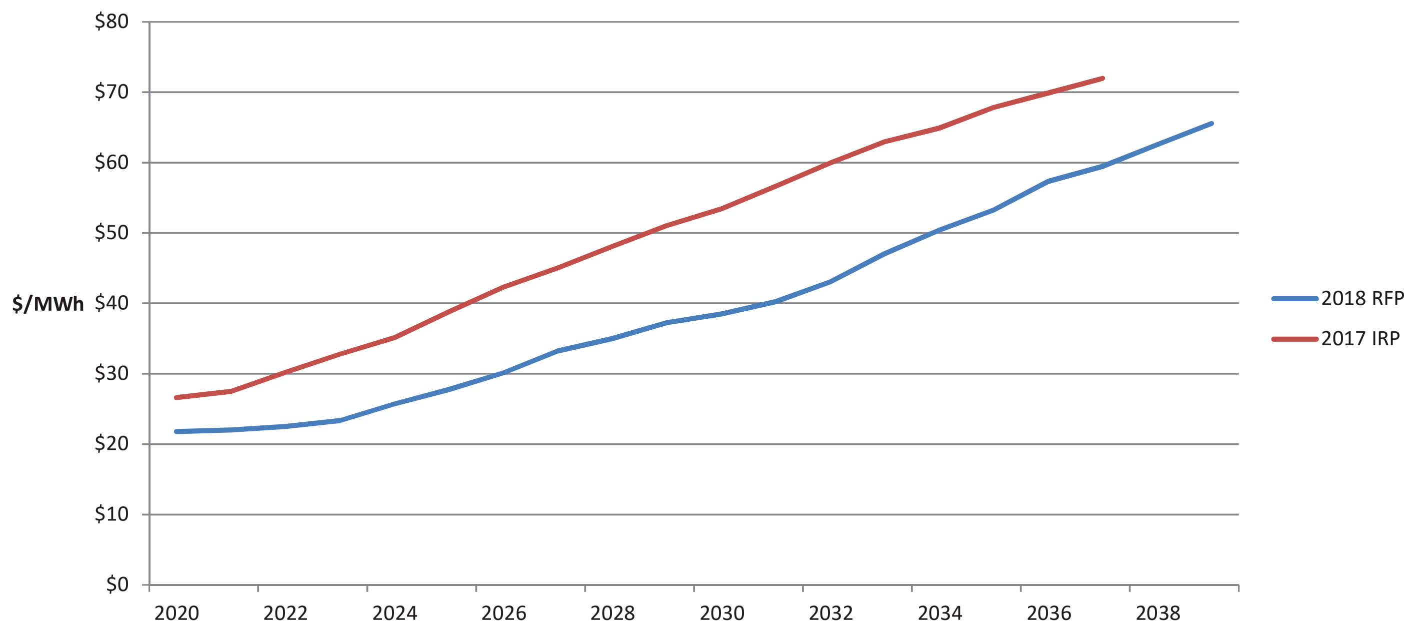
Phase 1: Load forecast comparison



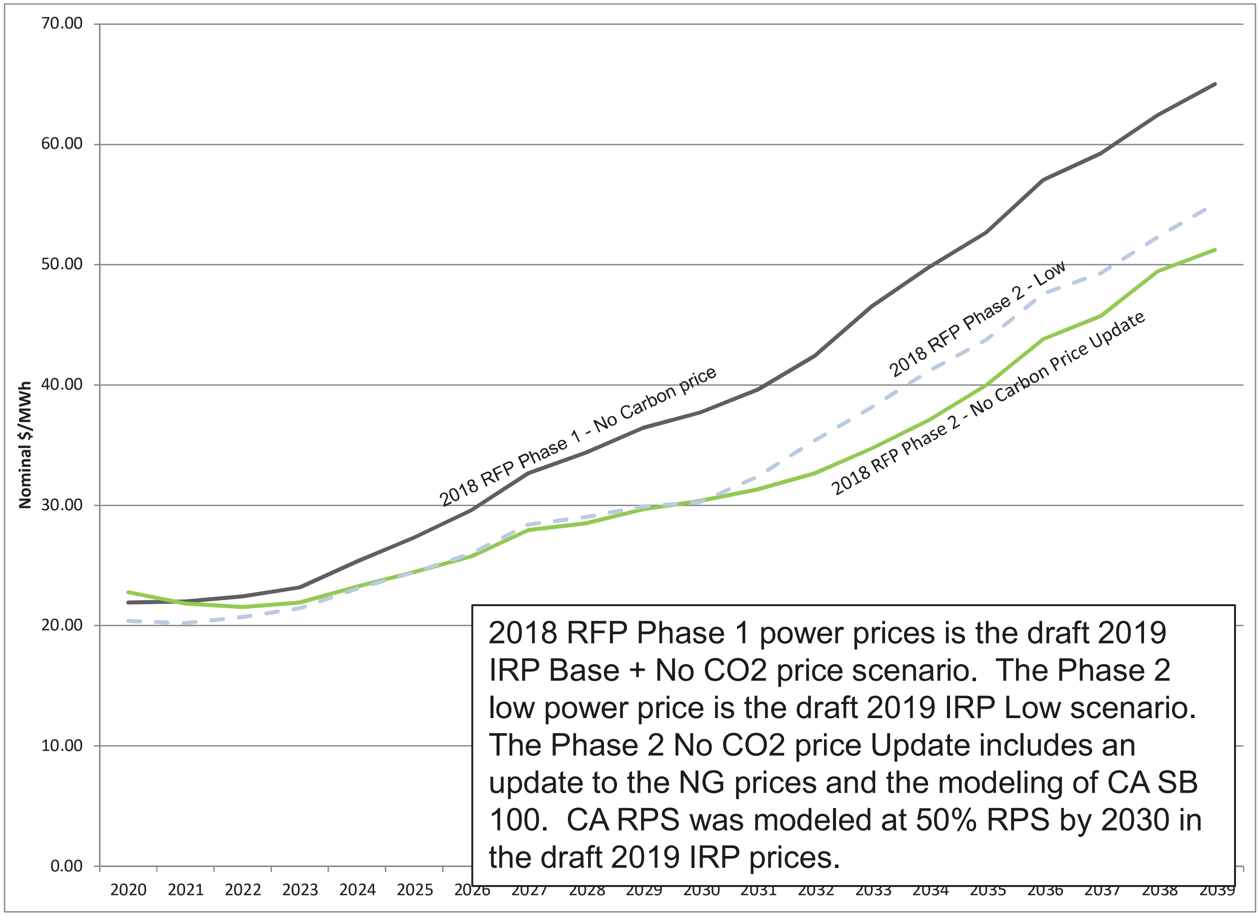
Phase 2: Load forecast comparison



Phase 1: Power price forecast

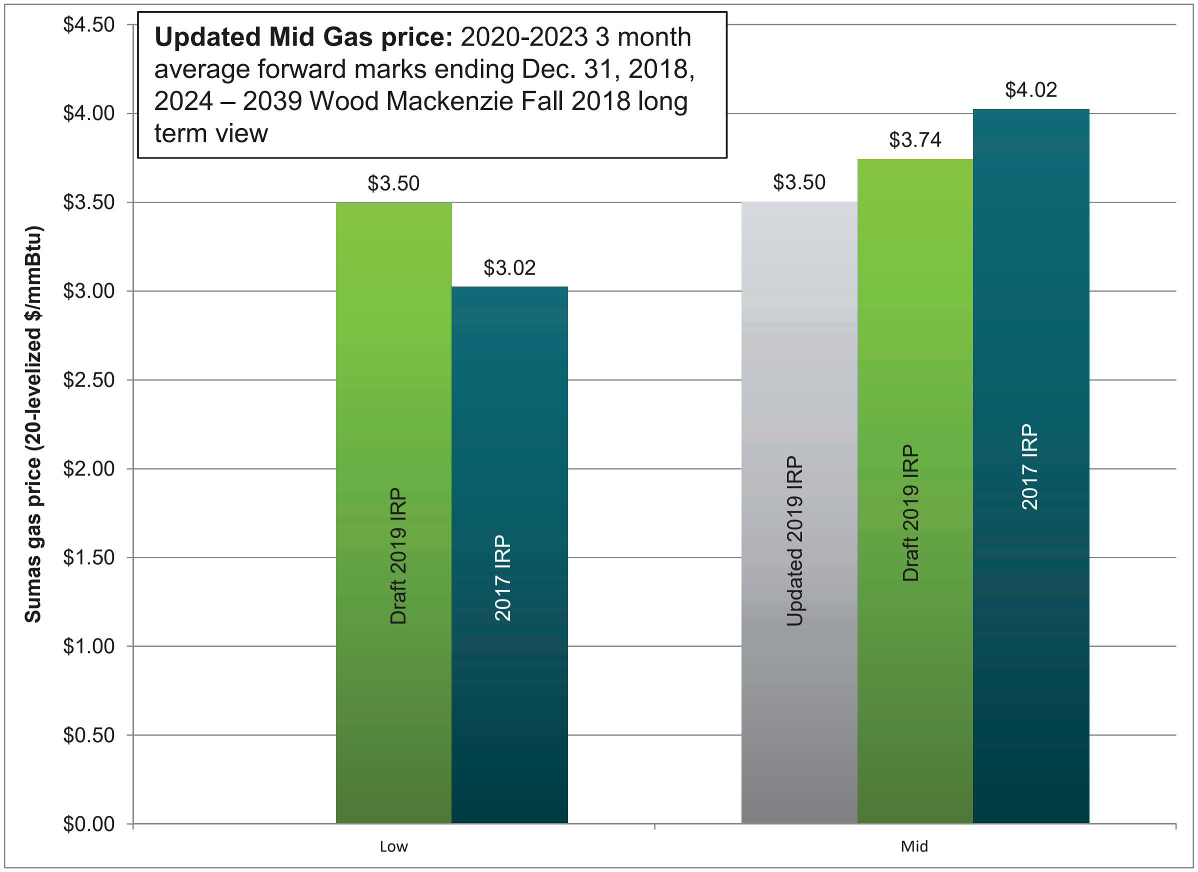


Phase 2: Power price forecast

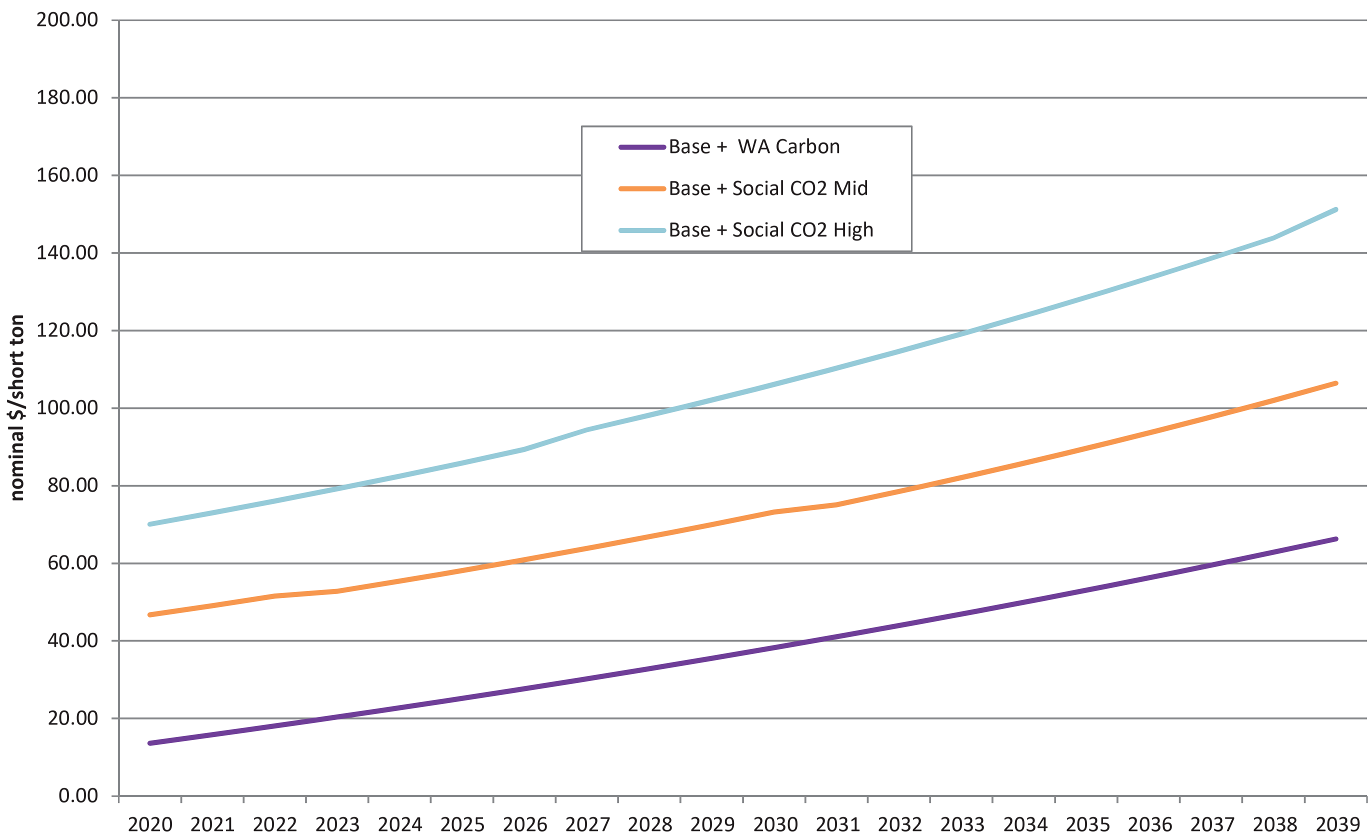


2018 RFP Phase 1 power prices is the draft 2019 IRP Base + No CO2 price scenario. The Phase 2 low power price is the draft 2019 IRP Low scenario. The Phase 2 No CO2 price Update includes an update to the NG prices and the modeling of CA SB 100. CA RPS was modeled at 50% RPS by 2030 in the draft 2019 IRP prices.

Phase 2: Natural gas price forecasts



Carbon Prices



Phase 1: Comparison of generic resource costs

	2017 IRP			2019 IRP			Change in costs from 2019 IRP to 2017 IRP		
2018 $/kW	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	All in Costs
CCCT	$1,020	$358	$1,378	$898	$269	$1,167	($122)	($89)	($211)
Frame Peaker (Fuel Fuel)	$526	$172	$698	$554	$271	$825	$28	$99	$127
Recip Engine (NG only)	$1,030	$312	$1,341	$842	$350	$1,192	($188)	$38	($149)
WA Wind	$1,548	$656	$2,204	$1,656	$386	$2,042	$108	($270)	($162)
MT Wind	$1,471	$1,312	$2,783	$1,633	$1,111	$2,744	$162	($201)	($39)
Solar	$1,497	$874	$2,371	$1,352	$570	$1,922	($145)	($304)	($449)
Biomass	$4,084	$207	$4,291	$7,036	$2,659	$9,695	$2,952	$2,452	$5,404
Offshore Wind	$5,717	$1,795	$7,512	$5,000	$1,547	$6,547	($717)	($248)	($965)
Li-Ion Battery 2-hr	$1,313	$342	$1,655	$1,331	$599	$1,930	$18	$257	$275
Li-Ion Battery 4-hr	$2,116	$552	$2,668	$2,346	$708	$3,054	$230	$156	$386
Flow Battery 4-hr	$1,870	$674	$2,544	$1,493	$618	$2,111	($377)	($56)	($433)
Flow Battery 6-hr	$2,447	$882	$3,329	$2,050	$708	$2,758	($397)	($174)	($571)
Pumped Storage	$2,503	$127	$2,630	$1,800	$879	$2,679	($703)	$752	$49

Phase 2: Generic resource costs

Generic resource capital costs updated from HDR final report as part of the 2019 IRP.

Cost updates include:

- **Solar capital cost**
  - *Draft: $1,922/kw*
  - Update: $1,614/kw
- **MT wind capital cost**
  - *Draft: $2,744/kw*
  - Update: $1,617/kw
- **WA wind capital cost**
  - *Draft: $2,042/kw*
  - Update: $1,633/kw
- **Frame Peaker FOM cost**
  - *Draft: $3.93/kw-yr*
  - Update: $11.40/kw-yr
    $11.40/kw-yr includes $3.93/kw-yr FOM + $7.47/kw-yr for 48 hours of oil.

PSE also updated ELCC modeling assumptions to reflect current draft 2019 IRP assumptions

Resource	Nameplate (MW)	IRP 2017 Peak Capacity Solve to 5% LOLP Relative to New Peaker	IRP 2019 Peak Capacity Solve to 5% LOLP Relative to Perfect Capacity
Existing Wind	823	11%	9.7%
Skookumchuck	131	40%	36.0%
Generic Montana Wind	100	49%	51.4%
Generic Washington Wind	100	16%	6.4%
Generic Offshore WA Wind	100	51%	47.6%
Generic Washington Solar	100	0%	1.0%
Lund Hill Solar	150	N/A	2.4%

Storage Resources	Nameplate (MW)	IRP 2017 Peak Capacity EUE at 5% LOLP	IRP 2019 Peak Capacity EUE at 5% LOLP
Lithium-Ion 2 hr, 82% RT efficiency	25	60%	19.2%
Lithium-Ion 4 hr, 87% RT efficiency	25	88%	38.4%
Flow 4 hr, 73% RT efficiency	25	76%	36.0%
Flow 6 hr, 73% RT efficiency	25	N/A	46.4%
Demand Response 3 hr duration, 6 hr delay 10 calls per year	100	77%	38.2%

PSE SOUND ENERGY

Appendix B

2018 All Resources RFP
Phase 2 Executive Summary

PUGET SOUND ENERGY

REDACTED VERSION

2018 RFP – Executive Summary*

Quantitative results are the product of analysis performed in PSM III version 25.13.

Phase 2 Candidate Short List: Proposals selected for contracting phase of RFP

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18100 **SPI Burlington Biomass** Sierra Pacific Industries PPA Operational biomass 17 MW nameplate COD: 01/01/2021 Term: 17 years capacity	Levelized cost: [redacted] / MWh Portfolio benefit: $14.132 M Levelized PB/REC: [redacted]*** Peak capacity PB / kW-Yr: [redacted] Net cost PV: $33.613 M Peak capacity contribution (MW): 16.4 Annual REC contribution: [redacted]	• Existing/operating facility so no development risk • Biomass project is REC producing • High effective load-carrying capability (ELCC), i.e. contribution to peak capacity need • Interconnected onto PSE's system	• Sierra Pacific Industries is a privately held company, so less financial information is available than if it were public • A disruption of mill operations would likely impact long-term operation of the facility	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.

**This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.*
***Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18161 **BPA Peak Capacity** Bonneville Power Administration PPA** Operational portfolio of projects 100 MW** COD: 01/01/2022** Term: 5 years**	Levelized cost: N/A Portfolio benefit: ($8.028 M) Peak capacity PB / kW-Yr: ([redacted])*** Net cost PV: $25.426 M Peak capacity contribution (MW): 100 Annual REC contribution: [redacted]	• Counterparty is well known with existing ties to PSE and, therefore, no risk for this proposal • There are no permitting, real estate or community relations concerns as the proposal is based on currently operational projects • As a response to data requests, Bonneville Power Administration (BPA) moved their delivery location from Mid-C to BPAT.PSEI		**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.
18169 [redacted] PPA** or 50% ownership+PPA Development wind [redacted] MW** or [redacted] MW COD: 12/31/2021** Term: 20 or 25** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $417.294 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: ($[redacted]) Net cost PV: $24.422 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Relatively cost efficient way to contribute towards both the REC and contribution to peak capacity need • Large and experienced counterparty • Site control is reportedly achieved, but supporting documentation was not included in proposal • Public has been notified of the project as a [redacted] MW facility • Shape of wind based on 6 operating meteorological towers appears to fit well with PSE's needs	• Lengthy gen-tie line for which site-control has not yet been fully obtained • Transmission from [redacted] to PSE brings both schedule and cost risk to PSE as the energy offtaker • There is a potential permitting issue with sage grouse habitat	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted] the [redacted] projects are considered mutually exclusive.
18170 **Golden Hills Wind** Avangrid Renewables [redacted]**, PPA-shaped [redacted] Development wind 200 MW** COD: 12/31/2020** Term: 20 years**	Levelized cost: $[redacted] / MWh Portfolio benefit: $106.924 M Levelized PB/REC: [redacted]** Net cost PV: $74.948 M Peak capacity contribution (MW): 51.6 Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Shaped product offers capacity contribution during peak winter months • Site control is achieved • Permitting well advanced with Oregon Energy Facility Siting Council (EFSC) permit application already amended	• Complex energy delivery will require additional vetting • Complexity of shaped product will require additional vetting	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18173 [redacted] PPA** Development wind [redacted] MW or [redacted] MW COD: 10/31/2022** Term: 20 years**	Levelized cost: $[redacted] / MWh Portfolio benefit: $280.504 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: ($[redacted]) Net cost PV: $116.358 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Project may be sited on a single landowner's property, which would likely minimize real estate complexity • Favorable state support; however, local level of support unknown	• Project site may include Montana Department of Natural Resources and Conservation (DNRC) land, which could complicate site control and permitting • Permitting is in a relatively early stage of development; risk of potential delay to scheduled COD • Assumed use of [redacted] is under ongoing review and may be problematic	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted] the [redacted] and [redacted] projects are considered mutually exclusive.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Phase 2 proposals not selected for contracting phase of RFP

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18103 [redacted] CTA** or asset transfer Operational combined cycle [redacted] MW** or [redacted] MW Start: 06/01/2022 Term: 10 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: ($29.120 M) Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $163.748 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Existing/operating facility (rather than new build) therefore no development risk • Existing presence in the community with local opposition unlikely	• High social cost of carbon adversely impacts project economics in certain quantitative scenarios • In light of recently passed Clean Energy Transition Act (SB5116), advancement of this and other fossil fuel-based projects represents considerable reputational and financial risk • Lack of firm delivery of natural gas is a risk to the effective load-carrying capability (ELCC) of the project	**Not Selected –** Project not selected during portfolio optimization process.
18105 [redacted] CTA** or BTS Frederickson thermal expansion [redacted] MW** or [redacted] MW COD: 01/01/2022 Term: 5, 15, or 20** years	Levelized cost: $[redacted]/ MWh Portfolio benefit: ($16.898 M) Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $85.973 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposed expansion of [redacted] facility may bring O&M cost savings on a per-kW basis (versus an entirely new thermal facility) • Technology is relatively site-agnostic and can potentially be designed to integrate at other sites • [redacted] MW proposal would likely be facilitated with firm gas supply from existing facilities	• In light of recently passed Clean Energy Transition Act (Washington State Bill 5116), advancement of new fossil fuel-based projects represents considerable reputational and financial risk • Proposed project would require extensive integration with existing PSE facility, the viability of which is unknown at this time • Would require review and likely modification of air permit for co-located generation facility. Process expected to be exceedingly difficult and the outcome uncertain, with possible impacts to existing facility operational permits • PSE will likely experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's CO_2 emitting portfolio • Strong likelihood of considerable delays to COD due to expected public protest, litigation and permit process	**Not Selected –** Project not selected due to qualitative risks.

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REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18107 [redacted] PPA** Operational hydro [redacted] MW Start: 1/1/2021 (assumed) Term: 20 years (assumed)	Levelized cost: $[redacted] / MWh Portfolio benefit: ($36.163 M) Levelized PB/REC: ($[redacted]** Net Cost PV: $38.677 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• No development risk; project is an existing operating facility • Clean energy (although not RPS compliant) • Run-of-river hydro can be less environmentally impactful than standard hydro • Little to no permitting or real estate risk due to current operational status	• Run-of-river asset provides little capacity value. • Not RPS complaint (although clean energy) • Energy delivery strategy has been left to PSE, and appears to be complex	**Not Selected –** Project not selected due to qualitative risks and did not show potential during standalone quantitative analysis.
18111 [redacted] PPA** Development solar Solar: [redacted] MWac COD: 12/31/2022 Term: 20 years	Levelized cost: $36.79 / MWh Portfolio benefit: $107.686 M Levelized PB/REC: $[redacted]** Net cost PV: $51.359 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Relatively high quantitative score for solar project • Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Site control has been achieved • Permitting status is sufficient at this stage • Located on PSE's system in [redacted] County; avoids community concerns in [redacted] County	• While on PSE's system, complex delivery due to available transmission capacity (ATC) constraints in area. Delivery is possible to Mid-C; however, may be difficult given project's proximity to [redacted] substation • Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18112 [redacted] PPA** Development solar Solar: n/a COD: n/a Term: n/a	Levelized cost: [redacted] Portfolio benefit: N/A Levelized PB/REC: [redacted] Net cost PV: N/A Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Project withdrawn by applicant	• Project withdrawn by applicant	**Not Selected -** Project withdrawn by applicant.

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18114 [redacted] PPA Solar generation [redacted] MW_{AC} COD: 12/1/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $45.772 M Levelized PB/REC: $[redacted]** Net Cost PV: $36.011 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• [redacted] is assessed to be a relatively strong parent company	• Environmental permitting not yet begun. • Permitting will require the transfer of a Washington Energy Facility Site Evaluation Council (EFSEC) permit, which introduces a viability and reputational risk to the project and PSE • Transmission and energy delivery may be overly expensive or otherwise infeasible • Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Current site leases were executed for wind projects; it is not yet known whether or not land owners would be amenable to solar leases	**Not Selected –** Project not selected during portfolio optimization process.
18122 [redacted] PPA**, optional BESS Development Wind [redacted] MW_{AC}** & [redacted] MW 1 Hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $32.877 M Levelized PB/REC: $[redacted]** Net Cost PV: $35.687 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control for project site is secured	• Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Solar development is viewed with skepticism in this area; history of active local opposition • Site may block the view of a local real estate development • Contribution to the peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18125 [redacted] PPA Development solar [redacted] MW_{AC} COD: 1/1/2023 Term: 15 or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $55.283 M Levelized PB/REC: $[redacted] Net Cost PV: $32.311 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience	• While interconnected to PSE's system, complex delivery due to available transmission capacity (ATC) constraints in the area • Site permitting is in a relatively early stage of development • Minimal information provided regarding community relations and or support	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18127 [redacted] PPA Development solar [redacted] MW$_{AC}$ COD: 12/31/2022 Term: 15** or 20 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $119.579 M Levelized PB/REC: $[redacted] Net Cost PV: $60.272 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Extensive solar energy development experience; developed, currently [redacted] solar installation in Washington State • Location on existing project site may provide economies of scale in developing and operating project • County has expressed support for the project	• Potential siting risks given proximity to wind turbines with required setbacks • Assumes use of PSE site control [redacted] • Interconnection and energy delivery assume use of PSE existing infrastructure and analysis assumes no coincidental curtailment due to overproduction between existing wind and proposed solar • Conditional Use Permit (CUP) required to permit project	**Not Selected –** Project not selected during portfolio optimization process.
18131 [redacted] PPA** or BTS Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 25 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $11.525 M Levelized PB/REC: $[redacted] Net Cost PV: $20.124 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposes to provide credit support in the form of a parent guarantee, letter of credit, or cash • Long-term site control for most of the site is secured • Community relations plan is strong compared to other proposals	• Less experienced than other counterparties • [redacted] MW offer configuration would likely exceed available transmission capacity • [redacted] tribe may request compensation from project	**Not Selected –** Project not selected during portfolio optimization process.
18132 [redacted] PPA** Development wind [redacted] MW COD: 01/01/2023 Term: 20 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $61.479 M Levelized PB/REC: $[redacted] Net Cost PV: $20.702 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Repower of existing wind project; site control and community relations risks are unlikely • Oregon Energy Facility Siting Council (EFSC) amendment secured during Phase 2 of the RFP	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18135 [redacted] PPA** or BTS Development solar [redacted] MW or [redacted]** MW solar Optional 25 MW, 4-hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $123.395 M Levelized PB/REC: $[redacted]** Net Cost PV: $55.724 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty with experience all over the world • Letter of intent with an option to lease has been signed for project lands	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Permitting plan is underdeveloped • There is no site control for current generation-tie line alignment • Project is on irrigated farmland--mitigation strategy not included in proposal, but developer has retained a "[redacted] PR firm" for support	**Not Selected –** Project not selected during portfolio optimization process.
18139 [redacted] PPA Development solar [redacted] MW solar* with optional [redacted] MW or [redacted] MW, 1.82-hr BESS COD: 1/1/2023 Term: 10 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $26.120 M Levelized PB/REC: $[redacted] Net Cost PV: $15.659 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large multi-national counterparty with greater-than-average renewable development experience	• Site control not yet secured and copy of anticipated letter of intent has not been provided • Energy delivery has been left to PSE, appears to be complicated, and may pose a feasibility risk • Respondent provided little to no evidence of a successful permitting strategy • Community relations matters were not covered sufficiently, and tribal support may be required	**Not Selected –** Project not selected during portfolio optimization process.
18163 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2022 Term: 18 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $19.635 M Levelized PB/REC: $[redacted]** Net Cost PV: $2.412 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Minimal risk regarding underlying projects • Interconnection at distribution voltage dictates that each as-generated MWh produces two Washington State RECs	• Little detail regarding underlying solar facilities	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18165 [redacted] REC purchase Underlying solar project [redacted] RECS per year Start of term: 1/1/2022** or 2024 Term: 16 or 18** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $13.181 M Levelized PB/REC: $[redacted] Net Cost PV: $1.755 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Minimal risk regarding underlying project	• Little detail regarding underlying solar facility	**Not Selected –** Project not selected during portfolio optimization process.
18166 [redacted] Development asset sale, BTS or PPA** Development wind [redacted] MW COD: 12/1/2020, 2021*, or 2022 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $114.836 M Levelized PB/REC: $[redacted] Net Cost PV: $121.737 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control established	• Significant concerns regarding the counterparty's ability to develop, finance, and construct the facility • Relatively small counterparty with inconclusive rights to the project's developmental assets • Timing of project is contingent on Bonneville Power Administration (BPA) infrastructure upgrades to enable transmission capacity • Project owner, [redacted], seemed uninterested in furthering project development via first-hand experience at [redacted] public hearing • Timeline as-proposed is likely infeasible and pricing is likely contingent on timing due to production tax credit (PTC) safe harbor	**Not Selected –** Project not selected during portfolio optimization process.
18175 [redacted] PPA, BTS**, or WSPP shaped Development wind [redacted] MW COD: 1/1/2021 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $176.514 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: $[redacted] Net Cost PV: $177.135 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control is secured • Western Systems Power Pool (WSPP) schedule C delivery is a unique value	• Counterparty and financing details will require data requests • Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Mid-C delivery will likely be necessary, which would negate a contribution to PSE's peak capacity • Permitting plan seems either underdeveloped or underrepresented in the proposal • Outreach plan is underdeveloped	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18176 [redacted] PPA** Development wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 20	Levelized cost: $[redacted] / MWh Portfolio benefit: $135,600 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: $[redacted] Net Cost PV: $242524 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Indications of strong local, state and environmental support • Potential to partner with a local Native American tribe • Located near [redacted] and in the same County [redacted] • Counterparty has indicated a plan to partner and/or otherwise engage an experienced renewable energy developer on the project	• Counterparty does not have experience designing, financing, building, owning or operating a large scale renewable or other energy project • Assumed use of [redacted] may be problematic for full proposed output • Additional detail needed regarding the real estate and permitting considerations necessary for the site	**Not Selected –** Project not selected during portfolio optimization process.
18179 [redacted] PPA** or DBS Development wind [redacted] MW** COD: 12/31/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $70.371 M Levelized PB/REC: $[redacted]** Net Cost PV: $28,121 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Real estate appears adequate and relatively low risk • Project size has been altered to address some local viewshed concerns	• History of considerable local and county-level opposition to the project • Counterparty bypassed the County permitting process by pursing permit approval through the state's Washington Energy Facility Site Evaluation Council (EFSEC) process	**Not Selected –** Project not selected during portfolio optimization process.
18190 [redacted] REC purchase 5 underlying proposed solar facilities [redacted] RECs / year COD: 01/01/2022 Term: 12, 15, or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $46.975 M Levelized PB/REC: $[redacted] Net Cost PV: $5.948 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Inexpensive RECs • Site control is secured • Washington Energy Facility Site Evaluation Council (EFSEC) projects have been approved by Governor Inslee	• Realizing full REC-output of underlying projects is unlikely due to interconnection issues • [redacted] is currently in litigation with PSE over interconnection issues with the underlying projects • [redacted] County opposes the EFSEC decision and has applied for judicial review • Major feasibility concerns with some and schedule concerns for all of the underlying projects • Projects sited on commercial agricultural land and many stakeholders in the county oppose development of these lands	**Not Selected –** Project not selected due to qualitative risks.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18201 [redacted] Direct load control Bring your own thermostat, smart water heater [redacted] MW COD: 1/1/2023 Term: 6 years	Not applicable, please see selection recommendation & rational section to the right	• Described as an industry leader by a recent [redacted] study • [redacted] • [redacted] manages all program implementation • Excellent financial strength, Washington based • The [redacted] MW option makes it a small scale project well suited for conceptual testing	• Proposal schedule includes significant ramp up of customer participation in first program year (2023); unclear if this is feasible • Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMs)	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
18205 [redacted] Commercial & industrial curtailment [redacted] MW COD: 1/1/2021 Term: 5 years	Not applicable, please see selection recommendation & rational section to the right	• Winter peak experience • Commercial and Industrial segment provides a diversification benefit	• Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMS) • Counterparty has only been established since 2016, and has not been financially profitable.	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
UP002 [redacted] REC purchase [redacted] RECs / year COD: 1/1/2020 Term: 15 years	Levelized cost: [redacted] / MWh Portfolio benefit: $4.502 M Levelized PB/REC: $ [redacted] Net Cost PV: $1.153 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Not applicable	• Price is higher and volume is smaller than other REC offers received in response this RFP.	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
XXXXX **Colstrip Transmission System Redirect** Puget Sound Energy N/A Transmission redirect [redacted] MW**, [redacted] MW COD: 01/01/2022 Term: 55-year book life	Levelized cost: [redacted] Portfolio benefit: $57.274 M Peak Capacity PB / kW-Yr: ($[redacted] Net Cost PV: $27.905 M Peak capacity contribution (MW): [redacted]) Annual REC contribution: [redacted])	• If feasible, redirect to Mid-C would provide a strong capacity resource	• Increased exposure to market prices (for redirect to Mid-C) • Redirects require Available Transmission Capacity (ATC) between the new points of receipt and delivery. With no ATC between Mid-C and BPAT.PSEI, a redirect to Mid-C is unfeasible. • Redirecting elsewhere on BPA's system would require appropriate ATC as well as an energy source at the redirect point, which may nullify contribution to peak capacity.	**Not Selected –** Proposal withdrawn from consideration due to lack of Available Transmission Capacity (ATC).

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REDACTED VERSION

Appendix C

2018 All Resources RFP
Phase 2 quantitative analysis scenarios and stand-alone proposal ranking results

2018 RFP Phase II Quantitative Results Summary- CAPACITY PROPOSALS

As of July 23, 2019

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

	ID	Capacity Proposals: Project Name	A: Technology	B: Term Start	C: Book Life / Contract Term	D: Nameplate Capacity (MW)	E: Peak Capacity Credit
1	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	78.8
2	18169	[redacted]	MT Wind	Dec-21	25	[redacted]	[redacted]
3	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	16.4
4	18173	[redacted]	MT Wind	Oct-22	20	[redacted]	[redacted]
5	18173	[redacted]	MT Wind	Oct-22	20	[redacted]	[redacted]
6	16161	BPA Peak Capacity Product	Capacity	Jan-22	5	100 MW	54.0
7	18105	[redacted]	Thermal	Jan-22	20	[redacted]	[redacted]
8	18103	[redacted]	Thermal	Jun-22	10	[redacted]	[redacted]
9	18105	[redacted]	Thermal	Jan-22	20	[redacted]	[redacted]
10	18201	[redacted]	DR	Jan-23	6	[redacted]	[redacted]
11	18205	[redacted]	DR	Jan-21	5	[redacted]	[redacted]
12	18190	[redacted]	MT Wind	Dec-22	20	[redacted]	[redacted]
13	XXXXX	Transmission Redirect				[redacted]	[redacted]

	Levelized PB /(Peak Capacity kW - YR): F: NO CO2 Low Load	G: NO CO2 Updated w/SB100	H: NO CO2	I: Low Societal	J: Mid Societal	K: High Societal
1–13	[redacted]					

	Ranking Levelized PB / (Peak Capacity kW - YR): L: NO CO2 Low Load	M: NO CO2 Updated w/SB100	N: NO CO2	O: Low Societal	P: Mid Societal	Q: High Societal
1	5	1	2	4	1	1
2	6	2	1	1	2	2
3	4	3	3	3	3	3
4	3	4	4	2	4	4
5	2	5	5	5	5	5
6	10	10	10	10	10	10
7	7	7	6	7	6	7
8	9	8	7	9	9	9
9	8	9	8	8	7	8
10						
11						
12						
13						

	Net Cost/KW-Yr: R: NO CO2 Low Load	S: NO CO2 Updated w/SB100	T: NO CO2	U: Low Societal	V: Mid Societal	W: High Societal
1–13	[redacted]					

	Ranking Net Cost/KW-Yr: X: NO CO2 Low Load	Y: NO CO2 Updated w/SB100	Z: NO CO2	AA: Low Societal	AB: Mid Societal	AC: High Societal
1	8	8	5	4	5	4
2	1	1	1	1	1	1
3	9	9	9	7	7	5
4	4	6	3	3	3	3
5	3	3	2	2	2	2
6	7	7	8	11	11	9
7	2	2	4	6	8	6
8	6	4	6	9	10	8
9	5	5	7	8	9	7
10						
11						
12						
13						

Notes:

1. The metric shown-- Levelized PB /(Peak Capacity kW - YR)-- is the portfolio benefit attributable to peak capacity service divided by the average peak capacity.
2. Generation Resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 30% or higher were considered "Capacity Resources".
3. Generation Resources with Mid-C delivery are not considered Capacity resources regardless of ELCC.
4. Capacity-specific contracts and products such as Demand Response, Transmission Redirect, and BPA Capacity are considered alongside generation resources
5. None of the demand response projects in Phase II were selected, as there was no identifiable deferred T&D value that would have made it a cost effective solution. In addition, the providers' lack of experience in integrating with PSE's DERM (Distributed Energy Resource Management) system was deemed to be a critical hindrance to implementation.
6. Transmission Redirect has been eliminated as a viable option to meet capacity need.
7. All of the Demand Response projects were eliminated as viable options to meet capacity need.
8. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

REDACTED VERSION

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2018 RFP Phase II Quantitative Results Summary- RENEWABLE PROPOSALS

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

As of July 23, 2019

	ID	Renewable Proposals: Project Name	Technology	Term Start	Book Life / Contract Term	Nameplate Capacity (MW)	Levelized PB / REC: NO CO2 Low Load; NO CO2 Updated w/SB100; NO CO2; Low Societal; Mid Societal; High Societal	Ranking Levelized PB / REC: NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	LEVELIZED $/REC: NO CO2 Low Load; NO CO2 Updated w/SB100; NO CO2; Low Societal; Mid Societal; High Societal	Ranking LEVELIZED $/REC: NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	Net Cost/REC: NO CO2 Low Load; NO CO2 Updated w/SB100; NO CO2; Low Societal; Mid Societal; High Societal	Ranking Net Cost/REC: NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2 base	Low Societal	Mid Societal	High Societal
1	18163	[redacted]	REC Only	Jan-22	18	54,000 REC	[redacted]	1	1	3	24	34	36	[redacted]							[redacted]	8	3	15	26	32	31
2	18165	[redacted]	REC Only	Jan-22	18	35,000 REC	[redacted]	2	2	4	23	35	35	[redacted]							[redacted]	12	6	18	28	35	33
3	18190	[redacted]	REC Only	Jan-20	20	110,000 REC	[redacted]	3	3	1	20	33	33	[redacted]							[redacted]	7	2	13	24	31	29
4	18169	[redacted]	MT Wind	Dec-21	25	300 MW	[redacted]	24	4	6	1	1	1	[redacted]	17	17	17	17	17	17	[redacted]	1	1	1	1	1	1
5	18190	[redacted]	REC Only	Jan-20	15	110,000 REC	[redacted]	19	5	14	26	32	32	[redacted]							[redacted]	9	4	16	27	33	32
6	18190	[redacted]	REC Only	Jan-20	12	110,000 REC	[redacted]	21	6	1	20	31	33	[redacted]							[redacted]	11	5	13	24	34	29
7	18173	[redacted]	MT Wind	Oct-22	20	295.55 MW	[redacted]	30	7	18	13	4	2	[redacted]	26	26	26	26	26	26	[redacted]	22	20	19	10	4	2
8	18190	[redacted]	Wind	Dec-21	20	100 MW	[redacted]	5	8	10	15	20	19	[redacted]	13	13	13	13	13	13	[redacted]	18	10	6	12	13	13
9	18135	[redacted]	Solar	Jan-23	20	250 MW	[redacted]	7	9	5	3	7	6	[redacted]	2	2	2	2	2	2	[redacted]	3	11	2	2	6	6
10	18111	[redacted]	Solar	Dec-22	20	200 MW	[redacted]	6	10	11	4	3	5	[redacted]	6	6	6	6	6	6	[redacted]	4	12	9	4	3	5
11	18127	[redacted]	Solar	Dec-22	15	275 MW	[redacted]	11	11	24	6	8	7	[redacted]	5	5	5	5	5	5	[redacted]	10	15	24	6	7	8
12	18135	[redacted]	Solar	Jan-23	20	80 MW	[redacted]	8	12	7	9	9	10	[redacted]	8	8	8	8	8	8	[redacted]	13	17	3	7	9	10
13	18125	[redacted]	Solar	Jan-23	20	110 MW	[redacted]	10	13	8	10	10	11	[redacted]	10	10	10	10	10	10	[redacted]	14	18	4	8	10	11
14	18127	[redacted]	Solar	Dec-22	15	275 MW	[redacted]	15	14	26	12	11	12	[redacted]	4	4	4	4	4	4	[redacted]	15	16	25	11	12	14
15	18132	[redacted]	Wind	Jan-23	20	98.9 MW	[redacted]	4	15	12	2	5	4	[redacted]	11	11	11	11	11	11	[redacted]	2	7	8	3	5	4
16	18125	[redacted]	Solar	Jan-23	15	110 MW	[redacted]	14	16	13	14	12	15	[redacted]	9	9	9	9	9	9	[redacted]	16	19	5	13	14	17
17	18173	[redacted]	MT Wind	Oct-22	20	202.1 MW	[redacted]	27	17	23	19	14	13	[redacted]	21	21	21	21	21	21	[redacted]	24	22	21	18	15	12
18	18111	[redacted]	Solar	Dec-22	20	200 MW	[redacted]	12	18	9	7	2		[redacted]	18	18	18	18	18	18	[redacted]	29	33	26	17	2	3
19	18139	[redacted]	Solar	Jan-23	10	100 MW	[redacted]	18	19	17	17	15	18	[redacted]	1	1	1	1	1	1	[redacted]	17	14	10	19	20	20
20	18132	[redacted]	Wind	Jan-22	20	98.9 MW	[redacted]	9	20	15	5	13	14	[redacted]	7	7	7	7	7	7	[redacted]	6	9	12	5	8	7
21	18114	[redacted]	Solar	Dec-21	20	100 MW	[redacted]	16	21	16	16	18	9	[redacted]	12	12	12	12	12	12	[redacted]	19	21	7	14	16	18
22	18179	[redacted]	Wind	Jan-21	25	250 MW	[redacted]	31	22	31	29	25	23	[redacted]	23	23	23	23	23	23	[redacted]	32	30	33	22	18	36
23	18166	[redacted]	Wind	Jan-21	25	192 MW	[redacted]	20	23	25	25	21	21	[redacted]	22	22	22	22	22	22	[redacted]	23	25	27	23	24	23
24	18132	[redacted]	Wind	Jan-21	20	98.9 MW	[redacted]	13	24	20	11	16	17	[redacted]	3	3	3	3	3	3	[redacted]	5	8	11	9	11	9
25	18170	[redacted]	Wind	Dec-20	20	200 MW	[redacted]	22	26	29	8	6	3	[redacted]	15	15	15	15	15	15	[redacted]	20	13	17	15	17	15
26	18122	[redacted]	Solar	Jan-23	20	90 MW	[redacted]	17	27	21	18	19	20	[redacted]	14	14	14	14	14	14	[redacted]	21	24	20	16	19	19
27	18166	[redacted]	Wind	Jan-23	25	192 MW	[redacted]	23	28	30	30	26	26	[redacted]	29	29	29	29	29	2	[redacted]	28	29	31	32	27	24
28	18131	[redacted]	Solar	Dec-22	25	35 MW	[redacted]	35	29	22	22	22	22	[redacted]	19	19	19	19	19	19	[redacted]	25	27	22	20	22	22
29	18139	[redacted]	Solar + BES	Jan-23	10	100 + 55 MW BE	[redacted]	26	30	28	27	24	25	[redacted]	16	16	16	16	16	16	[redacted]	27	26	28	29	25	25
30	18175	[redacted]	Wind	Jan-21	25	250 MW	[redacted]	34	31	33	33	29	29	[redacted]	27	27	27	27	27	27	[redacted]	31	28	29	30	26	35
31	18166	[redacted]	Wind	Jan-22	25	192 MW	[redacted]	25	32	32	32	27	27	[redacted]	28	28	28	28	28	28	[redacted]	30	31	32	33	29	27
32	18170	[redacted]	Wind	Dec-20	20	200 MW	[redacted]	29	33	19	28	17	16	[redacted]	24	24	24	24	24	24	[redacted]	33	32	30	31	21	16
33	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	[redacted]	33	34	35	34	28	28	[redacted]	30	30	30	30	30	30	[redacted]	35	34	34	34	28	26
34	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	[redacted]	28	25	27	31	23	24	[redacted]	20	20	20	20	20	20	[redacted]	26	23	23	21	23	21
35	18139	[redacted]	Solar + BES	Jan-23	10	100 +110 MW BE	[redacted]	32	35	34	35	30	30	[redacted]	25	25	25	25	25	25	[redacted]	34	35	35	35	30	28
36	18107	[redacted]	Hydro-Run	Jan-21	20	38 MW	[redacted]	36	36	36	36	36	31	[redacted]	31	31	31	31	31	3	[redacted]	36	36	36	36	36	34
	18190	[redacted]	MT Wind				[redacted]							[redacted]							[redacted]						

Notes:
1. The metric shown-- Levelized PB / RECs-- is the portfolio benefit attributable divided by RECs generated.
2. For generation resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 3.2% or higher, the Renewable Portfolio Benefit was recomputed by isolating the portfolio benefit attributable to REC generation. Resources with Mid-C delivery are considered to have zero capacity value.
3. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

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Appendix D

2018 All Resources RFP
Phase 2 qualitative assessment dashboard

At-a-glance **qualitative assessment** of Phase 2 proposals
(as of July 23, 2019)

Key: Green = Low Risk; Yellow = Acceptable Risk; Orange = Substantial Material Risk; Red = Fatal Flaw

	Project Counterparty (Project ID)	REC contribution (RECs/yr)	MW Capacity contribution	Term start / length	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk	Other considerations*
1	**SPI Biomass PPA** Sierra Pacific Ind. (18100)	[redacted]	16	1/2021 17 yrs	Operating	BPAT. PSEI	Green	Green	Green	Green	Green	Offers renewable resource diversity to portfolio
2	[redacted]	[redacted]	[redacted]	12/2021 25 yrs	Early Develop	[redacted]	Green	Yellow	Yellow	Yellow	Yellow	MT proposals are mutually exclusive
3	[redacted]	[redacted]	[redacted]	10/20222 0 yrs	Early Develop	[redacted]	Green	Yellow	Yellow	Yellow	Yellow	MT proposals are mutually exclusive
4	[redacted]	[redacted]	[redacted]	1/2022 18 yrs	Mature Develop	n/a	Green	Green	Green	Green	Green	Screening model selects RECs for arbitrage benefit, not to meet RPS
5	[redacted]	[redacted]	[redacted]	1/2022 18 yrs	Mature Develop	n/a	Green	Green	Green	Green	Green	Screening model selects RECs for arbitrage benefit, not to meet RPS
6	[redacted]	[redacted]	[redacted]	1/2020 15 yrs	Operating	n/a	Green	Green	Green	Green	Green	Screening model selects RECs for arbitrage benefit, not to meet RPS
7	[redacted]	[redacted]	[redacted]	12/2022 20 yrs	Early Develop	Mid-C*	Green	Green	Yellow	Yellow	Yellow	Mid-C delivery due to lack of transmission ATC
8	[redacted]	[redacted]	[redacted]	12/2022 20 yrs	Early Develop	Mid-C	Green	Yellow	Yellow	Yellow	Yellow	
9	[redacted]	[redacted]	[redacted]	12/2022 20 yrs	Early Develop	[redacted]	Orange	Green	Yellow	Orange	Green	Proposes independently operated solar co-located [redacted]
10	[redacted]	[redacted]	[redacted]	12/2022 20 yrs	Early Develop	[redacted] Sub	Green	Yellow	Yellow	Yellow	Yellow	
11	**BPA Peak Cap Sys PPA** BPA (18161)	0	54	1/2022 5 yrs	Operating	BPAT. PSEI	Green	Green	Green	Green	Green	
12	[redacted]	[redacted]	[redacted]	12/2022 20 yrs	Mature Develop*	Mid-C	Green	Green	Green	Green	Green	Operational project subject to repower
13	[redacted]	[redacted]	[redacted]	12/2021 20 yrs	Mature Develop	Mid-C	Green	Green	Green	Yellow	Orange	Mid-C delivery due to lack of transmission ATC
14	**Golden Hills Wind** (shaped / unshaped) Avangrid (18170)	[redacted]	79	12/2021 25 yrs	Mature Develop	BPAT.PSEI	Green	Green	Green	Yellow	Yellow	

**Table summarizes certain key qualitative findings of Phase 2 resources. See RFP Executive Summary (Appendix B) and proposal memos for detailed findings.*

At-a-glance **qualitative assessment** of Phase 2 proposals *(as of July 23, 2019)*

Key	
Low Risk	
Acceptable Risk	
Substantial Material Risk	
Fatal Flaw	

	Project Counterparty (Project ID)	REC contribution (RECs/yr)	MW Capacity contribution	Term start / length	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk	Other considerations*
15	[redacted]			1/2022 20 yrs	Early Develop	[redacted]	Substantial Material Risk	Low Risk	Fatal Flaw	Substantial Material Risk	Fatal Flaw	
16				6/2022 10 yrs	Operating	BPAT.PSEI (or Busbar)	Substantial Material Risk	Low Risk	Low Risk	Substantial Material Risk	Acceptable Risk	
17				10/20222 0 yrs	Early Develop	n/a	Fatal Flaw	Low Risk	Low Risk	Substantial Material Risk	Substantial Material Risk	
18				12/2022 10 yrs	Early Develop	Busbar	Acceptable Risk	Acceptable Risk	Substantial Material Risk	Acceptable Risk	Acceptable Risk	
19				12/2022 20 yrs	Early Develop	Mid-C	Acceptable Risk	Substantial Material Risk	Substantial Material Risk	Acceptable Risk	Substantial Material Risk	
20				1/2022 20 yrs	Early Develop	Busbar	Substantial Material Risk	Low Risk	Fatal Flaw	Substantial Material Risk	Fatal Flaw	
21				12/2022 20 yrs	Early Develop	Mid-C	Acceptable Risk	Acceptable Risk	Acceptable Risk	Fatal Flaw	Acceptable Risk	
22				12/2021 25 yrs	Early Develop	[redacted] Sub	Low Risk	Acceptable Risk	Acceptable Risk	Acceptable Risk	Acceptable Risk	
23				12/2022 25 yrs	Early Develop	BPAT.PSEI (or Busbar)	Acceptable Risk	Acceptable Risk	Acceptable Risk	Substantial Material Risk	Acceptable Risk	
24				1/2019 20 yrs	Operating	[redacted] Sub	Acceptable Risk	Low Risk	Low Risk	Substantial Material Risk	Low Risk	
25				12/2022 20 yrs	Early Develop	[redacted]	Substantial Material Risk	Substantial Material Risk	Substantial Material Risk	Substantial Material Risk	Low Risk	MT proposals are mutually exclusive
26				2023 6 yrs	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D values; concern about ability to integrate with in-development DERMS.**					
27				2019 5 yrs	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D values; concern about ability to integrate with in-development DERMS.**					

Table summarizes certain key qualitative findings of Phase 2 resources. See RFP Executive Summary (Appendix B) and proposal memos for detailed findings.

*** Distributed energy resource management system (DERMS)*

Appendix E

2018 All Resources RFP
Phase 2 detailed optimization results

Portfolio Optimization Summary: as of 7.23.2019

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio: [redacted] MW + Renewables	(I) As Proposed Optimized Portfolio: [redacted] MW + Renewables	(J) Optimized Lowest Cost Portfolio to Solve for 0 Capacity Deficit with Generic Battery	(K) Backup Portfolio: [redacted] + Renewables	(L) Contingency Portfolio: [redacted] + No MT Wind	(M) Optimized Lowest Cost Portfolio with NO Carbon Costs Consideration	(N) Optimized Lowest Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X	X	X			X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X	X	X	X	X		X
3a	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	X						
3b	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]		X	X			X	X
4a	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]				X			
4b	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
5a	18170	Wind	Golden Hill Shaped	200 MW	77 MW	[redacted]	X	X	X	X			X
5b	18170	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		
6	18132	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		X
7	18179	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
8	18166	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
9	18175	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18125	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18111	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18127	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18135	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18139	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18131	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		
####	18114	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18122	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18163	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	18165	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	UP-002	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	18103	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X	X	
####	XXXXX	Generic	Generic Peaker	237 MW	224 MW	N/A							
####	XXXXX	Generic	Generic Battery	61 MW	23 MW	N/A			X				X
####		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
####		Peak Capacity Surplus / (Deficit) in 2022 [4]					[redacted] MW [4]	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
####		Total Annual RECs					2,189,656	1,986,862	1,986,862	1,773,109	1,044,255	1,216,764	6,481,035
####		Portfolio Benefits - $M					$408	$397	$273	$286	$275	$477	-$491
####													
####		With Consideration of Social Cost of Carbon:											
####		Portfolio Benefits w/ Carbon Costs as an Adder - $M [5]					$1,038	$934	$829	$716	-$42	$354	$2,024
####		Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M					$959	$937	$800	$605	$281	$667	$2,175

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Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.
2. The optimization model chose a portfolio with [redacted] MW from [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted] Current indicative results reflect pricing based on the 300MW offer.
3. The current project COD for [redacted] is Dec 2021. There has been perceived timing risks [redacted] If the COD is delayed to Dec 2022 to mitigate this risk, NPV of [redacted] in total PPA costs is projected. The next highest ranked portfolio [redacted] is $123M more expensive than the recommended portfolio, yet sharing the same timing risks on transmission.
4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by 1) short-term capacity purchase for $720k per year; 2) a 20MW battery for $41M.
5. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

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2018 All Resources RFP Status Update

PUGET SOUND ENERGY

EMC Informational

November 21, 2019

Weimin Dang

Business Initiatives

CONFIDENTIAL

Informational

<u>Intended recommendation</u>: At next month's EMC meeting, ask for approval to execute contracts for the following projects:

- SPI Biomass (counterparty: Sierra Pacific Industries) 17 MW, 17-year PPA
- BPA peak capacity product (counterparty: BPA) 100 MW, 5-year call option
- Morgan Stanley System PPA (counterparty: Morgan Stanley): 100 MW, 5-year PPA (unsolicited proposal received on October 23, 2019)

[redacted]

Changes since October EMC

1. Updated peak capacity need from draft 2019 IRP
2. New unsolicited proposal from Morgan Stanley
3. Updated portfolio optimization results
4. Negotiation status update for all shortlisted RFP projects:
   - SPI
   - BPA
   - Golden Hills
   - [redacted]

REDACTED VERSION

Draft 2019 IRP projected peak capacity need after current shortlisted RFP resources

[redacted]

REDACTED VERSION

Unsolicited proposal: Morgan Stanley System PPA

Proposed terms are indicative, subject to change

Product:
- [redacted] 100 MW of firm heavy load hour (HLH) energy (16/6)
- Zero emission, no RECs
- Fixed or indexed pricing

Term:
- [redacted] 5 years starting 1/1/2022
- With or without Q2

Point of Delivery:
- BPAT.PSEI or other PSE designated point

LCOE: 5-year, no Q2, 100 MW
- Fixed: $[redacted] MWh
- Indexed + Hedging: $[redacted] MWh
- 81 MW peak capacity contribution

					Pricing structure alternatives		
Term	Volume	Details	Start	End	Fixed Price	MIDC + Adder	Hedge + Adder
3 Year	[redacted] MW	HLH Delivery	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
3 Year	100 MW	HLH Delivery	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
5 Year	[redacted] MW	HLH Delivery	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
5 Year	100 MW	HLH Delivery	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
3 Year	[redacted] MW	HLH Delivery No Q2	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
3 Year	100 MW	HLH Delivery No Q2	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
5 Year	[redacted] MW	HLH Delivery No Q2	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
5 Year	100 MW	HLH Delivery No Q2	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]

*Main pricing difference between hedging cost and offered fixed price is due to different pricing dates.

[redacted] ENERGY

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Adding 100 MW Morgan Stanley System PPA will help mitigate [redacted] COD risk and Colstrip risk

[redacted]

Recommendation:

5 years 100 MW HLH delivery no Q2 with fixed price

Benefits:

- Existing counterparty with good reputation
- Zero emission energy from a large renewable pool
- Relatively low capacity pricing
- Fixed pricing reduces exposure to market price volatility ([redacted] MWh/year)

Risk & Consideration:

- No renewable attributes (RECs)

[redacted] SOUND ENERGY

Updated portfolio optimization

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Recommended Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X
3	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	X
4	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	
5	18170	Wind	Golden Hills Shaped	200 MW	77 MW	[redacted]	X
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW	[redacted]	X
7		**Total Peak Capacity Credits - MWs**					**[redacted] MW**
8		**Total Annual RECs**					**2,189,656**
9		**Portfolio Benefits - $M**					**$679**
10		**Portfolio Benefits w/ Carbon Costs as an Adder - $M [2,3]**					**$1,179**

Peak Capacity and REC Need 2022-2025	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
Peak Need / (Surplus) after Resources	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
REC Need	0	233,449	691,864	700,482
REC Need / (Surplus) after Resources	-2,189,656	-1,956,207	-1,497,791	-1,489,174

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.

2. The social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.

3. Emission rate of 0.437 metric tons of CO_2/MWh for market purchases is included in social cost of carbon calculation.

REDACTED VERSION

REDACTED VERSION

Negotiation status update for all shortlisted RFP projects

1. SPI biomass: near agreement on final terms and price. Intend to ask for approval to execute the contract in next month's EMC.

2. BPA peak capacity product: near agreement on final terms. Intend to ask for approval to execute the contract in next month's EMC.

3. Golden Hills Oregon wind: negotiating with counterparty.

4. [redacted] Montana wind: negotiating with counterparty.

[redacted] SOUND ENERGY

REDACTED VERSION

Informational

Intended recommendation: At next month's EMC meeting, ask for approval to execute contracts for the following projects:

- SPI Biomass (counterparty: Sierra Pacific Industries) 17 MW, 17-year PPA
- BPA peak capacity product (counterparty: BPA) 100 MW, 5-year call option
- Morgan Stanley System PPA (counterparty: Morgan Stanley): 100 MW, 5-year PPA (unsolicited proposal received on October 23, 2019)

[redacted] SOUND ENERGY

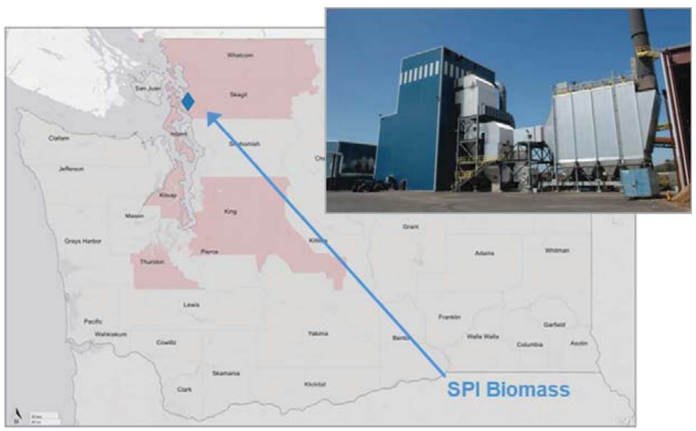
APPENDIX A

Draft terms for projects we intend to recommend for approval in next month's EMC

Selected proposal: SPI Biomass PPA

Seller:
- Sierra Pacific Industries (SPI)

Product:
- Delivery of 17 MW of firm capacity (24/7)
- Delivery of up to 20 MW worth of energy (3 MW is variable)
- Minimum availability: [redacted]% Nov-Feb, [redacted]% Annual (92% historic)
- Contribution to Peak Capacity: 16 MW



* The SPI Burlington lumber mill began operating in 2001. The biomass cogeneration facility was added in 2007. Facility is subject to an existing contract with a broker to sell the output through 2020.

** Levelized cost of energy is $[redacted].

Term:
- Start: Jan. 1, 2021*
- 17 years

Point of Delivery:
- SPI.CABO.GEN at Fredonia Substation *(also point of interconnection)*

Pricing: Currently negotiating price. Intend to return to the EMC in December with final price.

Calendar Year	Contract Year	Energy Price ($/MWh	Expected Energy Output (MWh/year)
2021	1	[redacted]	
2022	2		
2023	3		
2024	4		
2025	5		
2026	6		
2027	7		
2028	8		
2029	9		
2030	10		
2031	11		
2032	12		
2033	13		
2034	14		
2035	15		
2036	16		
2037	17		

[redacted] SOUND ENERGY

REDACTED VERSION

Selected RFP proposal: BPA Capacity Tolling Agreement (CTA)

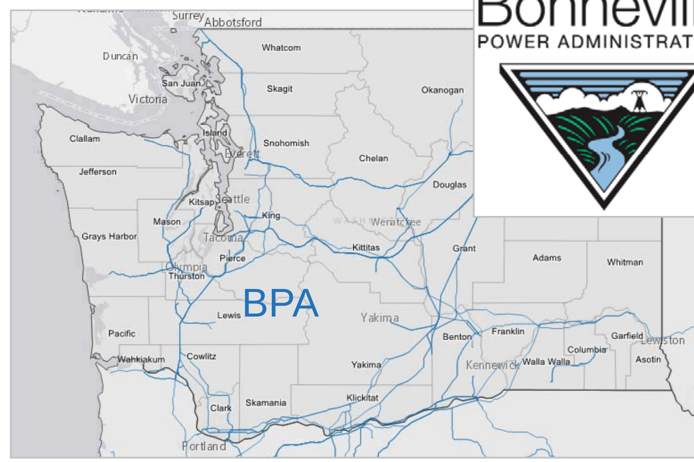
Proposed terms are subject to change

Seller:
- Bonneville Power Administration (BPA)

Product:
- Capacity: 100 MW
- Firm Capacity that may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis for up to [redacted]
- Western Systems Power Pool (WSPP) Schedule C, heavy load hour (HLH), low carbon firm energy

Term:
- Start: 01/01/2022
- Term: 5 years

Point of Delivery:
- BPAT.PSEI
- PSE Covington 230 kV Substation



Price*:

Calendar Year	Contract Year	Energy Price ($/MWh)	Possible Energy Output (MWH/Year)		Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]	[redacted]		[redacted]	[redacted]
2023	2	[redacted]	[redacted]		[redacted]	[redacted]
2024	3	[redacted]	[redacted]		[redacted]	[redacted]
2025	4	[redacted]	[redacted]		[redacted]	[redacted]
2026	5	[redacted]	[redacted]		[redacted]	[redacted]

- Mid-C price will be based on Powedex hourly price for each MWh delivered.
- Capacity Price [redacted] that will be indexed to BPA PTP and Ancillary Service Schedules 1 & 2. Rate will be updated on the first day of each new rate period.

[redacted] SOUND ENERGY

REDACTED VERSION

APPENDIX B

Detailed optimization summary

Portfolio Optimization Summary: as of 11.21.2019

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Recommended Portfolio: [redacted]+ Renewables	(I) Backup Portfolio: [redacted]+ Renewables	(J) Contingency Portfolio: No MT Wind	(K) Optimized Least Cost Portfolio with NO Carbon Costs Consideration	(L) Optimized Least Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X	X		X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X	X			X
3a.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	X			X	X
3b.	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
4a.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]		X			
4b.	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
5a.	18170	Wind	Golden Hills Shaped	200 MW	77 MW	[redacted]	X	X			X
5b.	18170	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		
6	xxxxx	Systerm PPA	Morgan Stanley Sys PPA	100 MW	81 MW	[redacted]	X	X	X		X
6	18132	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		
7	18179	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
8	18166	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
9	18175	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
10	18125	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
11	18111	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
12	18127	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
13	18135	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
14	18139	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X		X
15	18131	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
16	18114	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
17	18122	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
18	18163	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
19	18165	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
20	UP-002	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
21	18103	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]			X	X	
22	XXXXX	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]					
23	XXXXX	Generic	Generic Peaker	237 MW	224 MW	N/A					
24	XXXXX	Generic	Generic Battery	175 MW	66 MW	N/A					
25		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
26		Total Annual RECs					2,189,656	1,773,109	1,297,005	1,419,568	2,406,449
27		Portfolio Benefits - $M					$679	$619	$739	$926	$658
28		Portfolio Benefits w/ Carbon Costs as an Adder - $M [2,3]					$1,179	$945	$827	$1,046	$1,206

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Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.
2. The social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.

PSE PUGET SOUND ENERGY

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REDACTED VERSION

PUGET SOUND ENERGY

2018 RFP Evaluation Process Document

F.2 Presentations to WUTC Staff

2018 All Resources and Demand Response RFPs

PUGET SOUND ENERGY

Update to WUTC: Proposals Received and Evaluation Process

September 12, 2018

Agenda

- RFP schedule and resource need
- Proposals received
- All Resources RFP evaluation process
- Demand Response RFP evaluation process
- Next steps

[redacted] SOUND ENERGY

1

RFP schedule and resource need

Presenter: Cindy Song

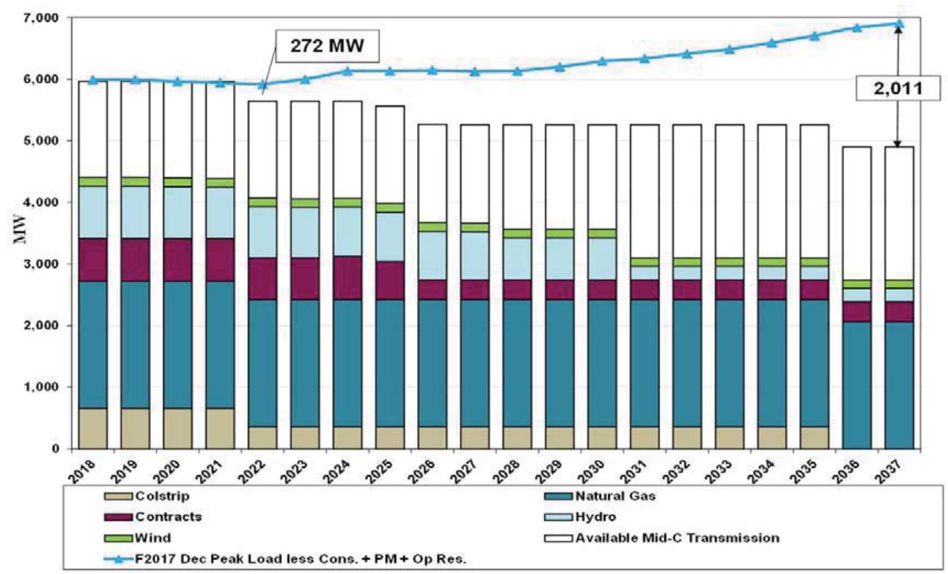
2018 RFP schedule

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
✓	June 28, 2018	WUTC approved Demand Response and All Resource RFPs
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
	Feb/Mar 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
	Q2 2019	Complete Phase 2 evaluation, select final short list

[redacted]

PSE seeks 272 MW of capacity by end of 2022

- Target online date by 2022*
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably
- Market PPAs must be delivered to BPAT.PSEI**

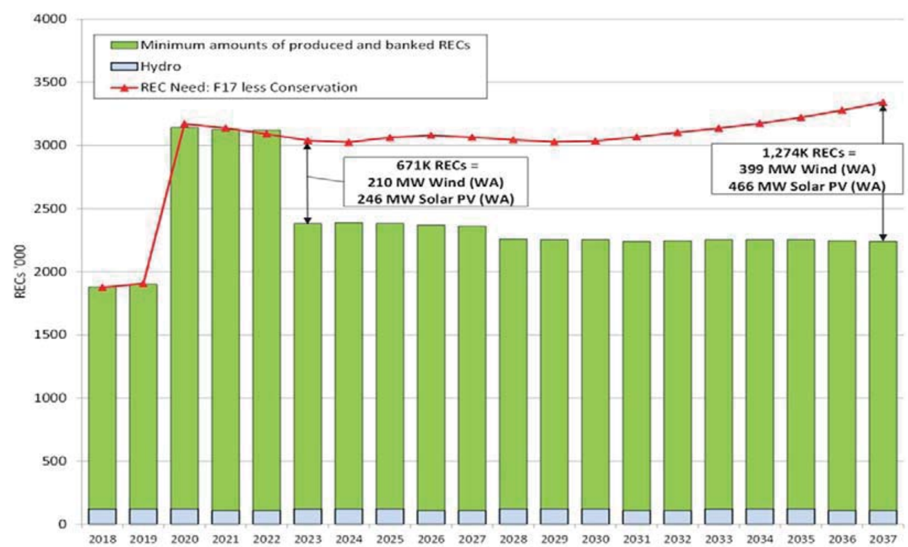


[redacted]

*Target online date is based on earliest need, but will not disqualify long-lead resources.
**Market / Non-unit contingent PPAs delivered to Mid-C or anywhere outside PSE's system are not eligible for this RFP.

Projected need to meet the RPS is 671,000 RECs 2023

- REC need is driven by the increase in the RPS from 9% to 15% in 2020
- PSE's inventory of banked RECs delays need until 2023
- PSE will consider early delivery dates to take advantage of tax incentives prior to phase out
  - PSE will evaluate the tradeoff between capturing the benefit of a higher tax incentive and the carrying cost of acquiring early



- A renewable resource may count toward peak capacity need based on coincident winter peak production
  - PSE will engage reputable consultant for resource due diligence and to develop synthetic distributions for peak capacity calculation
- Proposals which demonstrate that they qualify for Washington state apprenticeship labor credit will add 1.2x multiplier to REC output

[redacted]

* If proposing a qualifying renewable resource located outside the Pacific Northwest as defined for the Bonneville Power Administration in Section 3 of the Pacific Northwest Electric Power Planning and Conservation Act (94 Stat. 2698; 16 U.S.C. Sec. 839a), electricity from the facility must be delivered into Washington state on a real-time basis without shaping, storage, or integration services.

2

Proposals received

Presenter: Sheri Maynard

Nearly 100 proposals received

Largest response to an All Source RFP to date

	2018 All Resource and Demand Response RFPs		2017 Renewables Only RFP (Green Direct 2.0)[1]		2011 All Source RFP		2010 All Source RFP		2008 All Source RFP		2005 All Source RFP	
Resource Type	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW[1]	# Proposals	Max Cap MW
Biomass	2	72			3	61	9	590				
Biomass + BESS	1	15										
Coal - Traditional + IGCC					1	500			1	100	6	4950
Cold Fusion					1	1880						
Demand Response	6	154					1	80			1	34
Distributed Generation											1	5
Geothermal	2	43									1	48
Hydro - Run of River	1	38	2	4	1	77	2	105	3	165	3	139
Natural Gas-fired Generation[2]	4	1377			10	2624	18	5342	10	2588	17	4307
Solar - PV	16	2240	17	574	2	24	1	10				
Solar - PV + BESS	20	2848										
Storage - Battery ("BESS")	17	1265			2	251						
Storage - Pumped Hydro	2	900										
System PPA / Call Option	1	100			4	400	10	n/a	9	1675	7	400
Unbundled RECs[3]	4						2	n/a				
Waste-to-Energy / Landfill Gas					1	23					1	5
Wind - Off Shore	1	400										
Wind On Shore	16	3303	20	2601	4	369	21	3776	8	862	10	1165
Wind + Winter Sys PPA	1	371										
Wind + Solar and/or BESS	2	464	4	339								
TOTAL	96	13,590	43	3,518	29	6,209	64	9,903	31	5,390	47	11,053

[1] The 2017 RFP sought large and small (<5 MW) renewable resources to serve multiple voluntary green power programs.

[2] Natural gas-fired generation may include CCCTs, SCCTs, reciprocating engines, combined heat and power facilities and gas turbine equipment sales.

[redacted] SOUND ENERGY

92% of proposals offered a PPA option, 29% of proposals offered an ownership option

Resource Type	# Proposals	Max Cap MW[1]	Offer Structure(s) Own	PPA/Toll/ Other Agmt	Both
Biomass	2	72		2	
Biomass + BESS	1	15		1	
Geothermal	2	43			2
Hydro - Run of River	1	38		1	
Natural Gas CCCT	2	1020		1	1
Natural Gas SCCT	1	245			1
Natural Gas Recip	1	112	1		
Solar - PV	16	2240	1	14	1
Solar - PV + BESS	20	2848		18	2
Storage - Battery ("BESS")	17	1265	1	8	8
Storage - Pumped Hydro	2	900			2
Peak Capacity Call Option	1	100		1	
Unbundled RECs[2]	4	n/a		4	
Wind - Off Shore	1	400			1
Wind On Shore	16	3303	3	11	2
Wind + Winter Sys PPA	1	371		1	
Wind + Solar + BESS	2	464	1	1	
DR Direct Load Control	4	109		4	
DR C&I Curtailment[3]	2	44		2	
TOTAL	96	13,589	7	69	20

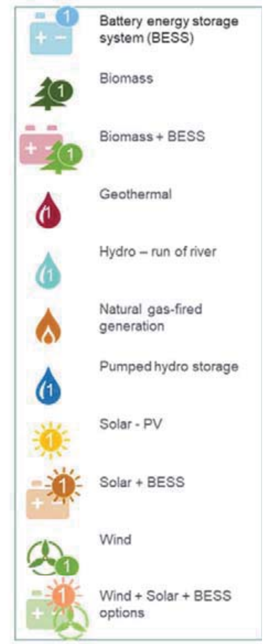
- 90% of proposed projects are in development stage
- Many proposals included multiple offer options, such as:
  - Multiple structure options:
    - development rights
    - asset purchase
    - PPA, Toll or other agreement
  - Fixed/escalating PPA pricing
  - Various term lengths and/or start dates
  - Hybrid options to include storage, or to pair solar with wind
  - Transmission delivery points

[redacted]

[1] MW column reflects total combined potential capacity
[2] Unbundled RECs: 1 offer is for a 10-year agreement for up to 100,000 RECs; the other three offers are due to arrive this week from the same entity (REC volume TBD)

70% of projects proposed are located in Washington

[redacted]



REDACTED VERSION

3

All Resources RFP evaluation process

Presenters: Ryan Sherlock, Bob Williams

Evaluation process is cross-functional and thorough

RFP proposals due
August 17, 2018

↓

Phase 1 evaluation
Qualitative fatal flaw review and cost screen

↓

Phase 2 evaluation
Due diligence evaluation and risk analysis

↓

Announce short list
Negotiation to follow

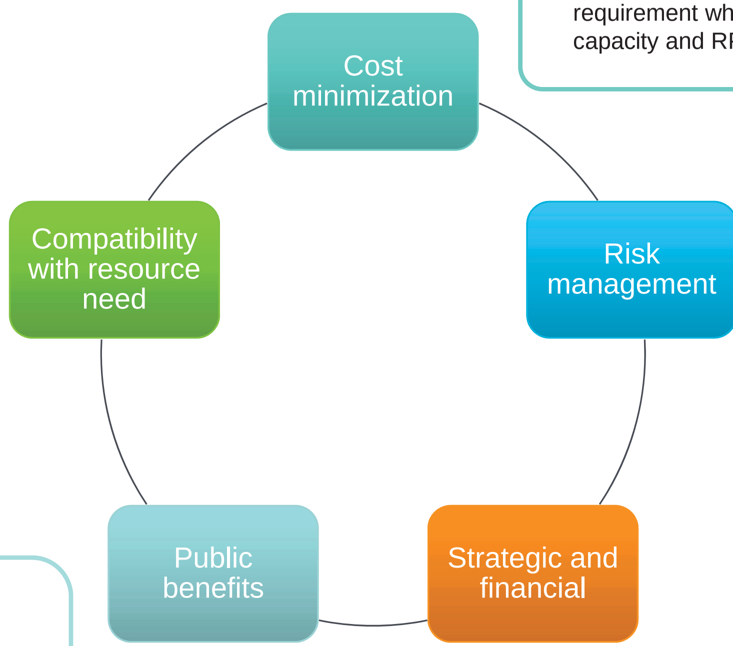
	Evaluation team	Scope of review
Phase 1: Prohibitive cost and fatal flaw screening	• Commercial & Development • Quantitative • Transmission & Integration • Technical / Plant Operations • Fuel Supply • Permitting / Environmental • Real Estate • Community / Government Relations • Power Supply Operations	• Fatal flaw screening of key qualitative attributes (See slide #13) • Static quantitative analysis screening by resource type • Flexibility analysis
	Most favorable resources selected to proceed to Phase 2. Respondents notified of status.	
Phase 2: Due Diligence	Phase 1 team, plus: • Credit • Regulatory / Legal • Property Accounting • Finance • Tax • Insurance • Other as needed • e.g. IT, HR, Compliance, etc.	• Formal data requests to respondents • Thorough evaluation of qualitative attributes based on evaluation criteria set forth in RFP • Quantitative portfolio optimization and risk analysis • Scenario analysis
	Final short list selected. Respondents notified of status.	

[redacted]

Evaluation criteria help identify proposals with lowest reasonable cost and risk*

- Output can be optimized to match PSE's need or resource production matches PSE's need
- Firm delivery of capacity to PSE's system
- Matches timing of resource need; flexibility

- Lower/ lowest portfolio revenue requirement while meeting capacity and RPS need



- Commercially-proven technology with long-term reliability
- Reduces PSE's risk exposure to changes in power prices, environmental policies, fuel prices, hydro generation, etc.

- Economic benefit to the community
- Local support for the project
- Low environmental impact

- Offer viability: project and respondent's ability to deliver
- Appropriate credit support or liquidated damages offered by respondent
- No PSE credit support required

*See Exhibit A of the All Resources RFP for complete evaluation criteria.

Phases allow PSE to focus on most favorable proposals for robust analysis

Phase 1: Screening	Phase 2: Due Diligence
Qualitative review based on evaluation criteria	Qualitative review based on evaluation criteria
Fatal flaw screening	Due diligence evaluation
	Data requests
	Respondent engagement
	Site visits
Static quantitative analysis by resource type	Quantitative portfolio optimization
Scenario analysis	Scenario analysis
Flexibility analysis	Flexibility analysis
• **Purpose:** Eliminate proposals with prohibitive costs and fatal flaws • **Result:** Identify Candidate List[1] for Phase 2 review	• **Purpose:** Thoroughly examine proposals and identify lowest reasonable cost and risk portfolio • **Result:** Identify Short List for negotiation

[1] The Candidate List represents the lowest cost resources with no fatal flaws, and a representative sampling of renewable, hybrid, storage, demand response and capacity resources.

[redacted]

Qualitative evaluation asks key questions designed to identify proposal benefits and risks*

- ✓ Are the offer terms acceptable?
- ✓ Is project operating or likely to meet proposed commercial operation date?
- ✓ What is the nameplate capacity of the project? Sized appropriately to help meet need?
- ✓ Where is the project located? Benefits/risks?
- ✓ Does project have site control?
- ✓ What is the permitting status?
- ✓ Status of transmission and interconnection?
- ✓ What is the selected technology? History of reliable operation?
- ✓ What is the useful life of the project?
- ✓ Does the project have community support?
- ✓ What is the status of all relevant agreements?
  Examples: key component supply contracts (e.g. wind turbines), service and maintenance, EPC contract, BOP, interconnection, transmission, permits, site control, etc.

- ✓ Project output?
- ✓ Net capacity factor (NCF)?
- ✓ Degradation?
- ✓ Eligible for tax incentives?

- ✓ Capacity (MW) and duration (MWh)?
- ✓ Roundtrip efficiency?
- ✓ Degradation / augmentation?
- ✓ Flexibility and T&D benefits?

- ✓ Fuel supply and transportation secured? If not, status?
- ✓ Operational characteristics?
- ✓ Emissions? Permitting risks? If operating, compliance history?

- ✓ Project output?
- ✓ Net capacity factor (NCF)?
- ✓ Eligible for tax incentives?

*This list is illustrative only. It does not reflect all eligible resource types or a complete list of criteria considered in the All Resources RFP evaluation. For more detail, see RFP Exhibit A (Evaluation Criteria) and Exhibit B (Proposal Requirements).

[redacted]

Examples of fatal flaws

- Significantly higher cost than alternatives
- Proposal fails to provide sufficient information to substantiate a viable project
- No transmission secured and no available transmission between the project and PSE’s system
- Insufficient fuel supply or fuel transportation to generation project
- Commercially unproven technology
- Unable to obtain necessary permits to execute the project
- Excessive counterparty risk likely to cause counterparty to be unable to complete the project or meet contractual obligations to PSE
- Regulatory or legal risks associated with non-compliance or other obligations that could adversely impact PSE

[redacted]

Projects are evaluated on a cost and risk basis delivered to PSE's load

Off PSE's system

1. Delivery to PSE's system (e.g. BPAT.PSEI, etc.)

- Developer provides transmission solution to PSE's load center
- Risk analysis: Is there ATC? Are ancillary services included in price? Is transmission long-term firm? Does it include rollover rights?

2. Delivery to Mid-C

- Developer provides transmission solution to PSE via Mid-C
- PSE applies cost to use PSE's existing transmission and integration costs
- Risk analysis: Does developer have long-term firm transmission to Mid-C? If not, is there ATC? Are ancillary services included in price?

3. Delivery to project busbar

- Leaves transmission solution to PSE
- PSE applies cost of transmission from project to PSE's load (inc. ancillary services and any cost to use existing PSE transmission)
- Risk analysis: Is long-term firm ATC available? Rollover rights?

On PSE's system

1. On system

- Project interconnects within PSE's service territory
- PSE applies integration costs
- PSE evaluates transmission solution (and all applicable costs) to PSE's load
- Risk analysis: Is resource interconnection ERIS or NRIS? Is there ATC? Is transmission long-term firm? Does it include rollover rights? Are ancillary services included in price?

Notes:
Available Transmission Capacity (ATC)
Energy Resource Interconnection Service (ERIS)
Network Resource Interconnection Service (NRIS)

Resource costs

PSE uses three models to analyze resource costs and characteristics

PSM*

Fixed costs

- Capital costs
  - Return on capital (rate base)
  - Depreciation
- Fixed O&M
- PPA pricing
- Transmission
- Avoided T&D costs
- Pipeline costs
- Property taxes
- Insurance
- Federal income tax
  - Tax incentives (PTC & ITC)
  - Tax depreciation
  - Deferred taxes

Aurora

Variable costs

- Fuel costs
- Variable O&M
- Variable transmission
- Carbon pricing
- Startup costs
- Plant technical information
  - Capacity (ISO & 23º)
  - Heat rates
  - Forced and planned outages
  - Renewable output
  - Emissions

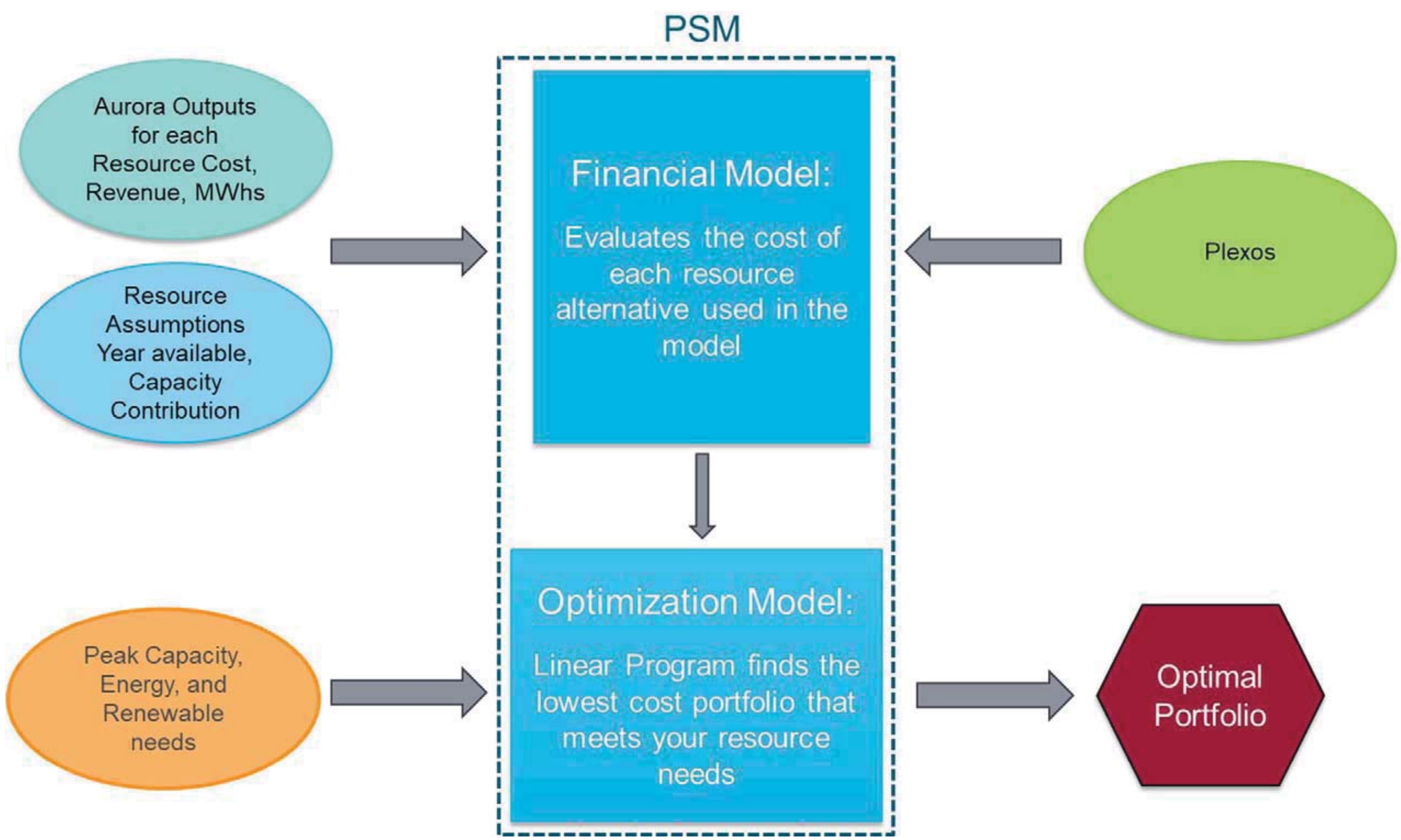
Plexos

Flexibility

- Regulation up-down
- Balancing
- Reserves
- Arbitrage

*Portfolio Screening Model (PSM)

PSM optimization process



[redacted] SOUND ENERGY

Quantitative screening metrics allow PSE to compare and rank resources with different characteristics and capacities

Portfolio benefit ($)
Useful for comparing projects with the same winter capacity value

Difference between net present value portfolio revenue requirement of proposed project (replaces a generic resource), and the net present portfolio revenue requirement of the generic portfolio strategy.

Levelized cost ($/MWh-REC)
Useful for comparing projects with the same or similar operating characteristics

A resource's net present value revenue requirement of the 20-year period with end effects, divided by the net present value generation.

Portfolio benefit ratio
Useful for comparing projects with the same or similar operating characteristics; removes size bias

Portfolio benefit divided by the net present value of the proposed revenue requirement. Allows projects of different capacities to be by eliminating bias for size.

Net cost/peak capacity credit ($/kW)
Useful for comparing cost of peak capacity credit across technologies

Present value of the cost less the market value of the energy divided peak capacity credit.

PSE has updated its RFP modeling assumptions to reflect 2019 IRP assumptions

	2018 RFP	2017 IRP
Mid-C power prices Levelized	$34.28/MWh	$40.48/MWh
Gas prices Levelized	$3.86/mmbtu	4.02/mmbtu
Load growth	0.5%	0.7%

[redacted]

RFP price scenarios (subject to change)

	Phase	WECC /PSE Demand	Gas Price	Generic Resource Costs
No carbon tax	1 + 2	Base	Base	Base
CO2 (Initiative 1631)	1 + 2	Base	Base	Base
CO2 (societal)	1 + 2	Base	Base	Base
CO2 (high societal tax)	2	Base	Base	Base
High growth (high societal)	2	High	High	Base
Low growth (no carbon tax)	2	Low	Low	Base

If Initiative 1631 does not pass, the RFP would use assumptions consistent with the 2019 IRP.

[redacted] SOUND ENERGY

4 Demand Response RFP evaluation process

Presenter: Wei Dang

DR proposals at a glance

Type	Term	Max MW
Direct Load Control	2019-23	35.5
Direct Load Control	2023-28	24.0
Direct Load Control	2019-28	21.5
Behavioral Demand Response + Direct Load Control	2019-23	28.1
C&I Curtailment*	2019-23	24
C&I Curtailment*	2019-23	40

*Commercial & Industrial (C&I)

[redacted] SOUND ENERGY

DR resource objectives

Primary Objectives:

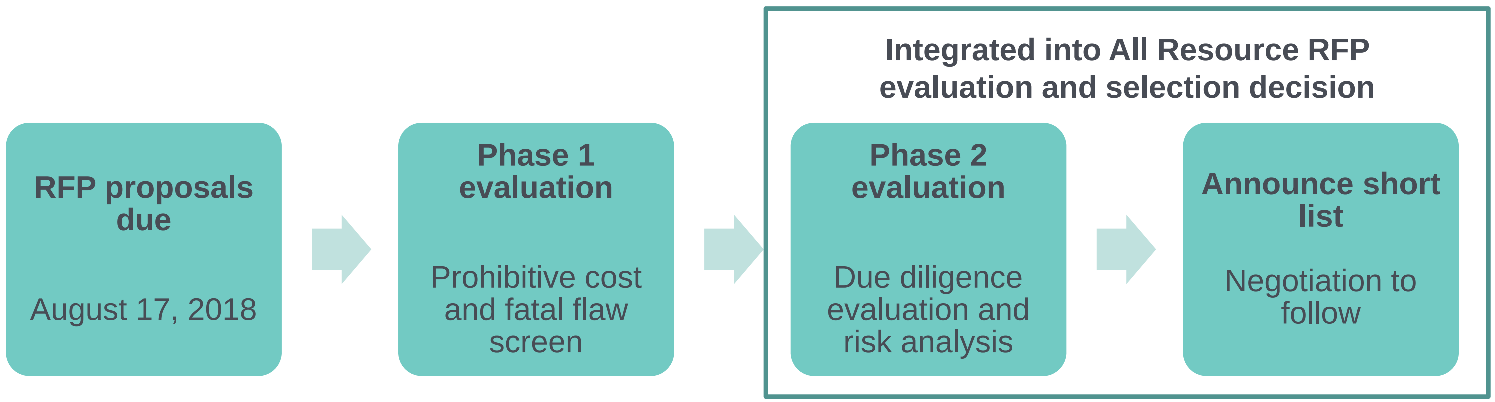
- Ensure DR resource is cost effective and is available:
  - November 1 – February 28/29
  - Weekdays, 7 a.m. – 10 a.m. and 5 p.m. – 9 p.m.
- Provide load response with one of the following options:
  - Hour ahead notification,
  - Day ahead notification, or
  - A combination of hour ahead and day ahead notification
- Total event time ≤ 40 hrs per individual product per season

Secondary Objectives:

- Develop flexible DR capability
  - Provide fast response with notification time of ≤10 mins

[redacted]

DR proposals evaluation process



Proposals will be evaluated on a variety of criteria including, but not limited to:

- Demonstrated competence and experience
- Management structure and assigned personnel
- Quality of proposed equipment and services
- Pricing
- Performance guarantees

[redacted]

Aligned with IRP methodology, using Portfolio Screening Model (PSM)

Costs	Benefits

• Technology and Implementation
  • Customer tech. and installation
  • PSE Integration
• Program Administration
	• Peak Capacity
	• System-Wide T&D Deferral

Other Tests / Considerations:

- Program administrator cost (PAC) / Total resource cost (TRC)
- Effective load carrying capability (ELCC)

[redacted]

Demand response evaluation team

Energy Supply (Merchant)

Demand Response Program Team

Planning and Analysis

- Resource Planning and Analysis
- Resource Acquisition
- Regulatory Affairs
- SmartGrid Roadmapping

Integration and Implementation

- IT
- Digital Experience
- Customer Energy Management
- AMI/Metering

Program Delivery and Operations

- Load Serving Operations
- Front Office
- EIM
- Marketing
- Customer Care
- Business Services

[redacted]

5

Next steps

Presenter: Sheri Maynard

What's next?

- Next WUTC update: late Q1/early Q2
  - Phase 1 results
  - Candidate short list
  - Phase 2 update/schedule

[redacted] SOUND ENERGY

2018 RFP schedule

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
✓	June 28, 2018	WUTC approved Demand Response and All Resource RFPs
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
	Feb/Mar 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
	Q2 2019	Complete Phase 2 evaluation, select final short list

[redacted] ENERGY

Appendix

Appendix

- Proposals received by status and location
- Montana transmission path
- RFP modeling assumptions:
  - Load forecast
  - Power price forecast
  - Carbon price
- Additional screening metrics
- Comparison of generic resource costs
- Program administrator costs (PAC) and total resource costs (TRC) tests
- Effective load carrying capability (ELCC) table

[redacted]

90% of projects proposed are development stage

Resource Type	# Proposals	Max Cap MW[1]	Status: Development	Status: Construction	Status: Operating
Biomass	2	72			2
Biomass + BESS	1	15	1		
Geothermal	2	43	1	1	
Hydro - Run of River	1	38			1
Natural Gas CCCT	2	1020			2
Natural Gas SCCT	1	245	1		
Natural Gas Recip	1	112	1		
Solar - PV	16	2240	16		
Solar - PV + BESS	20	2848	20		
Storage - Battery ("BESS")	17	1265	17		
Storage - Pumped Hydro	2	900	2		
Peak Capacity Call Option	1	100			
Unbundled RECs[2]	4	n/a	3		1
Wind - Off Shore	1	400	1		
Wind On Shore	16	3303	14	1	1
Wind + Winter Sys PPA	1	371	1		
Wind + Solar + BESS	2	464	2		
DR Direct Load Control	4	109			
DR C&I Curtailment[3]	2	44			
TOTAL	96	13,589	80	2	7

[redacted] SOUND ENERGY

[1] MW column reflects total combined potential capacity

[2] Unbundled RECs: 1 offer is for a 10-year agreement for up to 100,000 RECs; the other three offers are due to arrive this week from the same entity (REC volume TBD)

70% of projects proposed are located in Washington

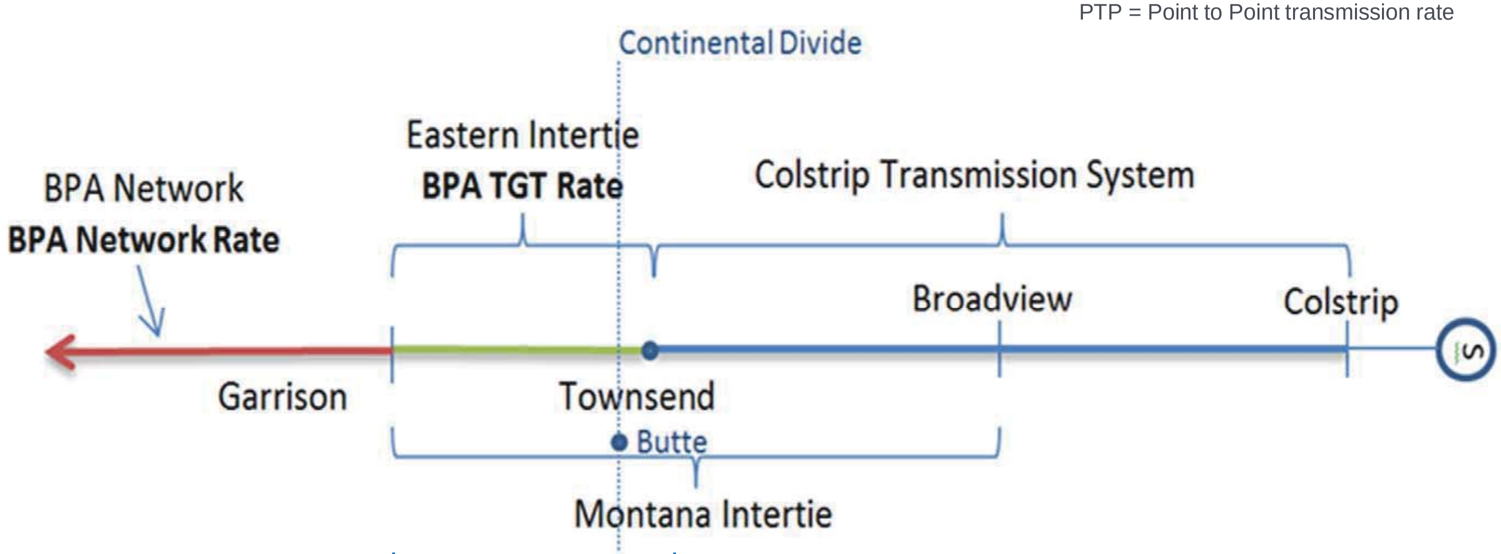
Resource Type	# Proposals	Max Cap MW[1]	Location WA	OR	MT	ID	NV
Biomass	2	72	2				
Biomass + BESS	1	15					
Geothermal	2	43				1	1
Hydro - Run of River	1	38				1	
Natural Gas CCCT	2	1020	1	1			
Natural Gas SCCT	1	245	1				
Natural Gas Recip	1	112	1				
Solar - PV	16	2240	14	2	1		
Solar - PV + BESS	20	2848	15	4	1		
Storage - Battery ("BESS")	17	1265	17				
Storage - Pumped Hydro	2	900	1		1		
Peak Capacity Call Option	1	100		1			
Unbundled RECs[2]	4	n/a		3			
Wind - Off Shore	1	400	1				
Wind On Shore	16	3303	7	3	6		
Wind + Winter Sys PPA	1	371		1			
Wind + Solar + BESS	2	464	1	1			
DR Direct Load Control	4	109	4				
DR C&I Curtailment[3]	2	44	4				
TOTAL	96	13,589	69	16	9	2	1

[1] MW column reflects total combined potential capacity

[2] Unbundled RECs: 1 offer is for a 10-year agreement for up to 100,000 RECs; the other three offers are due to arrive this week from the same entity (REC volume TBD)

Montana transmission path

PTP = Point to Point transmission rate



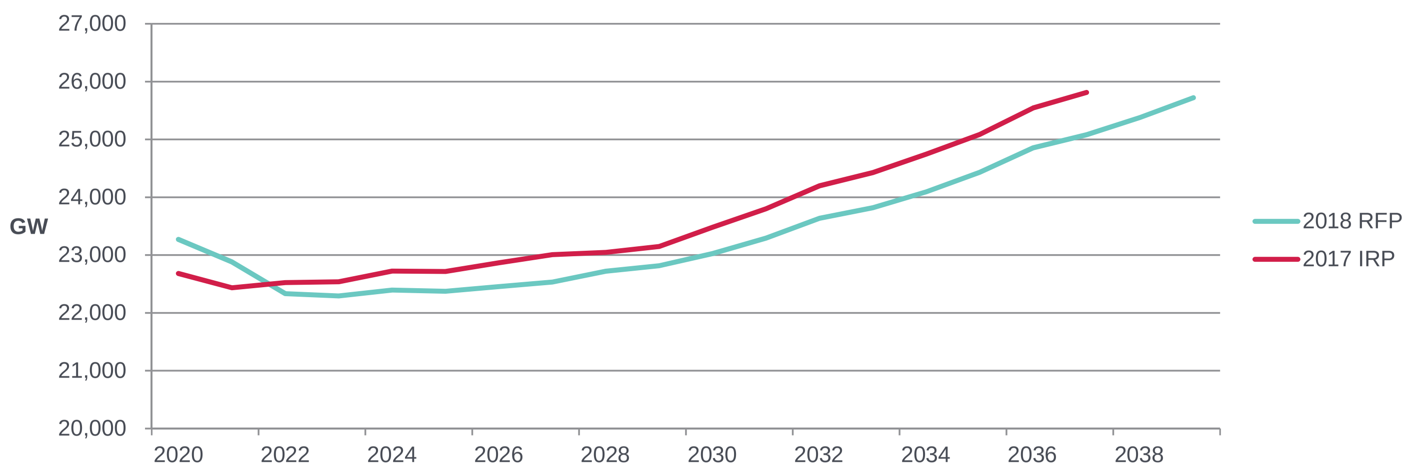
Termination year: 2024 PTP* rate: $21.52/kw-yr Losses: 1.9%	Termination yr: 2027 PTP* rate: $7.18/kw-yr Losses: 5.0%	PTP* rate: $28.76/kw-yr Losses: 2.7%

Other costs to consider:

- Additional losses from the project to the delivery point
- Renewable integration costs

[redacted]

Load forecast comparison



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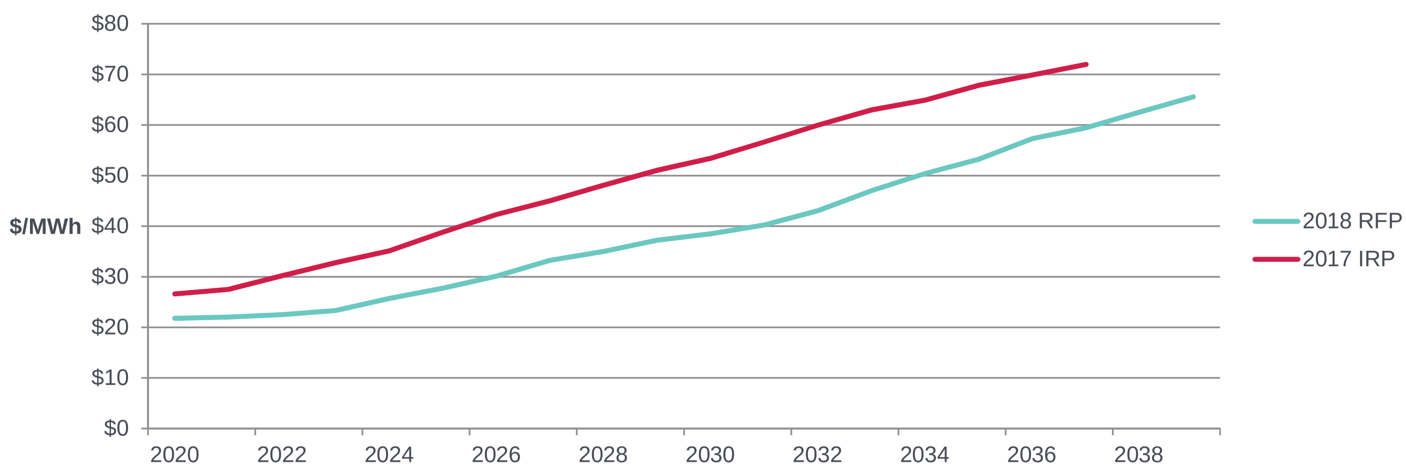
Power price forecast



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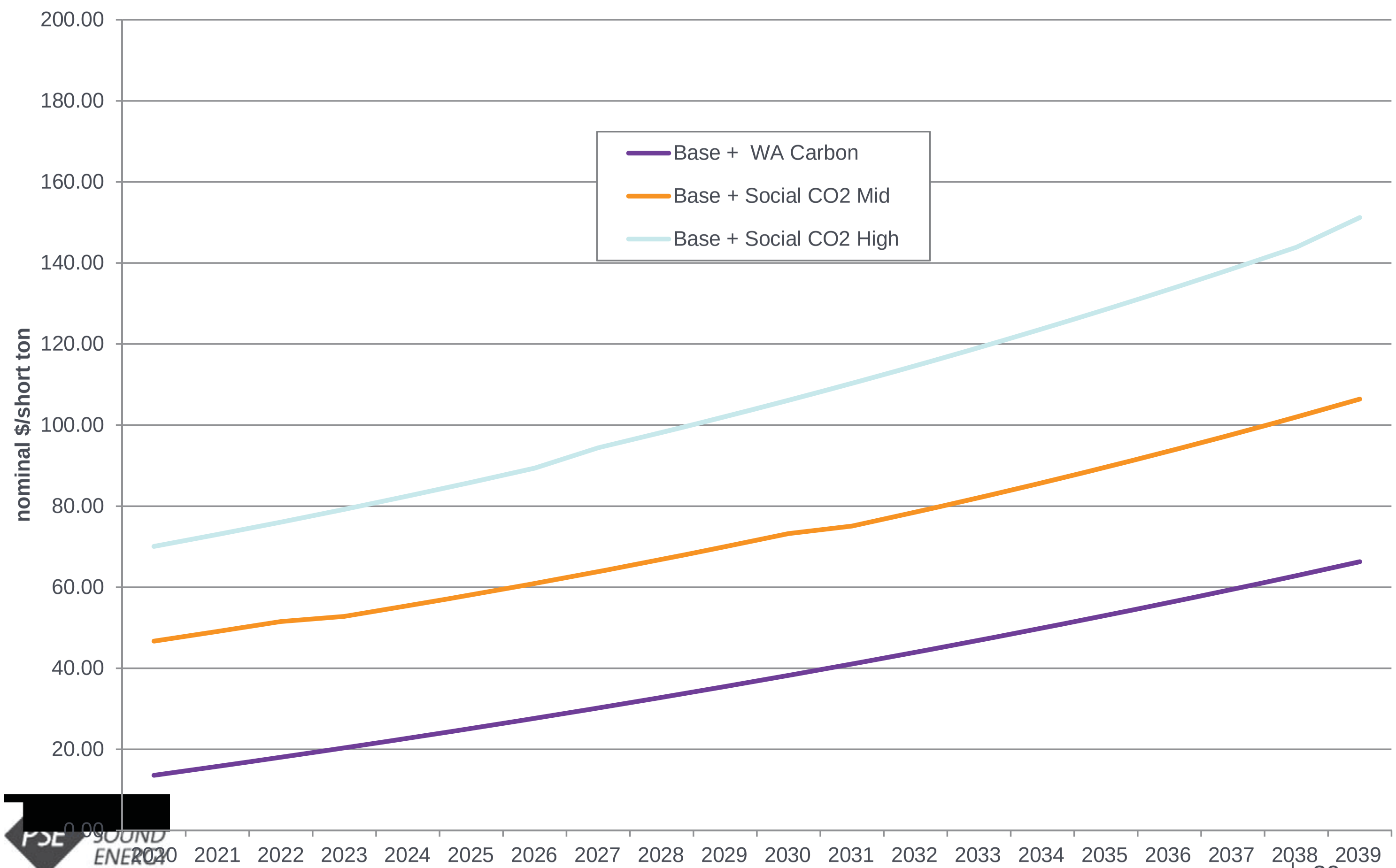
Carbon price



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Additional screening metrics

Metric	Description
Net cost/REC **($/MWh-REC)** *Useful for comparing renewable projects of different sizes*	Present value of the cost less the market value of the energy divided by the RECs.
Portfolio Benefit/REC **($/MWh-REC)** *Useful for comparing projects with the same or similar operating characteristics*	Provides a slightly different view than the above metric by taking the portfolio benefit divided by RECs.

[redacted] SOUND ENERGY

Comparison of generic resource costs

2018 $/kW	2017 IRP			2019 IRP			Change in costs from 2019 IRP to 2017 IRP		
	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	All in Costs
CCCT	$1,020	$358	$1,378	$898	$269	$1,167	($122)	($89)	($211)
Frame Peaker (Fuel Fuel)	$526	$172	$698	$554	$271	$825	$28	$99	$127
Recip Engine (NG only)	$1,030	$312	$1,341	$842	$350	$1,192	($188)	$38	($149)
WA Wind	$1,548	$656	$2,204	$1,656	$386	$2,042	$108	($270)	($162)
MT Wind	$1,471	$1,312	$2,783	$1,633	$1,111	$2,744	$162	($201)	($39)
Solar	$1,497	$874	$2,371	$1,352	$570	$1,922	($145)	($304)	($449)
Biomass	$4,084	$207	$4,291	$7,036	$2,659	$9,695	$2,952	$2,452	$5,404
Offshore Wind	$5,717	$1,795	$7,512	$5,000	$1,547	$6,547	($717)	($248)	($965)
Li-Ion Battery 2-hr	$1,313	$342	$1,655	$1,331	$599	$1,930	$18	$257	$275
Li-Ion Battery 4-hr	$2,116	$552	$2,668	$2,346	$708	$3,054	$230	$156	$386
Flow Battery 4-hr	$1,870	$674	$2,544	$1,493	$618	$2,111	($377)	($56)	($433)
Flow Battery 6-hr	$2,447	$882	$3,329	$2,050	$708	$2,758	($397)	($174)	($571)
Pumped Storage	$2,503	$127	$2,630	$1,800	$879	$2,679	($703)	$752	$49

[redacted] SOUND ENERGY

PAC and TRC tests

PSE will evaluate the cost-effectiveness of proposals in two ways: using the Program Administrator Cost Test (PAC) and Total Resource Cost (TRC) Test

Benefits	PAC	TRC
Avoided Capacity Costs	✓	✓
Avoided Energy Costs	✓	✓
Avoided Transmission & Distribution Costs	✓	✓
Avoided Environmental Compliance Costs	✓	✓

Costs	PAC	TRC
Program Administrator Expenses	✓	✓
Program Administrator Capital Costs	✓	✓
Financial Incentive to Participant	✓	×
DR Measure Cost: Program Administrator	✓	✓
DR Measure Cost: Participant Contribution	×	✓
Participant Transaction Costs	×	✓
Participant Value of Lost Service	×	✓
Increased Energy Consumption	✓	✓
Environmental Compliance Costs	✓	✓

Source: Demand Response RFP, Exhibit D: Cost-effectiveness Evaluation Criteria, Tables 1 and 2

[redacted]

ELCC Table

Effective Load Carrying Capability (ELCC) Estimates for Various DR Event Parameters						
Event Duration (Hours)	Call Frequency					
	Elapsed Hours After Last Events					Elapsed Hours Since Start of Last Event
	4	6	8	12	24	24
2	63%	61%	57%	49%		
3	80%	77%	77%	59%		
4	90%	85%	80%	65%	53%	58%
5	94%	89%	84%	68%	55%	

Source: Demand Response RFP, Exhibit D: Cost-effectiveness Evaluation Criteria, Table 3

[redacted] SOUND ENERGY

2018 All Resources and Demand Response RFPs

PUGET SOUND ENERGY

Update to WUTC: RFP Process and Phase 1 Results

April 2, 2019

CONFIDENTIAL

Agenda

- RFP schedule and resource need
- Proposals received
- Phase 1 evaluation process
- Phase 1 results
- Phase 2 evaluation process
- Next steps

[redacted] SOUND ENERGY

1 RFP schedule and resource need

Presenter: Cindy Song

2018 RFP schedule

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
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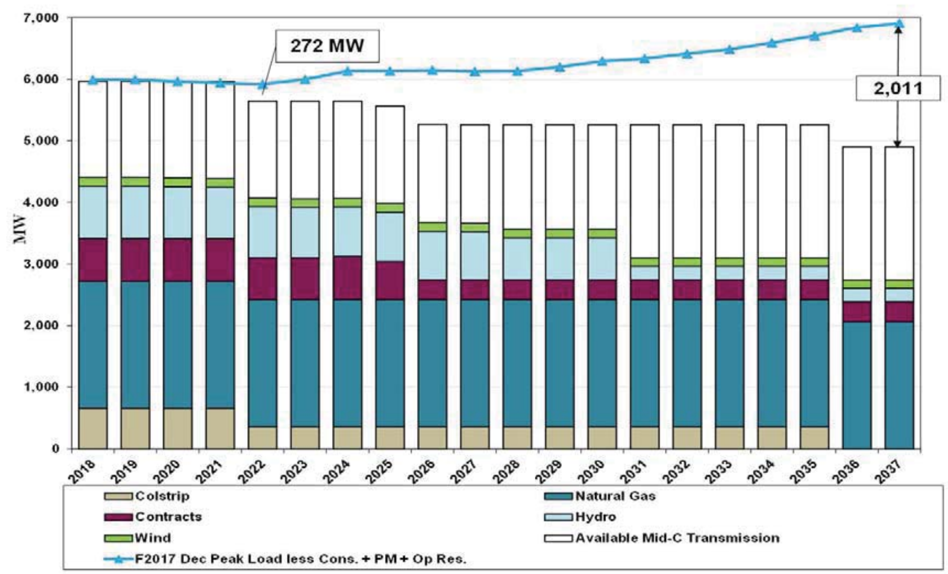
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
✓	Feb/Mar 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
	Q2 2019	Complete Phase 2 evaluation, select final short list

[redacted]

RFP solicits 272 MW of capacity by end of 2022*

- Target online date by 2022**
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably



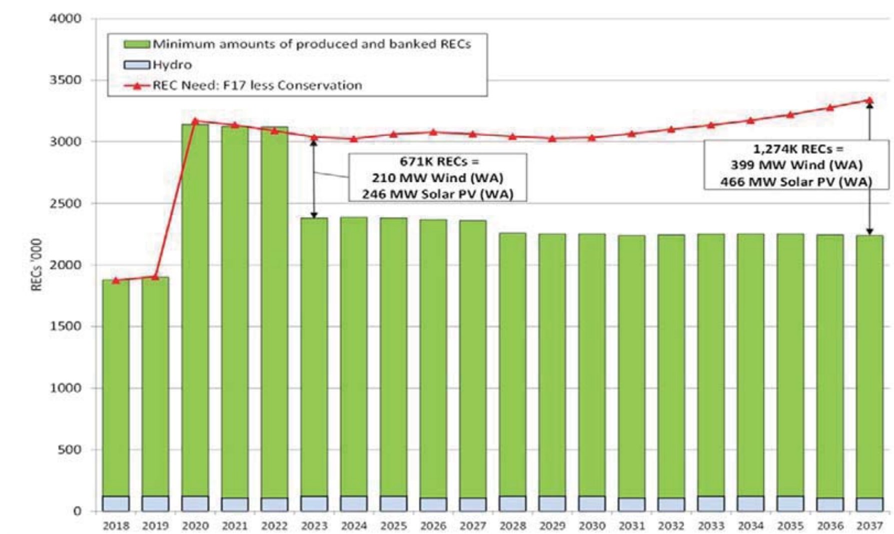
[redacted] SOUND ENERGY

* The All Resources RFP filed with the WUTC in June 2018 reflected then-current resource need projections based on the F2017 load forecast. In August 2018, PSE adjusted its resource need forecast for Phase 1 to reflect the F2018 load forecast. The resource need projection is based on current law and is not predictive of any future or pending legislative action.

** Target online date is based on earliest need, but will not disqualify long-lead resources.

Projected need to meet the RPS is 671,000 RECs 2023*

- REC need is driven by the increase in the RPS from 9% to 15% in 2020**
- PSE's inventory of banked RECs delays need until 2023
- PSE will consider early delivery dates to take advantage of tax incentives prior to phase out
  - PSE will evaluate the tradeoff between capturing the benefit of a higher tax incentive and the carrying cost of acquiring early



- A renewable resource may count toward peak capacity need based on coincident winter peak production
  - PSE will engage reputable consultant for resource due diligence and to develop synthetic distributions for peak capacity calculation
- Proposals which demonstrate that they qualify for Washington state apprenticeship labor credit will add 1.2x multiplier to REC output

[redacted]

* The All Resources RFP filed with the WUTC in June 2018 reflected then-current resource need projections based on the F2017 load forecast. In August 2018, PSE adjusted its resource need forecast for Phase 1 to reflect the F2018 load forecast.

** If proposing a qualifying renewable resource located outside the Pacific Northwest as defined for the Bonneville Power Administration in Section 3 of the Pacific Northwest Electric Power Planning and Conservation Act (94 Stat. 2698; 16 U.S.C. Sec. 839a), electricity from the facility must be delivered into Washington state on a real-time basis without shaping, storage, or integration services.

2

Proposals received

Presenter: Sheri Maynard

Nearly 100 proposals received

Largest response to an All Source RFP to date

As of 3/25/19

Resource Type	2018 All Resource and Demand Response RFPs		2017 Renewables Only RFP (Green Direct 2.0)[1]		2011 All Source RFP		2010 All Source RFP		2008 All Source RFP		2005 All Source RFP	
	# Proposals[2]	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW[1]	# Proposals	Max Cap MW
Solar - PV	16	2240	17	574	2	24	1	10				
Solar - PV + BESS	20	2848										
Wind - Off Shore	1	400										
Wind On Shore	16	3303	20	2601	4	369	21	3776	8	862	10	1165
Wind + Winter Sys PPA	1	371										
Wind + Solar and/or BESS	2	464	4	339								
Storage - Battery ("BESS")	17	1265			2	251						
Storage - Pumped Hydro	2	900										
Biomass	2	72			3	61	9	590				
Biomass + BESS	1	15										
Natural Gas-fired Generation	4	1377			10	2624	18	5342	10	2588	17	4307
Geothermal	2	43									1	48
Hydro - Run of River	1	38	2	4	1	77	2	105	3	165	3	139
System PPA / Call Option	1	100			4	400	10	n/a	9	1675	7	400
Unbundled RECs	5						2	n/a				
Demand Response	6	154					1	80			1	34
Coal - Traditional + IGCC					1	500			1	100	6	4950
Cold Fusion					1	1880						
Distributed Generation											1	5
Waste-to-Energy / Landfill Gas					1	23					1	5
TOTAL	**97**	**13,590**	**43**	**3,518**	**29**	**6,209**	**64**	**9,903**	**31**	**5,390**	**47**	**11,053**

[1] The 2017 RFP sought large and small (<5 MW) renewable resources to serve multiple voluntary green power programs.

[2] PSE also received two unsolicited proposals during Phase 1, a REC-only and a pumped storage hydro storage, which are not included in the table.

[redacted]

93% of proposals offered a PPA option, 28% of proposals offered an ownership option

Resource Type	# Proposals	Max Cap MW[1]	Offer Structure(s)		
			Own	PPA/Toll/ Other Agmt	Both
Solar - PV	16	2,240	1	14	1
Solar - PV + BESS	20	2,848		18	2
Wind - Off Shore	1	400			1
Wind On Shore	16	3,303	3	11	2
Wind + Winter Sys PPA	1	371		1	
Wind + Solar + BESS	2	464	1	1	
Storage - Battery ("BESS")	17	1,265	1	8	8
Storage - Pumped Hydro	2	900			2
Biomass	2	72		2	
Biomass + BESS	1	15		1	
Natural Gas CCCT	2	1,020		1	1
Natural Gas SCCT	1	245			1
Natural Gas Recip	1	112	1		
Geothermal	2	43			2
Hydro - Run of River	1	38		1	
System PPA / Call Option	1	100		1	
Unbundled RECs	5	n/a		5	
DR Direct Load Control	4	109		4	
DR C&I Curtailment[2]	2	44		2	
TOTAL	**97**	**13,589**	**7**	**70**	**20**

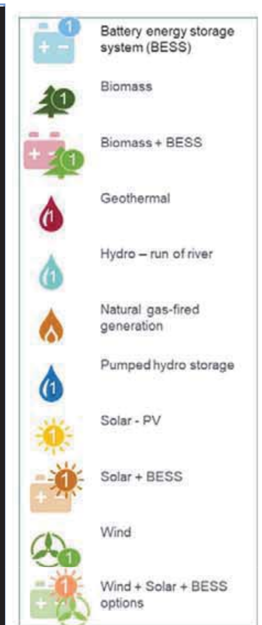
[1] MW column reflects total combined potential capacity
[2] Commercial & Industrial Curtailment (C&I Curtailment)

[redacted]

- 90% of proposed projects are in early development stage
- Many proposals included multiple offer options, such as:
  - Multiple structure options:
    - development rights
    - asset purchase
    - PPA, Toll or other agreement
  - Fixed/escalating PPA pricing
  - Various term lengths and/ or start dates
  - Hybrid options to include storage, or to pair solar with wind
  - Transmission delivery points

70% of projects proposed are located in Washington

[redacted]



REDACTED VERSION

3 Phase 1 evaluation process

Presenters: Will Foster, Wei Dang, Bob Williams

Two-phased evaluation process allows PSE to focus on most favorable proposals for robust analysis

Phase 1: Screening	Phase 2: Due Diligence
Qualitative review based on evaluation criteria	Qualitative review based on evaluation criteria
Fatal flaw screening	Due diligence evaluation
	Data requests
	Respondent engagement
	Site visits
Static quantitative analysis by resource type	Quantitative portfolio optimization
Scenario analysis	Scenario analysis
Flexibility analysis	Flexibility analysis
• **Purpose:** Eliminate proposals with prohibitive costs and fatal flaws • **Result:** Identify Candidate List[1] for Phase 2 review	• **Purpose:** Thoroughly examine proposals and identify lowest reasonable cost and risk portfolio • **Result:** Identify Short List for negotiation

[1] The Candidate List represents the lowest cost resources with no fatal flaws, and a representative sampling of renewable, hybrid, storage, demand response and capacity resources.

[redacted]

Phase 1 screening eliminates proposals with higher costs and fatal flaws

RFP proposals due
August 17, 2018

Phase 1 evaluation
Qualitative fatal flaw review and cost screen

Phase 2 evaluation
Due diligence evaluation and risk analysis

Announce short list
Negotiation to follow

Phase 1: Prohibitive cost and fatal flaw screening

Evaluation team	Scope of review
All Resources RFP proposals: • Commercial & Development • Quantitative • Planning • Energy Delivery • Technical / Plant Operations • Fuel Supply • Permitting • Real Estate • Community / Government Relations • Regulatory Demand Response RFP proposals: • Commercial • Quantitative • Customer Energy Management • Planning • Regulatory	All Resources and Demand Response RFPs: • Fatal flaw screening of key qualitative attributes (slides 14 and 17) • Static quantitative analysis screening of All Resources and Demand Response proposals by resource type • Flexibility analysis

Most favorable resources selected to proceed to Phase 2. Respondents notified of status.

Additional subject matter experts engaged in Phase 2 for both the All Resources and Demand Response proposals to help thoroughly evaluate the risks and merits of all offers (slide 28).

[redacted] SOUND ENERGY

Evaluation criteria help identify proposals with lowest reasonable cost and risk*

Cost minimization
- Lower/ lowest portfolio revenue requirement while meeting capacity and RPS need

Risk management
- Commercially-proven technology with long-term reliability
- Reduces PSE's risk exposure to changes in power prices, environmental policies, fuel prices, hydro generation, etc.
- Demonstrated experience and competence

Strategic and financial
- Offer viability: project and respondent's ability to deliver
- Appropriate credit support or liquidated damages offered by respondent
- No PSE credit support required

Public benefits
- Economic benefit to the community
- Positive perception of project among stakeholders
- Local support for the project
- Low environmental impact

Compatibility with resource need
- Output can be optimized to match PSE's need or resource production matches PSE's need
- Firm delivery of capacity to PSE's system
- Matches timing of resource need; flexibility

*See Demand Response RFP and Exhibit A of the All Resources RFP for complete evaluation criteria.

Qualitative evaluation asks key questions designed to identify proposal benefits and risks*

- ✓ Are the offer terms acceptable?
- ✓ Is project operating or likely to meet proposed commercial operation date?
- ✓ What is the nameplate capacity of the project? Sized appropriately to help meet need?
- ✓ Where is the project located? Benefits/risks?
- ✓ Does project have site control?
- ✓ What is the permitting status?
- ✓ Status of transmission and interconnection?
- ✓ What is the selected technology? History of reliable operation?
- ✓ What is the useful life of the project?
- ✓ Does the project have community support?
- ✓ What is the status of all relevant agreements? Examples: key component supply contracts (e.g. wind turbines), service and maintenance, EPC contract, BOP, interconnection, transmission, permits, site control, etc.

- ✓ Project output?
- ✓ Net capacity factor (NCF)?
- ✓ Degradation?
- ✓ Eligible for tax incentives?

- ✓ Capacity (MW) and duration (MWh)?
- ✓ Roundtrip efficiency?
- ✓ Degradation / augmentation?
- ✓ Flexibility and T&D benefits?

- ✓ Fuel supply and transportation secured? If not, status?
- ✓ Operational characteristics?
- ✓ Emissions? Permitting risks? If operating, compliance history?

- ✓ Project output?
- ✓ Net capacity factor (NCF)?
- ✓ Eligible for tax incentives?

*This list is illustrative only. It does not reflect all eligible resource types or a complete list of criteria considered. For more detail, see RFP Exhibit A (Evaluation Criteria) and Exhibit B (Proposal Requirements).

[redacted] SOUND ENERGY

Sample qualitative questions for demand response proposals*

- ✓ Are the offer terms acceptable?
- ✓ Is the program operating or likely to meet proposed commercial operation date?
- ✓ Has the respondent entity demonstrated its competence and experience?
- ✓ Does the proposal include a management structure and the relevant experience of assigned personnel?
- ✓ What is the quality of the proposed equipment and services?
- ✓ How does the proposed pricing compare to other alternatives?
- ✓ Does the offer include acceptable performance guarantees?

*This list is illustrative only. It does not reflect a complete list of criteria considered. For more detail, see the Demand Response RFP.

[redacted]

Examples of fatal flaws

- Significantly higher cost than alternatives
- Proposal fails to provide sufficient information to substantiate a viable project
- No transmission secured and no available transmission between the project and PSE’s system
- Insufficient fuel supply or fuel transportation to generation project
- Commercially unproven technology
- Unable to obtain necessary permits to execute the project
- Excessive counterparty risk likely to cause counterparty to be unable to complete the project or meet contractual obligations to PSE
- Regulatory or legal risks associated with non-compliance or other obligations that could adversely impact PSE

[redacted]

Resource costs

PSE uses three models to analyze resource costs and characteristics

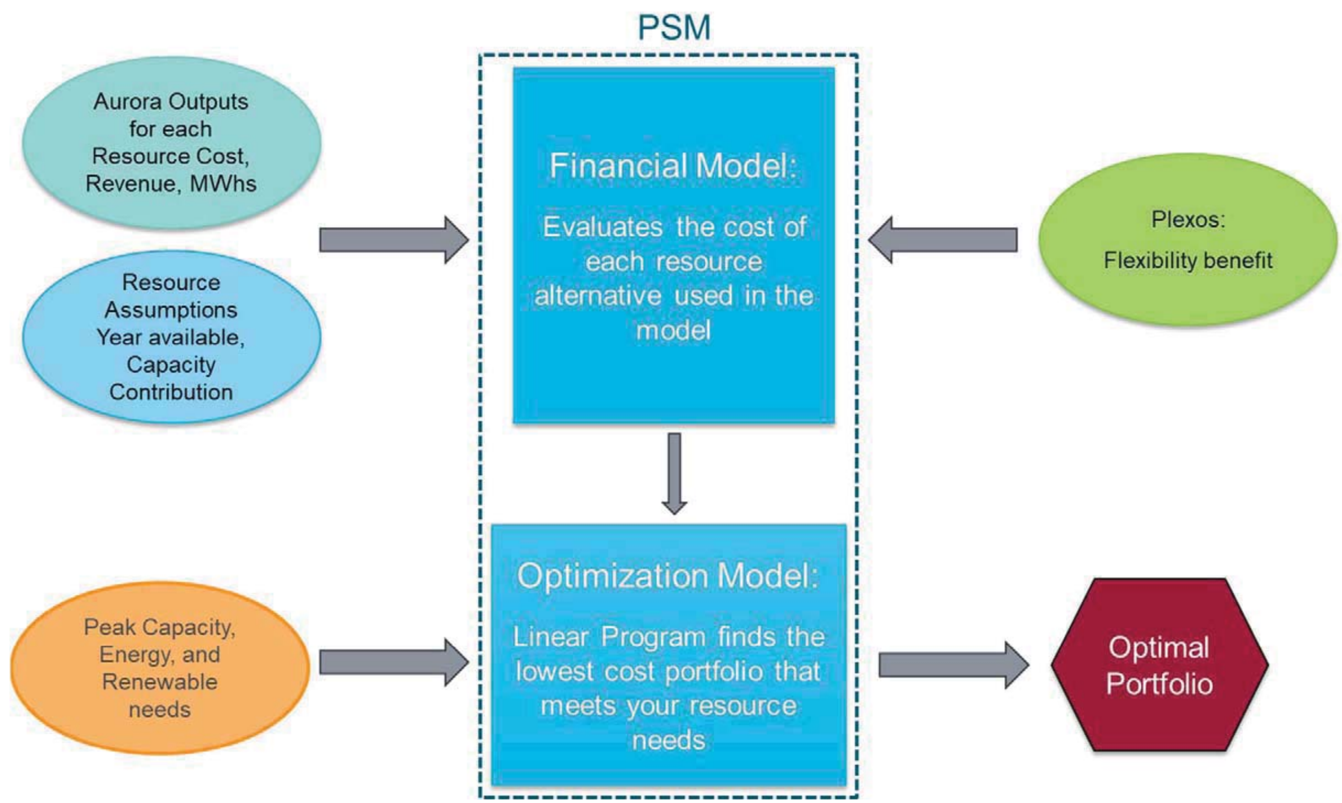
PSM* *Fixed costs*	Aurora *Variable costs*	Plexos *Flexibility*

• Capital costs
    • Return on capital (rate base)
    • Depreciation
• Fixed O&M
• PPA pricing
• Transmission
• Avoided T&D costs
• Pipeline costs
• Property taxes
• Insurance
• Federal income tax
    • Tax incentives (PTC & ITC)
    • Tax depreciation
    • Deferred taxes
	• Fuel costs
	• Variable O&M
	• Variable transmission
	• Carbon pricing
	• Startup costs
	• Plant technical information
	    • Capacity (ISO & 23º)
	    • Heat rates
	    • Forced and planned outages
	    • Renewable output
	    • Emissions
		• Regulation up-down
		• Balancing
		• Reserves
		• Arbitrage

*Portfolio Screening Model (PSM)

[redacted]

PSM optimization process



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Quantitative screening metrics allow PSE to compare and rank resources with different characteristics and capacities

Portfolio benefit ($)
Useful for comparing projects with the same winter capacity value

Difference between net present value portfolio revenue requirement of proposed project (replaces a generic resource), and the net present portfolio revenue requirement of the generic portfolio strategy.

Levelized cost ($/MWh-REC)
Useful for comparing projects with the same or similar operating characteristics

A resource's net present value revenue requirement over the term of the project, divided by the net present value generation.

Portfolio benefit/REC ($/MWh-REC)
Useful for comparing projects with the same or similar operating characteristics

Provides a slightly different view than the above metric by taking the portfolio benefit divided by RECs.

Levelized portfolio benefit/Unit of contribution to need ($PB/kW-yr):
Useful for comparing different capacity resource types and sizes

A project's portfolio benefit divided by the present value of the project's capacity contribution.

Additional screening metrics

Net cost/REC
($/MWh-REC)
Useful for comparing renewable projects of different sizes

Present value of the cost less the market value of the energy divided by the RECs.

Portfolio benefit ratio
Useful for comparing projects with the same or similar operating characteristics; removes size bias

Portfolio benefit divided by the net present value of the proposed revenue requirement. Allows projects of different capacities to be by eliminating bias for size.

Net cost/peak capacity credit **($/kW)**
Useful for comparing cost of peak capacity credit across technologies

Present value of the cost less the market value of the energy divided peak capacity credit.

Phase 1 price scenarios

1. **No carbon tax** – Base case from the 2017 IRP with no carbon tax
2. **CO2 (Initiative 1631)** – Scenario 1 + $16/ton carbon price
3. **CO2 (WECC-wide social cost)** – Scenario 1 + $42/ton carbon price

4

Phase 1 results

Presenter: Cindy Song

Observations from Phase 1

- Solar prices have dramatically declined compared to other resource types
- Battery storage prices have also considerably declined and show potential, but are not yet competitive with alternatives available to PSE in this RFP
- Of 97 total proposals, 40 included battery storage configurations, while only 4 offered gas-fired generation
- Phase 1 analysis suggests many renewables are beating our current projections for Mid-C transmission redirects

Proposals selected for Phase 2 evaluation reflect resource and technology diversity

As of 3/18/19

	Proposals Received[1]		Phase 2 Candidate List	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	8	1050
Solar - PV + BESS	20	2848	1	100
Wind - Off Shore	1	400	0	0
Wind On Shore	16	3303	7	1642
Wind + Winter Sys PPA	1	371	1	200
Wind + Solar and/or BESS	2	464	0	0
Storage - Battery ("BESS")	17	1265	0	0
Storage - Pumped Hydro	2	900	0	0
Biomass	2	72	1	17
Biomass + BESS	1	15	0	0
Natural Gas-fired Generation	4	1377	2	348
Geothermal	2	43	0	0
Hydro - Run of River	1	38	1	38
System PPA / Call Option	1	100	0	0
Unbundled RECs	5	n/a	3	n/a
Demand Response	6	154	1	8.7
TOTAL	**97**	**13,590**	**25**	**3,404**

[1]PSE also received two unsolicited proposals during Phase 1, one REC-only and one pumped hydro storage. While the proposals are not included in the table count above, they were evaluated as part of the Phase 1 analysis.

[redacted] ENERGY

Candidate list for Phase 2

(results are a snap shot in time, subject to change)

ID	Project Name	Resource Type	Nameplate	Counterparty	State
18100	SPI Industrial	Biomass	17 MW	SPI	WA
18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA
18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
18139	[redacted]	Solar + BESS	[redacted] MW BESS	[redacted]	OR
18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
XXXXX	[redacted]	Transmission	[redacted] MW	[redacted]	N/A
18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

Proposals shown here are best offers from each proposal.

* Numbers shown are rounded to the nearest 5MW.

** Reflects a redirect of [redacted] MW of BPA transmission from [redacted] to PSEI, available January, 2022 for a 50-year term, and using Mid-C forecast for energy pricing. [redacted] MW may be available for redirect on BPA's system, however it is likely only [redacted] MW is possible for redirect to Mid-C. Redirects are assessed given the most current data and are a snap shot of the present system. The results are subject to change and may vary in the future based on updated ATC calculations and flow gate constraints within BPA's network. While redirect of the remaining [redacted] MW is feasible, the location, source and cost of this redirect remains under review, therefore not included in this analysis.

[redacted] SOUND ENERGY

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Detailed Phase 1 results

5

Phase 2

Presenter: Will Foster, Wei Dang and Bob Williams

Phase 2 due diligence is designed to identify proposals that are lowest reasonable cost

RFP proposals due
August 17, 2018

Phase 1 evaluation
Qualitative fatal flaw review and cost screen

Phase 2 evaluation
Due diligence evaluation and risk analysis

Announce short list
Negotiation to follow

Phase 2: Due Diligence

Evaluation team

All Resources RFP proposals:
- Phase 1 team (slide 13), plus:
- PSE Transmission
- Environmental / Compliance
- Portfolio Hedging / Power Supply Ops
- Risk Control & Credit
- Legal
- Property Accounting
- Tax / Finance
- As needed: Insurance / IT / HR

Demand Response RFP:
- Phase 1 team (slide 13), plus:
- SmartGrid Roadmapping
- IT
- Digital Experience
- AMI / Metering
- Load Serving Operations
- EIM
- Marketing
- Customer Care
- Business Services

Scope of review

- Thorough evaluation of qualitative attributes based on evaluation criteria set forth in RFPs (slide 14)
- Quantitative portfolio optimization and risk analysis
- Scenario analysis
- Formal data requests and direct discussions with respondents as needed
- Site visits as needed

Final short list selected. Respondents notified of status.

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How is Phase 2 different from Phase 1?

Detailed, cross-functional due diligence to evaluate the costs, risks and merits of each proposal based on the evaluation criteria used in Phase 1 screening

- In Phase 1, we gave proposals the benefit of the doubt; in Phase 2, we verify
- Phase 1 analysis relies on the proposals and public information sources; Phase 2 involves more interaction with respondents and a deeper dive into the details of each proposal
    - Phase 2 will include data requests, direct discussion with respondents as needed, and may include site visits
- Phase 2 quantitative analysis will include:
    - Additional scenario testing in portfolio screening model (see slide 30)
    - Update quantitative assumptions as available
- RFP team will consider impacts of the Clean Energy Bill (anticipated April 2019) on potential resource selections

[redacted]
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Phase 2 price scenarios (subject to change)

	Phase	WECC /PSE Demand	Gas Price*	Generic Resource Costs	CA SB 100
No carbon tax	1 + 2	Base	Base	Base	No
CO_2 (Initiative 1631)	1 + 2	Base	Base	Base	No
CO_2 (WECC-wide social cost)	1 + 2	Base	Base	Base	No
CO_2 (high WECC-wide social cost)	2	Base	Base	Base	No
Low growth (no carbon tax)	2	Low	Low	Base	No
No carbon tax (updated gas price)	2	Base	2018 Price	Base	Yes

Source: Draft 2019 IRP assumptions

[redacted]

* The Base and Low gas prices are based on the Wood Mackenzie 2018 spring price. The 2018 Price is based on the 2018 fall price.

PSE will update key Phase 2 modeling assumptions to reflect current draft 2019 IRP assumptions*

	RFP Phase 2	RFP Phase 1	2017 IRP
Mid-C power prices levelized	$28.75/MWh	$33.92/MWh	$40.48/MWh
Gas prices levelized	$3.50/mmbtu	$3.74/mmbtu	4.02/mmbtu
Load growth	0.5%	0.5%	0.7%
Effective load carrying capability (ELCC)	See appendix.		

[redacted] ENERGY

* This is not intended to be a complete list of all model updates. Certain additional Phase 2modeling assumptions are described in the appendix.

5 Next steps

Presenter: Sheri Maynard

What’s next?

- Phase 2 evaluation of RFP proposals
- Select short list / present results to PSE management end of Q2
- Next WUTC update: July 2019
  - Phase 2 results
  - Final short list

[redacted]

2018 RFP schedule

	Date	Milestone
✓	March 29, 2018	Draft RFP filed with WUTC
✓	June 28, 2018	WUTC approved Demand Response and All Resource RFPs
✓	July 3, 2018	PSE released final RFPs
✓	August 17, 2018	Offers were due to PSE
✓	Feb/Mar 2019	Complete Phase 1 evaluation, select Phase 2 candidate list
	Late Q2 2019	Complete Phase 2 evaluation, select final short list

Appendix

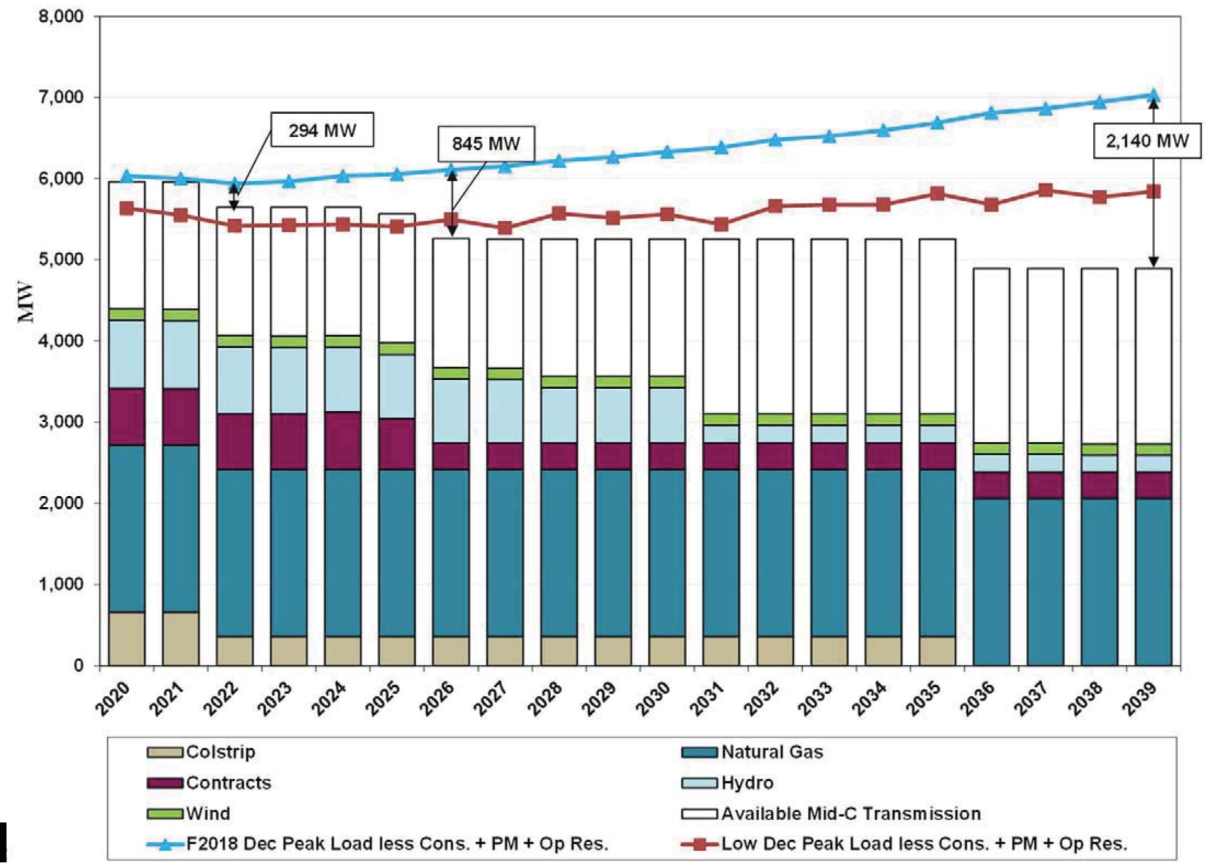
Appendix

- RFP modeling assumptions:
  - Resource need
  - Load
  - Power prices
  - Gas prices
  - Carbon prices
  - ELCC contribution
  - Generic resource costs
  - Transmission
- Additional proposal summary slides
- Additional demand response slides

[redacted]

Appendix 1: RFP modeling assumptions

Phase 1: Peak updated to F2018 demand forecast



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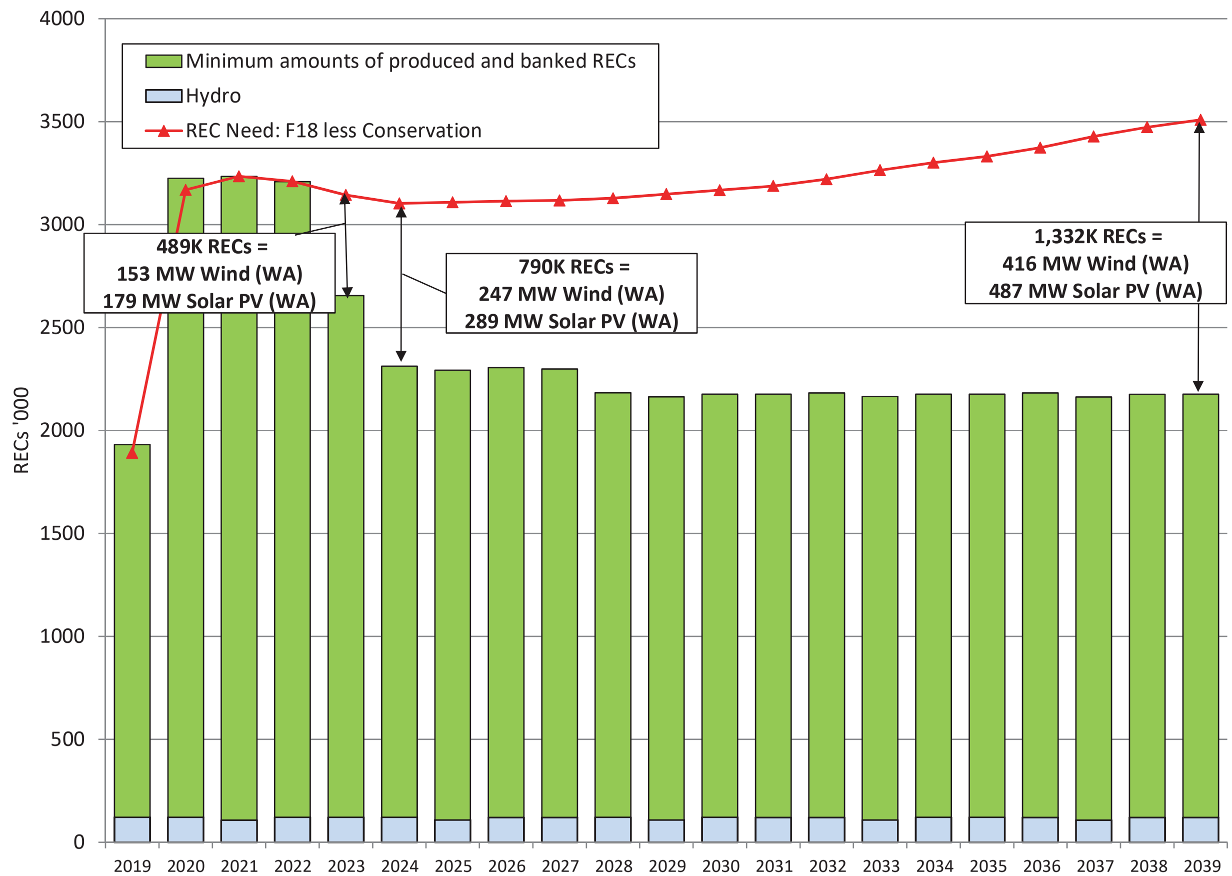
Phase 1: Renewable need updated to F2018 demand forecast



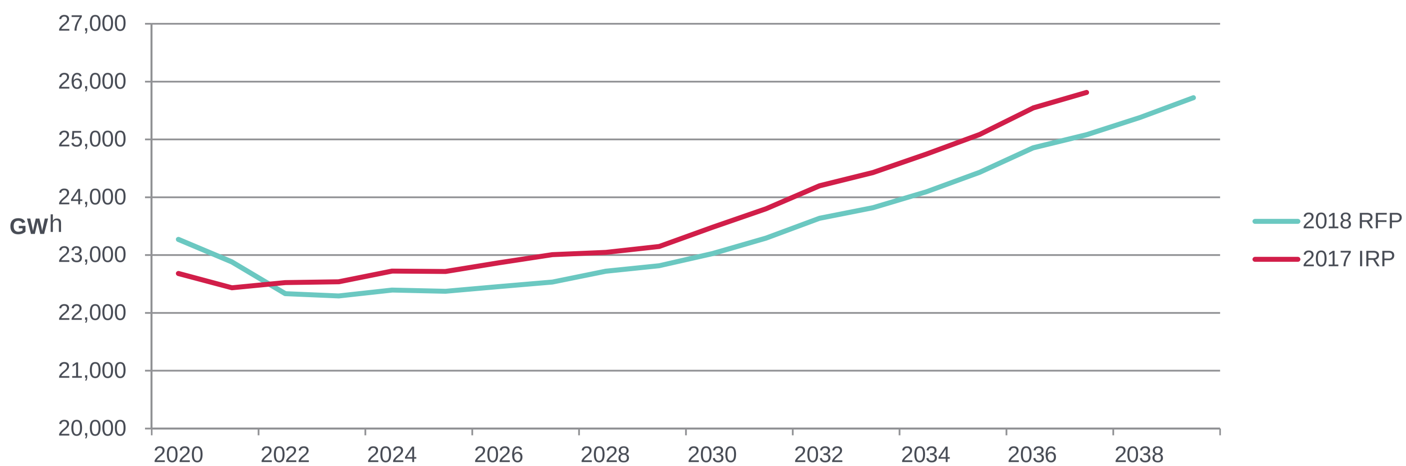
PSE updated key Phase 1 modeling assumptions to reflect then current draft 2019 IRP assumptions*

	RFP Phase 1	2017 IRP
Mid-C power prices Levelized	$33.92/MWh	$40.48/MWh
Gas prices Levelized	$3.74/mmbtu	4.02/mmbtu
Load growth	0.5%	0.7%

[redacted]

* This is not intended to be a complete list of all model updates. Certain additional modeling assumptions are described in the Phase 2 portion of this presentation (including updated ELCC assumptions consistent with the draft 2019 IRP). Other key assumptions are described in the appendix.

Phase 1: Load forecast comparison



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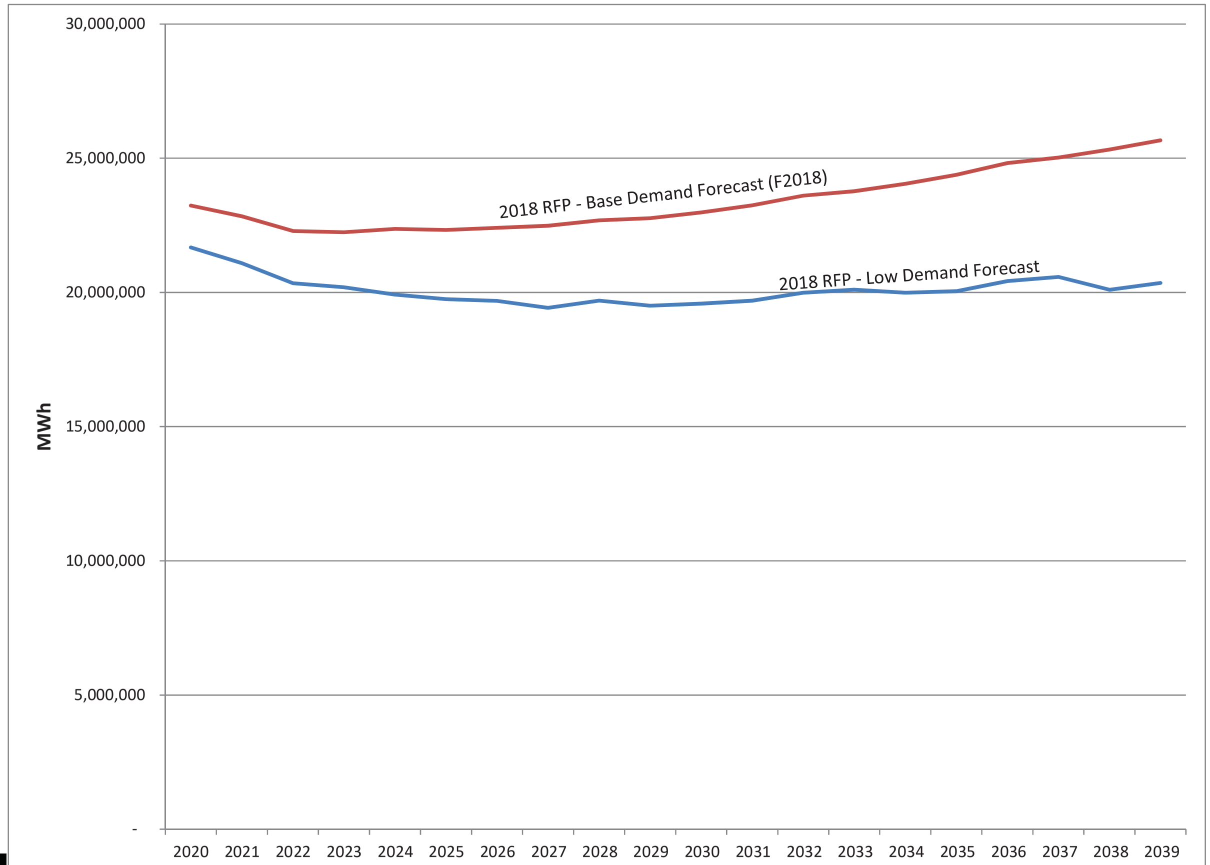
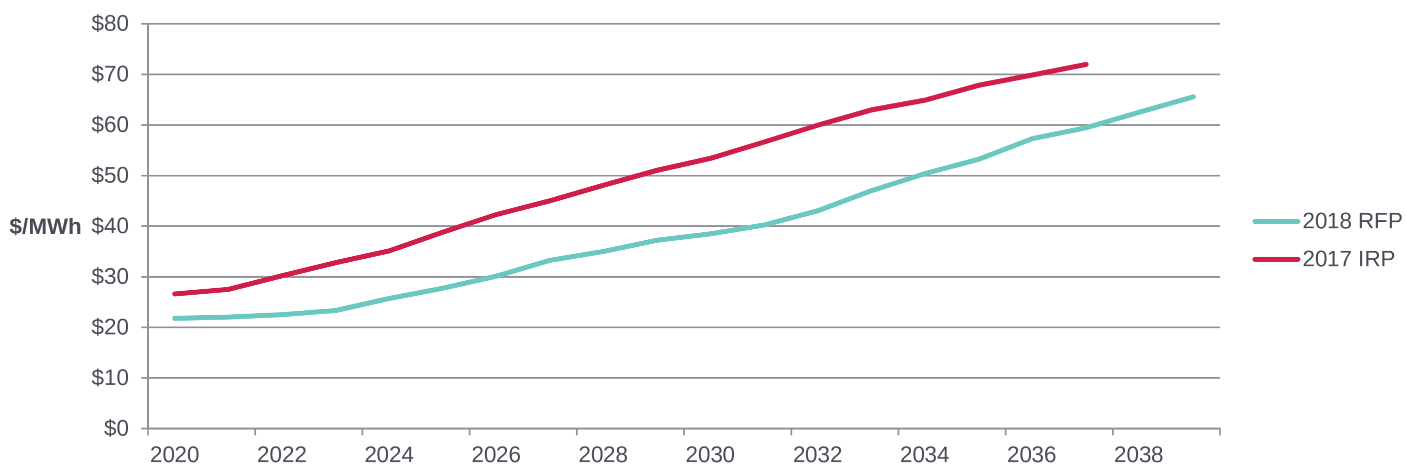
Phase 2: Load forecast comparison



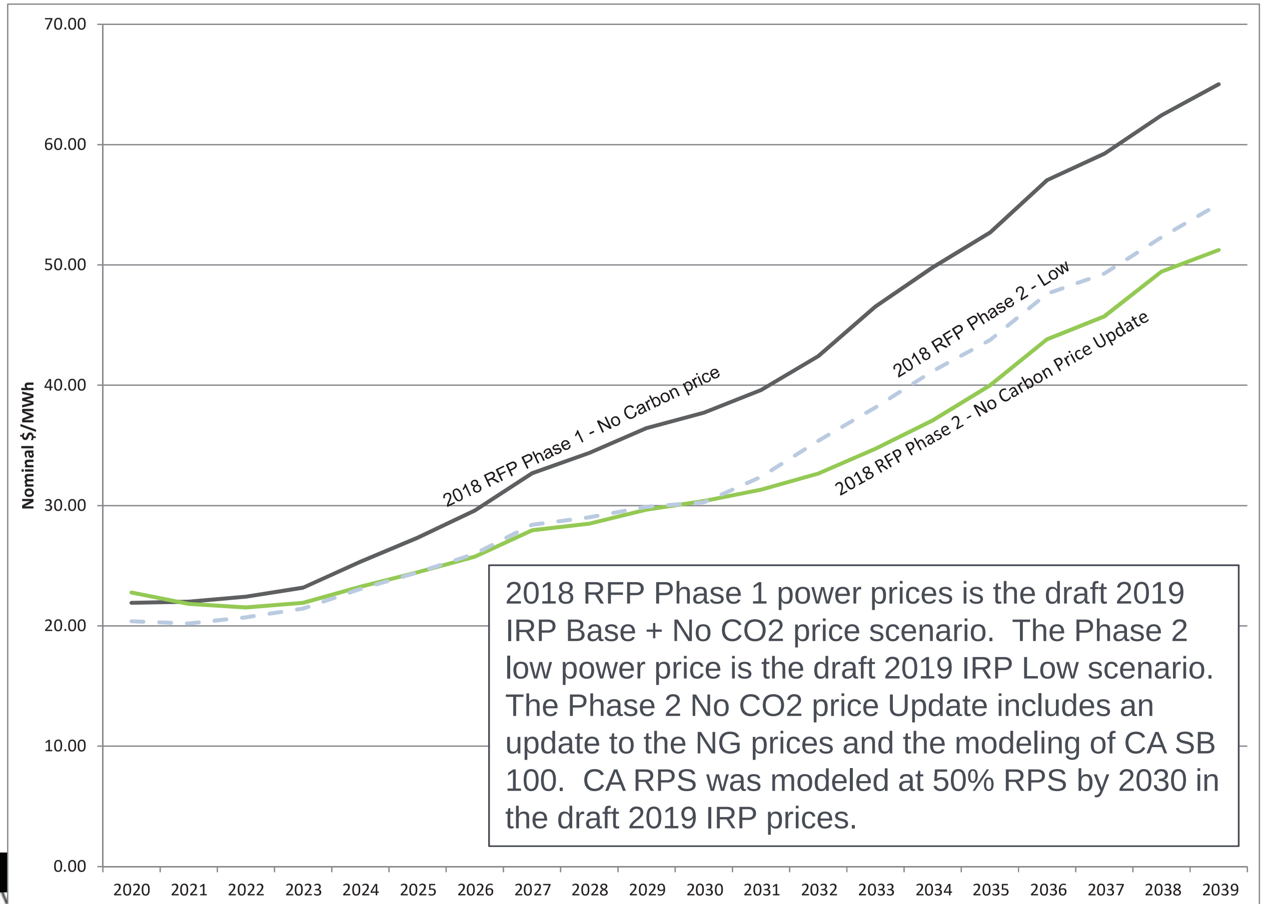
[redacted]

Phase 1: Power price forecast



[redacted]

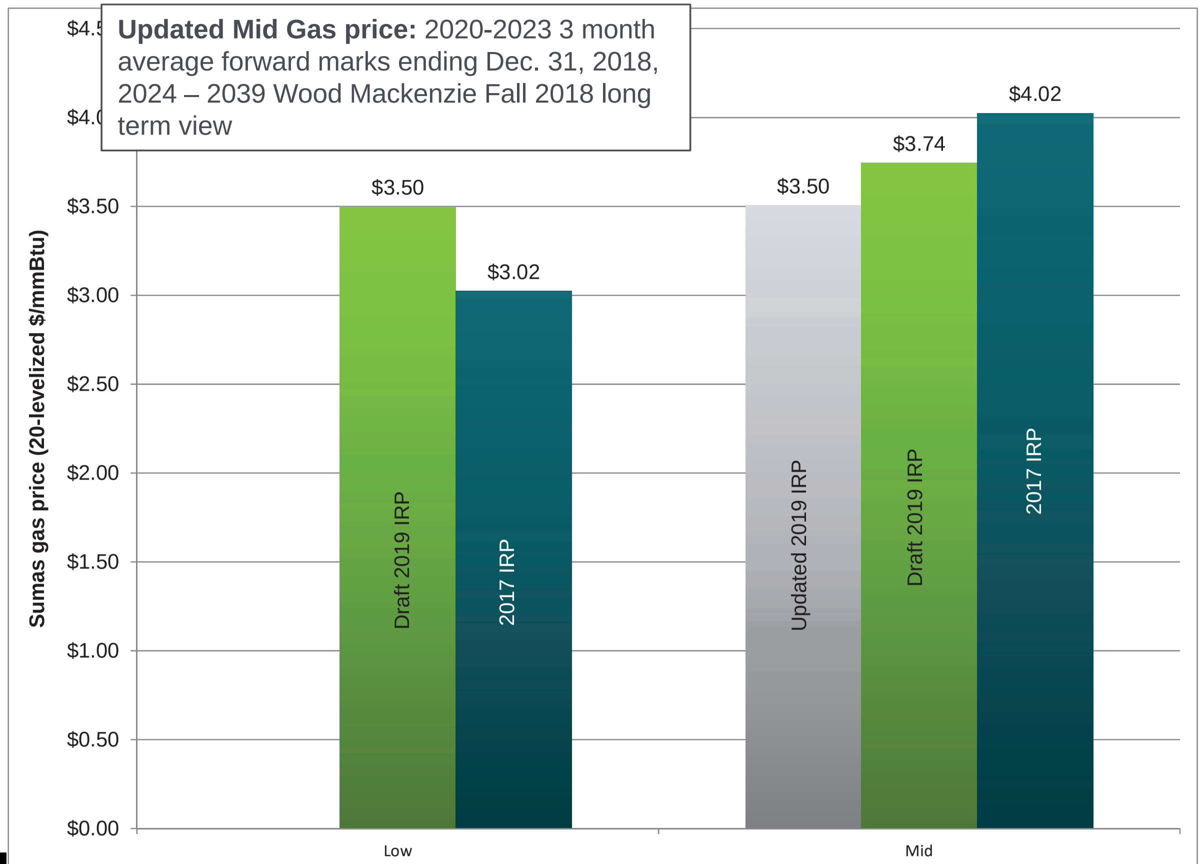
Phase 2: Power price forecast



2018 RFP Phase 1 power prices is the draft 2019 IRP Base + No CO2 price scenario. The Phase 2 low power price is the draft 2019 IRP Low scenario. The Phase 2 No CO2 price Update includes an update to the NG prices and the modeling of CA SB 100. CA RPS was modeled at 50% RPS by 2030 in the draft 2019 IRP prices.

[redacted]

Phase 2: Natural gas price forecasts



[redacted]

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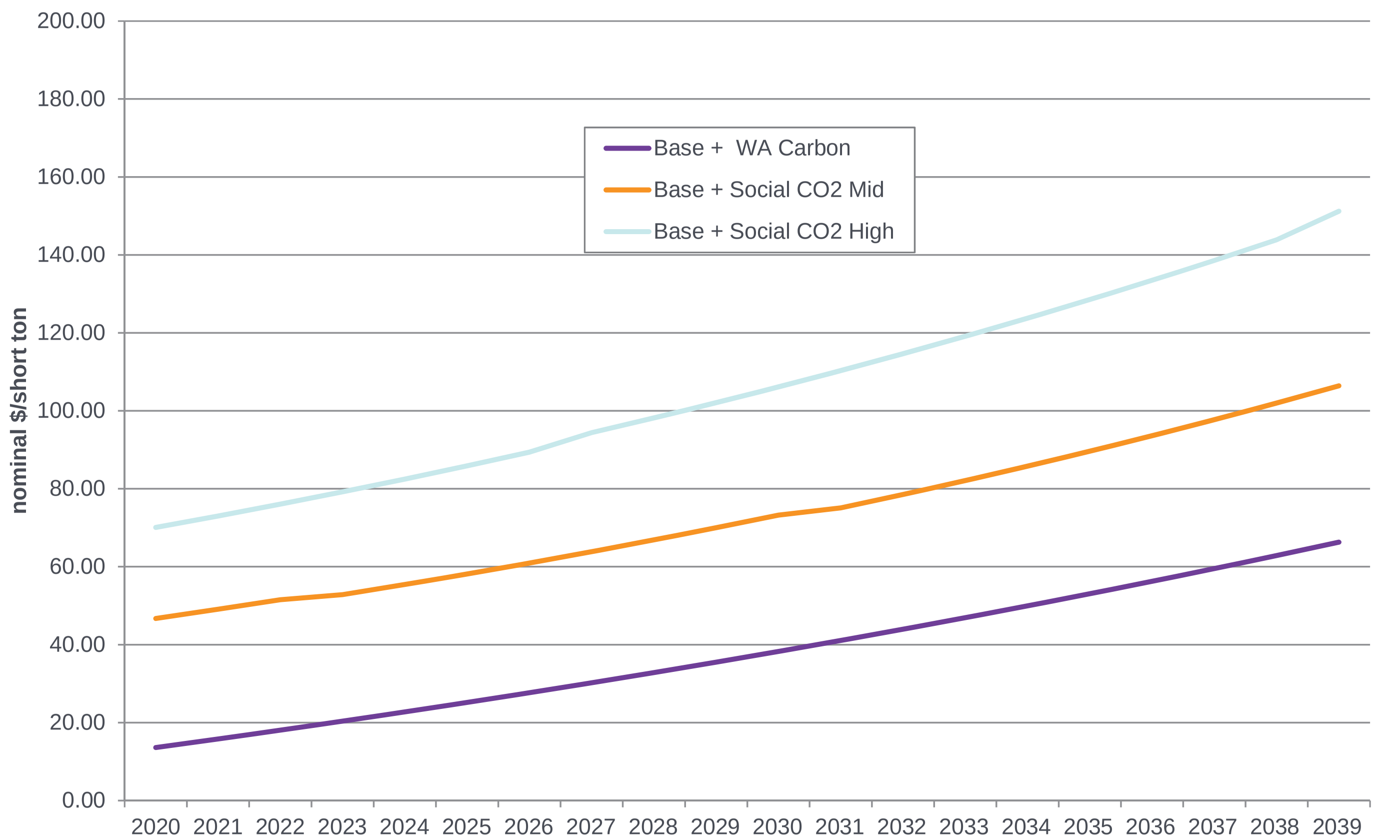
Carbon prices



[redacted]

Phase 1: Comparison of generic resource costs

	2017 IRP			2019 IRP			Change in costs from 2019 IRP to 2017 IRP		
2018 $/kW	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	All in Costs
CCCT	$1,020	$358	$1,378	$898	$269	$1,167	($122)	($89)	($211)
Frame Peaker (Fuel Fuel)	$526	$172	$698	$554	$271	$825	$28	$99	$127
Recip Engine (NG only)	$1,030	$312	$1,341	$842	$350	$1,192	($188)	$38	($149)
WA Wind	$1,548	$656	$2,204	$1,656	$386	$2,042	$108	($270)	($162)
MT Wind	$1,471	$1,312	$2,783	$1,633	$1,111	$2,744	$162	($201)	($39)
Solar	$1,497	$874	$2,371	$1,352	$570	$1,922	($145)	($304)	($449)
Biomass	$4,084	$207	$4,291	$7,036	$2,659	$9,695	$2,952	$2,452	$5,404
Offshore Wind	$5,717	$1,795	$7,512	$5,000	$1,547	$6,547	($717)	($248)	($965)
Li-Ion Battery 2-hr	$1,313	$342	$1,655	$1,331	$599	$1,930	$18	$257	$275
Li-Ion Battery 4-hr	$2,116	$552	$2,668	$2,346	$708	$3,054	$230	$156	$386
Flow Battery 4-hr	$1,870	$674	$2,544	$1,493	$618	$2,111	($377)	($56)	($433)
Flow Battery 6-hr	$2,447	$882	$3,329	$2,050	$708	$2,758	($397)	($174)	($571)
Pumped Storage	$2,503	$127	$2,630	$1,800	$879	$2,679	($703)	$752	$49

[redacted] SOUND ENERGY

Phase 2: Generic resource costs

Generic resource capital costs updated from HDR final report as part of the 2019 IRP.

Cost updates include:

- Frame peaker FOM cost
  - Draft: $3.93/kw-yr
  - Update: $11.40/kw-yr

    $11.40/kw-yr includes $3.93/kw-yr FOM + $7.47/kw-yr for 48 hours of oil.
- MT wind capital cost
  - Draft: $2,744/kw
  - Update: $1,617/kw
- WA wind capital cost
  - Draft: $2,042/kw
  - Update: $1,633/kw
- Solar capital cost
  - Draft: $1,922/kw
  - Update: $1,614/kw

[redacted] SOUND ENERGY

PSE will also update ELCC modeling assumptions to reflect current draft 2019 IRP assumptions

Resource	Nameplate (MW)	IRP 2017 Peak Capacity Solve to 5% LOLP Relative to New Peaker	IRP 2019 Peak Capacity Solve to 5% LOLP Relative to Perfect Capacity
Existing Wind	823	11%	8%
Skookumchuck	131	40%	37%
Green Direct 2 Solar	150	N/A	18%
Generic Montana Wind	100	49%	53%
Generic Washington Wind	100	16%	4%
Generic Offshore WA Wind	100	51%	42%
Generic Washington Solar	100	0%	10%

Energy Limited Resources	Nameplate (MW)	IRP 2017 Peak Capacity EUE at 5% LOLP	IRP 2019 Peak Capacity EUE at 5% LOLP
Lithium-Ion Battery 2 hr, 82% RT efficiency	25	60%	21%
Lithium-Ion Battery 4 hr, 87% RT efficiency	25	88%	42%
Flow Battery 4 hr, 73% RT efficiency	25	76%	39%
Flow Battery 6 hr, 73% RT efficiency	25	N/A	50%
Demand Response 3 hr duration, 6 hr delay	100	77%	40%

Source: 2019 IRTAG Meeting #5 presentation

[redacted]
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Projects are evaluated on a cost and risk basis delivered to PSE's load

Off PSE's system

1. Delivery to PSE's system (e.g. BPAT.PSEI, etc.)

- Developer provides transmission solution to PSE's load center
- Risk analysis: Is there ATC? Are ancillary services included in price? Is transmission long-term firm? Does it include rollover rights?

2. Delivery to Mid-C

- Developer provides transmission solution to PSE via Mid-C
- PSE applies cost to use PSE's existing transmission and integration costs
- Risk analysis: Does developer have long-term firm transmission to Mid-C? If not, is there ATC? Are ancillary services included in price?

3. Delivery to project busbar

- Leaves transmission solution to PSE
- PSE applies cost of transmission from project to PSE's load (inc. ancillary services and any cost to use existing PSE transmission)
- Risk analysis: Is long-term firm ATC available? Rollover rights?

On PSE's system

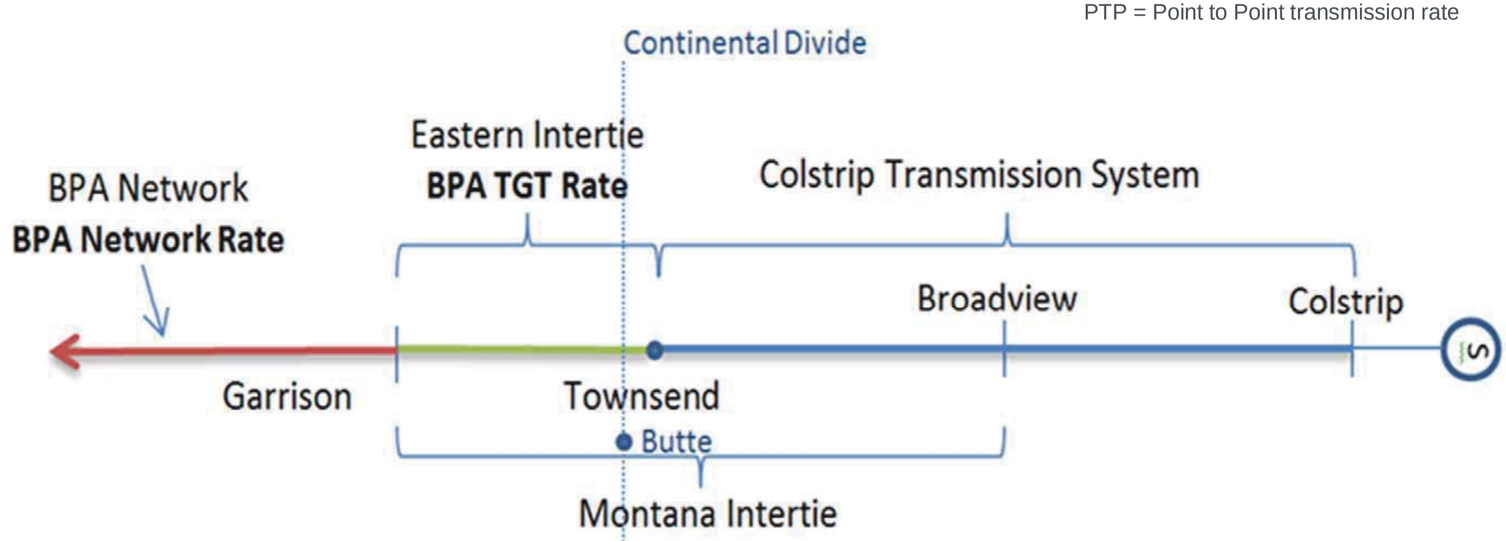
1. On system

- Project interconnects within PSE's service territory
- PSE applies integration costs
- PSE evaluates transmission solution (and all applicable costs) to PSE's load
- Risk analysis: Is resource interconnection ERIS or NRIS? Is there ATC? Is transmission long-term firm? Does it include rollover rights? Are ancillary services included in price?

Notes:
Available Transmission Capacity (ATC)
Energy Resource Interconnection Service (ERIS)
Network Resource Interconnection Service (NRIS)

Montana transmission path

PTP = Point to Point transmission rate



Termination year: 2024 PTP* rate: $21.52/kw-yr Losses: 1.9%	Termination yr: 2027 PTP* rate: $7.18/kw-yr Losses: 5.0%	PTP* rate: $28.76/kw-yr Losses: 2.7%

Other costs to consider:

- Additional losses from the project to the delivery point
- Renewable integration costs

[redacted]

Appendix 2: Additional proposal summary slides

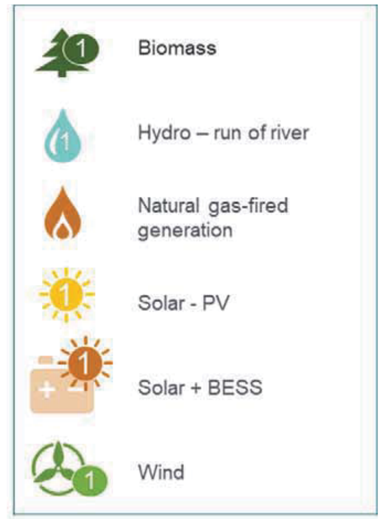
Proposals received

Resource type	# Proposals	Size range (MW / RECs, roughly)
Solar	36	35 – 290 MW
Wind	20	45 – 500 MW
Storage – battery	17	10 – 200 MW / 30 – 800 MWh
Storage – pumped hydro	2	330 – 500 MW
Biomass	3	10 – 55 MW
Natural Gas-fired Gen.	4	50 – 620 MW
Geothermal	2	15-25 MW
Hydro - run of river	1	40 MW
System PPA / Call Option	1	100 MW
Unbundled RECs	5	35,000 - 130,000 RECs
Demand Response	6	20-40 MW
Total	**97**	

[redacted]

Candidate list for Phase 2

[redacted]



Map does not include REC-only (3) or demand response (1) offers.

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Appendix 3: Additional demand response slides

DR resource objectives

Primary Objectives:

- Ensure DR resource is cost effective and is available:
  - November 1 – February 28/29
  - Weekdays, 7 a.m. – 10 a.m. and 5 p.m. – 9 p.m.
- Provide load response with one of the following options:
  - Hour ahead notification,
  - Day ahead notification, or
  - A combination of hour ahead and day ahead notification
- Total event time ≤ 40 hours per individual product per season

Secondary Objectives:

- Develop flexible DR capability
  - Provide fast response with notification time of ≤10 minutes

PAC and TRC tests

PSE will evaluate the cost-effectiveness of proposals in two ways: using the Program Administrator Cost Test (PAC) and Total Resource Cost (TRC) Test

Benefits	PAC	TRC
Avoided Capacity Costs	✓	✓
Avoided Energy Costs	✓	✓
Avoided Transmission & Distribution Costs	✓	✓
Avoided Environmental Compliance Costs	✓	✓

Costs	PAC	TRC
Program Administrator Expenses	✓	✓
Program Administrator Capital Costs	✓	✓
Financial Incentive to Participant	✓	×
DR Measure Cost: Program Administrator	✓	✓
DR Measure Cost: Participant Contribution	×	✓
Participant Transaction Costs	×	✓
Participant Value of Lost Service	×	✓
Increased Energy Consumption	✓	✓
Environmental Compliance Costs	✓	✓

Source: Demand Response RFP, Exhibit D: Cost-effectiveness Evaluation Criteria, Tables 1 and 2

[redacted] ENERGY

DR proposals phase I results summary

ID	Project Name	Resource Type	Nameplate	Term	State	Phase I Results
18200	[redacted]	DLC	[redacted] MW	2019-23	[redacted]	Not Selected
18201	[redacted]	DLC	[redacted] MW	2023-28	[redacted]	Selected
18201	[redacted]	DLC	[redacted] MW	2023-28	[redacted]	Not Selected
18201	[redacted]	DLC	[redacted] MW	2023-28	[redacted]	Not Selected
18202	[redacted]	DLC	[redacted] MW	2019-28	[redacted]	Not Selected
18203	[redacted]	BDR + DLC	[redacted] MW	2019-23	[redacted]	Not Selected
18204	[redacted]	C&I	[redacted] MW	2019-23	[redacted]	Not Selected
18205	[redacted]	C&I	[redacted] MW	2019-23	[redacted]	Not Selected

- PSE received 4 Direct Load Control (DLC) and 2 Commercial & Industrial Curtailment (C&I) proposals. Max proposed MWs between 21.5-40 MWs.
- [redacted] – Option 1 is the only project selected for phase II evaluation primarily based on cost-benefit analysis.

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2018 RFP Phase I Quantitative Results Summary - Renewable Resource

Project ID	Project	Nameplate	Levelized Cost: All Scenarios $/MWh	Levelized Cost: Rank	Portfolio Benefit / REC: NO CO2 $/REC	Portfolio Benefit / REC: CO2 Fee $/REC	Portfolio Benefit / REC: Societal $/REC	Portfolio Benefit / REC: NO CO2 Rank	Portfolio Benefit / REC: CO2 Fee Rank	Portfolio Benefit / REC: Societal Rank	Portfolio Benefit Ratio: NO CO2	Portfolio Benefit Ratio: CO2 Fee	Portfolio Benefit Ratio: Societal	Portfolio Benefit Ratio: NO CO2 Rank	Portfolio Benefit Ratio: CO2 Fee Rank	Portfolio Benefit Ratio: Societal Rank	Net Cost/REC: NO CO2 $/REC	Net Cost/REC: CO2 Fee $/REC	Net Cost/REC: Societal $/REC	Net Cost/REC: NO CO2 Rank	Net Cost/REC: CO2 Fee Rank	Net Cost/REC: Societal Rank
18169	[redacted]	[redacted] MW	$ [redacted]	18	[redacted]	[redacted]	[redacted]	1	2	1	-7.9	-2.7	-1.6	9	39	103	[redacted]	[redacted]	[redacted]	2	4	3
18135	[redacted]	[redacted] MW	$ [redacted]	3	[redacted]	[redacted]	[redacted]	2	9	13	-6.7	-3.3	-1.5	10	37	112	[redacted]	[redacted]	[redacted]	1	9	10
18173	[redacted]	[redacted]5 MW	$ [redacted]	49	[redacted]	[redacted]	[redacted]	3	4	4	11.8	-4.8	-1.8	25	23	90	[redacted]	[redacted]	[redacted]	63	12	5
18132	[redacted]	[redacted] MW	$ [redacted]	13	[redacted]	[redacted]	[redacted]	4	11	26	-14.5	-4.0	-1.4	5	28	116	[redacted]	[redacted]	[redacted]	5	16	15
18176	[redacted]	[redacted]5 MW	$ [redacted]	34	[redacted]	[redacted]	[redacted]	5	5	24	158.8	-3.5	-3.2	20	36	42	[redacted]	[redacted]	[redacted]	51	6	62
18135	[redacted]	[redacted] MW	$ [redacted]	1	[redacted]	[redacted]	[redacted]	6	3	9	-10.8	-2.2	-1.4	8	43	114	[redacted]	[redacted]	[redacted]	3	2	6
18112	[redacted]	[redacted] MW	$ [redacted]	12	[redacted]	[redacted]	[redacted]	7	10	18	-12.8	-3.1	-1.4	6	38	118	[redacted]	[redacted]	[redacted]	4	7	8
18175	[redacted]	[redacted] MW	$ [redacted]	30	[redacted]	[redacted]	[redacted]	8	41	45	5.9	-6.4	-6.0	39	19	16	[redacted]	[redacted]	[redacted]	74	23	104
18132	[redacted]	[redacted] MW	$ [redacted]	10	[redacted]	[redacted]	[redacted]	9	17	43	-22.4	-4.6	-1.5	4	25	109	[redacted]	[redacted]	[redacted]	6	18	17
18163	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	10	42	132	7.0	5.6	1.8	33	73	135	[redacted]	[redacted]	[redacted]	67	111	180
18169	[redacted]	[redacted] MW	$ [redacted]	29	[redacted]	[redacted]	[redacted]	11	6	3	9.9	-3.6	-1.7	27	31	96	[redacted]	[redacted]	[redacted]	79	5	4
18173	[redacted]	[redacted]1 MW	$ [redacted]	52	[redacted]	[redacted]	[redacted]	12	1	2	5.0	-2.6	-1.5	43	40	108	[redacted]	[redacted]	[redacted]	78	3	2
18165	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	13	45	136	6.1	4.8	1.5	37	78	140	[redacted]	[redacted]	[redacted]	67	120	185
18165	[redacted]	[redacted]0 REC	[redacted]		[redacted]	[redacted]	[redacted]	14	29	137	6.1	5.3	1.4	36	76	144	[redacted]	[redacted]	[redacted]	72	119	184
18111	[redacted]	[redacted] MW	$ [redacted]	8	[redacted]	[redacted]	[redacted]	15	16	8	-54.2	-3.6	-1.4	1	33	113	[redacted]	[redacted]	[redacted]	9	14	7
18179	[redacted]	[redacted] MW	$ [redacted]	9	[redacted]	[redacted]	[redacted]	16	15	20	-38.8	-3.6	-1.4	3	34	115	[redacted]	[redacted]	[redacted]	7	11	11
18125	[redacted]	[redacted] MW	$ [redacted]	11	[redacted]	[redacted]	[redacted]	17	12	15	52.6	-3.6	-1.5	21	35	111	[redacted]	[redacted]	[redacted]	52	10	12
18122	[redacted]	[redacted] MW	$ [redacted]	14	[redacted]	[redacted]	[redacted]	18	13	14	27.2	-3.8	-1.5	22	30	105	[redacted]	[redacted]	[redacted]	53	15	13
18190	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	19	84	133	5.7	4.4	1.7	41	86	137	[redacted]	[redacted]	[redacted]	70	112	181
18132	[redacted]	[redacted] MW	$ [redacted]	5	[redacted]	[redacted]	[redacted]	20	28	7	-47.3	-5.0	-1.5	2	22	110	[redacted]	[redacted]	[redacted]	8	20	19
18170	[redacted]	[redacted] MW	$ [redacted]	67	[redacted]	[redacted]	[redacted]	21	7	5	2.0	11.0	11.0	75	61	127	[redacted]	[redacted]	[redacted]	105	93	175
18190	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	22	151	134	6.5	1.4	1.7	34	138	136	[redacted]	[redacted]	[redacted]	66	110	179
18131	[redacted]	[redacted] MW	$ [redacted]	47	[redacted]	[redacted]	[redacted]	23	54	49	3.3	-21.9	-1.8	51	7	91	[redacted]	[redacted]	[redacted]	83	37	39
18125	[redacted]	[redacted] MW	$ [redacted]	4	[redacted]	[redacted]	[redacted]	24	18	21	18.2	-4.3	-1.6	24	27	104	[redacted]	[redacted]	[redacted]	55	17	16
18127	[redacted]	[redacted] MW	$ [redacted]	6	[redacted]	[redacted]	[redacted]	25	19	37	22.0	-4.7	-1.6	23	24	99	[redacted]	[redacted]	[redacted]	54	19	28
18114	[redacted]	[redacted] MW	$ [redacted]	17	[redacted]	[redacted]	[redacted]	26	80	33	11.1	-4.4	-1.6	26	26	100	[redacted]	[redacted]	[redacted]	57	22	22
18127	[redacted]	[redacted] MW	$ [redacted]	7	[redacted]	[redacted]	[redacted]	27	14	17	8.7	-3.6	-1.5	29	32	106	[redacted]	[redacted]	[redacted]	60	13	14
18139	[redacted]	[redacted] MW BESS	$ [redacted]	24	[redacted]	[redacted]	[redacted]	28	27	29	3.1	7.8	-3.2	55	65	39	[redacted]	[redacted]	[redacted]	100	98	67
18122	[redacted]	[redacted] MW	$ [redacted]	28	[redacted]	[redacted]	[redacted]	29	26	101	4.3	-11.8	-1.1	45	8	119	[redacted]	[redacted]	[redacted]	80	34	35
18166	[redacted]	[redacted] MW	$ [redacted]	63	[redacted]	[redacted]	[redacted]	30	35	31	4.5	-33.9	-1.9	44	5	82	[redacted]	[redacted]	[redacted]	77	39	36
18170	Golden Hill -Shaped	200 MW	$ [redacted]	44	[redacted]	[redacted]	[redacted]	31	8	6	3.5	94.6	-2.7	49	55	54	[redacted]	[redacted]	[redacted]	87	84	43
18170	[redacted]	[redacted] MW	$ [redacted]	19	[redacted]	[redacted]	[redacted]	32	37	22	8.5	-9.8	-1.7	31	12	94	[redacted]	[redacted]	[redacted]	61	30	21
18121	[redacted]	[redacted] MW	$ [redacted]	22	[redacted]	[redacted]	[redacted]	33	24	110	6.3	-5.7	-4.5	35	21	30	[redacted]	[redacted]	[redacted]	64	21	111
18121	[redacted]	[redacted] MW	$ [redacted]	23	[redacted]	[redacted]	[redacted]	34	39	111	6.0	-8.4	-4.7	38	14	28	[redacted]	[redacted]	[redacted]	65	28	113
18139	[redacted]	[redacted] MW	$ [redacted]	2	[redacted]	[redacted]	[redacted]	35	33	35	9.4	-8.2	-1.7	28	15	95	[redacted]	[redacted]	[redacted]	58	27	27
18132	[redacted]	[redacted] MW	$ [redacted]	26	[redacted]	[redacted]	[redacted]	36	69	25	5.8	-6.2	-1.8	40	20	89	[redacted]	[redacted]	[redacted]	69	138	25
18135	[redacted]	[redacted] MW BESS	$ [redacted]	79	[redacted]	[redacted]	[redacted]	37	68	56	2.8	4.7	-3.1	58	80	44	[redacted]	[redacted]	[redacted]	98	115	75
18171	[redacted]	[redacted]5 MW	$ [redacted]	21	[redacted]	[redacted]	[redacted]	38	44	34	8.6	-8.9	-1.5	30	13	107	[redacted]	[redacted]	[redacted]	59	29	18
18133	[redacted]	[redacted] MW	$ [redacted]	129	[redacted]	[redacted]	[redacted]	39	72	57	1.8	3.7	-3.6	83	92	36	[redacted]	[redacted]	[redacted]	127	132	84
18133	[redacted]	[redacted] MW	$ [redacted]	140	[redacted]	[redacted]	[redacted]	40	76	60	1.6	2.7	-5.1	89	110	26	[redacted]	[redacted]	[redacted]	144	148	102
18139	[redacted]	[redacted] MW BESS	$ [redacted]	98	[redacted]	[redacted]	[redacted]	41	43	39	1.3	2.0	22.9	101	123	124	[redacted]	[redacted]	[redacted]	162	174	170
18109	[redacted]	[redacted] MW	$ [redacted]	31	[redacted]	[redacted]	[redacted]	42	62	36	2.5	20.5	-1.8	64	57	92	[redacted]	[redacted]	[redacted]	95	87	32
18135	[redacted]	[redacted] MW	$ [redacted]	83	[redacted]	[redacted]	[redacted]	43	21	32	1.8	6.0	-2.2	81	71	72	[redacted]	[redacted]	[redacted]	96	102	58
18142	[redacted]	[redacted] MW	$ [redacted]	45	[redacted]	[redacted]	[redacted]	44	48	44	2.5	-10.5	-1.7	65	9	97	[redacted]	[redacted]	[redacted]	117	33	31
18187	[redacted]	[redacted]4 MW	$ [redacted]	104	[redacted]	[redacted]	[redacted]	45	31	73	1.7	4.1	-14.3	84	90	4	[redacted]	[redacted]	[redacted]	131	96	125
18187	[redacted]	[redacted]4 MW	$ [redacted]	138	[redacted]	[redacted]	[redacted]	46	58	138	1.5	3.0	-17.5	91	103	2	[redacted]	[redacted]	[redacted]	145	105	117
18190	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	47	87	135	5.4	4.3	1.6	42	87	138	[redacted]	[redacted]	[redacted]	71	113	182
18121	[redacted]	[redacted] MW	$ [redacted]	43	[redacted]	[redacted]	[redacted]	48	40	123	3.8	-8.0	-12.4	48	16	5	[redacted]	[redacted]	[redacted]	81	26	124
18171	[redacted]	[redacted]5 MW	$ [redacted]	20	[redacted]	[redacted]	[redacted]	49	65	28	7.7	-10.1	-1.6	32	11	98	[redacted]	[redacted]	[redacted]	62	35	20
18133	[redacted]	[redacted] MW	$ [redacted]	60	[redacted]	[redacted]	[redacted]	50	52	42	2.5	11.6	-2.5	66	60	63	[redacted]	[redacted]	[redacted]	102	91	59
18187	[redacted]	[redacted]4 MW	$ [redacted]	62	[redacted]	[redacted]	[redacted]	51	57	72	2.3	8.1	-3.2	67	64	38	[redacted]	[redacted]	[redacted]	111	89	82
18112	[redacted]	[redacted] MW	$ [redacted]	115	[redacted]	[redacted]	[redacted]	52	38	65	3.8	-6.6	-1.6	47	18	102	[redacted]	[redacted]	[redacted]	56	7	8
18111	[redacted]	[redacted] MW	$ [redacted]	112	[redacted]	[redacted]	[redacted]	53	51	54	1.1	2.6	-2.7	116	112	55	[redacted]	[redacted]	[redacted]	151	147	80
18140	[redacted]	[redacted] MW	$ [redacted]	85	[redacted]	[redacted]	[redacted]	54	95	150	1.2	1.6	N/A	109	130		[redacted]	[redacted]	[redacted]	160	167	78
18166	[redacted]	[redacted] MW	$ [redacted]	78	[redacted]	[redacted]	[redacted]	55	61	40	2.5	22.9	-2.1	63	56	77	[redacted]	[redacted]	[redacted]	99	85	48
18130	[redacted]	[redacted] MW	$ [redacted]	41	[redacted]	[redacted]	[redacted]	56	63	58	3.1	2,150.0	-1.9	52	54	83	[redacted]	[redacted]	[redacted]	85	83	49
18133	[redacted]	[redacted] MW	$ [redacted]	97	[redacted]	[redacted]	[redacted]	57	88	66	1.5	2.4	-5.3	93	115	22	[redacted]	[redacted]	[redacted]	142	149	107
18109	[redacted]	[redacted] MW	$ [redacted]	39	[redacted]	[redacted]	[redacted]	58	73	47	2.0	8.2	-1.9	72	63	85	[redacted]	[redacted]	[redacted]	109	92	40
18187	[redacted]	[redacted]4 MW	$ [redacted]	48	[redacted]	[redacted]	[redacted]	59	60	68	2.2	6.3	-3.6	70	69	34	[redacted]	[redacted]	[redacted]	114	100	90
18121	[redacted]	[redacted] MW	$ [redacted]	25	[redacted]	[redacted]	[redacted]	60	36	124	4.0	-7.5	-9.8	46	17	10	[redacted]	[redacted]	[redacted]	75	25	122
18128	[redacted]	[redacted] MW	$ [redacted]	51	[redacted]	[redacted]	[redacted]	61	50	59	3.1	-10.2	-1.8	54	10	93	[redacted]	[redacted]	[redacted]	84	32	41
18133	[redacted]	[redacted] MW	$ [redacted]	54	[redacted]	[redacted]	[redacted]	62	64	48	2.1	6.1	-2.9	71	70	49	[redacted]	[redacted]	[redacted]	116	101	69
18174	[redacted]	[redacted]6 MW	$ [redacted]	33	[redacted]	[redacted]	[redacted]	63	53	19	1.8	3.8	-2.7	82	91	56	[redacted]	[redacted]	[redacted]	119	137	52
18175	[redacted]	[redacted] MW	$ [redacted]	55	[redacted]	[redacted]	[redacted]	64	82	61	2.6	-163.9	-2.4	59	1	67	[redacted]	[redacted]	[redacted]	104	43	51
18164	[redacted]	[redacted]00 REC	[redacted]		[redacted]	[redacted]	[redacted]	65	122	141	2.5	1.6	0.1	61	131	152	[redacted]	[redacted]	[redacted]	94	157	191
18109	[redacted]	[redacted] MW	$ [redacted]	38	[redacted]	[redacted]	[redacted]	66	47	50	2.9	-46.1	-1.8	56	4	88	[redacted]	[redacted]	[redacted]	89	40	42
18140	[redacted]	[redacted] MW	$ [redacted]	66	[redacted]	[redacted]	[redacted]	67	97	153	1.0	1.4	N/A	124	137		[redacted]	[redacted]	[redacted]	165	172	88
18140	[redacted]	[redacted] MW	$ [redacted]	86	[redacted]	[redacted]	[redacted]	68	128	148	1.0	1.1	N/A	123	144		[redacted]	[redacted]	[redacted]	166	173	77
18109	[redacted]	[redacted] MW	$ [redacted]	42	[redacted]	[redacted]	[redacted]	69	49	52	2.9	-69.7	-1.8	57	2	87	[redacted]	[redacted]	[redacted]	91	41	44
18120	[redacted]	[redacted] MW	$ [redacted]	36	[redacted]	[redacted]	[redacted]	70	67	53	2.6	-65.7	-1.9	60	3	84	[redacted]	[redacted]	[redacted]	90	42	46
18174	[redacted]	[redacted] MW	$ [redacted]	37	[redacted]	[redacted]	[redacted]	71	56	12	1.5	3.4	-3.0	90	94	45	[redacted]	[redacted]	[redacted]	125	143	56
18171	[redacted]	[redacted]5 MW	$ [redacted]	58	[redacted]	[redacted]	[redacted]	72	89	55	2.2	4.8	-2.1	69	79	79	[redacted]	[redacted]	[redacted]	101	104	55
18133	[redacted]	[redacted] MW	$ [redacted]	113	[redacted]	[redacted]	[redacted]	73	93	71	1.2	1.8	-11.7	107	125	6	[redacted]	[redacted]	[redacted]	159	163	118
18130	[redacted]	[redacted] MW	$ [redacted]	32	[redacted]	[redacted]	[redacted]	74	81	77	1.7	4.3	-2.8	86	88	53	[redacted]	[redacted]	[redacted]	73	31	33
18166	[redacted]	[redacted] MW	$ [redacted]	64	[redacted]	[redacted]	[redacted]	75	74	46	2.2	16.1	-2.1	68	58	78	[redacted]	[redacted]	[redacted]	97	88	50
18181	[redacted]	[redacted]4 MW	$ [redacted]	106	[redacted]	[redacted]	[redacted]	76	34	38	1.0	3.2	-2.5	126	99	62	[redacted]	[redacted]	[redacted]	158	142	66
18119	[redacted]	[redacted] MW	$ [redacted]	53	[redacted]	[redacted]	[redacted]	77	75	76	1.9	10.8	-2.1	78	62	81	[redacted]	[redacted]	[redacted]	112	90	61

REDACTED VERSION

REDACTED VERSION

Project ID	Project	Nameplate	Levelized Cost All Scenarios $/MWh	Levelized Cost Rank	Portfolio Benefit / REC NO CO2 $/REC	Portfolio Benefit / REC CO2 Fee $/REC	Portfolio Benefit / REC Societal $/REC	Portfolio Benefit / REC NO CO2 Rank	Portfolio Benefit / REC CO2 Fee Rank	Portfolio Benefit / REC Societal Rank	Portfolio Benefit Ratio NO CO2	Portfolio Benefit Ratio CO2 Fee	Portfolio Benefit Ratio Societal	Portfolio Benefit Ratio NO CO2 Rank	Portfolio Benefit Ratio CO2 Fee Rank	Portfolio Benefit Ratio Societal Rank	Net Cost/REC NO CO2 $/REC	Net Cost/REC CO2 Fee $/REC	Net Cost/REC Societal $/REC	Net Cost/REC NO CO2 Rank	Net Cost/REC CO2 Fee Rank	Net Cost/REC Societal Rank
18162	[redacted]	[redacted] REC	[redacted]		[redacted]	[redacted]	[redacted]	78	118	115	2.5	1.8	1.5	62	126	141	[redacted]	[redacted]	[redacted]	88	150	190
18134	[redacted]	[redacted] MW	$ [redacted]	57	[redacted]	[redacted]	[redacted]	79	90	82	1.9	5.8	-2.3	77	72	71	[redacted]	[redacted]	[redacted]	110	95	70
18109	[redacted]	[redacted] MW	$ [redacted]	103	[redacted]	[redacted]	[redacted]	80	66	67	1.5	4.5	-3.0	92	84	46	[redacted]	[redacted]	[redacted]	129	117	23
18187	[redacted]	[redacted] MW	$ [redacted]	101	[redacted]	[redacted]	[redacted]	81	77	84	1.9	2.3	-3.2	79	117	41	[redacted]	[redacted]	[redacted]	148	155	90
18187	[redacted]	[redacted] MW	$ [redacted]	77	[redacted]	[redacted]	[redacted]	82	78	81	1.3	2.7	-3.2	100	111	40	[redacted]	[redacted]	[redacted]	174	146	90
18129	[redacted]	[redacted] MW	$ [redacted]	88	[redacted]	[redacted]	[redacted]	83	104	96	2.0	3.0	-2.5	73	102	59	[redacted]	[redacted]	[redacted]	106	122	83
18109	[redacted]	[redacted] MW	$ [redacted]	105	[redacted]	[redacted]	[redacted]	84	59	70	1.5	4.5	-3.1	94	85	43	[redacted]	[redacted]	[redacted]	132	127	24
18134	[redacted]	[redacted] MW	$ [redacted]	59	[redacted]	[redacted]	[redacted]	85	91	85	1.9	5.5	-2.3	80	74	69	[redacted]	[redacted]	[redacted]	113	99	73
18135	[redacted]	[redacted] MW	$ [redacted]	69	[redacted]	[redacted]	[redacted]	86	20	30	1.9	7.5	-2.1	76	66	80	[redacted]	[redacted]	[redacted]	120	94	54
18109	[redacted]	[redacted] MW	$ [redacted]	81	[redacted]	[redacted]	[redacted]	87	71	74	1.4	3.3	-3.8	99	98	31	[redacted]	[redacted]	[redacted]	137	151	34
18135	[redacted]	[redacted] MW BESS	$ [redacted]	122	[redacted]	[redacted]	[redacted]	88	79	75	1.0	2.0	-9.0	117	122	11	[redacted]	[redacted]	[redacted]	164	161	115
18174	[redacted]	[redacted] MW	$ [redacted]	111	[redacted]	[redacted]	[redacted]	89	22	10	1.2	6.3	-2.4	106	67	65	[redacted]	[redacted]	[redacted]	146	107	38
18137	[redacted]	[redacted] MW	$ [redacted]	56	[redacted]	[redacted]	[redacted]	90	92	80	1.2	2.1	-6.1	108	121	15	[redacted]	[redacted]	[redacted]	92	158	110
18174	[redacted]	[redacted] MW	$ [redacted]	114	[redacted]	[redacted]	[redacted]	91	46	11	1.1	5.0	-2.2	111	77	74	[redacted]	[redacted]	[redacted]	154	116	29
18174	[redacted]	[redacted] MW	$ [redacted]	126	[redacted]	[redacted]	[redacted]	92	22	16	1.0	6.3	-2.8	125	67	52	[redacted]	[redacted]	[redacted]	163	107	53
18140	[redacted]	[redacted] MW	$ [redacted]	82	[redacted]	[redacted]	[redacted]	93	116	156	0.8	1.0	N/A	139	151		[redacted]	[redacted]	[redacted]	177	178	101
18174	[redacted]	[redacted] MW	$ [redacted]	128	[redacted]	[redacted]	[redacted]	94	25	23	0.9	5.4	-2.8	127	75	50	[redacted]	[redacted]	[redacted]	170	118	57
18136	[redacted]	[redacted] MW	$ [redacted]	89	[redacted]	[redacted]	[redacted]	95	135	78	1.0	3.4	-2.1	122	96	75	[redacted]	[redacted]	[redacted]	175	97	63
18119	[redacted]	[redacted] MW	$ [redacted]	80	[redacted]	[redacted]	[redacted]	96	94	88	1.3	3.3	-3.0	102	97	47	[redacted]	[redacted]	[redacted]	130	124	89
UP002	[redacted]	[redacted] REC	[redacted]		[redacted]	[redacted]	[redacted]	97	152	108	3.1	2.2	0.8	53	120	148	[redacted]	[redacted]	[redacted]	76	44	186
18109	[redacted]	[redacted] MW	$ [redacted]	102	[redacted]	[redacted]	[redacted]	98	85	83	1.1	2.4	-5.2	115	116	25	[redacted]	[redacted]	[redacted]	149	127	106
18174	[redacted]	[redacted] MW	$ [redacted]	76	[redacted]	[redacted]	[redacted]	99	32	27	0.9	4.1	-4.9	130	89	27	[redacted]	[redacted]	[redacted]	169	139	96
18174	[redacted]	[redacted] MW	$ [redacted]	74	[redacted]	[redacted]	[redacted]	100	30	41	0.9	4.6	-4.7	129	82	29	[redacted]	[redacted]	[redacted]	167	126	99
18115	[redacted]	[redacted] MW	$ [redacted]	65	[redacted]	[redacted]	[redacted]	101	96	89	1.4	4.6	-2.3	96	81	68	[redacted]	[redacted]	[redacted]	122	103	74
18171	[redacted]	[redacted] MW	$ [redacted]	50	[redacted]	[redacted]	[redacted]	102	109	64	1.7	3.4	-2.2	85	93	73	[redacted]	[redacted]	[redacted]	103	114	60
18140	[redacted]	[redacted] MW	$ [redacted]	87	[redacted]	[redacted]	[redacted]	103	111	151	1.3	2.3	N/A	103	119		[redacted]	[redacted]	[redacted]	123	144	94
18140	[redacted]	[redacted] MW	$ [redacted]	90	[redacted]	[redacted]	[redacted]	104	120	147	1.3	1.7	N/A	105	128		[redacted]	[redacted]	[redacted]	124	154	93
18137	[redacted]	[redacted] MW	$ [redacted]	75	[redacted]	[redacted]	[redacted]	105	98	91	0.9	1.5	-14.7	132	134	3	[redacted]	[redacted]	[redacted]	115	165	121
18132	[redacted]	[redacted] MW	$ [redacted]	72	[redacted]	[redacted]	[redacted]	106	69	97	1.3	3.4	-3.4	104	95	37	[redacted]	[redacted]	[redacted]	50	24	95
18180	[redacted]	[redacted] MW	$ [redacted]	70	[redacted]	[redacted]	[redacted]	107	139	69	1.4	2.5	-2.5	97	114	61	[redacted]	[redacted]	[redacted]	118	109	68
18129	[redacted]	[redacted] MW	$ [redacted]	61	[redacted]	[redacted]	[redacted]	108	106	93	1.6	2.9	-2.7	87	105	57	[redacted]	[redacted]	[redacted]	107	130	85
18123	[redacted]	[redacted] MW	$ [redacted]	123	[redacted]	[redacted]	[redacted]	109	107	87	0.9	2.7	-5.7	131	109	18	[redacted]	[redacted]	[redacted]	140	135	71
18180	[redacted]	[redacted] MW	$ [redacted]	91	[redacted]	[redacted]	[redacted]	110	86	62	1.1	4.6	-2.5	113	83	64	[redacted]	[redacted]	[redacted]	135	106	65
18108	[redacted]	[redacted] MW	$ [redacted]	93	[redacted]	[redacted]	[redacted]	111	99	99	1.1	3.1	-2.8	110	101	51	[redacted]	[redacted]	[redacted]	133	125	97
18108	[redacted]	[redacted] MW	$ [redacted]	96	[redacted]	[redacted]	[redacted]	112	100	100	1.1	2.9	-2.9	114	104	48	[redacted]	[redacted]	[redacted]	134	129	98
18140	[redacted]	[redacted] MW	$ [redacted]	68	[redacted]	[redacted]	[redacted]	113	103	154	1.1	2.8	N/A	112	107		[redacted]	[redacted]	[redacted]	128	134	100
18123	[redacted]	[redacted] MW	$ [redacted]	109	[redacted]	[redacted]	[redacted]	114	105	86	1.0	2.8	-2.3	118	108	70	[redacted]	[redacted]	[redacted]	140	135	71
18113	[redacted]	[redacted] MW	$ [redacted]	107	[redacted]	[redacted]	[redacted]	115	108	105	1.0	2.6	-3.6	121	113	35	[redacted]	[redacted]	[redacted]	139	140	105
18118	[redacted]	[redacted] MW	$ [redacted]	35	[redacted]	[redacted]	[redacted]	116	55	51	3.4	-30.1	-1.9	50	6	86	[redacted]	[redacted]	[redacted]	82	38	45
18108	[redacted]	[redacted] MW	$ [redacted]	73	[redacted]	[redacted]	[redacted]	117	110	102	1.0	2.3	-3.6	119	118	33	[redacted]	[redacted]	[redacted]	138	145	103
18184	[redacted]	[redacted] MW	$ [redacted]	125	[redacted]	[redacted]	[redacted]	118	113	94	0.8	1.4	-5.2	138	136	24	[redacted]	[redacted]	[redacted]	155	152	86
18140	[redacted]	[redacted] MW	$ [redacted]	84	[redacted]	[redacted]	[redacted]	119	101	155	0.9	2.9	N/A	128	106		[redacted]	[redacted]	[redacted]	143	133	108
18129	[redacted]	[redacted] MW	$ [redacted]	95	[redacted]	[redacted]	[redacted]	120	141	116	1.0	1.0	-6.0	120	147	17	[redacted]	[redacted]	[redacted]	126	160	116
18184	[redacted]	[redacted] MW	$ [redacted]	120	[redacted]	[redacted]	[redacted]	121	121	95	0.8	1.7	-2.7	135	127	58	[redacted]	[redacted]	[redacted]	155	152	86
18108	[redacted]	[redacted] MW	$ [redacted]	132	[redacted]	[redacted]	[redacted]	122	115	104	0.7	1.2	112.7	140	141	123	[redacted]	[redacted]	[redacted]	173	171	168
18166	[redacted]	[redacted] MW	$ [redacted]	137	[redacted]	[redacted]	[redacted]	123	131	90	0.5	0.7	12.7	150	156	126	[redacted]	[redacted]	[redacted]	182	181	171
18108	[redacted]	[redacted] MW	$ [redacted]	92	[redacted]	[redacted]	[redacted]	124	123	109	0.8	1.6	-5.5	134	129	20	[redacted]	[redacted]	[redacted]	152	156	114
18179	[redacted]	[redacted] MW	$ [redacted]	141	[redacted]	[redacted]	[redacted]	125	130	117	0.4	0.7	5.9	151	158	129	[redacted]	[redacted]	[redacted]	183	182	173
18100	SPI Industrial Biomass	17 MW	$ [redacted]	100	[redacted]	[redacted]	[redacted]	126	112	63	0.7	1.3	-7.0	141	140	14	[redacted]	[redacted]	[redacted]	171	170	109
18108	[redacted]	[redacted] MW	$ [redacted]	136	[redacted]	[redacted]	[redacted]	127	126	107	0.6	1.1	15.3	143	145	125	[redacted]	[redacted]	[redacted]	176	175	169
18177	[redacted]	[redacted] MW	$ [redacted]	99	[redacted]	[redacted]	[redacted]	128	119	98	0.8	1.5	-5.4	136	135	21	[redacted]	[redacted]	[redacted]	150	159	112
18136	[redacted]	[redacted] MW	$ [redacted]	127	[redacted]	[redacted]	[redacted]	129	150	130	0.8	0.7	-5.2	137	157	23	[redacted]	[redacted]	[redacted]	147	131	81
18135	[redacted]	[redacted] MW BESS	$ [redacted]	148	[redacted]	[redacted]	[redacted]	130	129	112	0.3	0.4	1.1	158	165	146	[redacted]	[redacted]	[redacted]	192	190	192
18129	[redacted]	[redacted] MW	$ [redacted]	71	[redacted]	[redacted]	[redacted]	131	145	120	0.9	0.8	-10.8	133	154	9	[redacted]	[redacted]	[redacted]	136	164	123
18138	[redacted]	[redacted] MW BESS	$ [redacted]	144	[redacted]	[redacted]	[redacted]	132	138	126	0.3	0.4	1.1	154	166	145	[redacted]	[redacted]	[redacted]	187	186	187
UP002	[redacted]	[redacted]0 REC	[redacted]		[redacted]	[redacted]	[redacted]	133	148	128	1.6	1.2	0.3	88	143	151	[redacted]	[redacted]	[redacted]	86	44	189
18185	[redacted]	[redacted] MW	$ [redacted]	46	[redacted]	[redacted]	[redacted]	134	117	79	1.4	13.9	-1.6	95	59	101	[redacted]	[redacted]	[redacted]	93	86	47
18178	[redacted]	[redacted] MW	$ [redacted]	143	[redacted]	[redacted]	[redacted]	135	125	103	0.6	1.2	-11.0	146	142	8	[redacted]	[redacted]	[redacted]	172	169	119
18113	[redacted]	[redacted] MW	$ [redacted]	110	[redacted]	[redacted]	[redacted]	136	136	121	0.6	1.0	-36.4	142	149	1	[redacted]	[redacted]	[redacted]	161	168	126
18108	[redacted]	[redacted] MW	$ [redacted]	124	[redacted]	[redacted]	[redacted]	137	127	106	0.5	1.0	10.0	147	148	128	[redacted]	[redacted]	[redacted]	180	176	172
18141	[redacted]	[redacted] MW	$ [redacted]	121	[redacted]	[redacted]	[redacted]	138	102	92	0.4	3.1	-2.4	152	100	66	[redacted]	[redacted]	[redacted]	190	121	79
18181	[redacted]	[redacted] MW	$ [redacted]	119	[redacted]	[redacted]	[redacted]	139	134	118	0.5	1.1	-8.9	149	146	12	[redacted]	[redacted]	[redacted]	168	166	120
18135	[redacted]	[redacted] MW BESS	$ [redacted]	147	[redacted]	[redacted]	[redacted]	140	132	114	0.3	0.5	1.4	155	162	143	[redacted]	[redacted]	[redacted]	189	187	188
18108	[redacted]	[redacted] MW	$ [redacted]	133	[redacted]	[redacted]	[redacted]	141	137	119	0.3	0.7	2.8	157	155	132	[redacted]	[redacted]	[redacted]	184	180	178
18138	[redacted]	[redacted] MW BESS	$ [redacted]	149	[redacted]	[redacted]	[redacted]	142	83	140	0.2	0.6	0.1	163	159	154	[redacted]	[redacted]	[redacted]	193	191	195
18110	[redacted]	[redacted] MW	$ [redacted]	139	[redacted]	[redacted]	[redacted]	143	144	125	0.2	0.4	1.5	162	167	139	[redacted]	[redacted]	[redacted]	199	185	183
18172	[redacted]	[redacted] MW	$ [redacted]	130	[redacted]	[redacted]	[redacted]	144	147	127	0.3	0.5	3.0	156	161	131	[redacted]	[redacted]	[redacted]	178	177	176
18172	[redacted]	[redacted] MW	$ [redacted]	135	[redacted]	[redacted]	[redacted]	145	149	131	0.3	0.5	2.2	160	164	133	[redacted]	[redacted]	[redacted]	179	179	177
18138	[redacted]	[redacted] MW BESS	$ [redacted]	117	[redacted]	[redacted]	[redacted]	146	124	129	0.4	1.3	-8.5	153	139	13	[redacted]	[redacted]	[redacted]	157	162	30
18168	[redacted]	[redacted] MW	$ [redacted]	15	[redacted]	[redacted]	[redacted]	147	142	139	0.6	1.8	-0.2	144	124	121	[redacted]	[redacted]	[redacted]	108	123	76
18168	[redacted]	[redacted] MW	$ [redacted]	15	[redacted]	[redacted]	[redacted]	148	140	145	0.5	1.6	0.0	148	132	122	[redacted]	[redacted]	[redacted]	121	141	64
18138	[redacted]	[redacted] MW BESS	$ [redacted]	108	[redacted]	[redacted]	[redacted]	149	146	113	0.3	0.9	-5.6	159	153	19	[redacted]	[redacted]	[redacted]	153	36	37
18138	[redacted]	[redacted] MW BESS	$ [redacted]	142	[redacted]	[redacted]	[redacted]	150	143	146	0.1	0.5	1.9	166	160	134	[redacted]	[redacted]	[redacted]	181	183	26
18138	[redacted]	[redacted] MW BESS	$ [redacted]	151	[redacted]	[redacted]	[redacted]	151	133	152	N/A	0.3	N/A		168		[redacted]	[redacted]	[redacted]	195	194	198
18172	[redacted]	[redacted] MW	$ [redacted]	145	[redacted]	[redacted]	[redacted]	152	153	142	N/A	N/A	0.1			153	[redacted]	[redacted]	[redacted]	186	188	193
18182	[redacted]	[redacted] MW	$ [redacted]	131	[redacted]	[redacted]	[redacted]	153	114	122	N/A	0.9	4.1		152	130	[redacted]	[redacted]	[redacted]	185	184	174
18172	[redacted]	[redacted] MW	$ [redacted]	146	[redacted]	[redacted]	[redacted]	154	154	143	N/A	N/A	0.1			155	[redacted]	[redacted]	[redacted]	188	189	194
18106	[redacted]	[redacted] MW	$ [redacted]	150	[redacted]	[redacted]	[redacted]	155	155	144	N/A	N/A	0.0			156	[redacted]	[redacted]	[redacted]	194	193	197
18101	[redacted]	[redacted] MW	$ [redacted]	134	[redacted]	[redacted]	[redacted]	156	156	149	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	191	192	196
18186	[redacted]	[redacted] MW	$ [redacted]	155	[redacted]	[redacted]	[redacted]	157	157	157	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	196	195	199
18167	[redacted]	[redacted] MW	$ [redacted]	163	[redacted]	[redacted]	[redacted]	158	159	158	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	197	197	200
18167	[redacted]	[redacted] MW	$ [redacted]	162	[redacted]	[redacted]	[redacted]	159	158	159	N/A	N/A	N/A				[redacted]	[redacted]	[redacted]	198	196	201

Project ID	Project	Nameplate	Levelized Cost		Portfolio Benefit / REC						Portfolio Benefit Ratio						Net Cost/REC					
			All Scenarios $/MWh	Rank	NO CO2 $/REC	CO2 Fee $/REC	Societal $/REC	NO CO2 Rank	CO2 Fee Rank	Societal Rank	NO CO2	CO2 Fee	Societal	NO CO2 Rank	CO2 Fee Rank	Societal Rank	NO CO2 $/REC	CO2 Fee $/REC	Societal $/REC	NO CO2 Rank	CO2 Fee Rank	Societal Rank
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18131	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18116	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18126	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18124	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18169	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18169	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18182	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18183	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					
18102	[redacted]	[redacted] MW	N/A		[redacted]						N/A	N/A	N/A				[redacted]					

REDACTED
VERSION

REDACTED VERSION

REDACTED VERSION

2018 RFP Phase I Quantitative Results Summary - Capacity Resource

Project ID	Project	NAMEPLATE	Levelized Cost: All Scenarios $/MWh	Levelized Cost: Rank	Portfolio Benefit / kW-yr: NO CO2 $/kw-yr	Portfolio Benefit / kW-yr: CO2 Fee $/kw-yr	Portfolio Benefit / kW-yr: Societal $/kw-yr	Portfolio Benefit / kW-yr: NO CO2 Rank	Portfolio Benefit / kW-yr: CO2 Fee Rank	Portfolio Benefit / kW-yr: Societal Rank	Net Cost / kW-yr: NO CO2 $/kw-yr	Net Cost / kW-yr: CO2 Fee $/kw-yr	Net Cost / kW-yr: Societal $/kw-yr	Net Cost / kW-yr: NO CO2 Rank	Net Cost / kW-yr: CO2 Fee Rank	Net Cost / kW-yr: Societal Rank
18169	[redacted]	[redacted] MW	$ [redacted]	16	[redacted]			1	2	2	[redacted]			1	2	2
18169	[redacted]	[redacted] MW	$ [redacted]	27	[redacted]			2	3	3	[redacted]			10	3	3
18173	[redacted]	[redacted] MW	$ [redacted]	50	[redacted]			3	1	1	[redacted]			6	1	1
18176	[redacted]	[redacted] MW	$ [redacted]	32	[redacted]			4	4	5	[redacted]			3	4	6
18173	[redacted]	[redacted] MW	$ [redacted]	47	[redacted]			5	5	4	[redacted]			4	5	4
18100	SPI Industrial Biomass	17 MW	$ [redacted]	98	[redacted]			6	6	6	[redacted]			46	28	7
18105	[redacted]	[redacted] MW	$ [redacted]	150	[redacted]			7	10	10	[redacted]			2	8	11
18105	[redacted]	[redacted] MW	$ [redacted]	162	[redacted]			8	9	15	[redacted]			5	12	18
XXXXX	[redacted]	[redacted] MW	[redacted]		[redacted]			9	8	9	[redacted]			7	9	9
18105	[redacted]	[redacted] MW	$ [redacted]	160	[redacted]			10	14	11	[redacted]			9	15	12
18105	[redacted]	[redacted] MW	$ [redacted]	152	[redacted]			11	11	12	[redacted]			12	11	15
18170	Golden Hill -Shaped	200 MW	$ [redacted]	42	[redacted]			12	7	8	[redacted]			8	7	10
18105	[redacted]	[redacted] MW	$ [redacted]	161	[redacted]			13	13	16	[redacted]			13	16	19
18201	[redacted]	[redacted] MW	[redacted]		[redacted]			14	12	17	[redacted]			11	10	14
18103	[redacted]	[redacted] MW	$ [redacted]	25	[redacted]			15	17	20	[redacted]			15	6	24
18201	[redacted]	[redacted] MW	[redacted]		[redacted]			16	16	18	[redacted]			14	17	16
18104	[redacted]	[redacted] MW	$ [redacted]	117	[redacted]			17	21	25	[redacted]			17	25	13
18202	[redacted]	[redacted] MW	[redacted]		[redacted]			18	18	19	[redacted]			18	19	21
18104	[redacted]	[redacted] MW	$ [redacted]	114	[redacted]			19	24	26	[redacted]			16	22	29
18201	[redacted]	[redacted] MW	[redacted]		[redacted]			20	20	21	[redacted]			19	20	23
18105	[redacted]	[redacted] MW	$ [redacted]	151	[redacted]			21	23	23	[redacted]			20	24	25
18105	[redacted]	[redacted] MW	$ [redacted]	154	[redacted]			23	27	22	[redacted]			21	30	26
18105	[redacted]	[redacted] MW	[redacted]		[redacted]			24	26	24	[redacted]			23	27	27
18104	[redacted]	[redacted] MW	$ [redacted]	155	[redacted]			25	28	28	[redacted]			24	33	34
18104	[redacted]	[redacted] MW	$ [redacted]	92	[redacted]			26	31	29	[redacted]			22	32	32
18145	[redacted]	[redacted] MW	$ [redacted]	38	[redacted]			27	57	53	[redacted]			26	38	28
18104	[redacted]	[redacted] MW	$ [redacted]	156	[redacted]			29	37	27	[redacted]			25	40	33
18159	[redacted]	[redacted] MW	$ [redacted]	156	[redacted]			30	36	30	[redacted]			27	41	37
UP001	[redacted]	[redacted] MW	[redacted]		[redacted]			31	51	37	[redacted]			30	48	5
18203	[redacted]	[redacted] MW	[redacted]		[redacted]			32	46	34	[redacted]			28	47	40
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			33	45	59	[redacted]			29	46	42
18157	[redacted]	[redacted] MW	[redacted]		[redacted]			34	44	61	[redacted]			32	52	43
18145	[redacted]	[redacted] MW	[redacted]		[redacted]			35	80	74	[redacted]			31	29	22
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			36	42	62	[redacted]			33	42	46
18188	[redacted]	[redacted] MW	[redacted]		[redacted]			37	52	36	[redacted]			35	56	49
18157	[redacted]	[redacted] MW	$ [redacted]	158	[redacted]			38	41	63	[redacted]			34	54	47
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			39	48	80	[redacted]			36	51	48
18157	[redacted]	[redacted] MW	[redacted]		[redacted]			40	68	81	[redacted]			37	55	50
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			41	35	82	[redacted]			39	13	51
18145	[redacted]	[redacted] MW	[redacted]		[redacted]			42	95	71	[redacted]			48	31	20
18157	[redacted]	[redacted] MW	[redacted]		[redacted]			43	62	83	[redacted]			41	59	52
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			44	34	56	[redacted]			40	37	30
18188	[redacted]	[redacted] MW	[redacted]		[redacted]			45	56	45	[redacted]			43	60	64
18157	[redacted]	[redacted] MW	$ [redacted]	159	[redacted]			46	38	58	[redacted]			42	39	31
18107	[redacted]	[redacted] MW	[redacted]		[redacted]			47	29	7	[redacted]			38	26	8
18144	[redacted]	[redacted] MW	$ [redacted]	114	[redacted]			48	53	42	[redacted]			44	49	53
18147	[redacted]	[redacted] MW	[redacted]		[redacted]			49	49	32	[redacted]			45	53	39
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			50	43	77	[redacted]			47	43	35
18157	[redacted]	[redacted] MW	[redacted]		[redacted]			51	61	79	[redacted]			49	44	36
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			52	54	87	[redacted]			52	66	76
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			53	25	104	[redacted]			63	18	87
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			54	88	70	[redacted]			53	99	77
18200	[redacted]	[redacted] MW	[redacted]		[redacted]			55	59	33	[redacted]			51	64	61
18152	[redacted]	[redacted] MW	[redacted]		[redacted]			56	81	50	[redacted]			50	84	44
18147	[redacted]	[redacted] MW	[redacted]		[redacted]			57	58	38	[redacted]			54	62	54
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]			58	30	97	[redacted]			55	36	66

REDACTED VERSION

REDACTED VERSION

Project ID	Project	NAMEPLATE	Levelized Cost: All Scenarios $/MWh	Levelized Cost: Rank	Portfolio Benefit / kW-yr: NO CO2 $/kw-yr	Portfolio Benefit / kW-yr: CO2 Fee $/kw-yr	Portfolio Benefit / kW-yr: Societal $/kw-yr	Portfolio Benefit / kW-yr: NO CO2 Rank	Portfolio Benefit / kW-yr: CO2 Fee Rank	Portfolio Benefit / kW-yr: Societal Rank	Net Cost / kW-yr: NO CO2 $/kw-yr	Net Cost / kW-yr: CO2 Fee $/kw-yr	Net Cost / kW-yr: Societal $/kw-yr	Net Cost / kW-yr: NO CO2 Rank	Net Cost / kW-yr: CO2 Fee Rank	Net Cost / kW-yr: Societal Rank
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	59	103	86	[redacted]	[redacted]	[redacted]	65	63	65
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	60	99	98	[redacted]	[redacted]	[redacted]	57	71	68
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	61	22	99	[redacted]	[redacted]	[redacted]	58	23	70
18147	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	62	60	39	[redacted]	[redacted]	[redacted]	60	65	55
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	63	93	72	[redacted]	[redacted]	[redacted]	70	77	67
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	64	97	100	[redacted]	[redacted]	[redacted]	61	73	72
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	65	87	35	[redacted]	[redacted]	[redacted]	56	58	44
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	66	64	40	[redacted]	[redacted]	[redacted]	62	68	57
18205	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	67	72	49	[redacted]	[redacted]	[redacted]	59	72	71
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	68	65	41	[redacted]	[redacted]	[redacted]	64	69	60
18156 / 18158	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	69	19	95	[redacted]	[redacted]	[redacted]	66	21	56
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	70	96	96	[redacted]	[redacted]	[redacted]	69	61	58
18146	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	71	63	67	[redacted]	[redacted]	[redacted]	68	14	62
18145	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	72	40	68	[redacted]	[redacted]	[redacted]	67	92	17
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	73	71	44	[redacted]	[redacted]	[redacted]	71	74	63
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	74	76	47	[redacted]	[redacted]	[redacted]	73	80	75
18151	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	75	83	65	[redacted]	[redacted]	[redacted]	72	85	84
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	76	75	46	[redacted]	[redacted]	[redacted]	74	79	69
18157	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	77	106	102	[redacted]	[redacted]	[redacted]	80	82	82
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	78	77	48	[redacted]	[redacted]	[redacted]	76	81	74
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	79	90	57	[redacted]	[redacted]	[redacted]	75	94	86
18148	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	80	70	76	[redacted]	[redacted]	[redacted]	79	78	79
18146	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	81	79	69	[redacted]	[redacted]	[redacted]	77	34	73
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	82	82	51	[redacted]	[redacted]	[redacted]	78	87	78
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	83	86	52	[redacted]	[redacted]	[redacted]	81	93	81
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	84	89	54	[redacted]	[redacted]	[redacted]	83	95	85
18152	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	85	66	43	[redacted]	[redacted]	[redacted]	82	67	59
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	86	84	55	[redacted]	[redacted]	[redacted]	84	91	83
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	87	92	60	[redacted]	[redacted]	[redacted]	86	98	88
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	88	91	64	[redacted]	[redacted]	[redacted]	88	97	89
18204	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	89	94	73	[redacted]	[redacted]	[redacted]	89	100	91
18149	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	90	67	101	[redacted]	[redacted]	[redacted]	91	75	94
18155	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	91	98	66	[redacted]	[redacted]	[redacted]	90	101	92
18149 / 18153	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	92	73	105	[redacted]	[redacted]	[redacted]	97	86	99
18154	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	93	100	75	[redacted]	[redacted]	[redacted]	92	102	93
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	94	101	78	[redacted]	[redacted]	[redacted]	94	103	96
18149	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	95	55	90	[redacted]	[redacted]	[redacted]	93	57	95
18149	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	96	47	88	[redacted]	[redacted]	[redacted]	95	45	97
18160	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	97	104	93	[redacted]	[redacted]	[redacted]	96	106	105
18189	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	98	33	89	[redacted]	[redacted]	[redacted]	98	35	103
18149 / 18153	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	99	69	103	[redacted]	[redacted]	[redacted]	99	70	100
18150	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	100	78	85	[redacted]	[redacted]	[redacted]	100	83	101
18149 / 18153	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	101	105	106	[redacted]	[redacted]	[redacted]	101	89	102
18160	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	102	102	84	[redacted]	[redacted]	[redacted]	102	104	98
18150	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	103	74	91	[redacted]	[redacted]	[redacted]	103	76	80
18150	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	104	85	92	[redacted]	[redacted]	[redacted]	105	88	104
18189	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	105	50	94	[redacted]	[redacted]	[redacted]	104	50	106
18159	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]	106	107	107	[redacted]	[redacted]	[redacted]	107	107	107
18161	BPA Peak Capacity Product	100 MW	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			
18143	[redacted]	[redacted] MW	[redacted]		[redacted]	[redacted]	[redacted]				[redacted]	[redacted]	[redacted]			

2018 All Resources and Demand Response RFPs

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Update to WUTC: RFP Results and Short List (Draft)

December 20, 2019

Agenda

- Introduction and level set to Phase 2
  - RFP timeline
  - Updated resource need
  - Updated Phase 2 candidate list
- Phase 2 evaluation process
  - Process overview
  - Updated assumptions and scenarios
- Phase 2 results and short list (April – July 2019)
- Post-RFP re-evaluation of alternatives (August – December 2019)
  - Updated assumptions, RFP pricing and two new proposals
  - Updated optimization results
  - Revised short list
  - Overview of selected offers

[redacted] SOUND ENERGY

1 Introduction

Presenter: Cindy Song

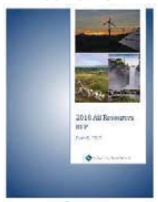
RFP timeline and UTC staff updates

PSE last met with UTC staff in April to present Phase 1 results

2018

PSE files draft RFPs
March 29

WUTC approves All Resource and Demand Response RFPs
June 28



RFP offers due
Aug. 17

PSE Update to WUTC staff
Sept. 12

Phase 1 evaluation
August 2018 – March 2019

2019

PSE Update to WUTC staff
April 2

Phase 2 evaluation
April – July 2019

Bidders notified
early August 2019

Received unsolicited Atlantic Power Proposal
August 29, 2019

Received unsolicited Morgan Stanley Proposal
October 23, 2019

Re-evaluation
August - Dec. 2019

PSE Update to WUTC staff
Dec. 20

Ongoing negotiations with counterparties

WUTC staff updates

RFP Kick Off
Sept. 12, 2018

- Overview of PSE's RFP evaluation process
- Proposals received

RFP Update
April 2, 2019

- Phase 1 evaluation process and modeling assumptions
- Phase 1 results and Phase 2 candidate list
- Overview of Phase 2 process

RFP Final Results
December 20, 2019

- Phase 2 evaluation process and updated modeling assumptions
- Phase 2 results and short list
- Re-evaluation of alternatives and revised final short list*

**After selecting a short list at the end of the Phase 2 analysis and notifying respondents of their status, PSE received new proposals from Atlantic Power and Morgan Stanley. PSE performed a re-evaluation of its alternatives and subsequently revised its short list.*

[redacted]

Capacity resource need updated to 299MW in 2022 and REC need updated to 233,449 RECs in 2023*

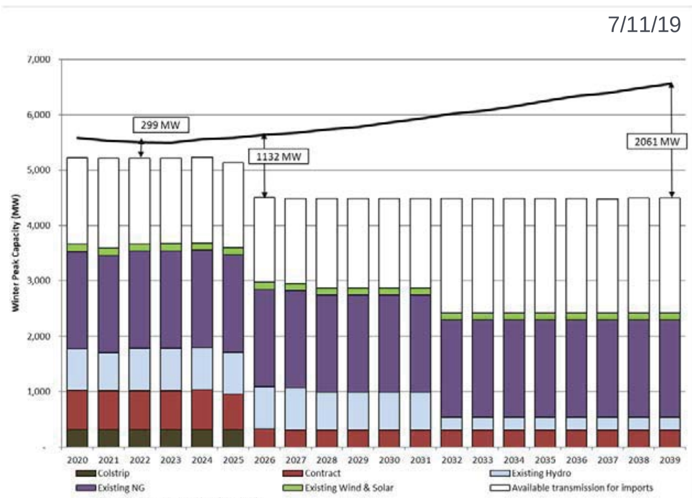
Resource need forecasts updated in Phase 2 analysis to reflect draft 2019 IRP need assessments and F2019 load forecast (net conservation)

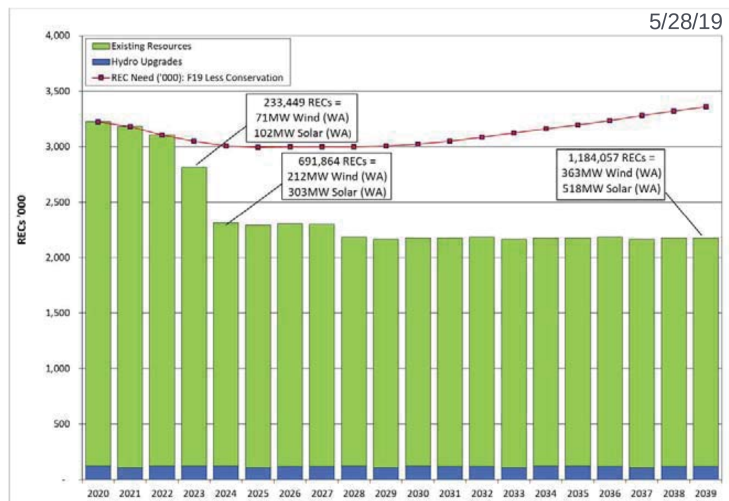
2018 RFP Capacity Need – Phase 2 update

- PSE seeks 299 MW capacity by end of 2022; near-term gap in 2020-2021 to be filled by short-term RFP
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably
- Need based on F2019 forecast net conservation (from 2017 IRP), 2019 IRP planning margin

2018 RFP REC Need – Phase 2 update**

- REC need is driven by the increase in the RPS from 9% to 15% in 2020
- Projected need to meet the RPS is 233,449 RECs by 2023
- PSE's inventory of banked RECs delays need until 2023





**Original RFP issued to fill 272 MW capacity need in 2022 and renewable need in 2023.*
***REC need reflects renewable need driven by RCW 19.285 (RPS). It does not reflect the impact of SB 5116 (Clean Energy Transfomation Act).*

PSE received 97 proposals in response to the 2018 RFPs

27 proposals advanced to Phase 2 for further analysis

Proposals selected for Phase 2 evaluation reflect resource and technology diversity

Updated 6/20/19

	Proposals Received*		Phase 2 Candidate List		Revised Phase 2 Candidate List **	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	8	1050	7	890
Solar - PV + BESS	20	2848	1	100	1	100
Wind - Off Shore	1	400	0	0	0	0
Wind On Shore	16	3303	7	1642	7	1642
Wind + Winter Sys PPA	1	371	1	200	1	200
Wind + Solar and/or BESS	2	464	0	0	0	0
Storage - Battery ("BESS")	17	1265	0	0	0	0
Storage - Pumped Hydro	2	900	0	0	0	0
Biomass	2	72	1	17	1	17
Biomass + BESS	1	15	0	0	0	0
Natural Gas-fired Generation	4	1377	2	348	2	348
Geothermal	2	43	0	0	0	0
Hydro - Run of River	1	38	1	38	1	38
System PPA / Call Option	1	100	0	0	1	100
Unbundled RECs	5	n/a	3	n/a	4	n/a
Demand Response	6	154	1	8.7	2	33.7
TOTAL	**97**	**13,590**	**25**	**3,404**	**27**	**3,369**

Phase 2 candidate list revised after April 2019 WUTC staff update due to the following changes:

- 1 solar proposal withdrawn by respondent (removed)
- 1 unsolicited REC and 1 demand response proposal reduced pricing (added)
- 1 system PPA/call option moved delivery point from Mid-C to BPAT.PSEI (added)

[redacted]

** In addition to the 97 RFP proposals shown above, PSE also received two unsolicited proposals during Phase 1 (a pumped hydro and a REC-only proposal) and three unsolicited proposals during Phase 2 (all solar). None of these offers were competitive with the RFP proposals. However, the REC-only proposal price was reduced in Phase 2 and the proposal was added to the revised candidate list.*

*** See Slide 7 for a list of proposals evaluated in Phase 2.*

Phase 2 candidate list[1,2]

	ID	Project Name	Resource Type	Nameplate	Counterparty	State
1	18100	SPI Industrial	Biomass	17 MW	SPI	WA
2	18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
3	18205	[redacted]	Demand Response	[redacted] MW	[redacted]	MA
4	18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
5	18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
6	18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
7	18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
8	18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
9	18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
10	UP002	[redacted]	REC Only	[redacted] REC	[redacted]	ID
11	18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
12	18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
13	18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
14	18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
15	18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
16	18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
17	18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18	18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
19	18139	[redacted]	Solar + BESS	[redacted] MW BESS	[redacted]	OR
20	18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
21	18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
22	18161	[redacted]	Sys PPA/Call Opt.	[redacted] MW	[redacted]	OR
23	XXXXX	[redacted]	Transmission	[redacted] MW	[redacted]	N/A
24	18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
25	18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
26	18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
27	18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
28	18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

* Numbers shown are rounded to the nearest 5 MW.

** Reflects a redirect of [redacted] MW of BPA transmission from [redacted] to PSEI, available January, 2022 for a 50-year term, and using Mid-C forecast for energy pricing. [redacted] MW may be available for redirect on BPA's system, however it is likely only [redacted] MW is possible for redirect to Mid-C. Redirects are assessed given the most current data and are a snap shot of the present system. The results are subject to change and may vary in the future based on updated ATC calculations and flow gate constraints within BPA's network. While redirect of the remaining [redacted] MW is feasible, the location, source and cost of this redirect remains under review, therefore not included in this analysis.

*** [redacted] (formerly [redacted] Solar) (#18111)

[1]The candidate list reflects the best offer from each proposal.
[2]The list was revised early in Phase 2 to remove the [redacted] proposal (#18112) (withdrawn developer), and to add the BPA Peak Capacity Product (#16161) (adjusted original delivery point from Mid-C to BPAT.PSEI), the [redacted] proposal (#18205) (repriced after Phase 1 elimination) and the unsolicited Moun[redacted] proposal (#UP002) (repriced after Phase 1 elimination).

2

Phase 2 evaluation process

Presenter: Bob Williams

How is Phase 2 different than Phase 1?

In Phase 1, we give proposals a reasonable benefit of the doubt; in Phase 2, we verify

Two-phased evaluation process allows PSE to focus on the most favorable proposals for robust analysis.

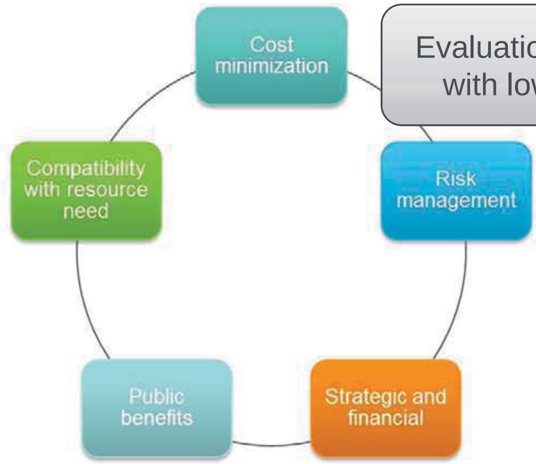
Phase 1: Screening	**Phase 2: Due Diligence**
Qualitative review based on evaluation criteria	
Fatal flaw screening	Due diligence evaluation
	Data requests
	Respondent engagement
Static quantitative analysis by resource type	Quantitative portfolio optimization
Scenario analysis	
• **Purpose:** Eliminate proposals with prohibitive costs and fatal flaws • **Result:** Identify Candidate List for Phase 2 review	• **Purpose:** Thoroughly examine proposals and identify lowest reasonable cost and risk portfolio • **Result:** Identify Short List for negotiation

- Phase 1 analysis relied on the proposals and public information sources; Phase 2 involved more interaction with respondents and a deeper dive into the details of each proposal
- Phase 2 quantitative analysis included:
  - Updated quantitative assumptions
  - Optimization analysis and updated standalone portfolio screening analysis in the Portfolio Screening Model (PSM)

[redacted] PSE SOUND ENERGY

Phase 2 uses the same evaluation criteria and models as Phase 1

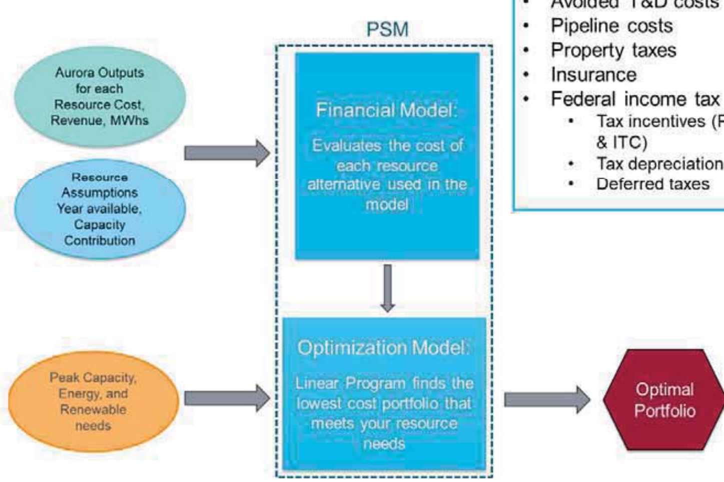
Process includes detailed, cross-functional due diligence to evaluate the costs, risks and merits of each proposal



Evaluation criteria help identify proposals with lowest reasonable cost and risk*

*See Demand Response RFP and Exhibit A of the All Resources RFP for complete evaluation criteria.

Two primary quantitative models help analyze resource costs and characteristics



PSM* *Fixed costs*

- Capital costs
  - Return on capital (rate base)
  - Depreciation
- Fixed O&M
- PPA pricing
- Transmission
- Avoided T&D costs
- Pipeline costs
- Property taxes
- Insurance
- Federal income tax
  - Tax incentives (PTC & ITC)
  - Tax depreciation
  - Deferred taxes

Aurora *Variable costs*

- Fuel costs
- Variable O&M
- Variable transmission
- Carbon pricing
- Startup costs
- Plant technical information
  - Capacity (ISO & 23°)
  - Heat rates
  - Forced and planned outages
  - Renewable output
  - Emissions

*Portfolio Screening Model (PSM)

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Phase 2 uses the same quantitative screening metrics as Phase 1

Key metrics allow PSE to compare and rank resources with different characteristics and capacities*

Portfolio benefit ($) — Higher is better

Useful for comparing projects with similar contribution to PSE's winter capacity or renewable needs

- Difference between the net present value portfolio revenue requirement with the proposed project and the net present value portfolio revenue requirement without the proposed project (the all generic portfolio)

Levelized cost ($/MWh) — Lower is better

Useful for comparing projects with the same or similar operating characteristics

- The net present value of the proposed project's revenue requirement divided by the net present value of the proposed project's generation

Levelized portfolio benefit per REC ($PB/REC) — Higher is better

Useful for comparing different project sizes and different technologies

- A proposed project's portfolio benefit divided by the renewable energy credits (REC) it would contribute to help meet PSE's renewable need

Levelized portfolio benefit per unit of levelized peak capacity ($PB/kW-yr) — Higher is better

Useful for comparing different project sizes and different technologies

- A project's portfolio benefit divided by the capacity it would contribute to help meet PSE's winter capacity need

**Primary quantitative screening metrics shown here. Additional metrics shown in appendix.*

[redacted] SOUND ENERGY

Modeling assumptions were updated as new information became available*

Modeling Assumption	2017 IRP (filed Nov. 2017)	RFP Phase 1 (Aug. 2018 – Mar. 2019)	RFP Phase 2 (Apr. 2019 – Jul. 2019)	RFP Phase 2 Update (Aug. 2019 – Nov. 2019)
Mid-C power prices levelized	$40.48/MWh	$33.92/MWh	$28.75/MWh**	$23.66/MWh***
Gas prices levelized	$4.02/mmbtu	$3.74/mmbtu	$3.56/mmbtu	No change
Annual average load growth	0.7%	0.5%	0.5%	No change

Other updates include testing a wider range of carbon costs (Slides 13 and 41), updating Effective Load Carrying Capability ("ELCC") values for generic resources to reflect 2019 IRP assumptions (Slide 43), and updating proposed RFP resource ELCC values to reflect resource-specific attributes (Slide 44).

***RFP Phase 2 Mid-C power price reflects the expected impact of California Senate Bill 100.*

****PSE used the RFP Phase 2 Update Mid-C power prices (consistent with September 19, 2019 IRTAG #8 publication) in its post-Phase 2 re-evaluation of resources (Aug.-Nov. 2019). The Update reflects the expected impact of the Clean Energy Transformation Act ("CETA").*

[redacted] SOUND ENERGY

RFP price scenarios

Scenarios	Phase	WECC /PSE Demand	Gas Price*	Generic Resource Costs
1. No carbon tax	1 + 2	Base	Base	Base
2. CO_2 (low societal $16/ton)	1 + 2	Base	Base	Base
3. CO_2 (mid-societal $42/ton)	1 + 2	Base	Base	Base
4. CO_2 (high societal $62/ton)	2	Base	Base	Base
5. No CO_2 low load	2	Low	Low	Base
6. No CO_2 updated pricing	2	Base	Update	Base

- Added 3 new pricing scenarios in Phase 2 to test:
  - a broader range of future carbon costs (from $0/ton to $62/ton)**
  - the impact of lower load growth (Scenario 5)
  - updated pricing as a result of California's Senate Bill 100, which mandates 100% renewable power generation in the state by 2045 (Scenario 6)

*The Base and Low gas prices are based on the Wood Mackenzie 2018 spring price. The Update price is based on the 2018 fall price.
**Carbon price forecast assumptions shown on Slide 41.

[redacted]

4 Phase 2 results

Presenter: Weimin Dang

Confidential

At-a-glance qualitative assessment*

PSE's cross-functional team evaluated proposals based on a wide range of criteria, consistent with criteria described in Appendix A to the 2018 All Resources RFP and Chapter 480-107-035 WAC

Project Counterparty (Project ID)	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk
SPI Biomass PPA Sierra Pacific Ind. (18100)	Operating	BPAT. PSEI					
[redacted]	Early Develop	[redacted]					
	Early Develop						
	Mature Develop	n/a					
	Mature Develop	n/a					
	Operating	n/a					
	Early Develop	Mid-C*					
	Early Develop	Mid-C					
	Early Develop	[redacted]					
	Early Develop						
	Operating	BPAT. PSEI					
	Mature Develop*	Mid-C					
	Mature Develop	Mid-C					
Golden Hills Wind (shaped / unshaped) Avangrid (18170)	Mature Develop	BPAT.PSEI					

Project Counterparty (Project ID)	Operating/ Development status	Delivery point	Counterparty/ Proposal risk	Site control	Permitting risk	Energy delivery risk	Opposition/ reputational risk
[redacted]	Early Develop	[redacted]					
	Operating						
	Early Develop	n/a					
	Early Develop	Busbar					
	Early Develop	Mid-C					
	Early Develop	Busbar					
	Early Develop	Mid-C					
	Early Develop	[redacted]					
	Early Develop	BPAT.PSEI (or Busbar)					
	Operating	[redacted]					
	Early Develop						
	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D				
	n/a	n/a	Not cost effective compared to alternatives without identifiable deferred T&D				

Key: Low Risk; Acceptable Risk; Substantial Material Risk; Fatal Flaw

- Table illustrates certain key qualitative findings of Phase 2 resources
- Detailed qualitative findings are presented in the 2018 RFP Evaluation Process Document, the Phase 2 Executive Summary and the individual proposal memos.

REDACTED VERSION

REDACTED VERSION

Six proposals were eliminated from Phase 2 prior to optimization based on qualitative and/or quantitative criteria

	ID	Project Name	Resource Type	Nameplate	Counterparty	State	Reason(s) for elimination*
1	18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA	Risks associated with integrating with new DERM, feasibility risks, less cost-effective than originally anticipated
2	18205	[redacted]	Demand Response	[redacted] MW	[redacted]	WA	Risks associated with integrating with new DERM, counterparty risks (experience and financial performance), less cost-effective than originally anticipated
3	18176	[redacted]	MT Wind	[redacted] MW	[redacted]	MT	Third-party review of net capacity factors provided by seller determined they were unrealistic; no met towers on site to verify expected output; significant development risks
4	18190	[redacted]	REC only	[redacted]000	[redacted]	WA	Risks include interconnection uncertainties that could impact REC output, substantial feasibility risks for underlying projects, potential legal issues associated with EFSC permitting decision ([redacted] County applied for judicial review), counterparty risks and concerns about local opposition related to siting projects on commercial agricultural land
5	18107	[redacted]	Run-of-river hydro	[redacted] MW	[redacted]	ID	Run-of-river plant offers little capacity value and is not RPS compliant; complex and potentially risky energy delivery strategy left to PSE
6	18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA	Expansion project development risks related to permitting, PR and energy delivery. Additional development at site also creates substantial permitting and PR risk for existing facility.

*The 2018 RFP Evaluation Process Document (Section 7) and the Executive Summary of Phase 2 Results (Appendix D-1), which describe the reasons for elimination in more detail. Additional findings are summarized in the RFP proposal evaluation memos.

REDACTED VERSION

21 proposals selected for Phase 2 optimization analysis

- Phase 2 proposals with a combination of the most favorable quantitative results across scenarios and no obvious qualitative fatal flaws advanced for optimization analysis*
- Updated scenario analysis in Phase 2 reflects current IRP assumptions and new information provided by respondents

	ID	Project Name	Resource Type	Nameplate	Counterparty	State
1	18100	SPI Industrial	Biomass	17 MW	SPI	WA
2	18169	[redacted]	MT Wind	[redacted]	[redacted]	MT
3	18173	[redacted]	MT Wind	[redacted]	[redacted]	MT
4	18163	[redacted]	REC Only	[redacted]	[redacted]	OR
5	18165	[redacted]	REC Only	[redacted]	[redacted]	OR
6	UP002	[redacted]	REC Only	[redacted]	[redacted]	ID
7	18135	[redacted]	Solar	[redacted]	[redacted]	WA
8	18111	[redacted]	Solar	[redacted]	[redacted]	WA
9	18122	[redacted]	Solar	[redacted]	[redacted]	WA
10	18131	[redacted]	Solar	[redacted]	[redacted]	WA
11	18127	[redacted]	Solar	[redacted]	[redacted]	WA
12	18114	[redacted]	Solar	[redacted]	[redacted]	WA
13	18125	[redacted]	Solar	[redacted]	[redacted]	WA
14	18139	[redacted]	Solar + BESS	[redacted]	[redacted]	OR
15	18103	[redacted]	Thermal	[redacted]	[redacted]	OR
16	18161	BPA Peak Capacity Product	SysPPA/Call Opt.	100 MW	BPA	OR
17	18175	[redacted]	Wind	[redacted]	[redacted]	WA
18	18132	[redacted]	Wind	[redacted]	[redacted]	OR
19	18179	[redacted]	Wind	[redacted]	[redacted]	WA
20	18170	Golden Hills Wind – Shaped	Wind	200 MW	Avangrid	OR
21	18166	[redacted]	Wind	[redacted]	[redacted]	OR

*Qualitative evaluation continued during the optimization analysis. Qualitative results were not final until the end of Phase 2. At-a-glance summary (Slide 15) is consistent with final results.

[redacted] SOUND ENERGY

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Portfolio optimization results*

(results as of July 23, 2019)

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio	(I) As Proposed Optimized Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW		X	X
3	18169	MT Wind	[redacted]				X	
4	18169	MT Wind						X
5	18170	Wind	Golden Hill Shaped	200 MW	77 MW		X	X
6		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW
7		Peak Capacity Surplus / (Deficit) in 2022 [4]					MW	MW
8		Total Annual RECs					2,189,656	1,986,862
9		Portfolio Benefits - $M					$408	$397
10								
11		With Consideration of Social Cost of Carbon:						
12		Portfolio Benefits w/ Carbon Costs as an Adder - $M [5]					$1,038	$934
13		Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M					$959	$937

CONFIDENTIAL

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.

2. The optimization model chose a portfolio with [redacted] MW from [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted] Current indicative results reflect pricing based on the [redacted] MW offer.

3. The current project COD for [redacted] is Dec 2021. There has [redacted] for PSE to secure long-term transmission rights to bring the energy home. If the COD is delayed to Dec 2022 to mitigate this risk, NPV of PPA cost will increase by up to $35M. Without [redacted] the next lowest cost portfolio is $123M more expensive than the recommended portfolio. However it would have the same timing risks on transmission because the new lowest cost portfolio includes the [redacted] project, which uses the same Colstrip transmission path.

4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by 1) short-term capacity purchase for $720k per year; 2) a 20MW battery for $41M.

5. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

**Detailed Phase 2 quantitative analysis results (standalone analysis and optimization analysis) are presented in Appendix C.*

PSE PUGET SOUND ENERGY

2018 RFP short list (as of July 23, 2019)

PSE notified RFP respondents of their selection status in early August 2019

1. SPI Biomass (Sierra Pacific Industries) 17-year PPA
2. [redacted] Montana wind ([redacted]) 25-year PPA
3. Golden Hills Oregon wind (Avangrid) 20-year PPA
4. BPA peak capacity product (BPA) 5-year call option

REDACTED VERSION

5 Post-RFP re-evaluation of alternatives

Presenter: Weimin Dang

Re-evaluation of resource alternatives

PSE re-ran its optimization analysis between Aug. 2019 and Dec. 2019 to include the following updates:

1. Updated peak capacity need based on draft 2019 IRP
2. Updated Mid-C price forecast consistent with September 19, 2019 IRTAG #8 publication (a 20% price reduction from previous forecast)
3. Added new proposal (received 8/29/19) from [redacted] to purchase or offtake power from their interest in [redacted]
4. Added new proposal (received on 10/23/19) from Morgan Stanley for a 3-5-year (no Q2), 100 MW system PPA**
5. Added updated pricing from [redacted] (lower price), BPA (higher price), SPI (lower price) and Morgan Stanley (new structure)
6. Updated social cost of carbon per UTC docket U-190730, dated 9-12-2019 (2.5% discount rate scenario, 0.437ton/MWh market purchase carbon intensity)
7. Retired Colstrip Units 1&2 by 2020
8. Other ad hoc model updates as they became available

*[redacted]

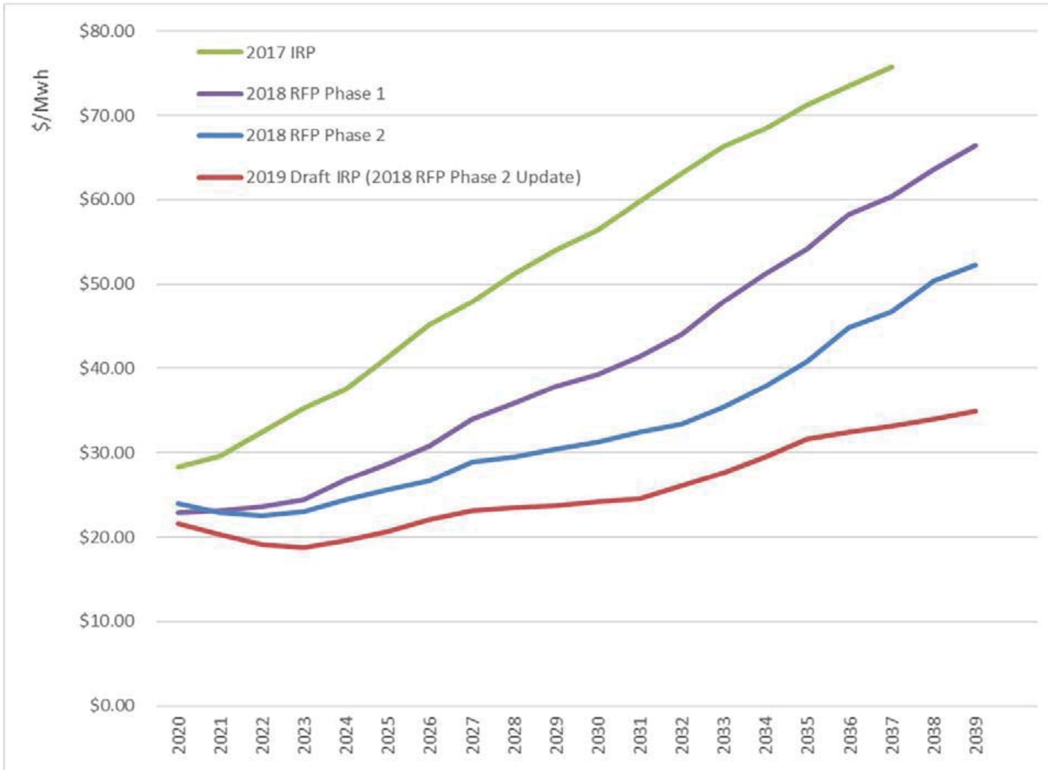
**MSCG is offering a zero emissions system PPA (no RECs).*

[redacted] SOUND ENERGY

REDACTED VERSION

Updated Mid-C power price forecast (red line)

*Phase 2 Update price forecast dropped 20% compared to the Phase 2 price forecast**



*PSE used the RFP Phase 2 Update Mid-C power prices (consistent with Sep. 19, 2019 IRTAG #8 publication) in its post-Phase 2 re-evaluation of resources (Aug.-Dec. 2019).
**Range of Phase 2 power prices tested is shown in Appendix A.

[redacted] ENERGY

REDACTED
VERSION

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VERSION

Updated **portfolio optimization** confirms selection of shortlisted resources and adds Morgan Stanley PPA

(results as of November 21, 2019)

Confidential

Updated optimization analysis included all 21 proposals from the RFP Phase 2 optimization analysis (Slide 18), the two new proposals from [redacted] and Morgan Stanley, and price updates from SPI, BPA and Morgan Stanley.

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Recommended Portfolio
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X
3	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]	X
4	18169	MT Wind	[redacted]	[redacted]	[redacted]	[redacted]	
5	18170	Wind	Golden Hills Shaped	200 MW	77 MW	[redacted]	X
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW	[redacted]	X
7		**Total Peak Capacity Credits - MWs**					[redacted] MW
8		**Total Annual RECs**					**2,189,656**
9		**Portfolio Benefits - $M**					**$679**
10		**Portfolio Benefits w/ Carbon Costs as an Adder - $M** [2,3]					**$1,179**

CONFIDENTIAL

Peak Capacity and REC Need 2022-2025 [4, 5]	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need / (Surplus) after Resources	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
REC Need	0	233,449	691,864	700,482
REC Need / (Surplus) after Resources	-2,189,656	-1,956,207	-1,497,791	-1,489,174

1. *The annual project RECs in column G do not include 0.2X apprenticeship multiplier.*
2. *The social cost of carbon at $62/metric ton in 2007dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept. 12, 2019.*
3. *Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon allocation.*
4. *REC and capacity need assessments updated to reflect CETA impact to market power prices.*
5. *Capacity resource need does not reflect the sale of Colstrip Unit 4 to NorthWestern Energy announced on Dec. 10, 2019.*

[redacted] SOUND ENERGY

Selected proposal: [redacted] Wind PPA

Proposed terms are subject to change based on negotiations

Highly Confidential

Seller:
- [redacted]

Product:
- Nameplate Capacity: Proposed [redacted] MW
- NCF: [redacted] %
- Expected Output: [redacted] MWh/year

Term:
- COD: Proposed 12/31/2021*
- Term: 25 years

Point of Delivery:
- [redacted]

  (*also Point of Interconnection)*

**To be determined based on timing of transmission availability*

[redacted]

Price**:

Calendar Year	Contract Year	PPA Flat Energy Price	PPA Expected Energy Output (MWh/year)
2022	1	[redacted]	[redacted]
2023	2		
2024	3		
2025	4		
2026	5		
2027	6		
2028	7		
2029	8		
2030	9		
2031	10		
2032	11		
2033	12		
2034	13		
2035	14		
2036	15		
2037	16		
2038	17		
2039	18		
2040	19		
2041	20		
2042	21		
2043	22		
2044	23		
2045	24		
2046	25		

***Price does not include delivery to PSE's system.* [redacted]

REDACTED VERSION

Selected proposal: Golden Hills Wind (Shaped)

Proposed terms are subject to change based on negotiations

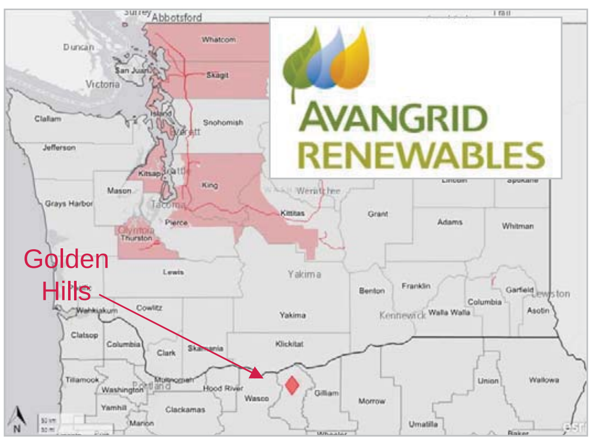
Highly Confidential

Seller:

- Avangrid Renewables, Inc.

Product:

- Nameplate Capacity: 200 MW
- NCF: [redacted]
- Expected Output: [redacted] MWh/year
- Shaped Capacity: up to [redacted] MW
- Shaped Schedule: Nov - Feb
- Shaped Hours: [redacted]



Term:

- COD: 12/31/2021
- Term: 20 years

Point of Delivery:

- BPAT.PSEI

Price*:

**Levelized cost of energy is $[redacted]/MWh.*

		PPA		Winter-Peaking Capacity	
Calendar Year	Contract Year	Flat Energy Price ($/MWh)	Expected Energy Output (MWh/year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]			
2023	2				
2024	3				
2025	4				
2026	5				
2027	6				
2028	7				
2029	8				
2030	9				
2031	10				
2032	11				
2033	12				
2034	13				
2035	14				
2036	15				
2037	16				
2038	17				
2039	18				
2040	19				
2041	20				

PUGET SOUND ENERGY

REDACTED VERSION

The uniquely shaped output during winter months yields higher peak capacity contribution

Highly Confidential

- "As generated" Golden Hills Wind has an ELCC of 26%, therefore a peak capacity contribution of 52MW.
- Avangrid Renewables has offered a synthetic peak capacity output profile for winter months (Nov-Feb) that reshapes the wind output in those months to optimize the coincidence to PSE's load profile.
- This reshaped wind product offers an ELCC of 39%, therefore a peak capacity contribution of 79MW.
- PSE has an opportunity to optimize the shaped product, and analysis is ongoing.

[redacted]

REDACTED VERSION

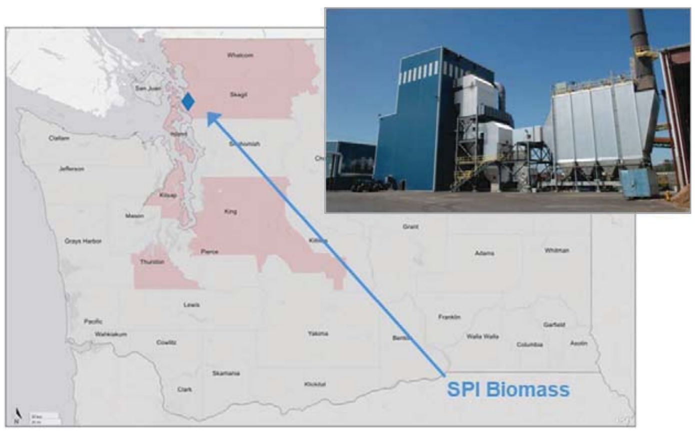
Highly Confidential

Selected proposal: SPI Biomass PPA

Proposed terms are subject to change based on negotiations

Seller:
- Sierra Pacific Industries (SPI)

Product:
- Delivery of 17 MW of firm capacity (24/7)
- Delivery of up to 20 MW worth of energy (3 MW is variable)
- Minimum availability: [redacted] Nov-Feb, [redacted] Annual (92% historic)
- Contribution to Peak Capacity: 16 MW



** The SPI Burlington lumber mill began operating in 2001. The biomass cogeneration facility was added in 2007. Facility is subject to an existing contract with a broker to sell the output through 2020.*

Term:
- Start: Jan. 1, 2021*
- 17 years

Point of Delivery:
- SPI.CABO.GEN at Fredonia Substation *(also point of interconnection)*

Updated pricing:

Calendar Year	Contract Year	Energy Price ($/MWH)	Expected Energy Output (MWh/year)
2021	1	[redacted]	[redacted]
2022	2	[redacted]	[redacted]
2023	3	[redacted]	[redacted]
2024	4	[redacted]	[redacted]
2025	5	[redacted]	[redacted]
2026	6	[redacted]	[redacted]
2027	7	[redacted]	[redacted]
2028	8	[redacted]	[redacted]
2029	9	[redacted]	[redacted]
2030	10	[redacted]	[redacted]
2031	11	[redacted]	[redacted]
2032	12	[redacted]	[redacted]
2033	13	[redacted]	[redacted]
2034	14	[redacted]	[redacted]
2035	15	[redacted]	[redacted]
2036	16	[redacted]	[redacted]
2037	17	[redacted]	[redacted]

*** Levelized cost of energy is $*[redacted]

[redacted] PUGET SOUND ENERGY

REDACTED VERSION

Highly Confidential

Selected proposal: BPA Capacity Tolling Agreement

Proposed terms are subject to change based on negotiations

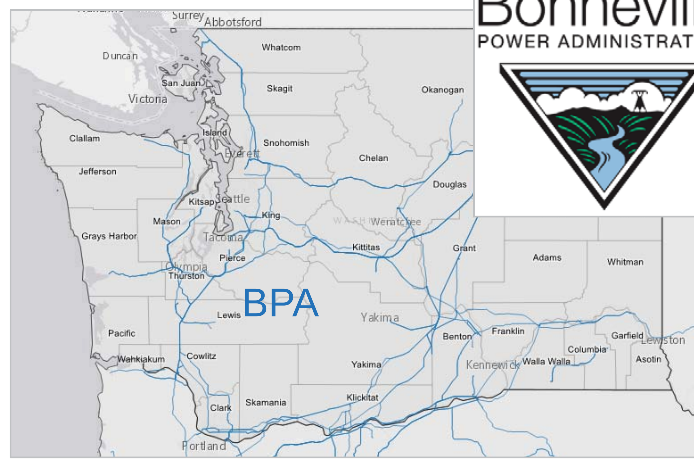
Bonneville POWER ADMINISTRATION

Seller:
- Bonneville Power Administration (BPA)

Product:
- Capacity: 100 MW
- Firm Capacity that may be scheduled in [redacted] increments from [redacted] MW on a [redacted] basis for up to [redacted]
- Western Systems Power Pool (WSPP) Schedule C, heavy load hour (HLH), low carbon firm energy

Term:
- Start: 01/01/2022
- Term: 5 years

Point of Delivery:
- BPAT.PSEI
- PSE Covington 230 kV Substation



Updated pricing*:

Calendar Year	Contract Year	Energy Price ($/MWh)	Possible Energy Output (MWH/Year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]			100
2023	2				100
2024	3				100
2025	4				100
2026	5				100

*Mid-C price will be based on Powerdex hourly price for each MWh delivered.
**Capacity Price [redacted] includes $[redacted] that will be indexed to BPA PTP and Ancillary Service Schedules 1 & 2. Rate will be updated on the first day of each new rate period.

[redacted] PSE PUGET SOUND ENERGY

REDACTED VERSION

Selected proposal: Morgan Stanley System PPA

Proposed terms are indicative, subject to change

Product:

- 100 MW of firm heavy load hour (HLH) energy (16/6)
- Zero emission, no RECs
- Fixed pricing
- Q1 and Q4 deliveries only

Term:

- 5 years starting 1/1/2022

Point of Delivery:

- BPAT.PSEI or other PSE designated point

LCOE: 5-year, Q1&Q4, 100 MW

- Fixed: $[redacted]MWh
- 70 MW peak capacity contribution

					Pricing structure alternatives		
Term	**Volume**	**Details**	**Start**	**End**	**Fixed Price**	**MIDC + Adder**	**Hedge + Adder**
3 Year	50 MW	HLH Delivery	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
3 Year	100 MW	HLH Delivery	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
5 Year	50 MW	HLH Delivery	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
5 Year	100 MW	HLH Delivery	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
3 Year	50 MW	HLH Delivery No Q2	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
3 Year	100 MW	HLH Delivery No Q2	Jan-22	Dec-24	$ [redacted]	[redacted]	[redacted]
5 Year	50 MW	HLH Delivery No Q2	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
5 Year	100 MW	HLH Delivery No Q2	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]
5 Year	100 MW	HLH Delivery Q1&Q4	Jan-22	Dec-26	$ [redacted]	[redacted]	[redacted]

*Main pricing difference between hedging cost and offered fixed price is due to different pricing dates.

[redacted] ENERGY

REDACTED VERSION

What’s next?

- Ongoing negotiations with counterparties
- Request approval from PSE management and (as needed) PSE Board to execute contracts with counterparties
- Execute contracts

Appendix

Appendix

A. Additional RFP modeling assumptions and metrics
- Resource need (as filed)
- Generic resource costs
- Carbon cost assumptions
- ELCC values
- Transmission assumptions
- Additional metrics produced by the Portfolio Screening Model

B. Additional proposal summary slides
- Comparison of 2018 RFP to prior RFPs
- Original Phase 2 candidate list (presented to UTC staff in April 2019)

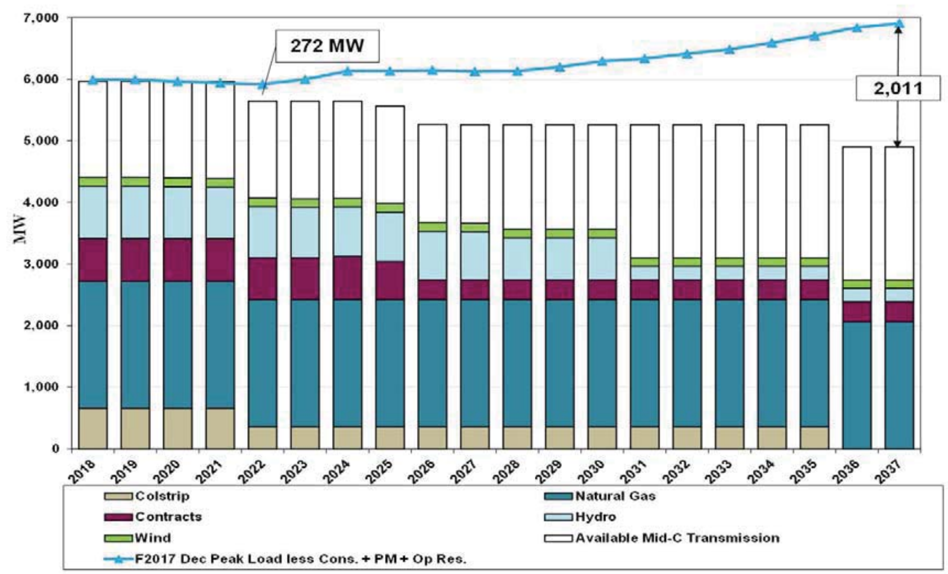
C. Detailed RFP Phase 2 results
- Executive summary of Phase 2 results
- Phase 2 standalone portfolio analysis results

Appendix A: Additional modeling assumptions and metrics

RFP solicits 272 MW of capacity by end of 2022*

Resource need as filed in June 2018

- Target online date by 2022**
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably



* The All Resources RFP filed with the WUTC in June 2018 reflected then-current resource need projections based on the F2017 load forecast. In August 2018, PSE adjusted its resource need forecast for Phase 1 to reflect the F2018 load forecast. The resource need projection is based on current law and is not predictive of any future or pending legislative action.

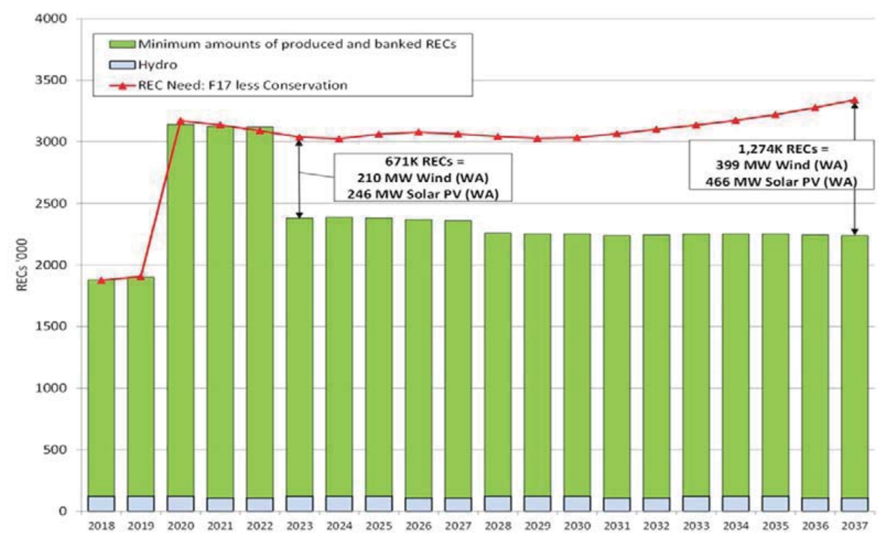
** Target online date is based on earliest need, but will not disqualify long-lead resources.

[redacted] SOUND ENERGY

Projected need to meet the RPS is 671,000 RECs 2023*

Resource need as filed in June 2018

- REC need is driven by the increase in the RPS from 9% to 15% in 2020**
- PSE's inventory of banked RECs delays need until 2023
- PSE will consider early delivery dates to take advantage of tax incentives prior to phase out
  - PSE will evaluate the tradeoff between capturing the benefit of a higher tax incentive and the carrying cost of acquiring early



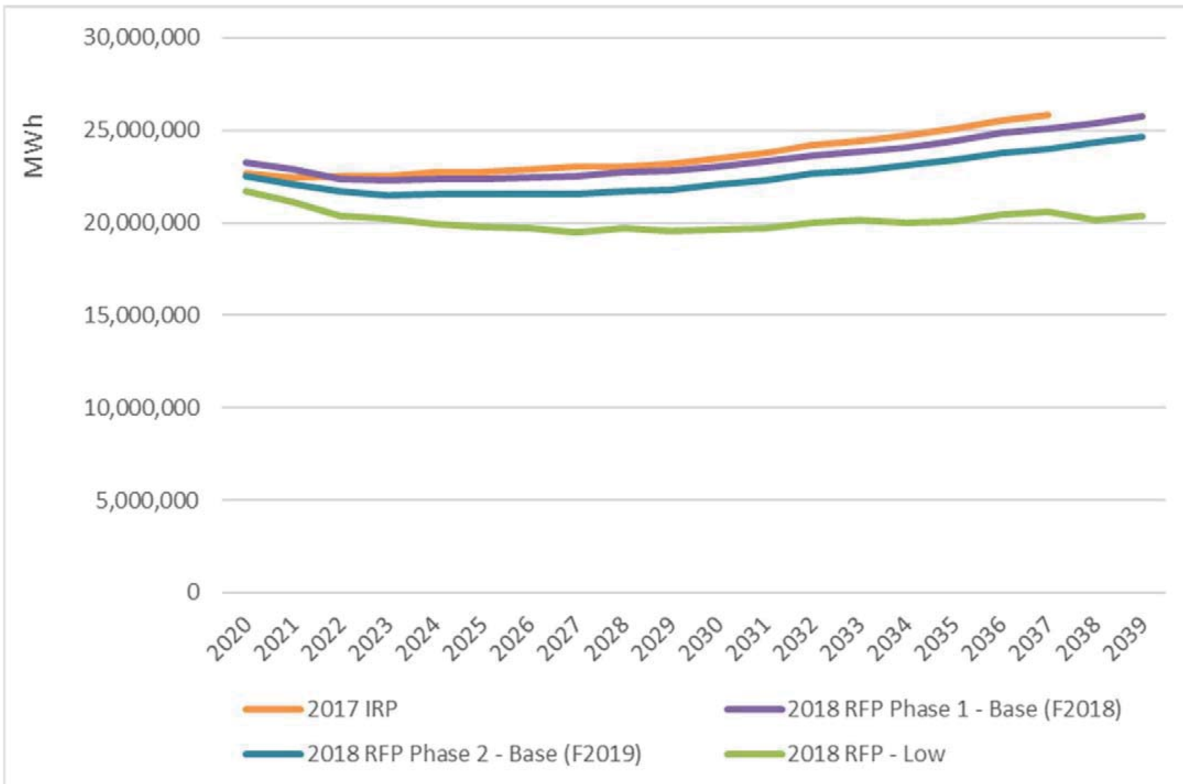
- A renewable resource may count toward peak capacity need based on coincident winter peak production
  - PSE will engage reputable consultant for resource due diligence and to develop synthetic distributions for peak capacity calculation
- Proposals which demonstrate that they qualify for Washington state apprenticeship labor credit will add 1.2x multiplier to REC output

[redacted] SOUND ENERGY

* The All Resources RFP filed with the WUTC in June 2018 reflected then-current resource need projections based on the F2017 load forecast. In August 2018, PSE adjusted its resource need forecast for Phase 1 to reflect the F2018 load forecast.

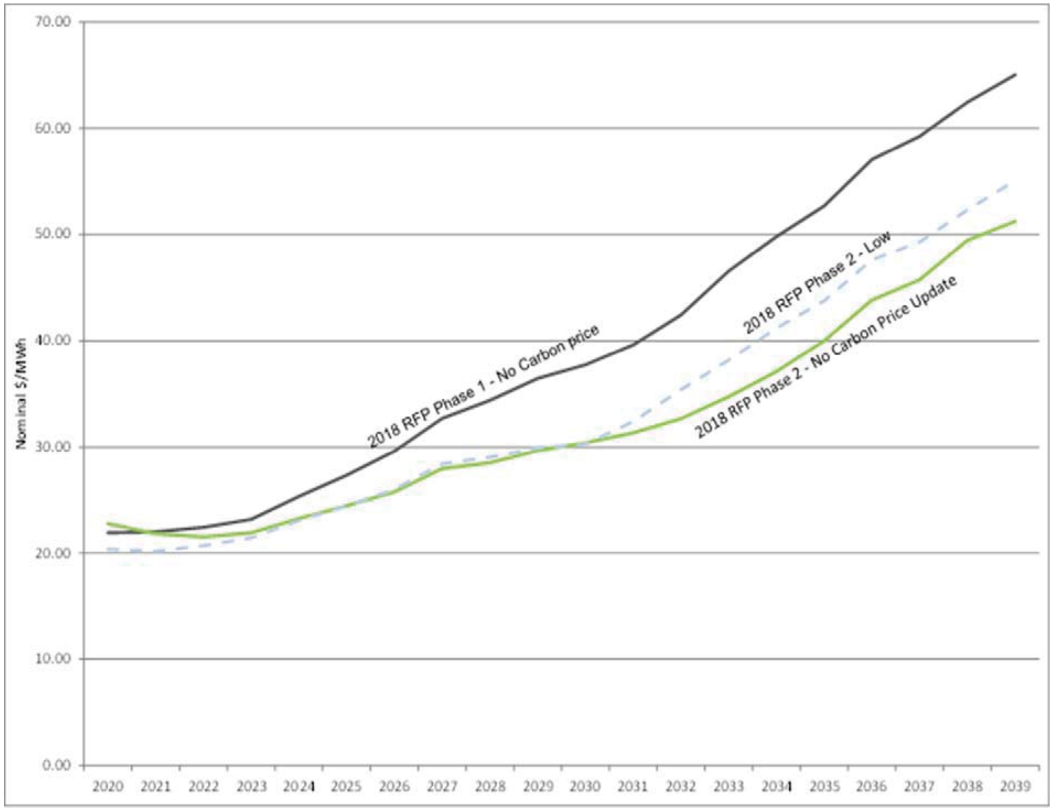
** If proposing a qualifying renewable resource located outside the Pacific Northwest as defined for the Bonneville Power Administration in Section 3 of the Pacific Northwest Electric Power Planning and Conservation Act (94 Stat. 2698; 16 U.S.C. Sec. 839a), electricity from the facility must be delivered into Washington state on a real-time basis without shaping, storage, or integration services.

Load forecast assumptions



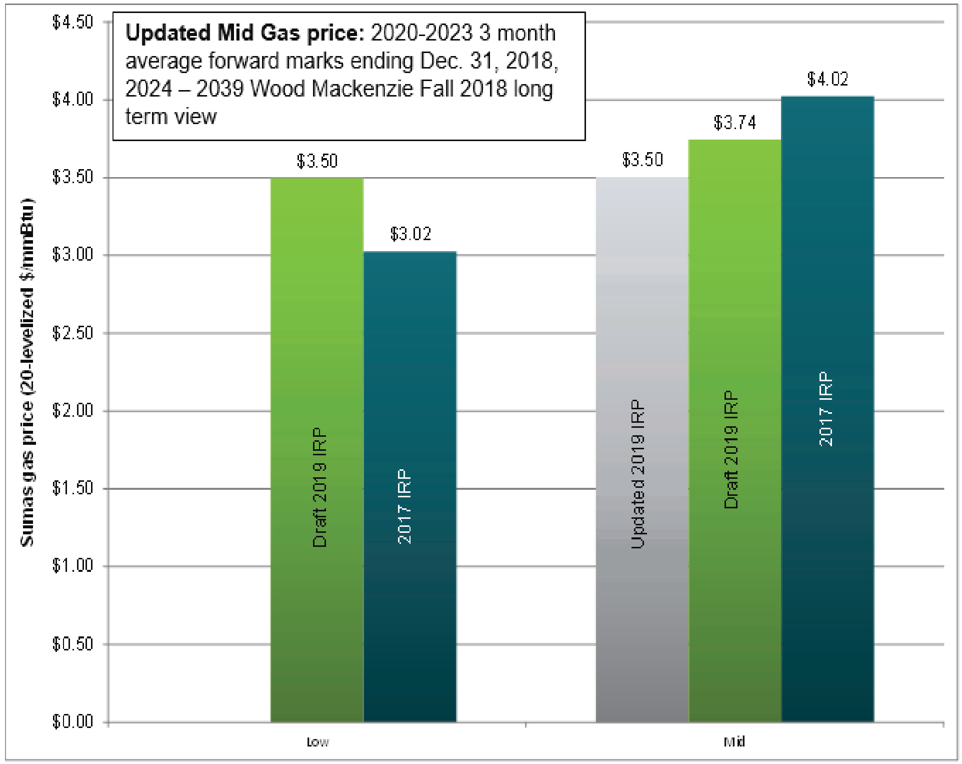
[redacted]

Range of power prices tested in Phase 2



[redacted] SOUND ENERGY

Natural gas price forecasts



- PSE used the draft 2019 IRP prices for RFP Phase 1
- PSE used the Updated 2019 IRP price for RFP Phase 2

Generic resource cost assumptions

2017 IRP vs. Draft 2019 IRP (used for RFP Phase 1)

	2017 IRP			Draft 2019 IRP			Cost change from 2017 IRP to Draft 2019 IRP		
2018 $/kW	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	Total Costs	EPC Cost	Owner's Costs + Interconnection	All in Costs
CCCT	$1,020	$358	$1,378	$898	$269	$1,167	($122)	($89)	($211)
Frame Peaker (Fuel Fuel)	$526	$172	$698	$554	$271	$825	$28	$99	$127
Recip Engine (NG only)	$1,030	$312	$1,341	$842	$350	$1,192	($188)	$38	($149)
WA Wind	$1,548	$656	$2,204	$1,656	$386	$2,042	$108	($270)	($162)
MT Wind	$1,471	$1,312	$2,783	$1,633	$1,111	$2,744	$162	($201)	($39)
Solar	$1,497	$874	$2,371	$1,352	$570	$1,922	($145)	($304)	($449)
Biomass	$4,084	$207	$4,291	$7,036	$2,659	$9,695	$2,952	$2,452	$5,404
Offshore Wind	$5,717	$1,795	$7,512	$5,000	$1,547	$6,547	($717)	($248)	($965)
Li-Ion Battery 2-hr	$1,313	$342	$1,655	$1,331	$599	$1,930	$18	$257	$275
Li-Ion Battery 4-hr	$2,116	$552	$2,668	$2,346	$708	$3,054	$230	$156	$386
Flow Battery 4-hr	$1,870	$674	$2,544	$1,493	$618	$2,111	($377)	($56)	($433)
Flow Battery 6-hr	$2,447	$882	$3,329	$2,050	$708	$2,758	($397)	($174)	($571)
Pumped Storage	$2,503	$127	$2,630	$1,800	$879	$2,679	($703)	$752	$49

*Generic resource costs used in RFP Phase 1 were based on a draft report produced by HDR for the 2019 IRP. This report was later updated; the final report costs were used in RFP Phase 2 (as shown on Slide 40).

Generic resource cost assumptions*

Overnight capital cost assumptions generally came down, with the exception of capital costs for frame peakers

	Solar capital cost ($/kW)	MT wind capital cost ($/kW)	WA wind capital cost ($/kW)	Frame Peaker FOM[1] ($/kW-yr)
RFP Phase 1 *(draft HDR report)*	$1,922	$2,744	$2,042	$3.93
RFP Phase 2 *(final HDR report)*	$1,614	$1,617	$1,633	$11.40[2]

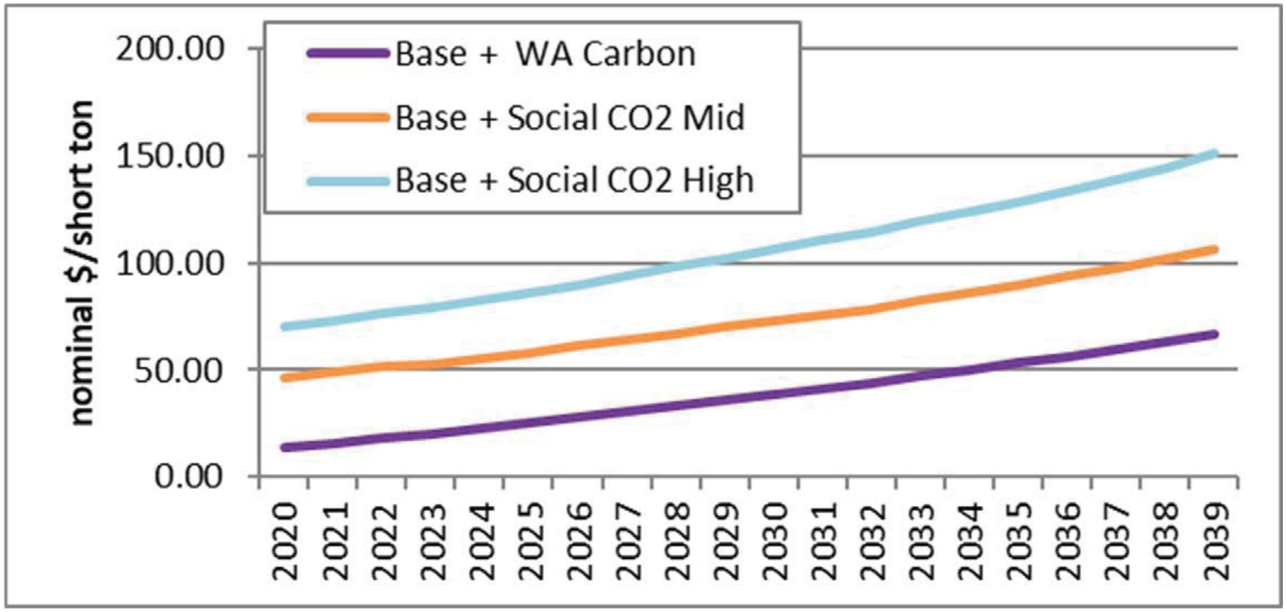
1. Fixed O&M costs ("FOM")
2. HDR's updated frame peaker FOM assumption ($11.40/kw-yr) includes $3.93/kw-yr FOM + $7.47/kw-yr for 48 hours of oil stored on site.

**Phase 1 cost assumptions were based on a draft report produced by HDR for the 2019 IRP. Phase 2 assumptions are based on the final HDR report.*

[redacted] SOUND ENERGY

Carbon price forecasts

*Assumptions used in RFP phases 1 & 2**



**Reflects carbon price assumptions used through July 2019. Does not reflect updates to social cost of carbon assumptions used in the Aug-Dec 2019 re-evaluation of alternatives (Slide 42).*

[redacted] ENERGY

Social cost of carbon assumptions

Revised per UTC docket U-190730

Highlighted column reflects assumptions used in the post-RFP re-evaluation analysis conducted between Aug. and Dec. 2019

Table ES-1: Social Cost of CO_2, 2010 – 2050 (in 2007 dollars per metric ton of CO_2)

Year	5% Average	**3% Average**	2.5% Average	High Impact (95th Pct at 3%)
2010	10	**31**	50	86
2015	11	**36**	56	105
2020	12	**42**	62	123
2025	14	**46**	68	138
2030	16	**50**	73	152
2035	18	**55**	78	168
2040	21	**60**	84	183
2045	23	**64**	89	197
2050	26	**69**	95	212

Source: U.S. Government 2016 Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866

[redacted]

Generic resource electric load carrying capability (ELCC) values*

Resource	Nameplate (MW)	IRP **2017** Peak Capacity Solve to 5% LOLP Relative to New Peaker	IRP **2019** Peak Capacity Solve to 5% LOLP Relative to Perfect Capacity
Existing Wind	823	11%	9.7%
Skookumchuck	131	40%	36.0%
Generic Montana Wind	100	49%	51.4%
Generic Washington Wind	100	16%	6.4%
Generic Offshore WA Wind	100	51%	47.6%
Generic Washington Solar	100	0%	1.0%
Lund Hill Solar	150	N/A	2.4%

Storage Resources	Nameplate (MW)	IRP 2017 Peak Capacity EUE at 5% LOLP	IRP 2019 Peak Capacity EUE at 5% LOLP
Lithium-Ion 2 hr, 82% RT efficiency	25	60%	19.2%
Lithium-Ion 4 hr, 87% RT efficiency	25	88%	38.4%
Flow 4 hr, 73% RT efficiency	25	76%	36.0%
Flow 6 hr, 73% RT efficiency	25	N/A	46.4%
Demand Response 3 hr duration, 6 hr delay, 10 calls per year	100	77%	38.2%

*Generic proxy values for RFP Phase 1 generally reflected 2017 IRP ELCC values (as published in the 2018 All Resources RFP, Appendix G). ELCC values were later updated to reflect ELCC values updated for the 2019 IRP.

[redacted] PSE SOUND ENERGY

Phase 2 ELCCs* for intermittent generation resources

Resource	Peak Capacity [MW]	Nameplate [MW]	ELCC
[redacted]	[redacted]	[redacted]	45.00%
[redacted]	[redacted]	[redacted]	5.40%
[redacted]	[redacted]	[redacted]	44.90%
[redacted]	[redacted]	[redacted]	1.71%
[redacted]	[redacted]	[redacted]	31.92%
[redacted]	[redacted]	[redacted]	1.82%
[redacted]	[redacted]	[redacted]	0.69%
[redacted]	[redacted]	[redacted]	1.49%
[redacted]	[redacted]	[redacted]	46.07%
[redacted]	[redacted]	[redacted]	2.00%
[redacted]	[redacted]	[redacted]	0.75%
[redacted]	[redacted]	[redacted]	1.56%
[redacted]	[redacted]	[redacted]	19.90%
[redacted]	[redacted]	[redacted]	16.00%
[redacted]	[redacted]	[redacted]	1.00%
[redacted]	[redacted]	[redacted]	1.13%

In Phase 2, PSE performed a study to determine the ELCC value of for each individual project, based on its unique characteristics and attributes, its nameplate capacity and its specific location.**

** In Phase 1, PSE applied a generic Electric Load Carrying Capability ("ELCC") proxy value to the proposals based on each project's resource type, nameplate capacity and general location (slide 43).*
*** ELCC values shown in the table do not take into account project delivery points.*

[redacted] SOUND ENERGY

REDACTED VERSION

Projects are evaluated on a cost and risk basis delivered to PSE’s load

Off PSE’s system

1. Delivery to PSE’s system (e.g. BPAT.PSEI, etc.)

- Developer provides transmission solution to PSE’s load center
- Risk analysis: Is there ATC? Are ancillary services included in price? Is transmission long-term firm? Does it include rollover rights?

2. Delivery to Mid-C

- Developer provides transmission solution to PSE via Mid-C
- PSE applies cost to use PSE’s existing transmission and integration costs
- Risk analysis: Does developer have long-term firm transmission to Mid-C? If not, is there ATC? Are ancillary services included in price?

3. Delivery to project busbar

- Leaves transmission solution to PSE
- PSE applies cost of transmission from project to PSE’s load (inc. ancillary services and any cost to use existing PSE transmission)
- Risk analysis: Is long-term firm ATC available? Rollover rights?

On PSE’s system

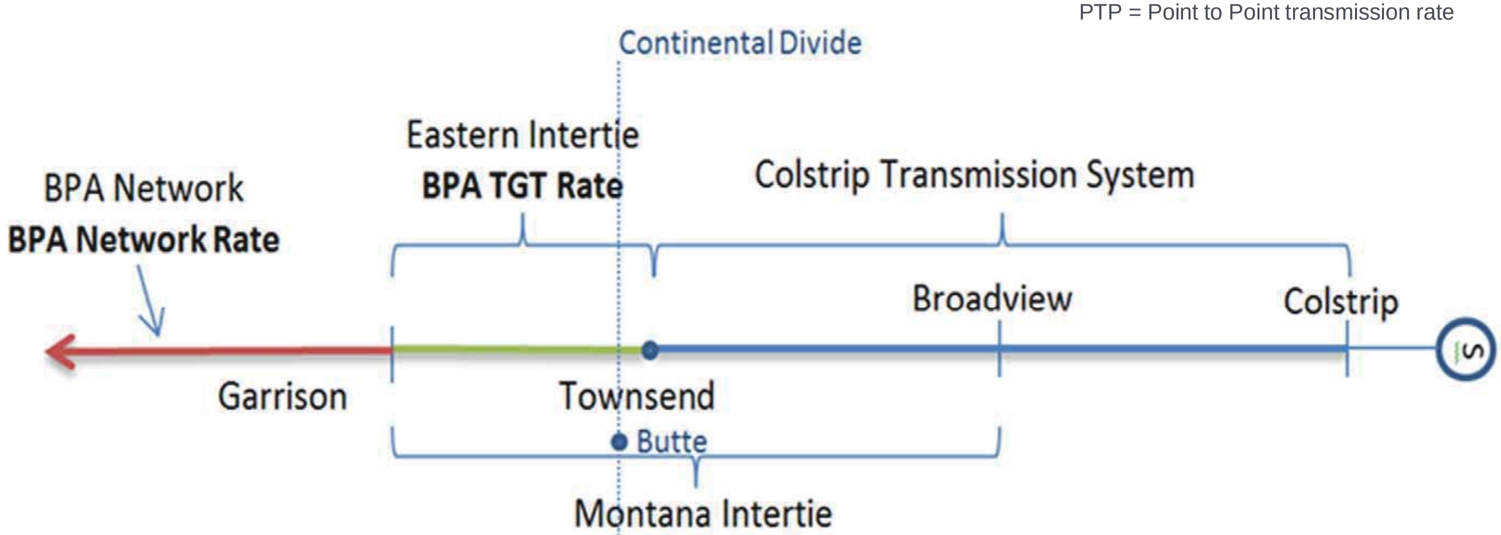
1. On system

- Project interconnects within PSE’s service territory
- PSE applies integration costs
- PSE evaluates transmission solution (and all applicable costs) to PSE’s load
- Risk analysis: Is resource interconnection ERIS or NRIS? Is there ATC? Is transmission long-term firm? Does it include rollover rights? Are ancillary services included in price?

Notes:
Available Transmission Capacity (ATC)
Energy Resource Interconnection Service (ERIS)
Network Resource Interconnection Service (NRIS)

Montana transmission path

PTP = Point to Point transmission rate



Termination year: 2024
PTP* rate: $21.52/kw-yr
Losses: 1.9%

Termination yr: 2027
PTP* rate: $7.18/kw-yr
Losses: 5.0%

PTP* rate: $28.76/kw-yr
Losses: 2.7%

Other costs to consider:

- Additional losses from the project to the delivery point
- Renewable integration costs

[redacted]

Additional quantitative screening metrics

Levelized net cost per REC ($/MWh-REC)
Useful for comparing renewable projects of different sizes

Lower is better

- Difference between the net present value project revenue requirement, and the net present value market revenue of the project's generation divided by the net present value of the project's capacity contribution

Levelized net cost per unit of peak capacity ($/kW)
Useful for comparing peak capacity projects of different sizes

Lower is better

- Difference between the net present value of the cost, and the market value of the energy divided by the peak capacity credit

Portfolio benefit ratio
Useful for comparing projects with similar operating characteristics; removes size bias

Higher is better

- Portfolio benefit divided by the net present value of the proposed project's revenue requirement. Allows projects with different capacities to be compared without a bias for size.

**Key quantitative screening metrics shown in presentation (on slide 11).*

[redacted]

Appendix B: Additional proposal summary slides

Nearly 100 proposals received

Largest response to an All Source RFP to date

As of 3/25/19

	2018 All Resource and Demand Response RFPs		2017 Renewables Only RFP (Green Direct 2.0)[1]		2011 All Source RFP		2010 All Source RFP		2008 All Source RFP		2005 All Source RFP	
Resource Type	# Proposals[2]	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW	# Proposals	Max Cap MW[1]	# Proposals	Max Cap MW
Solar - PV	16	2240	17	574	2	24	1	10				
Solar - PV + BESS	20	2848										
Wind - Off Shore	1	400										
Wind On Shore	16	3303	20	2601	4	369	21	3776	8	862	10	1165
Wind + Winter Sys PPA	1	371										
Wind + Solar and/or BESS	2	464	4	339								
Storage - Battery ("BESS")	17	1265			2	251						
Storage - Pumped Hydro	2	900										
Biomass	2	72			3	61	9	590				
Biomass + BESS	1	15										
Natural Gas-fired Generation	4	1377			10	2624	18	5342	10	2588	17	4307
Geothermal	2	43									1	48
Hydro - Run of River	1	38	2	4	1	77	2	105	3	165	3	139
System PPA / Call Option	1	100			4	400	10	n/a	9	1675	7	400
Unbundled RECs	5						2	n/a				
Demand Response	6	154					1	80			1	34
Coal - Traditional + IGCC					1	500			1	100	6	4950
Cold Fusion					1	1880						
Distributed Generation											1	5
Waste-to-Energy / Landfill Gas					1	23					1	5
TOTAL	**97**	**13,590**	**43**	**3,518**	**29**	**6,209**	**64**	**9,903**	**31**	**5,390**	**47**	**11,053**

[1] The 2017 RFP sought large and small (<5 MW) renewable resources to serve multiple voluntary green power programs.

[2] PSE also received two unsolicited proposals during Phase 1, a REC-only and a pumped storage hydro storage, which are not included in the table.

[redacted] ENERGY

Original Candidate list for Phase 2
(results are a snap shot in time, subject to change)

ID	Project Name	Resource Type	Nameplate	Counterparty	State
18100	SPI Industrial	Biomass	17 MW	SPI	WA
18201	[redacted]	Demand Response	[redacted] MW	[redacted]	WA
18169	[redacted]	MT Wind	[redacted] MW	[redacted]	MT
18173	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18176	[redacted]	MT Wind	[redacted] MW*	[redacted]	MT
18163	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18165	[redacted]	REC Only	[redacted] REC	[redacted]	OR
18190	[redacted]	REC Only	[redacted] REC	[redacted]	WA
18107	[redacted]	Run-of-River	[redacted] MW	[redacted]	ID
18135	[redacted]	Solar	[redacted] MW	[redacted]	WA
18111	[redacted]	Solar	[redacted] MW	[redacted]	WA
18122	[redacted]	Solar	[redacted] MW	[redacted]	WA
18131	[redacted]	Solar	[redacted] MW	[redacted]	WA
18127	[redacted]	Solar	[redacted] MW	[redacted]	WA
18114	[redacted]	Solar	[redacted] MW	[redacted]	WA
18112	[redacted]	Solar	[redacted] MW	[redacted]	WA
18125	[redacted]	Solar	[redacted] MW	[redacted]	WA
18139	[redacted]	Solar + BESS	[redacted] MW BESS	[redacted]	OR
18105	[redacted]	Thermal	[redacted] MW	[redacted]	WA
18103	[redacted]	Thermal	[redacted] MW	[redacted]	OR
XXXXX	[redacted]	Transmission	[redacted] MW	[redacted]	N/A
18175	[redacted]	Wind	[redacted] MW	[redacted]	WA
18132	[redacted]	Wind	[redacted] MW*	[redacted]	OR
18179	[redacted]	Wind	[redacted] MW	[redacted]	WA
18170	Golden Hill Wind - Shaped	Wind	200 MW	Avangrid	OR
18166	[redacted]	Wind	[redacted] MW	[redacted]	OR

* Numbers shown are rounded to the nearest 5MW.

** Reflects a redirect of [redacted] MW of BPA transmission from [redacted] to PSEI, available January, 2022 for a 50-year term, and using Mid-C forecast for energy pricing. [redacted] MW may be available for redirect on BPA's system, however it is likely only [redacted] MW is possible for redirect to Mid-C. Redirects are assessed given the most current data and are a snap shot of the present system. The results are subject to change and may vary in the future based on updated ATC calculations and flow gate constraints within BPA's network. While redirect of the remaining [redacted] MW is feasible, the location, source and cost of this redirect remains under review, therefore not included in this analysis.

Proposals shown here are best offers from each proposal.

[redacted] SOUND ENERGY

REDACTED VERSION

Appendix C: Detailed Phase 2 results

Detailed RFP Phase 2 evaluation results

2018 RFP – Executive Summary*

Quantitative results are the product of analysis performed in PSM III version 25.13.

Phase 2 Candidate Short List: Proposals selected for contracting phase of RFP

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18100 **SPI Burlington Biomass** Sierra Pacific Industries PPA Operational biomass 17 MW nameplate COD: 01/01/2021 Term: 17 years capacity	Levelized cost: $[redacted]/ MWh Portfolio benefit: $14.132 M Levelized PB/REC: [redacted] Peak capacity PB / kW-Yr: ($[redacted]) Net cost PV: $33.613 M Peak capacity contribution (MW): 16.4 Annual REC contribution: [redacted])	• Existing/operating facility so no development risk • Biomass project is REC producing • High effective load-carrying capability (ELCC), i.e. contribution to peak capacity need • Interconnected onto PSE's system	• Sierra Pacific Industries is a privately held company, so less financial information is available than if it were public • A disruption of mill operations would likely impact long-term operation of the facility	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.

This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
***Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18161 **BPA Peak Capacity** Bonneville Power Administration PPA** Operational portfolio of projects 100 MW** COD: 01/01/2022** Term: 5 years**	Levelized cost: [redacted] Portfolio benefit: ($8.028 M) Peak capacity PB / kW-Yr: ([redacted]** Net cost PV: $25.426 M Peak capacity contribution (MW): 100 Annual REC contribution: [redacted])	• Counterparty is well known with existing ties to PSE and, therefore, no risk for this proposal • There are no permitting, real estate or community relations concerns as the proposal is based on currently operational projects • As a response to data requests, Bonneville Power Administration (BPA) moved their delivery location from Mid-C to BPAT.PSEI		**Selected -** Project selected during portfolio optimization and qualitative risks appear to be minimal.
18169 [redacted] PPA** or 50% ownership+PPA Development wind [redacted])MW** or [redacted])MW COD: 12/31/2021** Term: 20 or 25** years	Levelized cost: ($[redacted] / MWh Portfolio benefit: $417.294 M Levelized PB/REC: ($[redacted] Peak capacity PB / kW-Yr: (($[redacted]) Net cost PV: $24.422 M Peak capacity contribution (MW): [redacted]) Annual REC contribution: [redacted])	• Relatively cost efficient way to contribute towards both the REC and contribution to peak capacity need • Large and experienced counterparty • Site control is reportedly achieved, but supporting documentation was not included in proposal • Public has been notified of the project as a [redacted]) MW facility • Shape of wind based on 6 operating meteorological towers appears to fit well with PSE's needs	• Lengthy gen-tie line for which site-control has not yet been fully obtained • Transmission from [redacted]) to PSE brings both schedule and cost risk to PSE as the energy offtaker • There is a potential permitting issue with sage grouse habitat	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted]) the [redacted])projects are considered mutually exclusive.
18170 **Golden Hills Wind** Avangrid Renewables [redacted])PPA-shaped [redacted]) Development wind 200 MW** COD: 12/31/2020** Term: 20 years**	Levelized cost: ($[redacted])/ MWh Portfolio benefit: $106.924 M Levelized PB/REC: [redacted])*** Net cost PV: $74.948 M Peak capacity contribution (MW): 51.6 Annual REC contribution: [redacted])	• Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Shaped product offers capacity contribution during peak winter months • Site control is achieved • Permitting well advanced with Oregon Energy Facility Siting Council (EFSC) permit application already amended	• Complex energy delivery will require additional vetting • Complexity of shaped product will require additional vetting	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
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COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

REDACTED VERSION

Project	Summary Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18173 [redacted] PPA** Development wind [redacted] MW or [redacted] MW COD: 10/31/2022** Term: 20 years**	Levelized cost: $[redacted] / MWh Portfolio benefit: $280.504 M Levelized PB/REC: $[redacted] ** Peak capacity PB / kW-Yr: ($[redacted]) Net cost PV: $116.358 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Project may be sited on a single landowner's property, which would likely minimize real estate complexity • Favorable state support; however, local level of support unknown	• Project site may include Montana Department of Natural Resources and Conservation (DNRC) land, which could complicate site control and permitting • Permitting is in a relatively early stage of development; risk of potential delay to scheduled COD • Assumed use of [redacted] is under ongoing review and may be problematic	**Selected -** Project selected during portfolio optimization and qualitative risks appear to be manageable. Due to available transmission capacity limitations between [redacted] the [redacted] and [redacted] projects are considered mutually exclusive.

This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
***Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.*
****Indicates primary ranking criteria for particular proposal category.*

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

PUGET SOUND ENERGY

REDACTED VERSION

REDACTED VERSION

Phase 2 proposals not selected for contracting phase of RFP

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18103 [redacted] CTA** or asset transfer Operational combined cycle [redacted] MW** or [redacted] MW Start: 06/01/2022 Term: 10 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: ($29.120 M) Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $163.748 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Existing/operating facility (rather than new build) therefore no development risk • Existing presence in the community with local opposition unlikely	• High social cost of carbon adversely impacts project economics in certain quantitative scenarios • In light of recently passed Clean Energy Transition Act (SB5116), advancement of this and other fossil fuel-based projects represents considerable reputational and financial risk • Lack of firm delivery of natural gas is a risk to the effective load-carrying capability (ELCC) of the project	**Not Selected –** Project not selected during portfolio optimization process.
18105 [redacted] CTA** or BTS Frederickson thermal expansion [redacted] MW** or [redacted] MW COD: 01/01/2022 Term: 5, 15, or 20** years	Levelized cost: $[redacted]/ MWh Portfolio benefit: ($16.898 M) Peak capacity PB / kW-Yr: ($[redacted] Net cost PV: $85.973 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposed expansion of [redacted] facility may bring O&M cost savings on a per-kW basis (versus an entirely new thermal facility) • Technology is relatively site-agnostic and can potentially be designed to integrate at other sites • [redacted] MW proposal would likely be facilitated with firm gas supply from existing facilities	• In light of recently passed Clean Energy Transition Act (Washington State Bill 5116), advancement of new fossil fuel-based projects represents considerable reputational and financial risk • Proposed project would require extensive integration with existing PSE facility, the viability of which is unknown at this time • Would require review and likely modification of air permit for co-located generation facility. Process expected to be exceedingly difficult and the outcome uncertain, with possible impacts to existing facility operational permits • PSE will likely experience significant resistance from local governments, local stakeholders, environmental stakeholders, and native tribes for expansion of the company's CO_2 emitting portfolio • Strong likelihood of considerable delays to COD due to expected public protest, litigation and permit process	**Not Selected –** Project not selected due to qualitative risks.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
**Represents best offer configuration from standalone quantitative analysis (PSM version 13, run 20190612) in No C02 updated with SB100 scenario. See detailed Phase 2 standalone quantitative analysis results for individual offer results in all scenarios. Optimization analysis may select different best offer configuration based on best solution (offer or combination of offers) to meet resource need.
***Indicates primary ranking criteria for particular proposal category.

Common acronyms:

BESS	Battery energy storage system
BTS	Build to sell
COD	Commercial operation date
CTA	Capacity Tolling Agreement
PPA	Power purchase agreement
REC	Renewable energy credit

REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18107 [redacted] PPA** Operational hydro [redacted] MW Start: 1/1/2021 (assumed) Term: 20 years (assumed)	Levelized cost: $[redacted]/ MWh Portfolio benefit: ($36.163 M) Levelized PB/REC: ($[redacted] Net Cost PV: $38.677 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• No development risk; project is an existing operating facility • Clean energy (although not RPS compliant) • Run-of-river hydro can be less environmentally impactful than standard hydro • Little to no permitting or real estate risk due to current operational status	• Run-of-river asset provides little capacity value. • Not RPS complaint (although clean energy) • Energy delivery strategy has been left to PSE, and appears to be complex	**Not Selected –** Project not selected due to qualitative risks and did not show potential during standalone quantitative analysis.
18111 [redacted] PPA** Development solar Solar: [redacted] MWac COD: 12/31/2022 Term: 20 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $107.686 M Levelized PB/REC: $[redacted] Net cost PV: $51.359 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Relatively high quantitative score for solar project • Strong counterparty with extensive renewable energy development experience and existing contractual relationships with PSE • Site control has been achieved • Permitting status is sufficient at this stage • Located on PSE's system in [redacted] County; avoids community concerns in [redacted] County	• While on PSE's system, complex delivery due to available transmission capacity (ATC) constraints in area. Delivery is possible to Mid-C; however, may be difficult given project's proximity to [redacted] substation • Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18112 [redacted] PPA** Development solar Solar: n/a COD: n/a Term: n/a	Levelized cost: [redacted] Portfolio benefit: N/A Levelized PB/REC: [redacted] Net cost PV: N/A Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Project withdrawn by applicant	• Project withdrawn by applicant	**Not Selected -** Project withdrawn by applicant.

*This matrix summarizes key findings from PSE's Phase 2 analysis. A more detailed discussion of the merits and risks of each proposal is documented in individual project memos.
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***Indicates primary ranking criteria for particular proposal category.

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REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18114 [redacted] PPA Solar generation [redacted] MW_{AC} COD: 12/1/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $45.772 M Levelized PB/REC: $[redacted]** Net Cost PV: $36.011 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• [redacted] is assessed to be a relatively strong parent company	• Environmental permitting not yet begun. • Permitting will require the transfer of a Washington Energy Facility Site Evaluation Council (EFSEC) permit, which introduces a viability and reputational risk to the project and PSE • Transmission and energy delivery may be overly expensive or otherwise infeasible • Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Current site leases were executed for wind projects; it is not yet known whether or not land owners would be amenable to solar leases	**Not Selected –** Project not selected during portfolio optimization process.
18122 [redacted] PPA**, optional BESS Development Wind [redacted] MW_{AC}** & [redacted] MW 1 Hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $32.877 M Levelized PB/REC: $[redacted]** Net Cost PV: $35.687 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty and promise of guaranty from an investment grade entity, a letter of credit, or cash • Long-term site control for project site is secured	• Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Solar development is viewed with skepticism in this area; history of active local opposition • Site may block the view of a local real estate development • Contribution to the peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.
18125 [redacted] PPA Development solar [redacted] MW_{AC} COD: 1/1/2023 Term: 15 or 20** years	Levelized cost: $[redacted] / MWh Portfolio benefit: $55.283 M Levelized PB/REC: $[redacted] Net Cost PV: $32.311 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience	• While interconnected to PSE's system, complex delivery due to available transmission capacity (ATC) constraints in the area • Site permitting is in a relatively early stage of development • Minimal information provided regarding community relations and or support	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18127 [redacted] PPA Development solar [redacted] MW_{AC} COD: 12/31/2022 Term: 15** or 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $119.579 M Levelized PB/REC: $[redacted] Net Cost PV: $60.272 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Extensive solar energy development experience; developed, currently [redacted] solar installation in Washington State • Location on existing project site may provide economies of scale in developing and operating project • County has expressed support for the project	• Potential siting risks given proximity to wind turbines with required setbacks • Assumes use of PSE site control [redacted] • Interconnection and energy delivery assume use of PSE existing infrastructure and analysis assumes no coincidental curtailment due to overproduction between existing wind and proposed solar • Conditional Use Permit (CUP) required to permit project	**Not Selected –** Project not selected during portfolio optimization process.
18131 [redacted] PPA** or BTS Development Wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 25 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $11.525 M Levelized PB/REC: $[redacted] Net Cost PV: $20.124 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Proposes to provide credit support in the form of a parent guarantee, letter of credit, or cash • Long-term site control for most of the site is secured • Community relations plan is strong compared to other proposals	• Less experienced than other counterparties • [redacted] MW offer configuration would likely exceed available transmission capacity • [redacted] tribe may request compensation from project	**Not Selected –** Project not selected during portfolio optimization process.
18132 [redacted] PPA** Development wind [redacted] MW COD: 01/01/2023 Term: 20 years	Levelized cost: $38.01 / MWh Portfolio benefit: $61.479 M Levelized PB/REC: $[redacted] Net Cost PV: $20.702 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Repower of existing wind project; site control and community relations risks are unlikely • Oregon Energy Facility Siting Council (EFSC) amendment secured during Phase 2 of the RFP	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18135 [redacted] PPA** or BTS Development solar [redacted] MW or [redacted] MW solar Optional 25 MW, 4-hr BESS COD: 1/1/2023 Term: 20 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $123.395 M Levelized PB/REC: $[redacted]** Net Cost PV: $55.724 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large counterparty with experience all over the world • Letter of intent with an option to lease has been signed for project lands	• Contribution to PSE's peak capacity need is negated due to Mid-C delivery • Permitting plan is underdeveloped • There is no site control for current generation-tie line alignment • Project is on irrigated farmland--mitigation strategy not included in proposal, but developer has retained a "[redacted] PR firm" for support	**Not Selected –** Project not selected during portfolio optimization process.
18139 [redacted] PPA Development solar [redacted] MW solar* with optional [redacted] MW or [redacted] MW, 1.82-hr BESS COD: 1/1/2023 Term: 10 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $26.120 M Levelized PB/REC: $[redacted] Net Cost PV: $15.659 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Large multi-national counterparty with greater-than-average renewable development experience	• Site control not yet secured and copy of anticipated letter of intent has not been provided • Energy delivery has been left to PSE, appears to be complicated, and may pose a feasibility risk • Respondent provided little to no evidence of a successful permitting strategy • Community relations matters were not covered sufficiently, and tribal support may be required	**Not Selected –** Project not selected during portfolio optimization process.
18163 [redacted] REC purchase Underlying solar projects [redacted] RECS per year Start of term: 1/1/2022 Term: 18 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $19.635 M Levelized PB/REC: $[redacted] Net Cost PV: $2.412 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Minimal risk regarding underlying projects • Interconnection at distribution voltage dictates that each as-generated MWh produces two Washington State RECs	• Little detail regarding underlying solar facilities	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18165 [redacted] REC purchase Underlying solar project [redacted] RECS per year Start of term: 1/1/2022** or 2024 Term: 16 or 18** years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $13.181 M Levelized PB/REC: $[redacted]** Net Cost PV: $1.755 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Minimal risk regarding underlying project	• Little detail regarding underlying solar facility	**Not Selected –** Project not selected during portfolio optimization process.
18166 [redacted] Development asset sale, BTS or PPA** Development wind [redacted] MW COD: 12/1/2020, 2021*, or 2022 Term: 25 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $114.836 M Levelized PB/REC: $[redacted] Net Cost PV: $121.737 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control established	• Significant concerns regarding the counterparty's ability to develop, finance, and construct the facility • Relatively small counterparty with inconclusive rights to the project's developmental assets • Timing of project is contingent on Bonneville Power Administration (BPA) infrastructure upgrades to enable transmission capacity • Project owner, [redacted], seemed uninterested in furthering project development via first-hand experience at [redacted] public hearing • Timeline as-proposed is likely infeasible and pricing is likely contingent on timing due to production tax credit (PTC) safe harbor	**Not Selected –** Project not selected during portfolio optimization process.
18175 [redacted] PPA, BTS**, or WSPP shaped Development wind [redacted] MW COD: 1/1/2021 Term: 25 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $176.514 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: $[redacted] Net Cost PV: $177.135 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Long-term site control is secured • Western Systems Power Pool (WSPP) schedule C delivery is a unique value	• Counterparty and financing details will require data requests • Energy delivery has been left to PSE, appears to be complicated, and might pose a feasibility risk • Mid-C delivery will likely be necessary, which would negate a contribution to PSE's peak capacity • Permitting plan seems either underdeveloped or underrepresented in the proposal • Outreach plan is underdeveloped	**Not Selected –** Project not selected during portfolio optimization process.

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REDACTED VERSION

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18176 [redacted] PPA** Development wind [redacted] MW** or [redacted] MW COD: 12/31/2022 Term: 20	Levelized cost: $[redacted]/ MWh Portfolio benefit: $135,600 M Levelized PB/REC: $[redacted] Peak capacity PB / kW-Yr: [redacted] Net Cost PV: $242524 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Indications of strong local, state and environmental support • Potential to partner with a local Native American tribe • Located near [redacted] and in the same County [redacted] • Counterparty has indicated a plan to partner and/or otherwise engage an experienced renewable energy developer on the project	• Counterparty does not have experience designing, financing, building, owning or operating a large scale renewable or other energy project • Assumed use of [redacted] may be problematic for full proposed output • Additional detail needed regarding the real estate and permitting considerations necessary for the site	**Not Selected –** Project not selected during portfolio optimization process.
18179 [redacted] PPA** or DBS Development wind [redacted] MW** COD: 12/31/2021 Term: 20 years	Levelized cost: $[redacted] / MWh Portfolio benefit: $70.371 M Levelized PB/REC: $[redacted]*** Net Cost PV: $28,121 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Strong counterparty with extensive renewable energy development experience • Real estate appears adequate and relatively low risk • Project size has been altered to address some local viewshed concerns	• History of considerable local and county-level opposition to the project • Counterparty bypassed the County permitting process by pursing permit approval through the state's Washington Energy Facility Site Evaluation Council (EFSEC) process	**Not Selected –** Project not selected during portfolio optimization process.
18190 [redacted] REC purchase 5 underlying proposed solar facilities [redacted] RECs / year COD: 01/01/2022 Term: 12, 15, or 20** years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $46.975 M Levelized PB/REC: $[redacted]** Net Cost PV: $5.948 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Inexpensive RECs • Site control is secured • Washington Energy Facility Site Evaluation Council (EFSEC) projects have been approved by Governor Inslee	• Realizing full REC-output of underlying projects is unlikely due to interconnection issues • [redacted] is currently in litigation with PSE over interconnection issues with the underlying projects • [redacted] County opposes the EFSEC decision and has applied for judicial review • Major feasibility concerns with some and schedule concerns for all of the underlying projects • Projects sited on commercial agricultural land and many stakeholders in the county oppose development of these lands	**Not Selected –** Project not selected due to qualitative risks.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
18201 [redacted] Direct load control Bring your own thermostat, smart water heater [redacted] MW COD: 1/1/2023 Term: 6 years	Not applicable, please see selection recommendation & rational section to the right	• Described as an industry leader by a recent [redacted] study • [redacted] • [redacted] manages all program implementation • Excellent financial strength, Washington based • The [redacted] MW option makes it a small scale project well suited for conceptual testing	• Proposal schedule includes significant ramp up of customer participation in first program year (2023); unclear if this is feasible • Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMs)	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
18205 [redacted] Commercial & industrial curtailment [redacted] MW COD: 1/1/2021 Term: 5 years	Not applicable, please see selection recommendation & rational section to the right	• Winter peak experience • Commercial and Industrial segment provides a diversification benefit	• Concern about ability to integrate with PSE's in-development distributed energy resource management system (DERMS) • Counterparty has only been established since 2016, and has not been financially profitable.	**Not Selected –** Project not selected due to qualitative risks and because demand response was determined not to be cost effective in the 2018 RFP without identifiable deferred transmission and distribution costs.
UP002 [redacted] REC purchase [redacted] RECs / year COD: 1/1/2020 Term: 15 years	Levelized cost: $[redacted]/ MWh Portfolio benefit: $4.502 M Levelized PB/REC: $[redacted]** Net Cost PV: $1.153 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• Not applicable	• Price is higher and volume is smaller than other REC offers received in response this RFP.	**Not Selected –** Project not selected during portfolio optimization process.

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Project	Quantitative Results**	Qualitative Advantages (+)	Qualitative Risks (-)	Selection Recommendation & Rationale
XXXXX **Colstrip Transmission System Redirect** Puget Sound Energy N/A Transmission redirect [redacted] MW**, [redacted] MW COD: 01/01/2022 Term: 55-year book life	Levelized cost: [redacted] Portfolio benefit: $57.274 M Peak Capacity PB / kW-Yr: ($[redacted])*** Net Cost PV: $27.905 M Peak capacity contribution (MW): [redacted] Annual REC contribution: [redacted]	• If feasible, redirect to Mid-C would provide a strong capacity resource	• Increased exposure to market prices (for redirect to Mid-C) • Redirects require Available Transmission Capacity (ATC) between the new points of receipt and delivery. With no ATC between Mid-C and BPAT.PSEI, a redirect to Mid-C is unfeasible. • Redirecting elsewhere on BPA's system would require appropriate ATC as well as an energy source at the redirect point, which may nullify contribution to peak capacity.	**Not Selected –** Proposal withdrawn from consideration due to lack of Available Transmission Capacity (ATC).

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REDACTED VERSION

REDACTED VERSION

2018 RFP Phase II Quantitative Results Summary- CAPACITY PROPOSALS

As of July 23, 2019

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

	ID	Capacity Proposals: Project Name	A: Technology	B: Term Start	C: Book Life / Contract Term	D: Nameplate Capacity (MW)	E: Peak Capacity Credit	Levelized PB /(Peak Capacity kW - YR): F: NO CO2 Low Load	G: NO CO2 Updated w/SB100	H: NO CO2	I: Low Societal	J: Mid Societal	K: High Societal	Ranking Levelized PB / (Peak Capacity kW - YR): L: NO CO2 Low Load	M: NO CO2 Updated w/SB100	N: NO CO2	O: Low Societal	P: Mid Societal	Q: High Societal	Net Cost/KW-Yr: R: NO CO2 Low Load	S: NO CO2 Updated w/SB100	T: NO CO2	U: Low Societal	V: Mid Societal	W: High Societal	Ranking Net Cost/KW-Yr: X: NO CO2 Low Load	Y: NO CO2 Updated w/SB100	Z: NO CO2	AA: Low Societal	AB: Mid Societal	AC: High Societal
1	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	78.8	[redacted]						5	1	2	4	1	1	[redacted]						8	8	5	4	5	4
2	18169	[redacted]	MT Wind	Dec-21	25	[redacted]	[redacted]							6	2	1	1	2	2							1	1	1	1	1	1
3	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	16.4							4	3	3	3	3	3							9	9	9	7	7	5
4	18173	[redacted]	MT Wind	Oct-22	20	[redacted]	[redacted]							3	4	4	2	4	4							4	6	3	3	3	3
5	18173		MT Wind	Oct-22	20									2	5	5	5	5	5							3	3	2	2	2	2
6	16161	BPA Peak Capacity Product	Capacity	Jan-22	5	100 MW	54.0							10	10	10	10	10	10							7	7	8	11	11	9
7	18105	[redacted]	Thermal	Jan-22	20	[redacted]								7	7	6	7	6	7							2	2	4	6	8	6
8	18103		Thermal	Jun-22	10									9	8	7	9	9	9							6	4	6	9	10	8
9	18105		Thermal	Jan-22	20									8	9	8	8	7	8							5	5	7	8	9	7
10	18201		DR	Jan-23	6																										
11	18205		DR	Jan-21	5																										
12	18190		MT Wind	Dec-22	20																										
13	XXXXX	Transmission Redirect																													

Notes:
1. The metric shown-- Levelized PB /(Peak Capacity kW - YR)-- is the portfolio benefit attributable to peak capacity service divided by the average peak capacity.
2. Generation Resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 30% or higher were considered "Capacity Resources".
3. Generation Resources with Mid-C delivery are not considered Capacity resources regardless of ELCC.
4. Capacity-specific contracts and products such as Demand Response, Transmission Redirect, and BPA Capacity are considered alongside generation resources
5. None of the demand response projects in Phase II were selected, as there was no identifiable deferred T&D value that would have made it a cost effective solution. In addition, the providers' lack of experience in integrating with PSE's DERM (Distributed Energy Resource Management) system was deemed to be a critical hindrance to implementation.
6. Transmission Redirect has been eliminated as a viable option to meet capacity need.
7. All of the Demand Response projects were eliminated as viable options to meet capacity need.
8. [redacted] was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

REDACTED VERSION

REDACTED VERSION

2018 RFP Phase II Quantitative Results Summary- RENEWABLE PROPOSALS

Primary Ranking Criteria
Secondary Criteria
Cutoff Line

As of July 23, 2019

		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
	Renewable Proposals			Book Life / Contract Term	Nameplate Capacity (MW)	Levelized PB / REC						Ranking Levelized PB / REC						LEVELIZED $/REC						Ranking LEVELIZED $/REC						Net Cost/REC						Ranking Net Cost/REC					
ID	Project Name	Technology	Term Start			NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2	Low Societal	Mid Societal	High Societal	NO CO2 Low Load	NO CO2 Updated w/SB100	NO CO2 base	Low Societal	Mid Societal	High Societal
1	18163	[redacted]	REC Only	Jan-22	18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1	1	3	24	34	36	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	8	3	15	26	32	31
2	18165	[redacted]	REC Only	Jan-22	18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	2	4	23	35	35	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	12	6	18	28	35	33
3	18190	[redacted]	REC Only	Jan-20	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3	3	1	20	33	33	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	7	2	13	24	31	29
4	18169	[redacted]	MT Wind	Dec-21	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	24	4	6	1	1	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17	17	17	17	17	17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1	1	1	1	1	1
5	18190	[redacted]	REC Only	Jan-20	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	19	5	14	26	32	32	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	9	4	16	27	33	32
6	18190	[redacted]	REC Only	Jan-20	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	21	6	1	20	31	33	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	11	5	13	24	34	29
7	18173	[redacted]	MT Wind	Oct-22	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	30	7	18	13	4	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	26	26	26	26	26	26	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	22	20	19	10	4	2
8	18190	[redacted]	Wind	Dec-21	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	5	8	10	15	20	19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	13	13	13	13	13	13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	10	6	12	13	13
9	18135	[redacted]	Solar	Jan-23	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	7	9	5	3	7	6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	2	2	2	2	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3	11	2	2	6	6
10	18111	[redacted]	Solar	Dec-22	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	6	10	11	4	3	5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	6	6	6	6	6	6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	4	12	9	4	3	5
11	18127	[redacted]	Solar	Dec-22	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	11	11	24	6	8	7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	5	5	5	5	5	5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	10	15	24	6	7	8
12	18135	[redacted]	Solar	Jan-23	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	8	12	7	9	9	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	8	8	8	8	8	8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	13	17	3	7	9	10
13	18125	[redacted]	Solar	Jan-23	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	10	13	8	10	10	11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	10	10	10	10	10	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	14	18	4	8	10	11
14	18127	[redacted]	Solar	Dec-22	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	15	14	26	12	11	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	4	4	4	4	4	4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	15	16	25	11	12	14
15	18132	[redacted]	Wind	Jan-23	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	4	15	12	2	5	4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	11	11	11	11	11	11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	7	8	3	5	4
16	18125	[redacted]	Solar	Jan-23	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	14	16	13	14	12	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	9	9	9	9	9	9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	16	19	5	13	14	17
17	18173	[redacted]	MT Wind	Oct-22	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	27	17	23	19	14	13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	21	21	21	21	21	21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	24	22	21	18	15	12
18	18111	[redacted]	Solar	Dec-22	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	12	18	9	7	2		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	18	18	18	18	18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	29	33	26	17	2	3
19	18139	[redacted]	Solar	Jan-23	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	19	17	17	15	18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1	1	1	1	1	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17	14	10	19	20	20
20	18132	[redacted]	Wind	Jan-22	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	9	20	15	5	13	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	7	7	7	7	7	7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	6	9	12	5	8	7
21	18114	[redacted]	Solar	Dec-21	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	16	21	16	16	18	9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	12	12	12	12	12	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	19	21	7	14	16	18
22	18179	[redacted]	Wind	Jan-21	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	31	22	31	29	25	23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	23	23	23	23	23	23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	32	30	33	22	18	36
23	18166	[redacted]	Wind	Jan-21	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	20	23	25	25	21	21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	22	22	22	22	22	22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	23	25	27	23	24	23
24	18132	[redacted]	Wind	Jan-21	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	13	24	20	11	16	17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3	3	3	3	3	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	5	8	11	9	11	9
25	18170	[redacted]	Wind	Dec-20	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	22	26	29	8	6	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	15	15	15	15	15	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	20	13	17	15	17	15
26	18122	[redacted]	Solar	Jan-23	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17	27	21	18	19	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	14	14	14	14	14	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	21	24	20	16	19	19
27	18166	[redacted]	Wind	Jan-23	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	23	28	30	30	26	26	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	29	29	29	29	29	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	28	29	31	32	27	24
28	18131	[redacted]	Solar	Dec-22	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	35	29	22	22	22	22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	19	19	19	19	19	19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	25	27	22	20	22	22
29	18139	[redacted]	Solar + BES	Jan-23	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	26	30	28	27	24	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	16	16	16	16	16	16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	27	26	28	29	25	25
30	18175	[redacted]	Wind	Jan-21	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	34	31	33	33	29	29	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	27	27	27	27	27	27	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	31	28	29	30	26	35
31	18166	[redacted]	Wind	Jan-22	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	25	32	32	32	27	27	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	28	28	28	28	28	28	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	30	31	32	33	29	27
32	18170	[redacted]	Wind	Dec-20	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	29	33	19	28	17	16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	24	24	24	24	24	24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	33	32	30	31	21	16
33	18100	SPI Industrial Biomass	Biomass	Jan-21	17	17 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	33	34	35	34	28	28	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	30	30	30	30	30	30	28.8	29.4	23.6	13.9	-2.8	-11.8	35	34	34	34	28	26
34	18170	Golden Hills Shaped	Wind	Dec-20	25	200 MW	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	28	25	27	31	23	24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	20	20	20	20	20	20	15.5	15.9	10.3	1.5	-13.3	-21.0	26	23	23	21	23	21
35	18139	[redacted]	Solar + BES	Jan-23	10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	32	35	34	35	30	30	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	25	25	25	25	25	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	34	35	35	35	30	28
36	18107	[redacted]	Hydro-Run	Jan-21	20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	36	36	36	36	36	31	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	31	31	31	31	31	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	36	36	36	36	36	34
	18190	[redacted]	MT Wind			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]							[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						

Notes:
1. The metric shown-- Levelized PB / RECs-- is the portfolio benefit attributable divided by RECs generated.
2. For generation resources with a peak capacity contribution (as described by ELCC, or Effective Load Carrying Contribution) of 3.2% or higher, the Renewable Portfolio Benefit was recomputed by isolating the portfolio benefit attributable to REC generation. Resources with Mid-C delivery are considered to have zero capacity value.
3. Garfield Peak was eliminated as a viable option due to various qualitative factors, including indeterminate production capacity figures.

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Portfolio Optimization Summary: as of 7.23.2019

(A) List	(B) Project ID	(C) Resource	(D) Project	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs[1]	(H) Preferred Optimized Portfolio: [redacted] + Renewables	(I) As Proposed Optimized Portfolio: [redacted] + Renewables	(J) Optimized Lowest Cost Portfolio to Solve for 0 Capacity Deficit with Generic Battery	(K) Backup Portfolio: [redacted] + Renewables	(L) Contingency Portfolio: [redacted] + No MT Wind	(M) Optimized Lowest Cost Portfolio with NO Carbon Costs Consideration	(N) Optimized Lowest Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW	[redacted]	X	X	X	X			X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW	[redacted]	X	X	X	X	X		X
3a	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]	X						
3b	18169	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]		X	X			X	X
4a	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]				X			
4b	18173	MT Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
5a	18170	Wind	Golden Hill Shaped	200 MW	77 MW	[redacted]	X	X	X	X			X
5b	18170	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		
6	18132	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		X
7	18179	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
8	18166	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
9	18175	Wind	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18125	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18111	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18127	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18135	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18139	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18131	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X		
####	18114	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18122	Solar	[redacted]	[redacted] MW	[redacted] MW	[redacted]							X
####	18163	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	18165	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	UP-002	REC-only	[redacted]	[redacted] MW	[redacted] MW	[redacted]							
####	18103	Thermal	[redacted]	[redacted] MW	[redacted] MW	[redacted]					X	X	
####	XXXXX	Generic	Generic Peaker	237 MW	224 MW	N/A							
####	XXXXX	Generic	Generic Battery	61 MW	23 MW	N/A			X				X
####		Total Peak Capacity Credits - MWs					[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
####		Peak Capacity Surplus / (Deficit) in 2022[4]					[redacted] MW[4]	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
####		Total Annual RECs					2,189,656	1,986,862	1,986,862	1,773,109	1,044,255	1,216,764	6,481,035
####		Portfolio Benefits - $M					$408	$397	$273	$286	$275	$477	-$491
####													
####		With Consideration of Social Cost of Carbon:											
####		Portfolio Benefits w/ Carbon Costs as an Adder - $M[5]					$1,038	$934	$829	$716	-$42	$354	$2,024
####		Portfolio Benefits w/ Carbon Costs in Dispatch Costs - $M					$959	$937	$800	$605	$281	$667	$2,175

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	291 MW	328 MW	457 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column I does not include 0.2X apprenticeship multiplier.
2. The optimization model chose a portfolio with [redacted] MW from [redacted] submitted proposals for both [redacted] MW and [redacted] MW, but not [redacted] MW. The [redacted] MW size of the project is reduced from the proposed [redacted] MW option based on available transmission capacity. The [redacted] MW option will have to be negotiated with [redacted]. Current indicative results reflect pricing based on the 300MW offer.
3. The current project COD for [redacted] is Dec 2021. There has been perceived timing risks [redacted] If the COD is delayed to Dec 2022 to mitigate this risk, NPV of [redacted] in total PPA costs is projected. The next highest ranked portfolio [redacted] is $123M more expensive than the recommended portfolio, yet sharing the same timing risks on transmission.
4. Final Portfolio ELCC reduces the sum of individual project peak capacity contribution by 8 MW. It could potentially be mitigated by 1) short-term capacity purchase for $720k per year; 2) a 20MW battery for $41M.
5. Social cost of carbon at $86/metric ton in 2010 dollars plus escalation is added to total portfolio costs as fixed cost.

PSE Report to the Board of Directors:
Golden Hills Wind Project Shaped PPA

Attachment 8(b).Comparative Analysis (Post-RFP Analysis)

ATTACHMENT 8(b). Comparative Analysis (Post-RFP Analysis)

Post-RFP Comparative Analysis

This attachment summarizes the quantitative analysis conducted during contract negotiation. The analysis presented in this attachment has been updated from the analysis presented to the Energy Management Committee on April 23, 2020. The updated analysis reflects the most current information and assumptions available to the evaluation team, including an updated Wind Resource Report, Attachment 6(a), received on April 20, 2020 and final negotiated cost adders for the use of represented labor and apprenticeship labor.

Table 1 shows that the Golden Hills Wind Project Shaped PPA is selected as part of the optimized portfolio. Table 2 shows the complete list of projects included in the optimization model. . Table 3 demonstrates that absent the Golden Hills Wind Project Shaped PPA, the next best available option to satisfy PSE's resource need is the Golden Hills Wind Project PPA unshaped product at a price at $[redacted]/MWh.

Table 1. *Portfolio optimization results show that Golden Hills Shaped PPA is selected as part of the optimized portfolio solution*

(A) List	(B) Project ID	(C) Project	(D) Resource	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs	(H) Portfolio Benefits
1	18100	SPI	Biomass	17 MW	16 MW	[redacted]	
2	18161	BPA Peak Capacity Product	Call Option	100 MW	53 MW		
3	18169	[redacted]	MT Wind	[redacted] MW	[redacted] MW		
4	18170	Golden Hills Shaped	Wind	200 MW	73 MW		
5	xxxxx	Morgan Stanley Sys PPA	Systerm PPA	100 MW	79 MW		
6		**Total Peak Capacity Credits - MWs**			[redacted] **MW**		
7		**Total Annual RECs**				[redacted]	
8		**Portfolio Benefits - $M**					**$711**
9		**Portfolio Benefits w/ Carbon Costs as an Adder - $M** [2,3,4]					**$1,144**

Peak Capacity and REC Need 2022-2025	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need/(Surplus) after Resources	[redacted] MW	[redacted] MW	[redacted] MW	[redacted] MW
REC Need	0	233,449	691,864	700,482
REC Need/(Surplus) after Resources	-2,278,361	-2,044,911	-1,586,496	-1,577,879

1. The annual project RECs for Golden Hills include 0.2X apprenticeship multiplier.
2. Social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO2 / MWh for market purchases is added into social cost of carbon calculation.
4. Includes $[redacted]/MWh adder (2020 dollars) for represented labor and $[redacted]MWh adder (2020 dollars) for apprenticeship labor for Golden Hills.

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Table 2. ***Detailed portfolio optimization results***

(A) List	(B) Project ID	(C) Project	(D) Resource	(E) Nameplate	(F) Peak Capacity Credit	(G) RECs	(H) Recommended Portfolio: Clearwater + Renewables
1	18100	SPI	Biomass	17 MW	16 MW	[redacted]	X
2	18161	BPA Peak Capacity Product	Call Option	100 MW	53 MW		X
3	18169	[redacted]	MT Wind	[redacted] MW	[redacted] MW		X
3b.	18169		MT Wind	[redacted] MW	[redacted] MW		
4a.	18173		MT Wind	[redacted] MW	[redacted] MW		
4b.	18173		MT Wind	[redacted] MW	[redacted] MW		
5	18170	Golden Hills Shaped	Wind	200 MW	73 MW		X
5b.	18170	[redacted]	Wind	200 MW	49 MW		
6	xxxxx	Morgan Stanley Sys PPA	Systerm PPA	100 MW	79 MW		X
7	18132	[redacted]	Wind	[redacted] W	[redacted] MW		
8	18179		Wind	[redacted] MW	[redacted] MW		
9	18166		Wind	[redacted] MW	[redacted] MW		
10	18175		Wind	[redacted] MW	[redacted] MW		
11	18125		Solar	[redacted] MW	[redacted] MW		
12	18111		Solar	[redacted] MW	[redacted] MW		
13	18127		Solar	[redacted] MW	[redacted] MW		
14	18135		Solar	[redacted] MW	[redacted] MW		
15	18139		Solar	[redacted] MW	[redacted] MW		
16	18131		Solar	[redacted] W	[redacted] MW		
17	18114		Solar	[redacted] MW	[redacted] MW		
18	18122		Solar	[redacted] W	[redacted] MW		
19	18163		REC-only	[redacted] W	[redacted] MW		
20	18165		REC-only	[redacted] W	[redacted] MW		
21	UP-002		REC-only	[redacted] W	[redacted] MW		
22	18103		Thermal	[redacted] MW	[redacted] MW		
23	XXXXX		Thermal	[redacted] MW	[redacted] MW		
24	XXXXX	Generic Peaker	Generic	237 MW	224 MW	N/A	
25	XXXXX	Generic Battery	Generic	175 MW	66 MW	N/A	
26		**Total Peak Capacity Credits - MWs**					[redacted] **MW**
27		**Total Annual RECs**					**2,278,361**
28		**Portfolio Benefits - $M**					**$711**
29		**Portfolio Benefits w/ Carbon Costs as an Adder - $M** [2,3,4]					**$1,144**

Peak Capacity and REC Need 2022-2025	**2022**	**2023**	**2024**	**2025**
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs for Golden Hills include 0.2X apprenticeship multiplier.
2. Social cost of carbon at $62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
3. Emission rate of 0.437 metric tons of CO_2 / MWh for market purchases is added into social cost of carbon calculation.
4. Includes $[redacted]/MWh adder (2020 dollars) for represented labor and $[redacted]/MWh adder (2020 dollars) for apprenticeship labor for Golden Hills.

REDACTED VERSION

REDACTED VERSION

Table 3. ***Alternatives analysis shows that the Golden Hills Unshaped PPA is the next best alternative.***

Peak capacity need

Line	*units in MW*	2020	2021	2022	2023	2024	2025	2026
1	Peak Need	5,814	5,871	5,908	5,948	6,046	6,121	6,187
2	Resources exclude RFP projects & Colstrip Unit 4 sale	5,845	5,904	5,609	5,656	5,688	5,645	5,062
3	**Deficit as shown for 2018 RFP**	**-32**	**-33**	**299**	**292**	**358**	**476**	**1,125**
4								
5	Colstrip 4 sale	-	95	95	95	95	95	-
6	**Deficit w/ Colstrip 4 Sale**	**-32**	**62**	**394**	**387**	**453**	**571**	**1,125**
7								
8	2018 RFP Projects without Golden Hills							
9	SPI	-	16	16	16	16	16	16
10	BPA	-	-	54	54	54	54	54
11	Morgan Stanley	-	-	79	79	79	79	79
12	[redacted]	-	-	[redacted]				
13	Subtotal	-	16					
14								
15	**Deficit w/ RFP Projects without Golden Hills**	**(32)**	**46**	[redacted]				

Alternatives analysis for unshaped Golden Hills project

		(A)	(B)	(C)	(D)
	$ in millions	**Nameplate**	**ELCC**	**Net cost**	**Cost with CO^2 and capacity value**
16	Golden Hiils Shaped @ 37% ELCC	200 MW	73 MW	$147.4	($10.0)
17	**Golden Hills Unshaped @ 25% ELCC**	200 MW	49 MW	**$126.8**	**($6.4)**
18	[redacted]	[redacted]MW	[redacted]MW	$224.9	$70.1
19		[redacted]MW	[redacted]W	$257.6	$28.9
20		[redacted]MW	[redacted]W	$141.6	$23.5
21		[redacted]W	[redacted]MW	$84.4	$17.3
22		[redacted]MW	[redacted]MW	$156.7	$117.1

REDACTED VERSION

Current RFP for new resources

Cindy Song

PUGET SOUND ENERGY

In 2018 PSE issued an all-resources and demand response RFP to fill a 272 MW capacity need in 2022 and renewable need in 2023

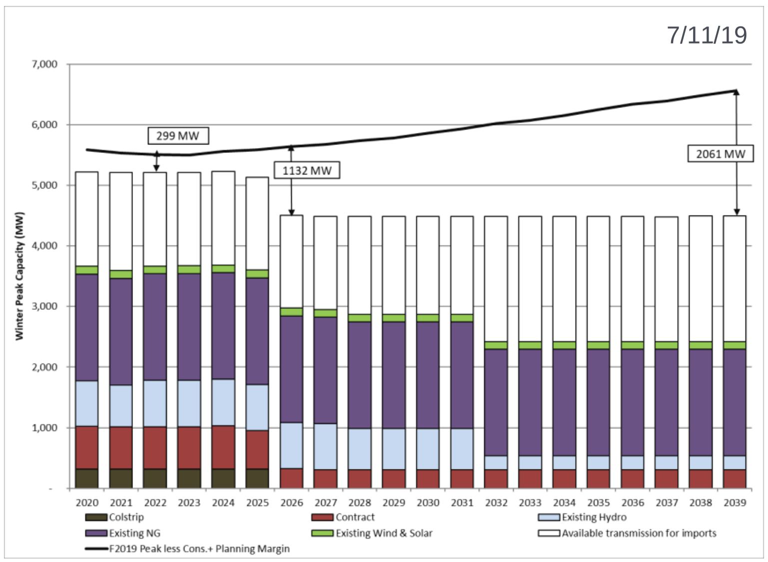
Resource need forecasts updated in Phase 2 analysis to reflect draft 2019 IRP need assessments and F2019 load forecast (net conservation)*

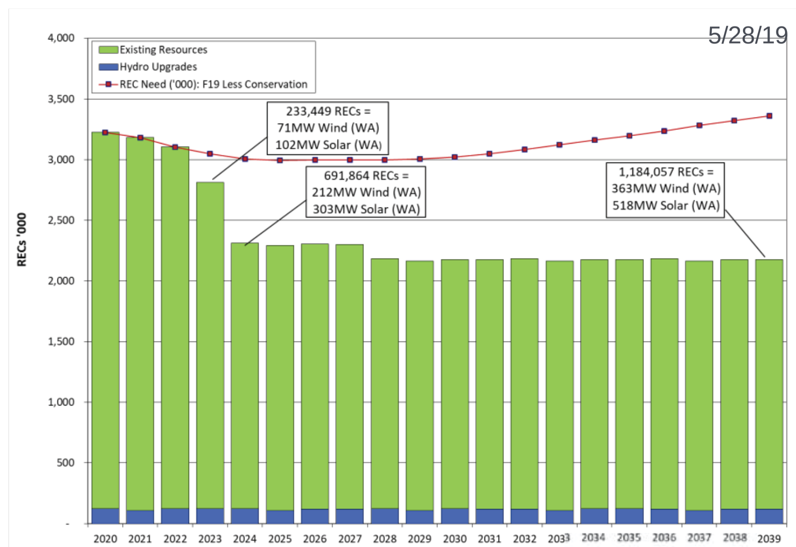
2018 RFP Capacity Need – Phase 2 update

- PSE seeks 299 MW capacity by end of 2022; near-term gap from 2020-2021 to be filled by short-term RFP
- Products that fill winter need while minimizing surpluses in other parts of the year will evaluate more favorably

2018 RFP REC Need – Phase 2 update**

- REC need is driven by the increase in the RPS from 9% to 15% in 2020
- Projected need to meet the RPS is 233,449 RECs by 2023
- PSE's inventory of banked RECs delays need until 2023





*Original RFP issued to fill 272 MW capacity need in 2022 and 671,000 REC renewable need in 2023.
**REC need reflects renewable need driven by RCW 19.285 (RPS). It does not reflect the impact of SB 5116 (Clean Energy Transformation Act).

Of the 97 proposals received in the 2018 RFPs, 27 advanced to Phase 2 for further analysis

Proposals selected for Phase 2 evaluation reflect resource and technology diversity

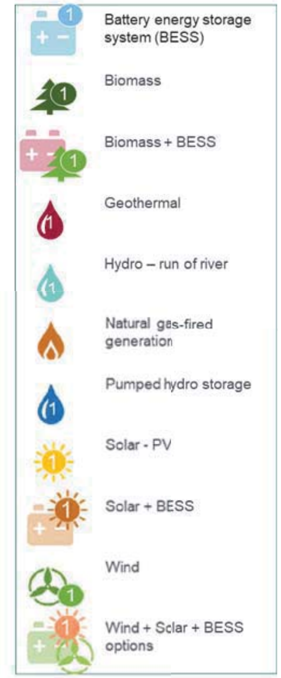
Updated 6/20/19

	Proposals Received		Revised Phase 2 Candidate List	
Resource Type	**# Proposals**	**Max Cap MW**	**# Proposals**	**Max Cap MW**
Solar - PV	16	2240	7	890
Solar - PV + BESS	20	2848	1	100
Wind - Off Shore	1	400	0	0
Wind On Shore	16	3303	7	1642
Wind + Winter Sys PPA	1	371	1	200
Wind + Solar and/or BESS	2	464	0	0
Storage - Battery ("BESS")	17	1265	0	0
Storage - Pumped Hydro	2	900	0	0
Biomass	2	72	1	17
Biomass + BESS	1	15	0	0
Natural Gas-fired Generation	4	1377	2	348
Geothermal	2	43	0	0
Hydro - Run of River	1	38	1	38
System PPA / Call Option	1	100	1	100
Unbundled RECs	5	n/a	4	n/a
Demand Response	6	154	2	33.7
TOTAL	**97**	**13,590**	**27**	**3,369**

PUGET SOUND ENERGY

93% of proposals offered a PPA option and 28% offered an ownership option

[redacted]



PUGET SOUND ENERGY

REDACTED VERSION

Four projects were selected for negotiations

1. SPI Biomass (Sierra Pacific Industries) 17-year PPA
2. [redacted] Montana wind ([redacted]) 25-year PPA
3. Golden Hills Oregon wind (Avangrid) 20-year PPA
4. BPA peak capacity product (BPA) 5-year call option

PUGET SOUND ENERGY

REDACTED VERSION

PUGET SOUND ENERGY

DISCUSSION

Current RFP for new resources

PUGET SOUND ENERGY

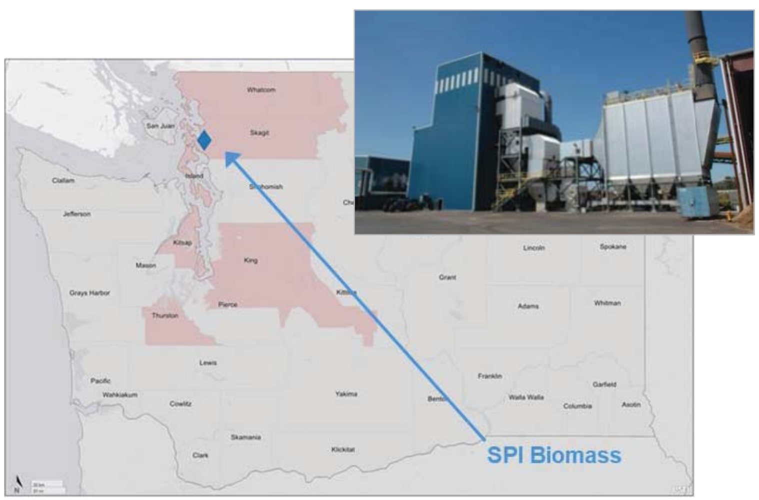
Selected proposal: SPI Biomass PPA

Seller:

- Sierra Pacific Industries (SPI)

Product:

- Delivery of at least 17 MW and up to 19 MW of firm (24/7) electrical energy
- Minimum availability: [redacted]% (92% historic)
- Expected output: [redacted] MW



**The SPI Burlington lumber mill began operating in 2001. The biomass cogeneration facility was added in 2007. Facility is subject to an existing contract with a broker to sell the output through 2020.*

Term:

- Contract start: Jan. 1, 2021*
- Term: 17 years

Point of Delivery:

- SPI.CABO.GEN at Fredonia Substation
  (also Point of Interconnection)

Price:

Calendar Year	Contract Year	Energy Price ($/MWh	Expected Energy Output (MWh/year)
2021	1	[redacted]	
2022	2		
2023	3		
2024	4		
2025	5		
2026	6		
2027	7		
2028	8		
2029	9		
2030	10		
2031	11		
2032	12		
2033	13		
2034	14		
2035	15		
2036	16		
2037	17		

PUGET SOUND ENERGY

REDACTED VERSION

Selected proposal: [redacted] wind PPA

Seller:
- [redacted]

Product:
- Nameplate Capacity: Proposed [redacted] MW*
- NCF: [redacted] %
- Expected Output: [redacted] MWh/year

Term:
- COD: Proposed 12/31/2021**
- Term: 25 years

Point of Delivery:
- [redacted] Substation 500 kV (*also Point of Interconnection)*

[redacted]

Price (based on 300 MW PPA)***:

Calendar Year	Contract Year	PPA Flat Energy Price	PPA Expected Energy Output (MWh/year)
2022	1	[redacted]	
2023	2		
2024	3		
2025	4		
2026	5		
2027	6		
2028	7		
2029	8		
2030	9		
2031	10		
2032	11		
2033	12		
2034	13		
2035	14		
2036	15		
2037	16		
2038	17		
2039	18		
2040	19		
2041	20		
2042	21		
2043	22		
2044	23		
2045	24		
2046	25		

**Preferred size [redacted] MW (no offer yet)*
***To be determined based on timing of transmission availability*
****Price does not include delivery to PSE's system. Levelized cost of energy is $[redacted]*

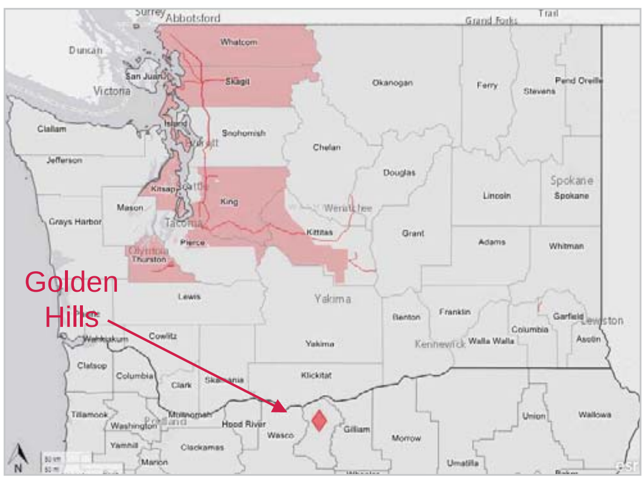
PSE PUGET SOUND ENERGY

REDACTED VERSION

Selected proposal: Golden Hills wind (shaped)

Seller:
- Avangrid Renewables, Inc.

Product:
- Nameplate Capacity: 200 MW
- NCF: [redacted]%
- Expected Output: [redacted] MWh/year
- Shaped Capacity: up to [redacted] MW
- Shaped Schedule: [redacted]
- Shaped Hours: [redacted]



Term:
- COD: 12/31/2021
- Term: 20 years

Point of Delivery:
- BPAT.PSEI

Price*:

Levelized cost of energy is $50/MWh.

		PPA		Winter-Peaking Capacity	
Calendar Year	Contract Year	Flat Energy Price ($/MWh)	Expected Energy Output (MWh/year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]	[redacted]	[redacted]	[redacted]
2023	2				
2024	3				
2025	4				
2026	5				
2027	6				
2028	7				
2029	8				
2030	9				
2031	10				
2032	11				
2033	12				
2034	13				
2035	14				
2036	15				
2037	16				
2038	17				
2039	18				
2040	19				
2041	20				

Selected proposal: BPA capacity tolling agreement

Seller:

- Bonneville Power Administration (BPA)

Product:

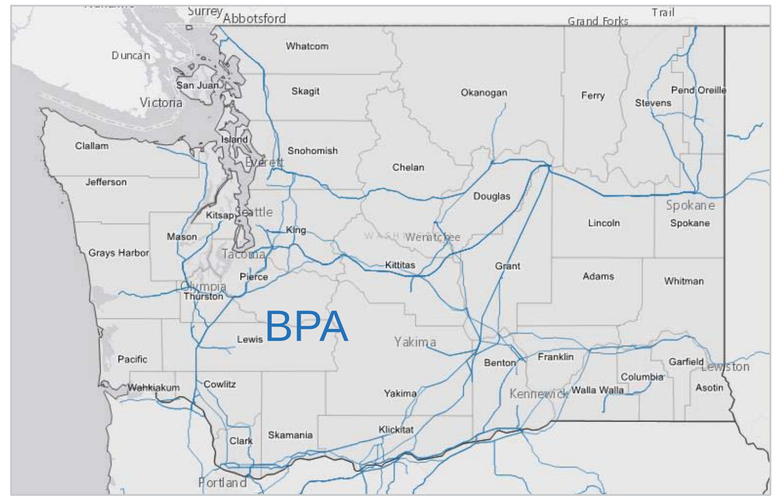
- Capacity: 100 MW
- Firm Capacity which may be scheduled in [redacted] increments from [redacted] MW on [redacted] basis
- Western Systems Power Pool (WSPP) Schedule C, Heavy Load Hour, Low Carbon Firm Energy

Term:

- Start: 01/01/2022
- Term: 5 years

Point of Delivery:

- BPAT.PSEI
- PSE Covington 230 kV Substation



Price*:

Calendar Year	Contract Year	Energy Price ($/MWh)	Possible Energy Output (MWh/year)	Capacity Price ($/kW-mo)	Capacity (MW)
2022	1	[redacted]	[redacted]	[redacted]	150
2023	2	[redacted]	[redacted]	[redacted]	150
2024	3	[redacted]	[redacted]	[redacted]	150
2025	4	[redacted]	[redacted]	[redacted]	150
2026	5	[redacted]	[redacted]	[redacted]	150

* *Powerdex hourly Mid-Columbia index for each hour MWh are delivered*

PSE PUGET SOUND ENERGY

REDACTED VERSION