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May 5, 2022

Via Electronic Filing

Public Utility Commission of Oregon
Attention: Filing Center
201 High Street, Ste. 100
P.O. Box 1088
Salem OR 97308-1088

Re: UM 2166 - Request for Acknowledgment of the Final Shortlist of Bidders in Portland General Electric Company's 2021 All-Source Request for Proposals

Attention Filing Center:

Portland General Electric Company (PGE) submits the enclosed Request for Acknowledgment of the Final Shortlist of Bidders in the 2021 All-Source Request for Proposals (2021 RFP or RFP). PGE has also attached Bates White's (the Independent Evaluator) Final Closing Report to this Request.

Please direct any questions regarding this filing to Jimmy Lindsay at jimmy.lindsay@pgn.com or (503) 464-8311.

Sincerely,

Erin Apperson
Assistant General Counsel II

EEA: dm
Enclosures

BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 2166

In the Matter of PORTLAND GENERAL ELECTRIC COMPANY 2021 All-Source Request for Proposals.	**REQUEST FOR ACKNOWLEDGMENT OF THE FINAL SHORTLIST OF BIDDERS IN 2021 ALL-SOURCE REQUEST FOR PROPOSALS**

I. INTRODUCTION

In accordance with Oregon's competitive bidding rules under Oregon Administrative Rule (OAR) Division 89 (Rules), Portland General Electric Company (PGE or Company) requests that the Public Utility Commission of Oregon (OPUC or Commission) acknowledge the final shortlist of bidders in PGE's 2021 All-Source Request for Proposals (2021 RFP or RFP).

In this RFP, PGE is pursuing clean energy resources to meet our customers' needs and decarbonize our portfolio. Additionally, in 2021, PGE collaborated with environmental groups and customer advocates to pass one of the most progressive clean energy laws in the nation through House Bill 2021. The resulting landmark legislation requires retail electricity providers to reduce Green House Gas (GHG) emissions associated with serving Oregon retail electricity consumers compared to their baseline emissions levels by 80% by 2030, 90% by 2035, and 100% by 2040.[1] PGE proposes to acquire long-term renewable resources, as well as clean capacity products to reliably serve customers as we move forward with decarbonizing Oregon's electric system.

[1] Reductions are measured from 2010-2012 baseline levels.

As recognized in PGE's 2019 Integrated Resource Plan (IRP) and 2019 IRP Update, PGE faces a capacity shortfall beginning in 2025. The 2019 IRP Action Plan identified a capacity need of 511 MW in 2025,[2] to be filled by approximately 150 MWa of renewable resources and clean capacity resources. PGE has pursued bilateral transactions to partially fill this need; following those transactions and updated load-growth assumptions, the remaining need is 388 MW. PGE's proposed procurement strategy is consistent with filling this capacity need with entirely carbon-free resources. In addition to acquisitions to meet capacity need, PGE has evaluated how costs and risks associated with House Bill (HB) 2021's requirements are affected through the procurement of additional renewable energy and clean capacity resources beyond the quantities outlined in PGE's 2019 IRP Action Plan. PGE's assessment of bids in this RFP finds that the shortlist projects provide least-cost, least-risk outcomes currently available for customers in meeting the 2019 IRP Action Plan need of 150 MWa. Additionally, the timing and design of the 2021 RFP provides PGE customers the best opportunity to capture the benefits of expiring Federal Production Tax Credits (PTCs)[3] and Investment Tax Credits (ITCs) while simultaneously addressing growing energy and capacity needs that PGE will face as the region accelerates decarbonization, addresses resource adequacy needs, and experiences continued competition for remaining capacity resources.

PGE, in collaboration with Staff and stakeholders, designed the 2021 RFP in compliance with the Rules. PGE conducted the solicitation in accordance with the Commission-approved RFP structure[4] and with the active participation of, and oversight by, the Commission-selected

[2] 388 MW represents the 511 MW of 2025 system need, less bilateral transactions at Pelton Round Butte, and inclusive of PGE's most current load forecast.
[3] In order for a project to be eligible to capture 26% of the available PTCs, PGE and the project bidder must be prepared to execute procurement agreements by the end of 2022 to allow for a 24-month construction period.
[4] The Commission approved PGE's 2021 RFP with modifications. *See In the Matter of Portland General Electric Company, 2021 All-Source Request for Proposals,* Docket No. 2166, Order No. 21-460 (Dec 10, 2021).

third-party independent evaluator (IE) Bates White[5], ensuring a fair and transparent procurement process for all bidders.

The IE, in accordance with the Rules, and as directed by the Commission:

- Attended the pre-RFP Scoring and Modeling workshop on August 9, 2021.
- Consulted with PGE during PGE's preparation of this 2021 RFP and submitted its assessment of the final draft RFP to the Commission on October 20, 2021.
- Attended the pre-RFP issuance workshop on December 17, 2021.
- Reviewed "mock bids" to test the integrity of the evaluation models and reviewed final scoring and evaluation criteria.
- Conferred with OPUC Staff.
- Oversaw the 2021 RFP process to ensure it was administered fairly.
- Separately evaluated and scored PGE's Benchmark bids.
- Reviewed all correspondence between bidders and PGE's RFP Evaluation Team.
- Reviewed all bids to ensure conformance with the 2021 RFP's identified requirements.
- Reviewed and edited all memoranda sent to bidders of non-compliant bids.
- Independently scored all bids to determine whether the selections for the initial and final shortlists were consistent with the bid evaluation criteria.
- Compared the results of the IE's scoring with PGE's scoring.
- Prepared a Sensitivity Analysis, which was filed May 4, 2022.
- Prepared a Final Closing Report for the Commission after PGE selected the final shortlist. The IE's report provides its assessment of the solicitation process and the IE's involvement, including detailed bid scoring and evaluation results.

PGE received bids from 19 counterparties, who collectively offered 110 distinct proposals, including 15 Benchmark proposals. The process, designed in conformance with the Rules, required Benchmark bids to be received and evaluated prior to PGE's receipt of all other bids. Following the receipt and initial evaluation of bids, PGE allowed bidders to revise prices downward as part of the best and final offer process as outlined in the 2021 RFP documents. At the time of best and final offer, some bids eligible for best and final offer price updates were found to be non-conforming by PGE and the IE and were therefore removed from consideration.

[5] On June 15, 2021, PGE filed an application for the selection of the IE. On July 13, 2021, the Commission adopted Staff's recommendation to appoint Bates White, LLC as the IE.

Following the opportunity for bidders to provide best and final offers, PGE performed additional due diligence and updated scores reflecting best and final offer updates to identify PGE's final shortlist. Finally, PGE performed Portfolio Analysis on all final shortlist offers. The Portfolio Analysis results were used to inform the identification of top performing bids and determine potential procurement volumes.

PGE, working in collaboration with the IE, requested clarifying and additional information from bidders throughout the process, as each bid package required, to properly determine compliance with 2021 RFP requirements, evaluate offers, and identify execution risks. PGE proactively engaged with bidders by conducting pre-issuance workshops designed to answer questions raised from bidders during the bid submittal process. PGE identified the final shortlist projects from the initial shortlist after performing both price (updated for best and final offer prices) and non-price analysis, incorporating feedback from the independent variable energy resource expert's review of variable energy resource assessments,[6] an independent engineer's owner's cost analysis, making shortlist RFP compliance determinations, completing portfolio risk analysis, and conducting additional sensitivity studies as described in Section IV.

PGE's portfolio analysis described in Section IV of this filing examines procurement volumes—beyond those identified in the 2019 IRP Action Plan—to achieve the progress necessary for PGE to comply with HB 2021. The portfolio analysis indicates that larger procurement volumes lead to cost and risk outcomes that are beneficial for customers compared to future resource procurement. Portfolio modeling as part of this RFP shows that larger portfolio volumes may lead to lower-cost, lower-risk outcomes for customers, and that increased procurement volumes in the near-term may be beneficial. This finding is similar to the

[6] *See* OAR 860-089-0400(5)(a).

top-performing portfolios in PGE's 2019 IRP, which recommended adding up to 500 MWa of renewables within the action plan window. Ultimately, the preferred portfolio was constrained to 150 MWa to appropriately mitigate risks and rate impacts that may not be captured within PGE's established analytical framework.

PGE finds that many external risks and uncertainties remain, including federal tax credit policy, inflationary supply chain concerns, the US Department of Commerce solar investigation, and other macroeconomic factors continue to present a challenge in balancing resource need with long-term cost and risk. Given the current environment, PGE finds that the acknowledged Action Plan continues to provide instructive guidance regarding the volume of renewable resources to be procured through this solicitation. On an ongoing basis, PGE will continue to work with the Commission to consider how HB 2021 requirements invite further review of least-cost, least-risk renewable volumes and look to explore those considerations in this proceeding.[7]

Through this Request, PGE seeks acknowledgment of its final shortlist to support procurement of approximately 150 MWa of renewable resources on behalf of cost-of-service customers plus the 100 MW of nameplate resources to meet Phase II of PGE's Green Future Impact (GFI) program. PGE believes that procurement decisions aligned with the recognized order of the final shortlist and accompanying portfolio analysis will promote least-cost and least-risk outcomes for customers. PGE's portfolio analysis demonstrates a least-cost, least-risk path associated with the acquisition of renewable resources that ultimately reduce the present value revenue requirement of PGE's portfolio. Despite these anticipated decreased long-term

[7] The Commission opted not to change the procurement volume in this RFP but noted that "robust analysis" should be presented to justify additional procurement. *See In the Matter of Portland General Electric Company, 2021 All-Source Request for Proposals,* Docket No. 2166, Order No. 21-460 (Dec 10, 2021).

price estimates, PGE is currently forecasting an increase in near-term customer prices costs associated with the planned procurement.

This 2021 RFP was conducted fairly and transparently, and the final shortlist is reasonable based on information available at the time of this filing and determined in a manner consistent with the Rules. The final shortlist includes bids providing customers with cost-effective resources to fill PGE's capacity need. The final shortlist also includes bids that move PGE's generation mix meaningfully forward to achieve HB 2021's goals and capture federal tax credits for customers. PGE therefore requests that the Commission acknowledge the 2021 RFP final shortlist.

II. PGE RESOURCE NEED

PGE's 2019 IRP Action plan included procurement of 150 MWa of renewable resources for cost-of-service customers, plus sufficient capacity to meet the remainder of the 388 MW capacity need from the 2019 IRP: a resource volume which PGE intends to fill through procurement in this RFP. In addition, PGE's RFP is designed to procure 100 MW of renewable resources to supply PGE's GFI program for the PGE Supply Option.

PGE's 2019 IRP Action Plan, as supplemented by the 2019 IRP Update, indicated a 2025 capacity shortfall of approximately 511 MW of capacity contribution.[8] Consistent with the 2019 IRP Action Plan, PGE continued to pursue bilateral negotiations for existing capacity in the region and committed to update its capacity need in the RFP to reflect any resource acquisitions and/or load updates. PGE was able to reduce the overall capacity need through the Pelton Round

[8] PGE's 2019 IRP was acknowledged, with conditions and additional directives, in Order No. 20-152 and the 2019 IRP Update was acknowledged, with guidance, in Order No. 21-129. *See In the Matter of Portland General Electric Company, 2019 Integrated Resource Plan,* Docket No. LC 73, Order No. 20-152 (May 6, 2020) and Order No. 21-129 (May 3, 2021).

Butte transaction,[9] which reduced the 2025 capacity shortfall to 372 MW. Incorporating the latest load forecast from March 2022, the estimated capacity need slightly increased to 388 MW.

Following the 2019 IRP Update process, the State of Oregon passed House Bill 2021, which requires retail electricity providers to reduce GHG emissions associated with serving Oregon retail electricity consumers, compared to their baseline emissions levels by 80% by 2030, 90% by 2035, and 100% by 2040. Following the passage of HB 2021, PGE shared a preliminary estimate in the RFP approval proceeding that an additional 650 MWa of additional renewable resources (inclusive of the 150 MWa acknowledged in the 2019 IRP) would be required to meet the law's requirement in 2030. This resource requirement will be scrutinized and updated in PGE's 2023 IRP. Nonetheless, PGE's RFP analysis recognizes and attempts to quantify the risk associated with these resource requirements.

PGE discusses the benefits and risks of additional renewable procurement as part the Portfolio Development, Portfolio Analysis, and Portfolio Sensitivity sections of this document. Analysis shared by PGE in the RFP approval phase of this proceeding estimated the potential magnitude of additional renewable resources required to meet the requirements of HB 2021 in 2030. These past estimates assume that approximately 230 MWa of carbon free resources currently contracted for are renewed. However, on a portfolio planning basis, PGE uses the established IRP practice of assuming that these contracts expire without renewal. Additionally, should economic growth continue in our region, PGE will face an increased need to meet HB 2021's requirements. PGE's RFP analyses account for these uncertainties when modeling the quantity of additional renewable resource required in 2030.

[9] *See In the Matter of Portland General Electric Company*, Application for Waiver of the Competitive Bidding Rules, Docket No. 2176, Order No. 21-328.

In this filing, PGE is seeking acknowledgment of the final shortlist to meet the needs outlined in the 2019 IRP and 2019 IRP Action Plan and consistent with the Commission's decision approving the RFP. While PGE is maintaining these procurement targets consistent with prior proceedings, PGE also provides analysis reviewing the costs and risks associated with different procurement scenarios in this filing, including the procurement of resources in excess of the need identified in the 2019 IRP and IRP Update. PGE looks forward to additional discussions on this matter through the proceeding.

III. COMMISSION APPROVAL OF THE 2021 RFP

On April 28, 2021, PGE provided notice of commencement of the process to select an IE to oversee the 2021 RFP. PGE issued the IE RFP on May 5, 2021. On June 15, 2021, PGE sought Commission approval to engage the IE, and on July 15, 2021, that approval was granted.

On June 15, 2021, PGE filed the Application for Approval of Scoring and Methodology (Application). In the Application, PGE proposed an RFP design consistent with the capacity shortfall identified in the 2019 IRP Action Plan, as well as a detailed description of PGE's price scoring and non-price scoring methodology, bid compliance requirements, proposed form contracts, and detailed appendices explaining PGE's Portfolio Analysis and Portfolio Analysis sensitivities. PGE held workshops with stakeholders and potential bidders on August 9, 2021, and October 11, 2021, and filed the final draft RFP—which incorporated feedback from stakeholders—on October 15, 2021. The IE filed the Draft IE Report on October 20, 2021, and stakeholders provided comments on November 1, 2021. Following PGE's Reply Comments on November 10, 2021, Staff issued the Staff Report on November 19, 2021, and stakeholders filed comments on November 24, 2021.

In response to feedback received from stakeholders, Staff, the IE, and the Commission in the RFP review and approval process, PGE incorporated several changes to the final RFP design. The more significant changes included:

- Added transmission flexibility—allowing bidders to demonstrate a viable and achievable plan to secure transmission.
- Allowing bidders to provide a narrative description of why the project may not conform to the timelines specified in PGE's permitting matrix.
- Posting an effective load carrying capability (ELCC) calculator to assist bidders in estimating their project's capacity contribution and level capacity ratio score.
- Providing actual ELCC values following determination of the initial shortlist.
- Performance of price and non-price weighting sensitivity analysis.

As part of the RFP review, PGE and stakeholders noted that procuring resources beyond the stated need in the 2019 IRP Action Plan may be appropriate to make adequate progress toward meeting the requirements of HB 2021. In the September 29, 2021 memorandum addressing PGE's proposed scoring and modeling methodology, Staff recommended that PGE consider analysis of alternative procurement scenarios to demonstrate HB 2021 progress.[10] In reply comments, PGE noted that the Company would consider the alternative procurement analysis.

On December 2, 2021, the Commission held a Special Public Meeting to consider PGE's request for approval of the draft RFP, and on December 10, 2021, the Commission approved, with modifications, PGE's 2021 RFP in Order No. 21-460.

PGE appreciates the feedback from the Commission, stakeholders, and IE during the 2021 RFP design process as it allowed for a more competitive and inclusive solicitation.

[10] *See* Staff's September 29, 2021 Public Meeting Memorandum at 12.

IV. 2021 RFP SELECTION PROCESS AND RESULTS

This 2021 RFP was well received by the market—PGE received proposals from bidders offering 110 bid alternatives for wind, solar, pumped storage, hydrogen storage, and battery storage projects, and several hybrid technology bids:

- 2,940 MW of wind resources
- 1,437 MW of solar resources
- 3,999 MW of hybrid resources (MW figure excludes paired storage)
- 3,233 MW of standalone storage technologies

The bids received presented a diversity of choices for PGE in terms of resource type and geography—project sites were in Oregon, Washington, and Montana. The bids included unique commercial structures including power purchase agreements, utility-ownership, and hybrid structures.

The following table, Table 1, summarizes all offers received in the 2021 RFP solicitation, the technology types and unique MW included, and the distinction between benchmark and third-party bids.

Table 1: Offers Received in PGE's 2021 RFP

Technology	Benchmark Bids Received	Unique MW – Benchmark Bids	Third-Party Bids Received	Unique MW – Third Party Bids	Total Bids	Total Unique MW
Wind	2	662	19	2,278	21	2,940
Solar	3	100	14	1,337	17	1,437
Wind/Solar/Storage Hybrid	2	610	2	1,050	4	1,660
Solar/Storage	0	0	21	1,887	21	1,887
Wind/Storage	0	0	7	452	7	452
Standalone Battery	8	400	11	1,600	30	2,000
Pumped Storage	0	0	7	793	7	793
Hydrogen Storage	0	0	3	440	3	440
Total	15	1,772	95	9,837	110	11,609

A. Bid Submittal Process

The Benchmark bids were submitted for evaluation on January 4, 2022, reviewed for conformity with minimum bid requirements, and scored and sealed on February 4, 2022, before other bids were received by PGE, consistent with OAR 860-089-0350(1)-(3). All remaining bids were due January 20, 2022 to the IE. Following PGE's completion and submission of the Benchmark bid analysis, the IE shared all remaining bids with PGE to review for conformance with the minimum bid requirements—these minimum requirements are outlined in the 2021 RFP main document.

PGE sought clarification and/or additional information from bidders as necessary. The IE, in parallel to PGE's review process, also reviewed bid information, requests for clarification and/or additional information and responses from the bidders. PGE and the IE identified and agreed that certain bids were non-conforming and failed to meet the 2021 RFP's initial bidder eligibility requirements for one or multiple of the following reasons: lack of system impact study agreement and/or lack of a viable plan to secure transmission rights, reliance on PGE assets not made available as part of the solicitation, or submission of technologies not widely deployed in North America. All bids found initially to be non-conforming were presented with non-conforming notices granting a "cure" period, during which bidders could remedy their bids (through modification or clarification) to conform to the 2021 RFP requirements. In total, 20 unique projects were identified as non-conforming, of which 15 were withdrawn by the bidder and the remaining five were determined to be non-compliant with the 2021 RFP requirements.

B. Determination of Initial Shortlist

On March 25, 2022, PGE and the IE completed its initial evaluation and scoring of conforming bids and on March 4, 2022, PGE notified remaining bidders of an opportunity to provide a best and final offer price revision. Projects receiving notification of the best and final offer opportunity are considered to comprise the Initial Shortlist. PGE's Initial Shortlist included all projects found to be conforming by PGE and the IE and included 44 variants, from 17 projects, and eight bidders. No projects were removed from the Initial Shortlist on account of a resource's individual offer analysis, non-price score, or price score further described below.

C. Individual Offer Analysis: Price and Non-Price Scoring

All conforming bids were scored within PGE's Individual Offer Analysis and assigned a price and non-price score. Price scoring utilized models and methodologies consistent with the 2019 IRP and IRP Update. Revenue requirement modeling determined the bid cost, while AURORA calculated energy values, Sequoia determined the capacity value, and results from ROM will provide flexibility value assessments. Price scoring employed the methodology described in Section 8.6 of the 2021 RFP. Non-price scoring employed the methodology described in Section 8.8 and detailed in the non-price scoring rubric included in Appendix N of the 2021 RFP. During the Individual Offer Analysis, PGE sent clarifying questions to bidders to ensure PGE possessed all required information to score the bids accurately. The IE was included[11] in this question-and-answer process for all bidders.

Within Individual Offer Analysis, price scoring is designed to identify how project costs compare to the relative economic value they return to PGE's customers. Those bids that offered the lowest priced project with the greatest delivered economic benefit received the best price

[11] IE was included via cc on all email correspondence between PGE's RFP team and bidders.

scores. Project costs generally included items such as forecasted fixed payments, capacity charges, wheeling costs, integration costs, ancillary services, upgrade costs, energy payments, and other ownership-specific costs in the case of BTA or hybrid ownership structures.[12] Within Individual Offer Analysis, the size of the project did not directly contribute to a resource's assigned price score, as that is addressed through PGE's Portfolio Analysis process.

Non-price scoring is designed to identify projects that have the most mature development plan, lowest execution and commercial risk, and offer additional non-quantifiable benefits to PGE's customers. The qualities reviewed in non-price scoring are critical for the undertaking of a successful project, but the qualities cannot be easily reflected as a cost impact. As such, PGE's Individual Offer Analysis identified a non-price score for each bidder consistent with the non-price scoring rubric in Appendix N of the 2021 RFP. Price and non-price scores contribute toward the total score of each bid in PGE's Individual Offer Analysis. Those projects with the highest total price score generally present the least-cost and least-risk for PGE's customers.

D. Initial Shortlist Requirements

Following additional due diligence and bidders' responses, PGE reviewed all initial shortlist bids for conformance with all 2021 RFP eligibility requirements (including those requirements effective prior to final shortlist). These threshold requirements are outlined in the 2021 RFP Appendix N, Table 1, "Qualifications & Performance Screening Requirements." Based on feedback from the Commission, the IE, and various stakeholders during the 2021 RFP approval process, PGE's RFP requirements were designed to give bidders additional time and flexibility to satisfy the RFP's eligibility requirements.[13] During the due diligence process, PGE sought some clarification and additional information from bidders.

[12] Summarized from PGE 2021 RFP, Appendix N at 9.
[13] *See* Order 21-460, which adopts Staff's November 19, 2021 Report.

E. Final Short List Selection Process

Consistent with the bid evaluation and selection process outlined in the 2021 RFP, PGE performed additional analysis and due diligence to select a final shortlist. PGE performed the following additional analysis on the conforming bids remaining on the initial shortlist.

1. Best and Final Offer Process

As part of PGE's 2021 RFP design, PGE invited "Best and Final Offers" (BAFO) from eligible bidders on PGE's Initial Shortlist.[14] The process provided eligible bidders the opportunity to provide price updates so long as the total bid price was reduced relative to the initial offer. The BAFO allowed for price adjustments only. BAFOs could not be used to propose new bid variants, change bid structures, or make significant changes to project design.

On March 16, 2022, PGE received a BAFO from four project variants. After discussions with the IE, two of the variants were determined to be outside the scope of the allowed BAFO process and therefore non-conforming. Following communication of non-conformance, the two variants were withdrawn by the bidder. The remaining two BAFOs received requested price increases, which is outside the BAFO guidelines included in PGE's RFP document. PGE notified the bidder of the inconsistency and the bidder elected to retain their initial pricing submitted January 20, 2022.

2. Wind and Solar Capacity Factor (Hendrickson Renewables)

Consistent with OAR 860-089-0400(5)(a), PGE retained an independent renewable energy expert—Hendrickson Renewables (Hendrickson)—to provide an analysis and opinion on the accuracy of Variable Energy Resource (VER) studies submitted to PGE by the renewable bid variants on the initial shortlist. Hendrickson provided reports on each VER study received, each

[14] *See* Section 3.3 of the Final RFP.

of which outlined adjustments related to the gross energy estimate, the gross to net conversion process, the uncertainty evaluation, and the combination of the three. Hendrickson proposed adjusted net capacity factors (NCF) to the bidders' original resource evaluations. PGE incorporated Hendrickson's proposed adjusted NCFs into the price scoring model for all initial shortlisted bidders as part of the final shortlist selection process.

3. Owner's Cost (1898 and Company)

PGE assigned a generic owner's cost to all utility-ownership resources during the initial shortlist analysis. For the final shortlist analysis, PGE contracted with 1898 & Co. (1898), an engineering and construction firm, to provide an independent assessment of the approximate owner's cost for only those bids proposed under a utility-owned commercial structure. 1898 provided owner's costs estimates based on bidder's proposed modification of PGE's Technical Specifications (Appendix M). PGE reviewed bidder's proposed modifications to PGE's Technical Specifications, and where those modifications were found unacceptable, 1898 added the estimated cost to reverse such modification to the tabulated owner's costs for each bidder. PGE incorporated the proposed estimated owner's cost from 1898 for the utility-ownership bids into the price scoring model.

4. Final Shortlist Price and Non-Price Scoring

Of the 44 initial shortlist bids that were found to be compliant with the 2021 RFP eligibility requirements, 29 were placed on PGE's final shortlist. The final shortlist for renewable resources and dispatchable capacity resources were separately identified by selecting the top resources for each resource type based on the projects' total price score.

For renewable resources, PGE identified the first meaningful break in the bids' total price score after including on the final shortlist all renewable projects that passed PGE's cost-to-value

metric (a cost to benefit ratio less than 100%). This methodology resulted in the final shortlist selection of nine renewable projects with eighteen total project variations. The renewable final shortlist for renewables includes enough projects to generate 599 unique MWa of renewable energy. The volume of renewable resources included in the final shortlist provides adequate bids to meet three to four times the 150 MWa IRP Action Plan and 100 MW GFI renewable procurement levels approved in the RFP design.

The robust renewable volume on PGE's final shortlist provides several important advantages for customers. First, a robust volume of final shortlisted resources ensures that competitive pressures are exerted on potential counterparties throughout the totality of the procurement process. Should bidders attempt to diminish the cost and performance of the project as reflected in the bid, PGE can work with alternative counterparties. Second, a robust volume allows PGE to broaden its portfolio analysis methods to consider procurement volumes beyond 150 MWa as discussed in the OPUC's RFP approval order.[15] PGE will further discuss its portfolio analysis methods below. Lastly, bidders occasionally are not able to meet the terms and conditions of their bid due to a host of competing commercial, economic, or development factors. A robust final shortlist volume allows PGE to make important progress to HB 2021 compliance goals in the event of bidder withdrawal from the final shortlist.

The final shortlist for dispatchable resources was also determined by identifying the best dispatchable capacity resources according to those bids total price score. PGE included all dispatchable capacity resources on its final shortlist with a total price score that was superior to an identified break point in total price scores, while ensuring that the final shortlist included a

[15] Although the Commission declined to alter the size of PGE's procurement during the approval process, the Commission concluded that "PGE's preliminary analysis established the wisdom of considering acquiring more resources in response to the RFP." Order No. 21-460 at 9.

diversity of dispatchable capacity technologies. The final shortlist for dispatchable resources represents 497 MW of ELCC. The dispatchable capacity final shortlist includes one-to-two times the volume of resources required to meet PGE's identified 2025 capacity need of 388 MW.

The results of PGE's final shortlist are included in Tables 2 and 3. The highly confidential rank order results of PGE Individual Offer Analysis (IOA) are also included. The rank order presented in these figures does not incorporate the impacts of PGE's portfolio analysis results which are described in detail below.

Table 2: PGE's 2021 RFP Final Shortlist (Renewable Resources):

Begin Highly Confidential

Bidder	Unique Project	Bid Number	Technology	Location	Commercial Structure	IOA Rank	2025 MWa	ELCC
18	2	26	Solar + Wind + Battery	WA	Hybrid		206	133
		27	Wind	WA	Hybrid		212	82
		28	Solar + Wind + Battery	WA	Hybrid		303	177
29	3	14	Solar + Battery	WA	PPA		37	64
		15	Solar + Battery	WA	PPA		41	91
	4	16	Solar + Battery	OR	PPA		19	34
31	1	9	Solar + Wind + Battery	WA	Hybrid		137	64
		10	Solar + Wind + Battery	WA	Hybrid		179	103
		11	Wind	WA	Hybrid		113	42
32	2	12	Wind	MT	Hybrid		136	109
43	1	17	Solar	OR	PPA		34	9
		18	Solar + Battery	OR	PPA		36	80
	2	19	Solar	OR	PPA		57	15
		20	Solar + Battery	OR	PPA		58	87
62	3	22	Solar	OR	PPA		11	4
		23	Solar	OR	PPA		11	4
	4	24	Solar + Battery	OR	PPA		11	16
		25	Solar + Battery	OR	PPA		11	15

[End Highly Confidential]

Table 3: PGE's 2021 RFP Final Shortlist (Dispatchable Resources):

[Begin Highly Confidential]

Bidder	Unique Project	Bid Number	Technology	Location	Commercial Structure	IOA Rank	MW	ELCC
9	3	1	Battery	OR	PPA		200	124
		2	Battery	OR	PPA		175	115
		3	Battery	OR	PPA		150	100
	4	4	Battery	OR	BTA		75	51
		5	Battery	OR	BTA		50	34
	5	6	Battery	OR	BTA		125	84
		7	Battery	OR	BTA		100	67
		8	Battery	OR	BTA		75	51
16	2	13	Pumped Storage	OR	PPA		197	144
43	3	21	Battery	OR	PPA		100	70
69	1	29	Battery	OR	PPA		100	64

[End Highly Confidential]

Consistent with Recommendation 9 of Staff's September 29, 2021, Public Meeting Memo adopted by the Commission in Order No. 21-320, PGE performed price/non-price weighting sensitivity analysis. Following the testing of 60/40, 70/30, and 90/10 price, non-price weighting sensitivity analyses, PGE determined that the rankings of the top three unique projects for both renewable and dispatchable projects were unaffected by the price, non-price scoring sensitivity weighting applied. In order for there to be an impact to the ranking of the top three projects, the price, non-price weighting would need to be adjusted past a 95/5 price, non-price weighting or below a 45/55 price, non-price weighting. This sensitivity analysis demonstrates

that in this solicitation, PGE's non-price scoring determination did not play a primary selective role in identifying top performing resources.

F. Portfolio Analysis

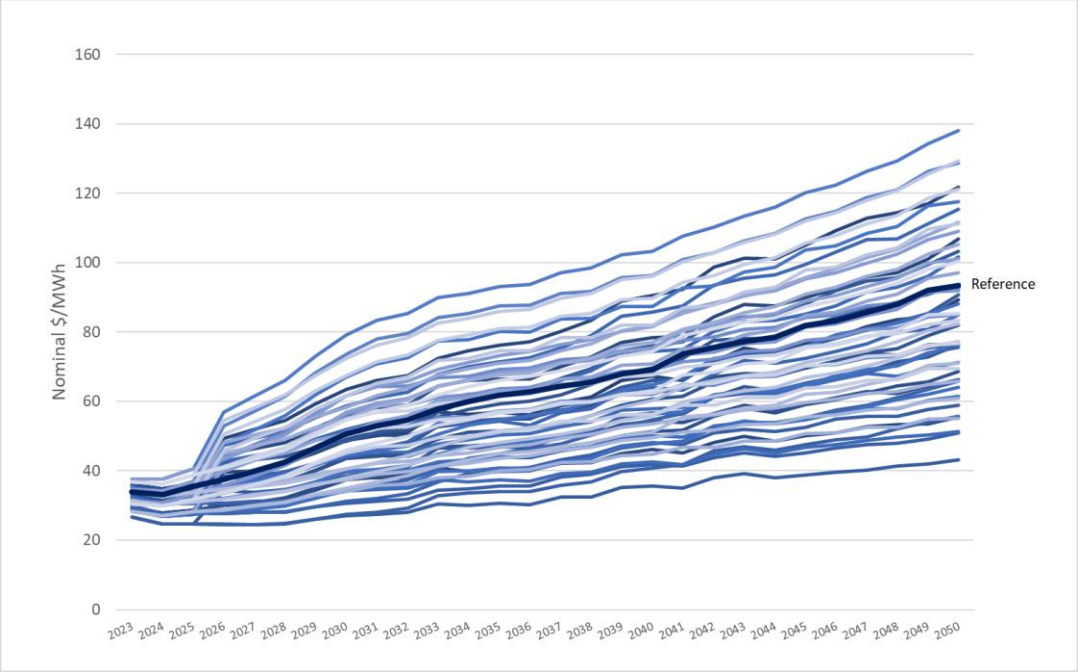
All final shortlist bids were included in portfolio analysis to determine which combinations of bids will provide the best balance of cost and risk through the year 2050, while meeting system requirements for reliability, energy, and carbon emissions compliance. PGE used its capacity expansion modeling tool, ROSE-E, to assess total system costs and risk of portfolios constructed to represent procurement of a variety of amounts of energy and capacity, and optimized portfolios created within ROSE-E. All portfolios were analyzed across a wide range of potential future economic conditions and sensitivity analysis was conducted on several key inputs. The following sections describe the portfolio development process and the economic futures analyzed, and present portfolio analysis results, including those from the various sensitivities conducted.

1. Economic Future Assumptions

Before initiating the final shortlist selection process, PGE updated forecasts of hourly wholesale power prices for the 54 potential economic futures used in the acknowledged 2019 IRP and 2019 IRP Update.[16] Figure 1 illustrates the average annual price for each economic future studied within PGE's Portfolio Analysis.

[16] The 54 price futures include all combinations of two renewable buildouts (reference, high) three CO2 price forecasts (low, reference, and high), three natural gas price forecasts (low, reference, and high), and three regional hydro availabilities (low, reference, and high): 2*3*3*3 = 54.

Figure 1: Annual Average Energy Price Forecast for Economic Futures Studied in this 2021 RFP



2. Portfolio Development Phase

PGE evaluated all twenty-nine final shortlist project variants in portfolio analysis.[17] After accounting for mutually exclusive combinations (i.e., variants from the same project that cannot each be built), PGE's portfolio construction tools identified all possible portfolios combinations that aligned with the portfolio construction scenarios detailed in Table 4.

[17] See OAR 860-089-0400(5) which states "selection of the final shortlist of bids must be based on bid scores and the results of modeling the effect of candidate resources on overall system costs and risks using modeling methods that are consistent with those used in the Commission-acknowledged IRP. Further, OAR 860-089-0400(5)(b) states "the electric company must conduct, and consider the results in selecting a final short list, a sensitivity analysis of its bid rankings[.]"

Table 4: Potential Portfolio Energy and Capacity Contribution Constraints

Portfolio Construction Constraints		Portfolio Construction 180 MWa Scenario	Portfolio Construction 250 MWa Scenario	Portfolio Construction 400 MWa Scenario
Energy (MWa)	Minimum	125	125	125
	Target	150	185	212
	Maximum	180	250	400
2025 Capacity Contribution (MW)	Minimum	350		
	Target	388		
	Maximum	400		

To narrow these possibilities to a suitable number for portfolio analysis, PGE ranked each portfolio according to its expected economic performance. For those candidate portfolios whose bids did not meet identified target energy or target capacity contribution quantities, generic proxy resources were added to ensure that all portfolios reached an equivalent minimum level of energy and capacity. The resulting list was then ordered by forecasted net costs under reference case economic conditions and the top 50 portfolios were identified as the top performing portfolios.

In a final step, PGE ensured that all bids were included in a candidate portfolio in the final portfolio analysis. This was achieved by replacing the highest forecasted net-cost portfolios in the top 50 portfolios with the lowest forecasted net-cost portfolio inclusive of select bids not otherwise included.[18] This process was repeated for two alternative potential energy procurement target levels, creating the final 150 unique profiles that were advanced to portfolio analysis.

[18] For example, if the top 50 portfolios did not include Bid X, the best portfolio containing Bid X was added to the top 50 list, removing that 50th best portfolio. Because some bids individually provided more energy than the portfolio maximum energy limits, not all bids are represented in the 250 and 180 MWa portfolio scenarios.

3. Portfolio Analysis Results

The portfolios created in the development phase described above were then used in PGE's capacity expansion model ROSE-E to estimate each portfolio's cost and risk metrics.[19] ROSE-E considers each portfolio and identifies any additional renewable resources and capacity resources to satisfy PGE's reliability and carbon compliance requirements. Through separate calculations for each economic future, ROSE-E produces the necessary portfolio cost and risk metrics. After performing the portfolio ranking methods described in Appendix N,[20] PGE identified the top performing portfolios and separately ranked the final shortlist consistent with PGE's portfolio analysis results. PGE's top five portfolios across all portfolio construction scenarios are listed below in Table 5.

To identify the top performing portfolio cohort, PGE calculated an "efficient frontier." The efficient frontier methodology intends to identify portfolios that provide the optimal level of expected return at a given level of risk. In PGE's supply portfolio analysis, the efficient frontier is calculated based on traditional cost and risk metrics: namely through a comparison of cost, variability,[21] and severity.[22] The efficient frontier identifies a meaningful break point, below which portfolios can be said to provide the greatest return at the least cost. An example of portfolio calculation under PGE's efficient frontier methodology can be found on page 191 of the 2019 IRP. Table 6 and 7 shows the rank of final shortlisted bids based on the frequency that each bid is present in the top performing 41 portfolios of superior cost and risk.

[19] ROSE-E has been applied in the 2019 IRP and 2019 IRP Update. A detailed description of ROSE-E methodology can be found in Appendix I of PGE's 2019 IRP. The metrics 'cost' and 'risk' are the same as those used in the 2019 IRP and 2019 IRP Update. *See* 2019 IRP Section 7.2.1 - Scoring Metrics at 186 for detail.
[20] See 2021 RFP Appendix N at 18.
[21] Variability captures the potential deviation in cost outcomes across futures. Portfolios with low variability scores tend to provide more cost certainty.
[22] Severity measures the potential magnitude of very high-cost outcomes across potential futures, and is based on tail-risk at the 90th percentile. Portfolios with low severity scores tend to have less costly worst-case scenarios.

Table 5: PGE's 2021 RFP Top Five Portfolio Analysis Results

[Begin Highly Confidential]

Portfolio Name	Bid Numbers Included in Portfolio	2025 MWa	Rank
P_1	[redacted]	374	1
P_3		375	2
P_18		363	3
P_4		374	4
P_10		375	5

[End Highly Confidential]

Table 6: Renewable Bid Count in Top Performing Portfolios

[Begin Highly Confidential]

Resource	Efficient Frontier Portfolios	All 400 MWa Portfolios	All 250 MWa Portfolios	All 180 MWa Portfolios	All Portfolios Total
[redacted]	41	48	45	14	107
	40	48	45	47	140
	40	48	47	33	128
	34	35	1	1	37
	17	17	2	18	37
	13	17	16	22	55
	8	8	9	7	24
	8	11	9	3	23
	7	9	1	1	11
	6	7	7	1	15
	3	8	1	30	39
	1	1	1	3	5
	1	1	1	1	3
	1	1	1	1	3
	0	1	1	1	3
	0	1	1	0	2
	0	1	1	0	2
	0	1	0	0	1

[End Highly Confidential]

Table 7: Dispatchable Bid Count in Top Performing Portfolios

[Begin Highly Confidential]

Resource	Efficient Frontier Portfolios	All 400 MWa Portfolios	All 250 MWa Portfolios	All 180 MWa Portfolios	All Portfolios Total
[redacted]	18	21	29	32	82
	12	18	15	10	43
	11	11	6	8	25
	8	8	13	13	34
	0	1	15	30	46
	0	1	13	19	33
	0	1	1	24	26
	0	2	6	17	25
	0	1	2	17	20
	0	1	9	8	18
	0	1	1	1	3

[End Highly Confidential]

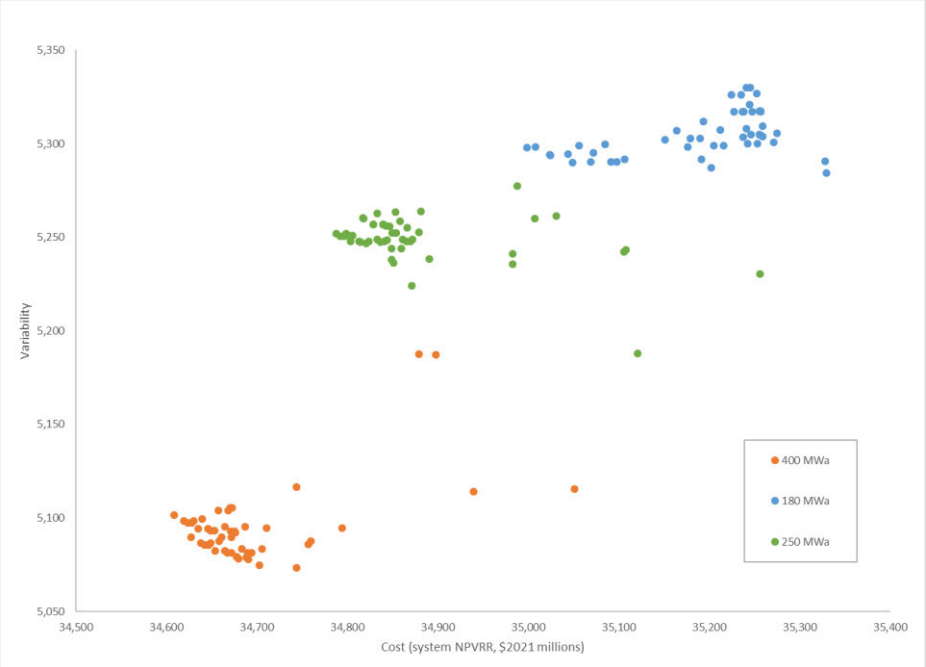
The results included in Table 5, Table 6, and Table 7 consider portfolio costs under standard study assumptions including a planning horizon through 2050, 100 percent completion of executed QF projects, planning to HB 2021 targets using 2019 IRP methodology, and an energy fill resource whose cost and performance is consistent with a Pacific Northwest Wind resource modeled in the 2019 IRP Update.[23] Additional sensitivity analyses and sensitivity assumptions are discussed separately below.

All portfolios in the Efficient Frontier are part of the 400 MWa energy procurement target. The top five performing portfolios include procurement greater than 360 MWa of

[23] The energy fill resource represents a blend of the characteristics of the four wind resources modeled in the 2019 IRP, located in: the Columbia Gorge, Southeastern Washington; Central Montana, and Ione, Oregon. Fixed costs, capacity factor, and energy value are an average of the four resources. Capacity contribution is also based on an average of the four IRP Update wind resources, but it is adjusted to diminish less-quickly with incremental additions than within any of the individual resources to account for the fact that an incremental addition of the generic wind resource can be thought of as a geographically-diverse addition of renewable generation and therefore each incremental addition of the generic resource would not experience as steep of a rate of diminishing capacity value as would each incremental addition of a geographically-specific individual wind resource.

renewable resources. Specifically, the top five performing portfolios procure 363 MWa to 375 MWa of renewable energy in the year 2025. As can be observed in Figure 2, Portfolios for renewable energy procurement targets of 180 MWa and 250 MWa perform relatively worse in PGE's Portfolio Analysis. The diminished performance of smaller portfolio construction scenarios is indicated in those portfolio's elevated variability risk metric. The top performing portfolio volumes capture available, cost-effective renewables that take advantage of expiring tax credits. Early procurement reduces late period procurement more expensive renewables, delivers near-term capacity to reduce dispatchable capacity needs, and reduces period market energy purchases. In addition, the portfolio results favor procurement of diverse resources. All top performing portfolios include either a combination of wind, solar, and battery facilities or provide geographic diversity to reduce portfolio costs and risks.

Figure 2: Portfolio Cost and Risk, by Size



To further examine the value of near-term renewable procurement, PGE compared the cost of studied portfolios against an alternative portfolio that was prevented from selecting any

bids. The "No Bid Addition" portfolio relies exclusively on future resources studied within the IRP. Figure 3 compares the cost and risk of the "No Bid Addition" portfolio to the top performing RFP portfolios. As is indicated in the lower cost and variability results, adding near-term renewables dramatically reduces customers costs and risk when compared to the alternative of no procurement. Further, Figure 4 indicates that top performing portfolios have a negative incremental cost in all studied economic futures when compared to the "No Bid Addition" portfolio.

Figure 3: Cost and Variability of Top Portfolios and "No Bid Additions" Portfolio

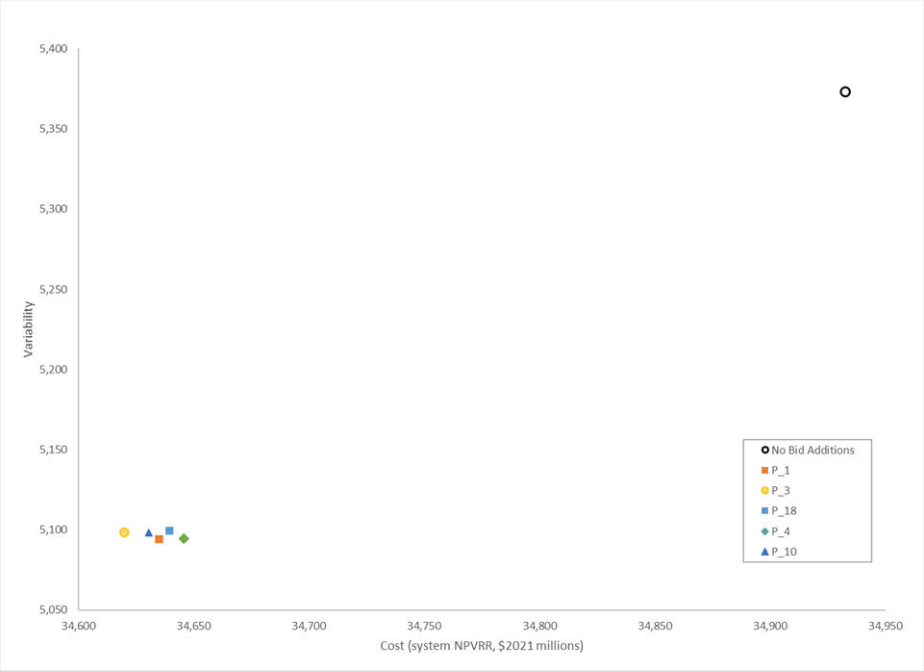
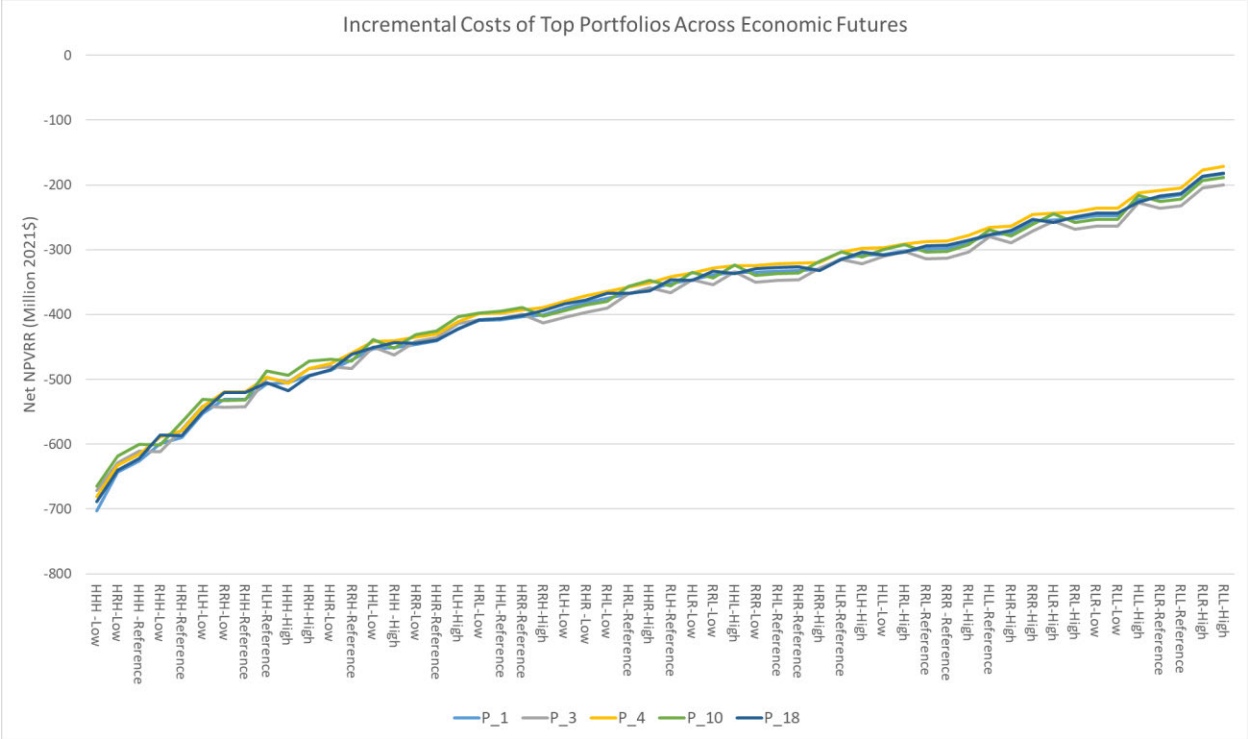


Figure 4: Top Five Portfolios Net NPVRR Across Economic Futures



Note: Economic futures are read as: Renewable Buildout (H, R), CO_2 Price (H, L, R), Natural Gas Price (H, L, R), and Hydro Conditions (High, Low, Reference).

4. Portfolio Sensitivity Analysis Results

PGE's sensitivity portfolio analysis tested several sensitivities that considered alternative study assumptions. These sensitivities were selected in collaboration with Staff and through feedback received during stakeholder review of the draft RFP and are consistent with the Commission's direction when acknowledging the IRP Update.[24] PGE's sensitivities included a high-cost capacity fill assumption, an assumed extension of federal tax credits and a low market price future all described below.

[24] *See* Order No. 21-129 at 5.

i. High Capacity-Fill Cost

To study the effect carbon free capacity requirements on portfolio results, the cost of the generic capacity fill resource was increased.[25] In the reference analysis described above, the capacity fill was priced at the 2019 IRP Update value of $113/kw-yr (real-levelized, 2021$). In this sensitivity the price was increased to **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**, based on the average costs of all stand-alone 4-hour batteries on the initial shortlist of this 2021 RFP. Results are intuitive: both cost and risk metrics increase at a consistent rate across portfolios in each of the energy targets. Table 8 identifies the average cost and risk metric results for all portfolio of a given construction scenario. This suggests the capacity fill resource was being added by portfolios as the lowest-cost option to meet capacity needs even when the price was increased to meet observed stand-alone storage costs.

Table 8: Capacity Fill Resource Sensitivity

	Base-Case			High Capacity-Fill Cost		
	180 MWa	250 MWa	400 MWa	180 MWa	250 MWa	400 MWa
Average NPVRR (Million 2021$)	35,189	34,879	34,694	35,540	35,267	35,086
Average Variability (Million 2021$)	5,305	5,249	5,095	5,412	5,353	5,234

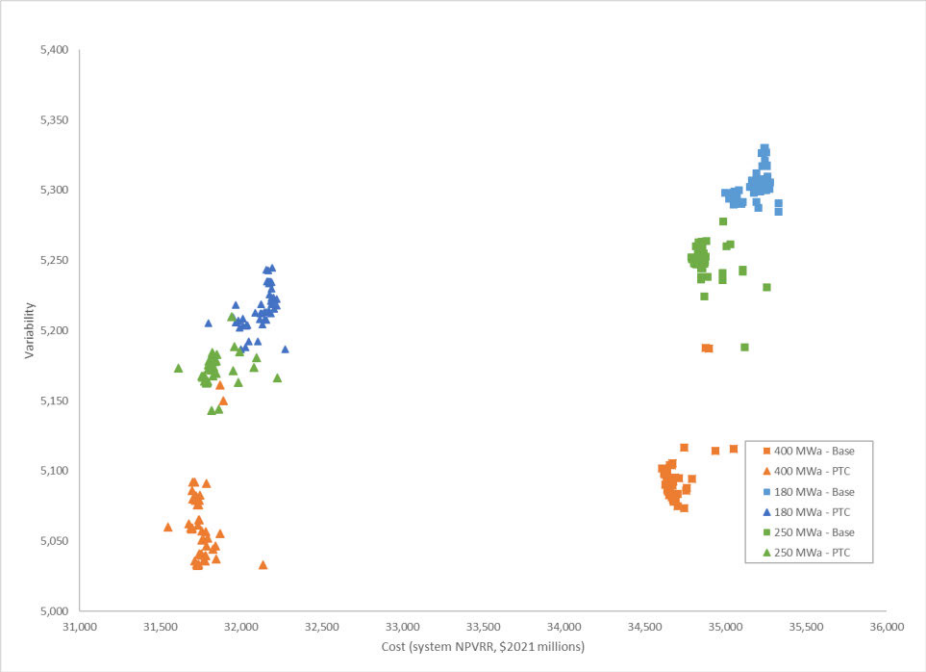
[25] The capacity fill resource is treated as a proxy to the possible cost to obtain capacity through bilateral negotiations with counterparties in the region. Capacity fill is used to ensure resource adequacy of portfolios by filling the gap between system capacity need and the amount of capacity supplied by bids in a portfolio. In the case of optimized portfolios, capacity fill is added to meet capacity needs when none of the available bids provide capacity at a lower cost than the capacity fill resource.

ii. PTC Extension

To study the impact of tax credit extension on the economics of renewable resources, PGE evaluated all portfolios under a scenario in which the full value of the production tax credit is extended through 2030.[26] PGE chose this assumption given its consideration in the Build Back Better bill reviewed in the House of Representatives in 2021. Results of the PTC extension sensitivity also show intuitive results. By extending the availability of the PTCs for the generic renewable wind resource, the cost and risk of all portfolios are reduced. Across all portfolios, in the reference-case, system NPVRR is reduced by 8.6% ($3,017 million), and variability is reduced by 1.3% ($66 million). Figure 5 illustrates how portfolio cost and risk are adjusted by an assumed extension to the PTC. Importantly, even under an assumed extension of the PTC, portfolios with greater renewable energy procurement have superior cost and risk metrics than smaller renewable energy portfolios—though the relative difference in cost and risk results is reduced when compared to standard PTC assumptions.

[26] *See* Order No. 21-129 at 5.

Figure 5: PTC Extension Sensitivity



iii. Low Market Price Future

To study renewable resource economics in a future of depressed wholesale market prices, PGE designed a low market price future. PGE specifically studied an economic future with a high WECC-wide renewable buildout, low carbon and gas prices, and high-hydro conditions: this future had an annual nominal price increase of approximately two percent through 2050, increasing slightly faster than average inflation but representing the lowest of PGE's 2019 IRP update forecasts. The sensitivity assesses the overall portfolio price risk under a future with lower regional prices than expected in the reference case. Results, included in Table 9, suggest that total system costs continue to be lower for all portfolios even when future market prices are lower than forecasted in the reference case. Portfolios containing larger procurement volumes are lower cost and lower risk than smaller portfolios.

Table 9: Low Market Price Future

	Average NPVRR (Million 2021$)	
	Reference Price Future	Low Price Future
180 MWa	35,189	31,473
250 MWa	34,879	31,251
400 MWa	34,694	31,146

5. Optimized Portfolios

PGE also performed portfolio analysis that relies upon the optimized capacity expansion techniques available with ROSE-E. In the above-described portfolio analysis, ROSE-E was directed to study specific portfolios that were limited by portfolio construction constraints. For optimized portfolios, PGE's capacity expansion model is not limited to maximum procurement targets and is free to add those bid resources that minimize cost and risk over the planning horizon. When performing the optimized calculation, the model compares the opportunity of adding a bid resource against the cost of relying on generic wind and capacity resources to meet reliability and carbon reduction requirements.

PGE ran six distinct optimized portfolios. In addition to the reference case, PGE studied sensitivities for PTC extensions, higher capacity fill cost ("High Cap Cost"), and requirement to meet 2025 capacity needs without generic resources ("No Cap Fill"). These sensitivities were also combined for a total of five sensitivity assumption cases.

Results from the optimized portfolios exhibit similar affinity toward large renewable procurement volumes as seen in the portfolio analysis evaluated above. Unconstrained by either energy limits, ROSE-E's optimizer to procure significantly more 400 MWa in most cases. As shown in Table 10 below, even when PTCs are extended through 2030 under the reference case price future, ROSE-E elects to add 355 MWa of bid resources by 2025. When prevented

from meeting capacity needs with the generic fill resource, optimized results increased quantities of bids to meet capacity needs; more than 2,300 MW of nameplate bid capacity (generating 584 MWa in 2025). As a general matter, optimized portfolio results reinforce previous results. As was observed in portfolio modeling from the 2019 IRP and 2019 IRP Update, elevated renewable procurement volumes continue to reduce forecasted costs and risks within PGE's analytical framework. This tendency is reinforced due to the additional renewable requirements from HB 2021.

Table 10: Reference Case Scoring Metrics for Optimized Portfolios

	Reference	Higher Cap Cost	PTC Extension	PTC Extension & Higher Cap Cost	No Capfill Resource	No Capfill Resource & PTC Extension
Cost	34,542	35,014	31,607	32,069	34,712	31,798
Variability	5,016	5,126	5,046	5,199	5,057	5,105
Severity	42,847	43,548	40,040	40,695	43,288	40,352
2025 Bid MWa	548	548	355	447	584	446
2025 CapFill	45	45	173	27	-	-
2025 Bid MW	2,074	2,074	1,144	1,734	2,374	1,784
2030 GenWind MW	1,503	1,503	5,000	5,000	1,414	5,000
2030 Total Renewable MW	3,577	3,577	6,144	6,734	3,788	6,784
2030 CapFill	684	684	253	107	649	73
2030 GenWind MWa	598	598	1,991	1,991	563	1,991
2030 Total MWa	1,142	1,142	2,344	2,434	1,142	2,433

V. Procurement Strategy and Risks

PGE's RFP analysis provides a strong analytical foundation to facilitate PGE's procurement decisions. With respect to the identification of the best projects for customers, all analysis performed reinforces the general rank order of projects listed in Table 6 and 7. PGE intends to commence negotiations with top performing counterparties and PGE will look to execute agreements with those top performing bidders who honor the price and design features

of their bids. PGE looks to finalize this work by the end of the year and will continue working with counterparties until PGE's resource needs are satisfied.

PGE's analysis provides additional insights to support's PGE determination of the quantity of renewable resources to procure as an outcome of this solicitation. Widespread analytical findings indicate the opportunity to reduce customer costs and risks through procurement volumes above and beyond the 150 MWa acknowledged in the 2019 IRP Action Plan. At the same time, important and unquantified risks provide additional context support adherence to the approved volumes of approximately 150 MWa of renewable resources in addition to the 100 MW of GFI resources. These risks include transient increases in renewable pricing, federal tax policy, and supply chain disruptions related to federal trade investigations described further below.

While the relative forecasted value of evaluated projects cannot simply be compared given the change in PGE's portfolio and changing wholesale market forecasts, the total delivered costs for projects have risen significantly over the past year.[27] The increase in costs are associated with competition amongst buyers, inflationary pressure in the supply chain, and general increase in bidder's assumed cost structure. While it remains difficult to accurately forecast renewable prices to be experienced in future solicitations, it is reasonable to consider how macro-economic impacts on demand could dimmish some of these price drivers.

Federal tax policy remains uncertain. As recently as last year, Congress discussed extensions to the PTC and ITC at levels not available today. PGE's economic analysis suggests that higher renewable volume portfolios are favored even when PTCs are extended. However,

[27] *See* Renewable PPAs could see 'sellers market' in 2021 after year of price increases. Available at: https://www.utilitydive.com/news/renewable-ppa-prices-are-rising-for-the-first-time-creating-potential-sel/593708/ (Jan 21, 2021). *See also* Q2 2021 PPA Price Index (leveltenenergy.com); Q3 2021 PPA Price Index (leveltenenergy.com); Q4 2021 PPA Price Index (leveltenenergy.com).

this finding is at least partially mitigated by the fact that 1) relative portfolio results are less conclusive under PTC extension sensitivities, 2) the uncertainty associated with PGE's specific tax extension assumptions, and 3) the analytical limitation associated with extending PTCs for generic wind resources only as opposed to having assumed bid costs under a tax extension scenario.

Renewable resource supply chains are presently disrupted, particularly for solar. It remains unclear whether all project on the final shortlist will be able to honor the terms and conditions of their offer. Due to the Department of Commerce's anti-circumvention investigation regarding the origin of photovoltaic equipment and the applicability of trade tariffs, members of the solar development community have found challenges securing necessary panels in the solar supply chain. The duration and outcome of the Department of Commerce's investigation remains unclear, but it is possible that multiple solar projects on PGE's final shortlist are unable to transact during the pendency of the investigation. PGE's due diligence thus far indicates that solar bidders expect to be impacted unevenly by this investigation—some recognize the potential challenges in reaching commercial agreements before the end of the investigation.

Non-traditional portfolio metrics provide additional considerations to evaluate the reasonableness of higher renewable procurement volumes. PGE has estimated near-term rate impacts associated with the procurement of the various procurement construction scenarios and estimated the relative contributions those portfolio scenarios make toward reducing PGE's carbon emissions. Table 11 identifies PGE's forecasted, reference case 2025 revenue requirement and forecasted associated customer price increase associated with the three portfolio construction scenarios based on information available today. Despite the robust finding

regarding the largest renewable portfolios contributions toward lowering portfolio cost and risk, larger portfolios also elevate near-term costs. Higher near-term costs are associated with the introduction of forecasted fixed costs in 2025 which exceed the forecasted net-variable power cost reductions experienced in 2025. Specific rate impact outcomes remain uncertain given the unknown impacts of specific procurement decisions and future wholesale power prices.

Table 11: Forecasted, Reference Case Net Increase to 2025 Revenue Requirement Under Multiple Portfolio Construction Scenarios

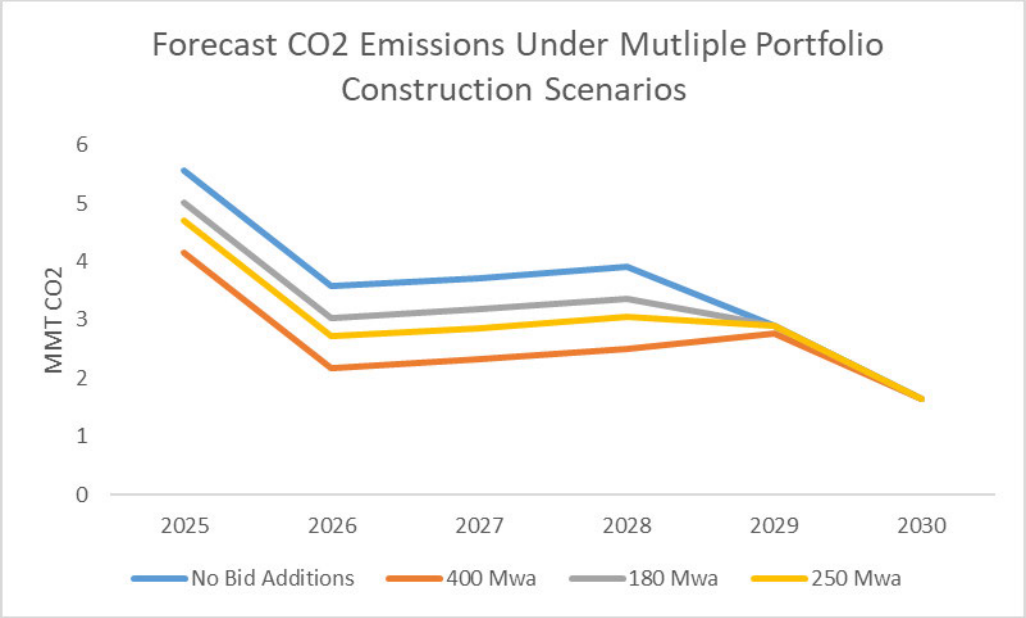
	Percent Increase in 2025 Rev Req		
Portfolio Construction Scenario	Average	Median	10th Percentile[28]
180 MWa	7.0%	6.2%	5.8%
250 MWa	9.4%	9.6%	9.2%
400 MWa	11.0%	11.1%	10.7%

A central benefit of adding larger quantities of renewable resources to PGE's portfolio is the reduction of PGE's forecasted carbon emissions and incremental progress toward PGE's HB 2021 compliance requirement. Figure 6, displays the average forecasted emissions for all portfolios included in PGE's portfolio construction scenarios. ROSE-E results illustrate that larger procurement portfolios allow PGE to meet approximately one-third of the Company's presently forecasted HB 2021 needs. However, multiple additional resource procurement options present themselves to facilitate HB 2021 compliance. As can be identified in Figure 6, irrespective of the Portfolio Construction Scenario, ROSE-E elects to add additional renewables with CODs in the 2026-2027 time period and still more resources with CODs in 2029-2030. Should PGE not procure beyond acknowledged renewable volumes, additional procurement

[28] Tenth percentile results indicate the approximate net revenue requirement impact of the fifth lowest cost portfolio included in each fifty-portfolio set.

must occur later this decade. PGE foresee multiple opportunities to engage in further renewable resource procurement this decade to meet HB 2021's compliance requirements.

Figure 6: Average Forecasted CO_2 Emissions By Portfolio Construction Scenario



Lastly, risks relating to high volume renewable procurement have been highlighted in PGE's planning activities over multiple planning cycles. PGE's 2019 IRP portfolio results also indicated that larger renewable resource additions reduced long-term system cost and risks. In the 2019 IRP many of the 44 portfolios evaluated (including the preferred portfolio) were constrained in resource additions in the near-term. However, as was performed in this RFP, optimized portfolios were also run testing alternative objective functions but unconstrained in their ability to add resources in the near-term. As discussed in PGE's reply comments in the 2019 IRP proceeding,[29] several of these optimized portfolios in the 2019 IRP did show lower cost and risk relative to the preferred portfolio by increasing renewable additions. However, PGE proposed, and the Commission acknowledged, an action plan item of adding only 150

[29] *See* PGE's Reply Comments at 11 (Nov 5, 2019).

MWa. Despite the ability to lower the modeled system cost and risk by adding significantly more renewables, PGE and the Commission found value in a smaller procurement target as there were several sources of risk unable to be quantitatively modeled. Today, PGE again encounters similar risks previously described related to cost increases, federal tax credit policy and supply chain. In this environment, PGE finds it reasonable to begin procurement of acknowledged renewable resource volumes while monitoring and evaluating additional opportunities to deliver the best outcomes for PGE customers.

VI. Compliance with the Rules

A. OAR 860-089-0100 Applicability of Competitive Bidding Requirements

OAR 860-089-0100 requires an electric company issue an RFP for all major resource acquisitions with durations greater than five years and quantities greater than 80 MW. PGE's action plan associated with the 2019 IRP capacity need called for the acquisition of approximately 150 MWa of renewable resources and sufficient capacity to meet the 2025 shortfall. In addition, PGE planned to leverage the 2021 RFP to procure 100 MW of clean energy resources for Phase II of the GFI PGE Supply Option. The 2021 RFP—with the request for resources that could be online by December 31, 2024 (except in the case of long lead-time resources)—was intended to fulfill this IRP capacity need. As discussed in this filing, PGE's development and issuance of the 2021 RFP satisfies OAR 860-089-0100.

B. OAR 860-089-0200 Engaging an Independent Evaluator

As described in OAR 860-089-0200, prior to issuing an RFP, the electric company must engage the services of an IE. The IE will oversee the competitive bidding process to ensure it is administered fairly and in accordance with the Rules. PGE filed a request to open an IE

selection docket on April 28, 2021, and worked with regulatory stakeholders to finalize an IE RFP prioritizing the IE qualifications outlined in OAR 860-089-0200(2)(b-e).

On June 15, 2021, PGE filed a request for Commission approval to engage an IE. Commission Staff evaluated PGE's IE selection process and following its own independent review of the IE bids, recommended that the Commission approve Bates White to serve as IE. The Commission adopted Staff's recommendation and approved Bates White as the IE on July 13, 2021 (later memorialized through Order No. 21-235).

C. OAR 860-089-0250 Design of Request for Proposals

PGE prepared a proposal for scoring and methodology and a draft request for proposals for review by the Commission and stakeholders in the IE selection docket in accordance with OAR 860-089-0250. PGE held a stakeholder workshop on its scoring and modeling methodology on August 9, 2021, and stakeholders provided feedback on August 23, 2021. On September 29, 2021, Commission Staff issued a memo recommending the approval, with conditions, of the scoring and modeling methodology, and Staff's recommendation was adopted by the Commission at the October 5, 2021 Public Meeting.

PGE then prepared a draft request for proposals for review by the Commission and stakeholders in the IE selection docket in accordance with OAR 860-089-0250.

PGE filed the draft request for proposals on October 15, 2021, and the draft included:

- Minimum bid requirements,
- Standard form contracts,
- Bid evaluation and scoring criteria,
- Language to allow bidders to negotiate mutually agreeable final contract terms that may differ from the standard contracts,

- Description of how PGE would share information about bid scores, including what information about the bid scores and bid ranking may be provided to bidders and when and how it will be provided,
- Bid evaluation and scoring criteria as approved by the Commission, and
- Resource need per the 2019 IRP and 2019 IRP Update.

On October 20, 2021, the IE filed the draft Independent Evaluator Report, finding PGE's draft RFP to be "generally consistent with Oregon's Competitive Bidding Guidelines" [30] while recommending limited changes to the structure to clarify requirements and maximize opportunities for bid response. PGE incorporated the following changes as a result of the IE's Report:

- Clarified credit requirements;
- Added language to ensure that sufficient flexibility existed to ensure that the initial shortlist had a diversity of fuel type, transaction type, technology, and location;
- Provided additional flexibility for bidders who may not meet the permitting timelines outlined in PGE's permitting matrix;
- Provided additional flexibility for bidders who can show a viable transmission plan; and
- Provided opportunity to list and describe potential long-term service agreement offers within the term sheets.

Regulatory stakeholders filed reply comments on November 1, 2021, with PGE replying on November 10, 2021. A Staff report was issued on November 19, 2021, which outlined the stakeholder feedback received and incorporated by PGE throughout the process. PGE included the following changes as a result of Staff and stakeholder feedback:

- Provided additional consideration for long-lead time resources beyond pumped storage hydro,

[30] The Independent Evaluator's Assessment of Portland General Electric's Final Draft 2021 All Source RFP at 1.

- Posted a calculator meant to assist in the calculation of ELCC
- Clarified language in the final contracts to properly reference the acknowledgement of the final shortlist,
- Provided a report of the actual ELCC values of bids selected to the initial shortlist, and
- Update to the cost containment screen to better reflect its role in RFPs following the passage of HB 2021.

The Staff report recommended that the Commission approve PGE's RFP structure with modifications to the draft RFP. The Commission adopted the Staff recommendation at the December 2, 2021 public meeting and approved PGE's RFP with modifications.[31] The Commission modifications updated the price/non-price score values, modified the non-disclosure agreement provisions, and adopted the Staff memo.

PGE issued the 2021 RFP on December 6, 2021 and held a post-issuance bidder workshop to review the structure, scoring, resource need, standard contracts, and other key provisions on December 17, 2021.

D. OAR 860-089-0300 Resource Ownership

Under OAR 860-089-0300, an electric company may submit bids in response to its RFP, which must be treated in the same manner as other bids. PGE submitted benchmark bids into this RFP and took precautions to ensure that the benchmark development and bid process was kept distinctly separate from the development of the RFP, evaluation of bids, or scoring of bids, consistent with OAR 860-089-0300. PGE prepared a personnel list of company employees who were assigned to either the "benchmark team" or the "RFP team" and shared that list with the IE in December 2021 to demonstrate the clear separation of functions.

[31] Order No. 21-460.

Under OAR 860-089-0300, the electric company may make elements of the benchmark resource owned or secured by the electric company available for use in third-party bids, and if not made available, the electric company must provide analysis explaining that decision. All elements owned or secured by the benchmark bid team were outlined and noted in Appendix P of the 2021 RFP, which is posted publicly on PGE's 2021 RFP webpage. All bid elements were made available for use to third-party bidders as outlined in OAR 860-089-0300(3) except for a seven-acre parcel of land in Hillsboro that is contiguous with existing PGE operations. The Hillsboro land was identified as a potential safety risk, and PGE outlined industry best practices around operation of large-scale batteries, which made multi-entity operations at the Hillsboro parcel infeasible.[32] In the November 19, 2021, Staff report, Staff noted that the information provided was "satisfactory to support PGE's decision to limit the availability of that land."[33]

Under OAR 860-089-0300(5), the electric company must allow independent power producers to submit bids with and without an option to renew and may not require that bids include an option for transferring ownership of the resource. The 2021 RFP allowed for these options as outlined on page 13 of PGE's main RFP document, which specifies that all renewable and non-emitting projects that meet the minimum criteria are eligible for consideration.

While PGE initially submitted an affiliate-structure bid into the 2021 RFP, the bid was subsequently withdrawn.

E. OAR 860-089-0350 Benchmark Resource Score

OAR 860-089-0350 directs that prior to the opening of bidding on an approved RFP, PGE must file with the Commission and submit to the IE, for review and comment, a detailed

[32] PGE's Reply Comments at 33-35 (Nov 10, 2021).
[33] Staff's Public Meeting Memorandum at 13 (Nov 19, 2021).

score for any benchmark resource with supporting cost information, any transmission arrangements, and all other information necessary to score the benchmark resource. As part of this RFP, PGE applied the same assumptions and bid scoring and evaluation criteria to the benchmark bid that are used to score other bids consistent with OAR 860-089-0350.

PGE made the filing required under OAR 860-089-0350(1)-(3) on February 4, 2022, before opening bids in this RFP. In accordance with the RFP design and as required by Commission rules, PGE was not able to open bids for review and scoring until the bids were released by the IE. PGE does not have access to the system that holds the bids that are uploaded to the IE-managed website and thus did not, nor could not, open third-party submitted bids until after the submission of detailed scoring and cost information for benchmark resources on February 4, 2022. No updates have been made to the benchmark scores other than the opportunity to provide best and final offer price updates[34], consistent with the opportunity offered simultaneously to all other bids in the RFP.

F. OAR 860-089-0400 Bid Scoring and Evaluation by Electric Company

OAR 860-089-0400 states that the utility must provide all proposed and final scoring criteria and metrics in its draft and final RFPs filed with the Commission. The scoring of bids and selection of the initial shortlist must be based on price and non-price factors with non-price factors converted to price factors where practicable.

PGE held a scoring and modeling methodology workshop on August 9, 2021, with stakeholder feedback received (and incorporated) through comments on August 23, 2021. Staff's September 29, 2021 memo recommended the approval of PGE's scoring and modeling methodology, and the Commission approved the methodology at the October 2, 2021 Public

[34] All projects in this RFP declined to update pricing.

Meeting. PGE further revised the price and non-price ratios—reducing the emphasis on commercial performance risk—as directed by the Commission in Order No. 21-460.

PGE's 2021 RFP initial shortlist was identified using both price and non-price scoring. Non-price scoring was based on the following factors: 1) Commercial Performance Risk, and for renewable resources: 2) Transmission Plan Attributes and 3) Level Capacity Ratio. For dispatchable resources, the other non-price scoring factor was online date certainty. PGE converted all non-price criteria that were better suited as minimum requirements to the "minimum bidder requirements" as outlined in PGE's RFP documents.

The non-price criteria selected by PGE was based on overall risk and was consistent with the Company's 2019 IRP. The non-price criteria were selected due to their focus on the 2025 capacity shortfall date, contribution to capacity need, ability to procure transmission, and providing a least-risk option for PGE customers, which were all components of the acknowledged IRP.

PGE took steps to ensure that the non-price criteria was reasonably able to be self-scored by potential bidders, and in response to stakeholder recommendations and Commission Order No. 21-460, provided an ELCC calculator on the RFP website to assist in the self-scoring of level capacity ratio.

PGE's price scoring was consistent with 2019 IRP analysis as it used the same economic models and methodology to evaluate system impact and cost associated with each bid.

Per OAR 860-089-0400(6), the IE had full access to all price and non-price scoring, including any production models, cost models, and sensitivity analyses.

Following identification of the initial shortlist, PGE retained Hendrickson Renewables to complete a review of the variable energy resource production curves submitted by bidders, and 1898 & Co. to provide an assessment of owner's costs associated with BTA bid structures.

G. OAR 860-089-0450 Independent Evaluator Duties

Consistent with OAR 860-089-0450(1), the IE oversaw the 2021 RFP process to ensure it was conducted fairly, transparently, and properly. The IE participated in review meetings, workshops, and submitted assessments as part of the RFP structure process. The IE attended a pre-RFP scoring and methodology workshop and a pre-RFP issuance workshop. Consistent with OAR 860-089-0450(3), the IE consulted with PGE during PGE's preparation of the draft 2021 RFP and submitted its assessment of the final draft RFP to the Commission on October 20, 2021. The IE also reviewed "mock bids" to test the integrity of the evaluation models and reviewed final scoring and evaluation criteria.

In accordance with OAR 860-089-0450, the IE had access to all PGE scoring documents and models, was included on communications as PGE sought additional information and clarification from bidders, scored all benchmark bids, and was consulted as PGE determined bidder conformance, selected the initial and final shortlists. The IE separately evaluated and scored PGE's Benchmark bids. The IE also reviewed all bids to ensure conformance with the 2021 RFP's identified requirements, reviewed all correspondence between bidders and the RFP evaluation team, and reviewed all memoranda sent to bidders of non-complaint bids. The IE independently scored all bids to determine whether the selections for the initial and final shortlists were consistent with the bid evaluation criteria and compared the results of the IE's scoring with PGE's scoring to determine whether PGE's scoring of the bids and selection of the initial and final shortlists were reasonable. The IE prepared a Final Closing Report for the

Commission after PGE selected the final shortlist. The IE's Final Closing Report provides its assessment of the solicitation process and the IE's involvement, including detailed bid scoring and evaluation results. The IE Closing Report is included in this filing as Appendix A.

Under OAR 860-089-0450(6), the IE must "evaluate the unique risks and advantages associated with any company owned resources (including but not limited to the electric company's benchmark), and may apply the same evaluation to third-party bids," including an evaluation of certain issues. The IE discusses these factors as part of the Closing Report.

Under OAR 860-089-0450(7), the IE reviews the reasonableness of any score submitted by PGE for a benchmark resource and once PGE and the IE have both scored and evaluated the competing bids and any benchmark resource, the IE and the Company must file their scores with the Commission. The IE and Company must compare results and attempt to reconcile and resolve any scoring differences. Here, as discussed above, the IE reviewed scores submitted by PGE for the benchmark prior to PGE filing scores on February 4, 2022.

Under OAR 860-089-0450(8), the IE is required to review the Company's sensitivity analysis of the bid rankings required under OAR 860-089-0400 and file a written assessment with the Commission before the Company requests acknowledgment of the final shortlist. Here, the Company provided its sensitivity analysis of the bid rankings to the IE April 27, 2022, and the IE submitted its written assessment on May 4, 2022.

H. OAR 860-089-0500 Final Shortlist Acknowledgement

PGE's final shortlist is consistent with PGE's 2019 IRP Action Plan and PGE seeks acknowledgment of the final shortlist. PGE requests Commission acknowledgment this final shortlist by July 14, 2022, to enable PGE to timely finalize negotiations with final shortlist

bidders and ensure capture of expiring federal tax credits for the benefit of PGE's customers.

OAR 860-089-0500 directs utilities to request acknowledgement of the final shortlist before negotiations may begin with bidders. "Acknowledgement" is defined as "finding by the Commission that an electric company's final shortlist of bid responses appears reasonable at the time of acknowledgment and was determined in a manner consistent with the rules in this division."[35]

In accordance with OAR 860-089-0500, PGE's request for acknowledgement includes the IE's Final Closing Report, PGE's final shortlist of responsive bids, the sensitivity analyses performed, and a discussion of the consistency between the final shortlist and PGE's last-acknowledged IRP Action Plan or acknowledged IRP Update. Consistent with this rule, PGE will begin contract negotiations with bidders after filing this request for acknowledgment.

VI. CONCLUSION

The Commission's acknowledgment of PGE's final shortlist will enable PGE to secure long-term value for customers, fill the 2025 capacity shortfall identified in the 2019 IRP process, and to achieve meaningful progress toward the HB 2021 decarbonization compliance targets. PGE is committed to continuing to provide safe, reliable, affordable and increasingly clean electricity to our customers. The 2021 RFP had robust participation and provided PGE a competitive selection process. The final shortlist included in this Request represents resources with the best combination of cost and risk for customers to implement the 2019 IRP Action Plan and clean energy need associated with the HB 2021 greenhouse gas reduction targets.

[35] OAR 860-089-0500.

PGE respectfully requests Commission acknowledgement of the 2021 RFP final shortlist by July 14, 2022, to enable PGE to timely finalize negotiations with final shortlist bidders and ensure capture of expiring federal tax credits for the benefit of PGE's customers.

DATED this 5th day of May, 2022.

Respectfully submitted,

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BATES WHITE
ECONOMIC CONSULTING

THE INDEPENDENT EVALUATOR'S FINAL REPORT ON PORTLAND GENERAL ELECTRIC'S 2021 ALL SOURCE REQUEST FOR PROPOSALS

Presented to:
OREGON PUBLIC UTILITY COMMISSION

Prepared by
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May 5, 2022

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I. INTRODUCTION AND SUMMARY

A. INTRODUCTION

Bates White, LLC (Bates White) is the Independent Evaluator (IE) for Portland General Electric (PGE)'s 2021 All Source RFP (RFP). The primary purpose of this report is to provide the Oregon Public Utility Commission (Commission) with the IE's findings with respect to the Company's selection of a Final Shortlist. This report is also intended to provide the Commission with a record of the development and evaluation process for the shortlist.

B. THE FINAL SHORTLIST

The Company has selected a total of twenty nine separate offers from thirteen projects for the Final Shortlist. These offers provide a total of approximately 600 MWa of renewable supply and over 1000 MW of capacity on the basis of Effective Load Carrying Capability (ELCC).

We have the following findings:

The RFP process was run in accordance with the rules laid out in the RFP document. All bidders were treated fairly under the rules of the RFP. We reviewed all bids that were found to not meet the minimum qualification criteria and agreed with the Company's decision to disqualify these projects.

The RFP process was reasonably competitive. The RFP received bids from 19 suppliers offering a total of 34 projects. Some of these projects offered multiple options. In total there were 110 bid options presented. Offers were received from wind, solar, pumped storage and standalone battery storage projects. Offers included power purchase agreements and build-transfer agreements.

The offers selected for the shortlist were selected fairly, via the approved RFP scoring system. Bates White was able to independently evaluate each offer from a price and non-price prospective. We were able to conclude that PGE's price and non-price scoring were reasonable.

The shortlist contains several Company-sponsored Benchmark bids. We confirmed the accuracy of the Benchmark costs and scoring and provided the Commission with a complete review of all costs of each project prior to bid receipt. We also confirmed each project's status by: (a) reviewing the project price score in the PGE model, (b) independently scoring the non-price characteristics, (c) comparing the cost and output of the project to recent third-party bids and public data, and (d) evaluating the bid costs in our own cost model. It's important to state here that the benchmark offers are all developed in conjunction with third parties and sold under a mix of power purchase agreements and build-transfer agreements, just as the other non-benchmark offers would be. These are not traditional "cost-plus" offers, where the cost is just an estimate and final costs are as-incurred (subject to a prudence finding), meaning many risks of the projects are mitigated via contract.

The RFP aligns with the Company's Integrated Resource Planning (IRP) process. The models and processes used to select the Final Shortlist were the same models that the Company uses in its IRP process.

The shortlist contains projects significantly in excess of the RFP targets – even accounting for the fact that some backup offers might be necessary. The RFP targets were 150 MWa of renewable resources and a total of 375 MW of capacity[1] and the shortlist provides roughly 3 to 4 times these amounts. This is in part because PGE did not use the results of the portfolio modelling process to further narrow down the list of candidate offers. Having said that, the portfolio modelling suggests a clear preference order for offers that is in line with PGE's shortlist scoring. We expect that PGE will use these findings to prioritize negotiations with the top-scoring offers first, and will bear the burden of justifying their actions in a future prudence hearing should they ultimately have a different selection of offers.

PGE's portfolio modelling suggests that a larger renewable portfolio – i.e. one beyond the RFP target of 150 MWa might result in lower costs and risks. However, several factors might make such portfolios less optimal including; extension of the Production Tax Credit (PTC), higher than expected WECC-wide renewable buildouts, and lower than expected future wind technology costs. These factors might argue for a more moderate quantity selection. Again, we presume that PGE will bear the future burden of proving their final contracted quantity is prudent.

PGE was also seeking to procure 100 MW of renewable resources for its Green Energy Affinity Rider (GEAR) program.[2] PGE did not specially designate any resource in this shortlist as a GEAR resource, we assume that PGE will, per the RFP, only select bids for this program after it has selected the top offers from the RFP to serve its load.

We participated in the entire RFP process from design, through bid receipt and analysis, to the selection of the shortlist. During that time we:

[1] RFP p 4.
[2] Ibid.

1. Reviewed and commented on drafts of the RFP;

2. Attended the pre-bid conference;

3. Monitored bidder contact, including the answers to bidder questions;

4. Confirmed the assumptions, models and processes used in the analyses;

5. Confirmed the initial qualification of bidders and the confirmation of proposal details;

6. Provided input with respect to bidder disqualifications;

7. Reviewed the price and non-price scores and models for the Company's shortlist process and confirmed the Company's selection of a shortlist; and

8. Reviewed the portfolio creation and modelling using the shortlisted offers.

Throughout the process, we were in constant contact with PGE's evaluation team. The Company was transparent in their discussions with us and provided all the information that we requested.

C. ADDITIONAL COMMENTS AND RECOMMENDATIONS

We do have some additional recommendations and observations from this process that might help in future RFPs.

First, several offers for standalone energy storage on PGE's system were disqualified because they did not have a completed system impact study and because they were in danger of not meeting the RFP-required 2024 COD for such projects, despite submitting application materials in August of 2021. We would encourage PGE to pursue measures to reform and speed its interconnection queue process – this could include moving to a cluster process or other reforms. As it stands, the serial queue process can see major delays when projects drop out or significantly alter their proposed project as all subsequent offers in the queue must then be re-studied. PGE appears to be working on this process and we'd encourage them to reach out to developers as well to develop solutions that work for all parties.

Second, as transmission is a scarce resource, both here and in other RFPs we are seeing many proposals that wish to utilize existing transmission service reservations for the output of a renewable facility with a countervailing generation schedule on an as-available basis. In other words, a proposal for a new solar facility that would output power into the reservation of an existing wind facility (and vice versa). This sort of resource was generally not consistent with the RFP design. We would encourage PGE to accommodate these sorts of proposals in future RFPs for their own resources and from third-party offers as they better utilize a scarce resource.

Third, we would recommend that PGE provide additional data regarding what their IRP termed "non-traditional" metrics. PGE did provide a near-term rate impact of portfolios in the reference case and CO_2 emission reductions numbers. We would specifically recommend that PGE provide more detail on near term rate impacts in other cases and reductions of other GHG and non-criteria pollutants as well. While these metrics would not likely change the preference order of offers they might provide more information regarding the costs and benefits of larger renewable purchases.

Fourth, this was the first RFP process for PGE under the new Oregon Competitive Bidding Rules. As part of these Rules, the scoring and modelling methodology for the RFP is approved prior to the RFP draft being submitted for consideration, unless it was included as part of a Commission acknowledged IRP. Since the Commission did not reach a conclusion on PGE's scoring and modeling methodology in the IRP process, PGE pursued approval of the scoring and modeling methodology separately. Unlike the RFP design phase there is no specific requirement for IE involvement in this process. While we were consulted on the methodology we did not submit a formal assessment, nor did we formally appear at the hearing in which it was approved. PGE's methodology included minimum bid requirements, scoring and modelling processes, essentially the core of the RFP process. While a number of these items were adjusted based on our feedback and even more were adjusted during the RFP approval process in theory under these rules much of the core of the RFP process would be approved prior to true IE involvement. We would recommend that in situations such as this where the methodology is not part of the IRP acknowledgement the IE, at a minimum, conduct an informal review of the methodology, perhaps submitting a memo to the Commission, in advance of the approval hearing so that they can weigh in on key factors in advance before they are locked down via approval.[3]

[3] In our opinion the IRP process has enough scrutiny and participation such that any methodology acknowledged there will have been sufficiently vetted by stakeholders.

II. IRP APPROVAL TO BID RECEIPT

The RFP is based off of the findings of PGE's 2019 IRP. This IRP was filed on July 19, 2019 in OPUC Docket LC-73. The IRP was acknowledged with conditions and additional directives in May of 2020. The IRP was updated in a filing of January 29, 2021. The IRP Update was acknowledged by the Commission in April of 2021.

Bates White was selected to be the IE on July 13, 2021. Bates White has previously served as the IE for PGE's 2018 Renewable Request for Proposals and PacifiCorp's 2017R RFP. Bates White personnel have also served as IEs for several previous RFP from PacifiCorp dating back to 2007.

In early August PGE requested that we also facilitate the design of the RFP bidding website. This is a task that we handled in the last PGE RFP through our subcontractor Mower and Associates. We worked to connect Mower with PGE so that they could create the bidding website

Our first major task as IE was to review the proposed scoring and modelling methodology. We attended a workshop on August 9, 2021 where PGE provided proposed details regarding resource need, minimum requirements, analysis process, and modelling. In mid-August we also established a standing call with Staff to brief them on RFP process as well as to listen to any concerns or comments they may have had. In August and September we reviewed comments on the scoring an modelling methodology, asked questions and provided comments to PGE and discussed our review with Staff. Areas of questioning for us included cost containment screens, permitting requirements, transmission requirements, non-price scoring, credit, and more. We listened in to the Commission hearing of October 5, 2021 where the methodology was approved with modifications. We attended another workshop on October 11, 2021 where PGE presented its updated scoring and modelling methodology based on the ordered modifications.

PGE provided us an advance copy of its draft RFP on October 12, 2021. The Draft RFP was filed with the Commission on October 15, 2021. We filed our comments on the draft RFP on October 20, 2021. We subsequently reviewed comments from third parties and PGE. We appeared at the December 2, 2021 Special Public Meeting where the RFP was approved with modifications.

Since the RFP approval the following steps have been completed.

Table 1: Milestone Events to Date

Milestone	Date
RFP Issued to Market	12/6/2021
Bidder's Conference	12/17/2021
Benchmark Bid Due	1/4/2022
RFP Bids Due	1/20/2022
BAFO Price Update	3/16/2022
Sensitivity Analysis submitted to OPUC	5/4/2022
IE Report submitted to OPUC	5/5/2022

The RFP was issued to market with the modifications as requested by the Commission on December 6, 2021. Some items were not included by mistake - such as ordered edits to the pro forma contracts - however, PGE was able to correct these omissions and update the files in a timely manner.

PGE held a Bidder's Conference on December 17, 2021. The conference was held online. PGE personnel walked through the RFP process, including bid qualification and valuation. At the conference, PGE answered several questions regarding the RFP, qualification and bid evaluation. Bates White attended the conference and reviewed all questions and answers as bidder continued to ask questions until bid receipt. All questions and answers were posted publicly on the RFP website so that all bidders would have access to the same information.

In the run up to bid receipt we reviewed test bids analyzed with PGE's scoring models and discussed those models and methods with PGE evaluators so that we would be ready to evaluate offers when they were submitted.

III. BENCHMARK BID ANALYSIS

On January 4, 2022, in accordance with the RFP timeline, PGE's Benchmark team submitted their offers to the IE and the PGE evaluation team. Bates White accessed the benchmark bids directly from the RFP bidding website and sent them to PGE evaluators. While the offers were partnered with PGE the offers were essentially submitted as a third-party offer might be. That is, the bidder offered either a Power Purchase Agreement (PPA) or Build-Transfer Agreement (BTA) under which the developer would build the facility and then turn it over to PGE. These were not "cost-plus" offers in the traditional sense (i.e. not price estimates wherein the actual costs will be recovered as spent subject to a prudence check). Bidders offered edits to the same term sheets that third-party offers used. This helped mitigate the traditional risks of benchmark offers to a good degree.

The base offers for the projects offered are summarized in the table below.

Table 2: Benchmark Summary Data – Base Offers Only

[Begin Highly Confidential]

Project	Partner	Capacity	Transaction Type	Technology
		200	PPA	Battery Storage
		75	BTA	Battery Storage
		125	BTA	Battery Storage
		230	BTA	Wind
		120	PPA	Wind
		100	PPA	Solar
		30	PPA	Battery Storage
		209	BTA	Wind
		103	PPA	Wind
		100	PPA	Solar
		100	BTA	Solar

[End Highly Confidential]

After the bid receipt, Bates White undertook a multi-part review of the offers. First, we reviewed the full contents of the submissions made by PGE. Second, we compared the BTA and PPA prices in the offer to prices received in PGE's 2018 Renewables RFP. Third, we compared the BTA and PPA prices to publicly available data from respected sources. Fourth, we compared the projected BTA O&M costs to authoritative data sources. Fifth, we reviewed the forecast capacity factors of the renewable projects and compared this information to public sources. Sixth, we reviewed submission documents, including the proposed pro forma PPA and BTA term sheets, to assess the other unique risks proposed by the transaction and confirm that the offers met the RFP's qualification requirements. Finally, we validated the PGE evaluation team's price and non-price scores by independently scoring the bids on a price and non-price basis.

We were copied on all Q&A to the benchmark team so we could follow the lines of inquiry and use the same data PGE used. In addition, as required by the Oregon Competitive Bidding Rules, we reviewed PGE's price and non-price scoring of the benchmarks prior to receipt of third-party offers. The price score was based on a comparison of the bid's costs to the value of the energy and capacity the bid would replace as well as any flexibility value provided. The non-price score was based on criteria laid out in the RFP. Bates White confirmed the price scores by inputting key bid criteria into our own busbar levelized cost model. Additional details about all scores are provided later in this memo.

We concluded that the benchmark offers were acceptable based on several factors. First, the benchmark BTA and PPA prices appeared reasonable when compared to past RFP data given the reduction of the Production Tax Credit and recent materials price increases. Second, the benchmark BTA and PPA prices were generally within the acceptable range of capital and levelized costs when compared to public data for the wind and BESS projects. For the solar projects the offered costs were **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** not understated. Third, the capacity factors of the renewable resources were reasonable when compared with public data on U.S. wind and solar projects. Fourth, the O&M costs of the benchmarks appeared reasonable when compared against public data. Finally, PGE's evaluation scores for the benchmarks were acceptable. We were able to roughly match price scores with our independent modelling and our non-price scores are similar enough so as to have no effect on the overall bid selection.

In our report we noted that Portland Renewable Resources, who was supporting the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**, had yet to receive Commission approval to form. This proposed company would have been a PGE affiliate created to manage this PPA. The initial application for approval was denied by the Commission in December.[4] The offer was formally withdrawn on February 25, 2022.

[4] Order No 21-482, Docket UI-461, December 22, 2021.

IV. BID RECEIPT AND QUALIFICATION

Bids from third-party bidders were due, per the original RFP schedule, on January 17, 2022. In advance of the due date, PGE decided to move the due date back one day as the original due date was on the MLK Holiday. On the due date we began to receive complaints from bidders who were having difficulty uploading files to the RFP website. After some investigation there was determined to be a technical issue with the server that was preventing the bids from being uploaded. In order to ensure that all bids could be properly submitted we worked with Mower and PGE to extend the due date until January 20. We monitored bid receipt to make sure that all bidders could submit their documents. Ultimately, all bidders were able to upload all their files.

While the schedule called for the benchmark scoring to be complete prior to third party offers being reviewed the extensive amount of Q&A needed between the bid and evaluation teams meant that the PGE scoring for the benchmark was not provided to the IE until the 26th of January. Due to this delay and in keeping with the Competitive Bidding Rules third party offers were kept stored at the bidding website. We reviewed PGE's benchmark scoring and filed our memo on February 3, 2022. Only after this, on February 4, 2022, did we download the third-party bids from the RFP website and distribute them to PGE's evaluation team.

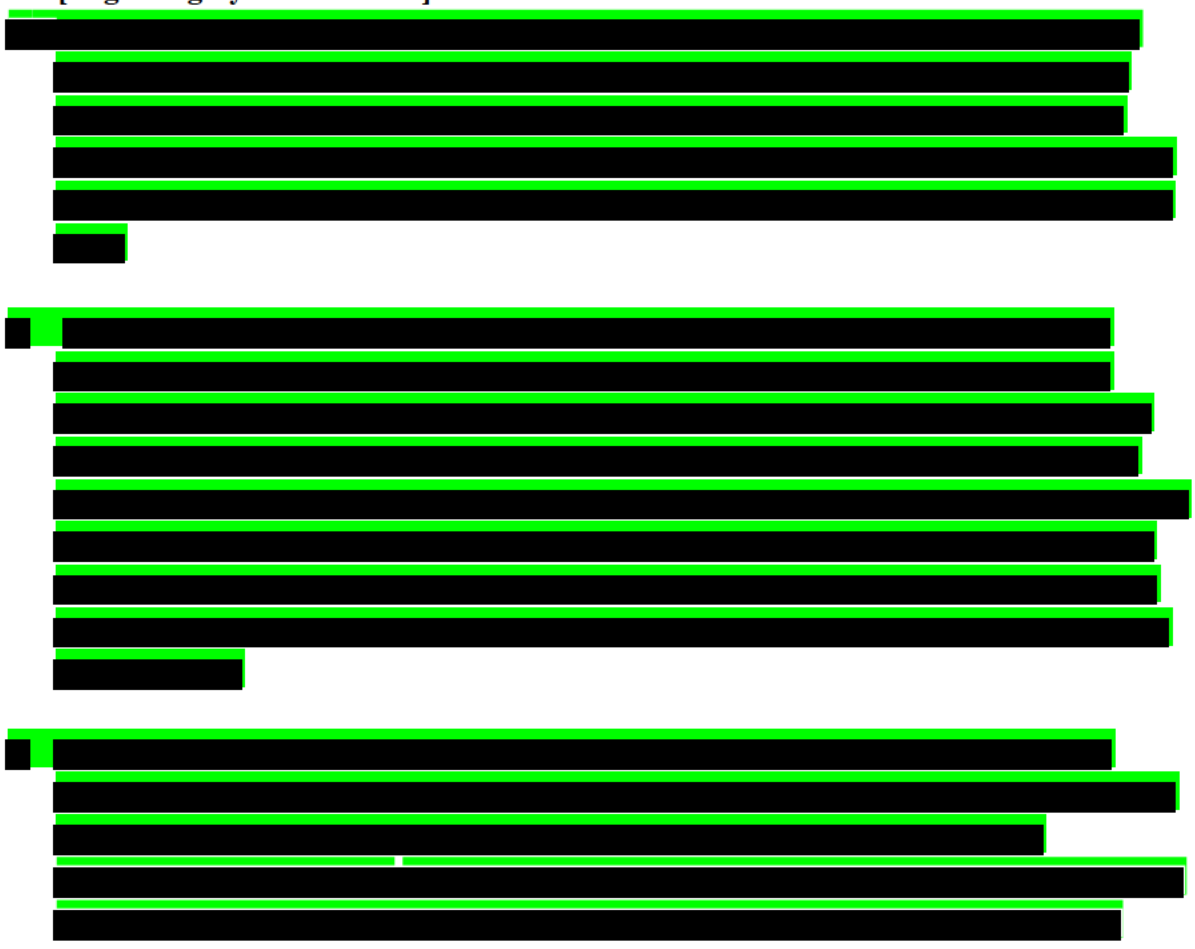
Ultimately, nineteen suppliers submitted a total of thirty-four projects for consideration, with many projects offering several different variants in terms of contract length, storage pairing and more. The projects represented a mix of resources, including wind and solar facilities, both standalone and on a paired basis, standalone battery energy storage systems (BESS), pumped storage facilities and more. Most renewable facilities were located in the service territory of the Bonneville Power Administration (BPA). The offering was far in excess of the stated targets of the RFP.

Slightly unusual was the fact that some third-party developers who partnered with PGE in submission of benchmark offers also independently submitted different variations of the same proposals at this point in the RFP. PGE's evaluation team contacted each bidder to inquire about the submissions. The bidders **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** both confirmed that the offers were developed independently of PGE's benchmark offers and without assistance from PGE. Each bidder wanted to offer additional configurations of the projects into the RFP and provided appropriate bid fees. Since there was nothing prohibiting this in the RFP and because the benchmark team had received no feedback regarding how competitive their offers were (and thus, no additional information they could use to make their subsequent offers more attractive) we thought it was appropriate to consider these additional offers.

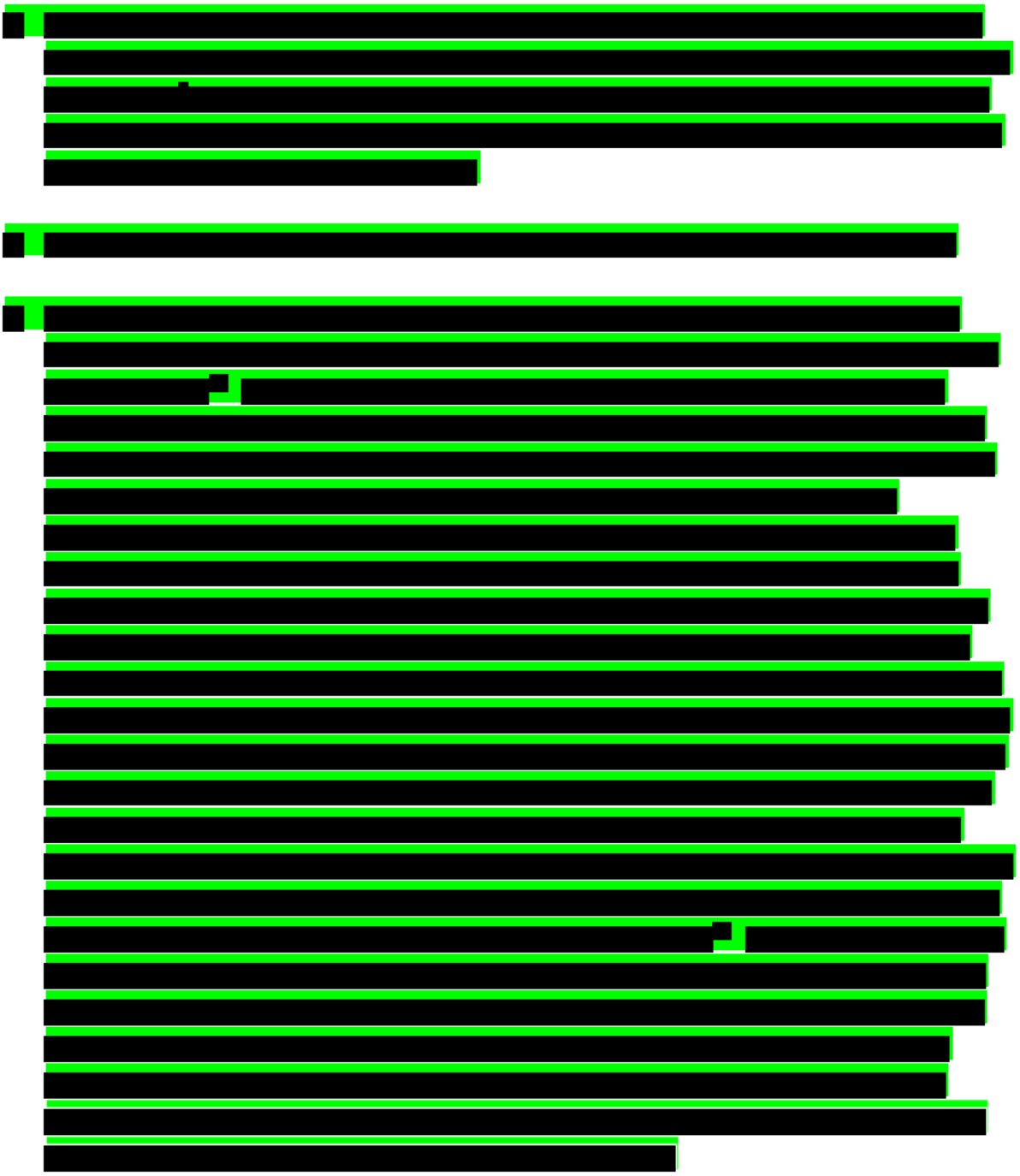
After the receipt of offers, PGE went to work confirming bid details with bidders. PGE sent multiple sets of questions to bidders and bidders confirmed project information and provided updated information where their original response was lacking. Bates White was copied on all questions and responses. PGE and the IE reviewed the offers for qualification purposes. Bids were held to several minimum requirements. Key requirements included: (a) demonstrating that the project could be commercially operational no later than December 31, 2024[5], (b) having a completed system impact study[6], (c) demonstrating site control[7] and (d) demonstrating a clear plan to deliver firm supply to PGE's territory.[8]

There were a number of projects that failed to meet the minimum requirements for participation in the RFP and were either rejected or withdrawn by the bidder. These projects were;

[Begin Highly Confidential]



[5] RFP p 14. Per the RFP, this requirement was relaxed for pumped-storage facilities as they feature much longer lead times for construction.
[6] RFP, p 16.
[7] RFP, p 15.
[8] RFP p 17-28. Dispatchable bids had to deliver 100% of their output with firm transmission while renewable offers had to have at least 80% of their offer secured with firm transmission. Renewable bidders were able to use conditional firm bridge and reassessment products in addition to standard long term firm transmission.



[9] RFP p 14.
[10] RFP P 16.
[11] For example, the PJM interconnection has recently approved a two-year freeze on new applications in order to give evaluators time to sort through the existing requests. https://www.utilitydive.com/news/pjm-interconnection-reform-plan-renewable/618707/

[redacted]

[12] See RFP p 17, "Bidders relying on BPA for transmission service are required to have either previously been granted eligible transmission service or have an eligible and active OASIS status Transmission Service Request (TSR) participating in the BPA TSR Study and Expansion Process (TSEP)".

[End Highly Confidential]

Bates White was consulted on the decision to remove each of these bidders and bid options and we agreed with the decisions. As has been the case in past RFPs securing transmission and interconnection service proved a major hurdle for many offers – though even with these removals we did have a reasonable selection of offers to evaluate. Reviewing the rejections here generated two observations for future improvement. First, we would encourage PGE to pursue measures to reform and speed it's interconnection queue process – this could include moving to a cluster process

or other reforms. As it stands, the serial queue process can see major delays when projects drop out or significantly alter their proposed project as all subsequent offers in the queue must then be re-studied. PGE appears to be working on this process and we'd encourage them to reach out to developers as well to develop solutions that work for all parties. Second, as transmission is a scarce resource, both here and in other RFPs we are seeing many proposals that wish to utilize existing transmission service reservations for the output of a renewable facility with a countervailing generation schedule on an as-available basis. In other words, a proposal for a new solar facility that would output power into the reservation of an existing wind facility (and vice versa). This sort of option was not consistent with this RFP's design due to the requirement for firm transmission and the limits on Company assets made available. We would encourage PGE to accommodate these sorts of proposals in future RFPs, both from their own assets and third-party offers, as they better utilize a scarce resource.

V. SHORTLIST DEVELOPMENT

After the bids were received and bid details were confirmed, the Company began the shortlist evaluation. Because of the delay in evaluating offers PGE requested that all bidders who were under consideration at the time submit a best and final offer by mid-March. Bidders were informed at the time if their offers had met the minimum requirements of the RFP or were still under evaluation. No bidders lowered their offers, which was understandable in the current inflationary environment.

In addition, PGE worked with the IE and Staff to adjust the RFP schedule to account for the delay, essentially moving the proposed date for the Company to file the shortlist acknowledgement out by about a month.

Per the RFP, each bid was scored on price and non-price factors. The total bid score was weighted at roughly 81.2% for price and 18.8% for non- price factors. The non-price factors were defined as follows:

Table 3: Non-Price Factor Weighting

	Dispatchable Resources	Renewable Resources
Commercial Performance Risk	100	100
Transmission Plan		29
Level Capacity Ratio		59
Online Date	88	

Appendix N of the RFP laid out specific point values and requirements within each of these categories. The main category of commercial performance risk referred to edits to the term sheets provided in the RFP. Appendix N gave further direction as to how this category would be scored, allocating point values to specific sections, including credit, output, forecasting, payment, settlement, and more.

The price score was based on a comparison of the cost of the bid to the benefits of the bid. Costs differed based on the type of bid. For BTA bids the costs were:

(a) the revenue requirement needed to cover the project's capital cost,
(b) O&M costs,
(c) insurance, land lease and other services costs,

(d) network upgrade costs,

(e) any transmission services needed to deliver the power to PGE's territory, including wheeling, line losses, reserves, and balancing costs and,

(f) the value of tax credits. For the PTC this value was reduced for PGE-owned units due to the fact that PGE does not project to have the taxable income to fully use the PTC as it is earned. PGE presumed that any PTC earned would be carried forward as a deferred tax asset and used in the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**. The additional carrying cost for this asset was counted against the PGE-owned offer.

For PPA bids the costs included:

(a) the PPA price, and

(b) all applicable transmission costs.

On the benefits side PGE looked at three categories of benefits:

(a) Energy Value – This is the value of the energy that is being purchased from the unit. It is calculated by using the Company's forward price curve and the hourly unit dispatch projections from the bid using the AURORA production cost model.

(b) Capacity Value – This is the value of capacity from the project. The quantity of capacity provided by each offer was calculated by using the Sequoia model and the output projections, transmission service, location, and dispatch limitations from the bidder. The price of capacity was based on the cost of a new simple-cycle combustion turbine (SCCT).

(c) Flexibility Value –PGE used the values produced by its Resource Optimization Model (ROM) for the 2019 IRP to value dispatch flexibility.[13]

Costs and benefits were calculated on a real-levelized basis per megawatt-hour. Price scores were created by looking at the cost to benefit ratio. These approaches were laid out in the RFP.

A. RENEWABLE CATEGORY

Bates White independently verified the rankings in three ways. First, we reviewed each model on a line-by-line basis to make sure that the details of the bids were properly input and that all bids used the same default assumptions. Second, we reviewed the terms and conditions of the bids and compiled our own non-price scores. Third, we tested PGE's models by inputting key costs of each bid option into our own cost model, which determined an annual $/MWh annuity cost

[13] 2019 IRP, p 163.

for the bid option. Our simplified cost models were able to match PGE's models reasonably well, with small differences generally owing to the greater precision of PGE's modeling.

Renewable Category

Bids were separated into two categories, dispatchable (i.e. energy storage) and renewable. Hybrid offers (that is, storage and renewable resources) were considered in the renewable category. In the table below we show the offers from the renewable category. Some projects (most notably the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**) offered a mix of sources and ownership options under one project, so those are separated out here. The table below shows the total costs and benefits for each project, and Bates White's calculated cost, all on a real-levelized cost per MWh basis.

Table 4: Qualifying Renewable Projects

[Begin Highly Confidential] [redacted] **[End Highly Confidential]**

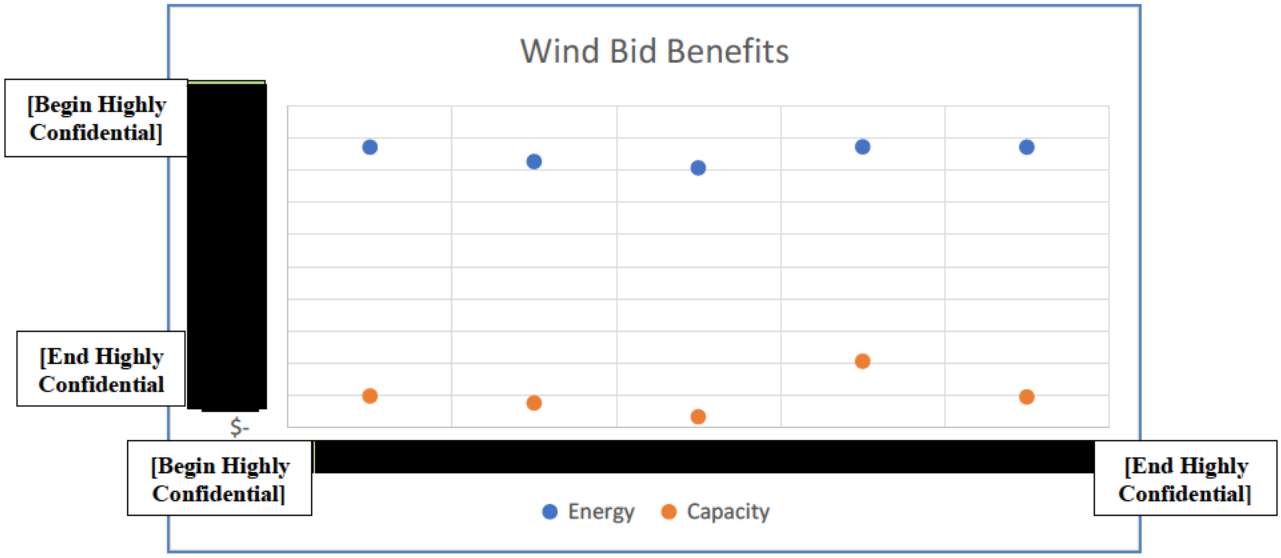
Bid Number	Technology	Transaction	Capacity (MW)
18.2.Base	Solar + Storage	PPA	100
	Solar + Storage	PPA	260
18.2.Alt_1	Wind	BTA	350
	Wind	PPA	340
18.2.Alt_2	Wind	BTA	350
	Solar + Storage	PPA	100
	Wind	PPA	340
	Solar	PPA	260
29.1.Base	Wind	BTA	350
29.3.Alt_1	Wind	PPA	313
29.3.Alt_2	Solar + Storage	PPA	150
29.3.Base	Solar + Storage	PPA	150
29.4.Alt_1	Solar	PPA	150
29.4.Alt_2	Solar + Storage	PPA	76
29.4.Base	Solar + Storage	PPA	76
29.5.Base	Solar	PPA	76
32.2.Base	Wind	PPA	90
	Wind	BTA	209
	Wind	PPA	103
31.1.Base	Wind	BTA	230
	Wind	PPA	120
	Solar	PPA	100
31.1.Alt_2	BESS	PPA	30
	Wind	PPA	120
	Wind	BTA	230
	Wind	BTA	350
31.1.Alt_1	Solar	PPA	100
	Solar	PPA	160
	BESS	PPA	30
34.4.Base	BESS	PPA	50
43.1.Alt_2	Solar	BTA	100
43.1.Base	Solar + Storage	PPA	120
43.2.Alt_2	Solar	PPA	120
43.2.Base	Solar + Storage	PPA	200
62.3.Alt_1	Solar	PPA	200
62.3.Alt_2	Solar	PPA	41
62.3.Base	Solar	PPA	41
62.4.Alt_1	Solar	PPA	41
62.4.Base	Solar + Storage	PPA	41
69.1.Alt_1	Solar + Storage	PPA	41
69.1.Base	Solar	PPA	100
	Solar + Storage	PPA	150

[End Highly Confidential]

We see here that the offers from **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** were the most beneficial offers as evidenced by their cost-benefit ratios. The **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** was the most valuable benchmark. There were a number of offers bunched at the breakeven cost/benefit ratio. The least competitive tier comes from a group of basic solar and wind PPAs.

To get a better sense of the valuation dynamics we grouped the bids into three basic categories (wind, solar and hybrid) and looked first at the benefits each project provided. The figure below shows the benefits PGE calculated for each wind project on a real-levelized $/MWh basis. Renewable resources without batteries have no flexibility value in PGE's scoring system.

Figure 1: Wind Offer Benefits (Real-Levelized $/MWh)

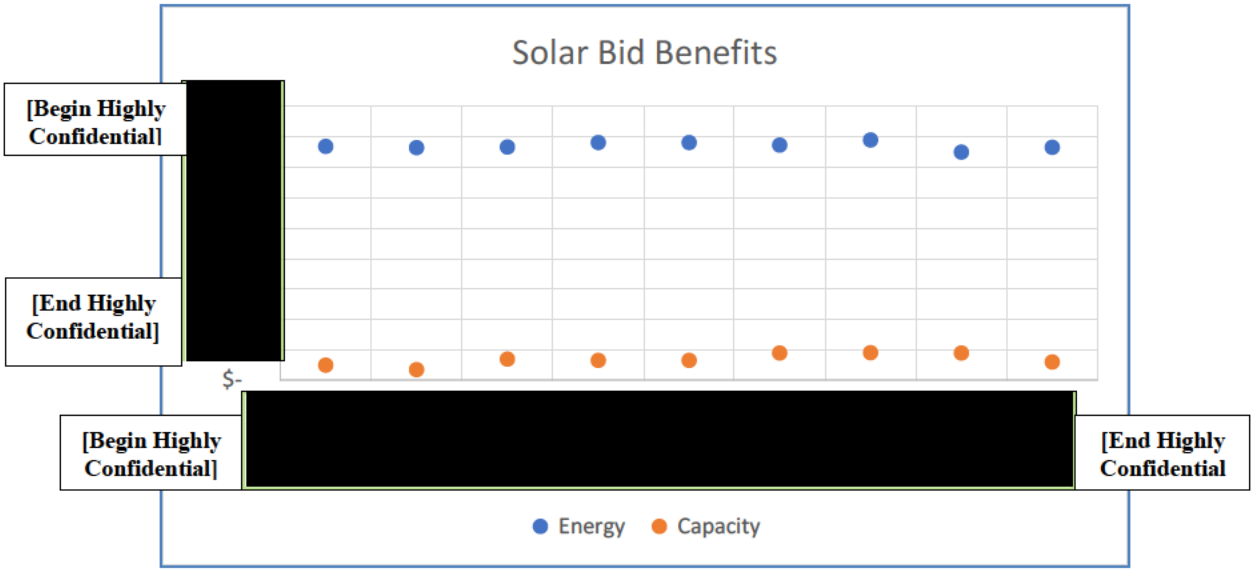


Here we see all five wind projects provided roughly similar energy benefits, as might be expected. On the capacity side the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** provides an relatively large capacity benefit. This is somewhat expected as the project has a high capacity factor and is located in Montana. PGE's Capacity Contribution Calculator, based on their IRP analysis, shows Montana wind as providing the highest capacity contribution – over 40% for the first 100MW – as compared to 12-26% for other locations.[14] **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**– again in line with Ione WA wind location as represented in the Calculator.

[14] See "Capacity Contribution Calculator (XLSX)" available at https://portlandgeneralrfp2021.com/documents/

For the solar offers, the benefits of each offer are shown in the next Figure.

Figure 2: Solar Offer Benefits (Real-Levelized $/MWh)

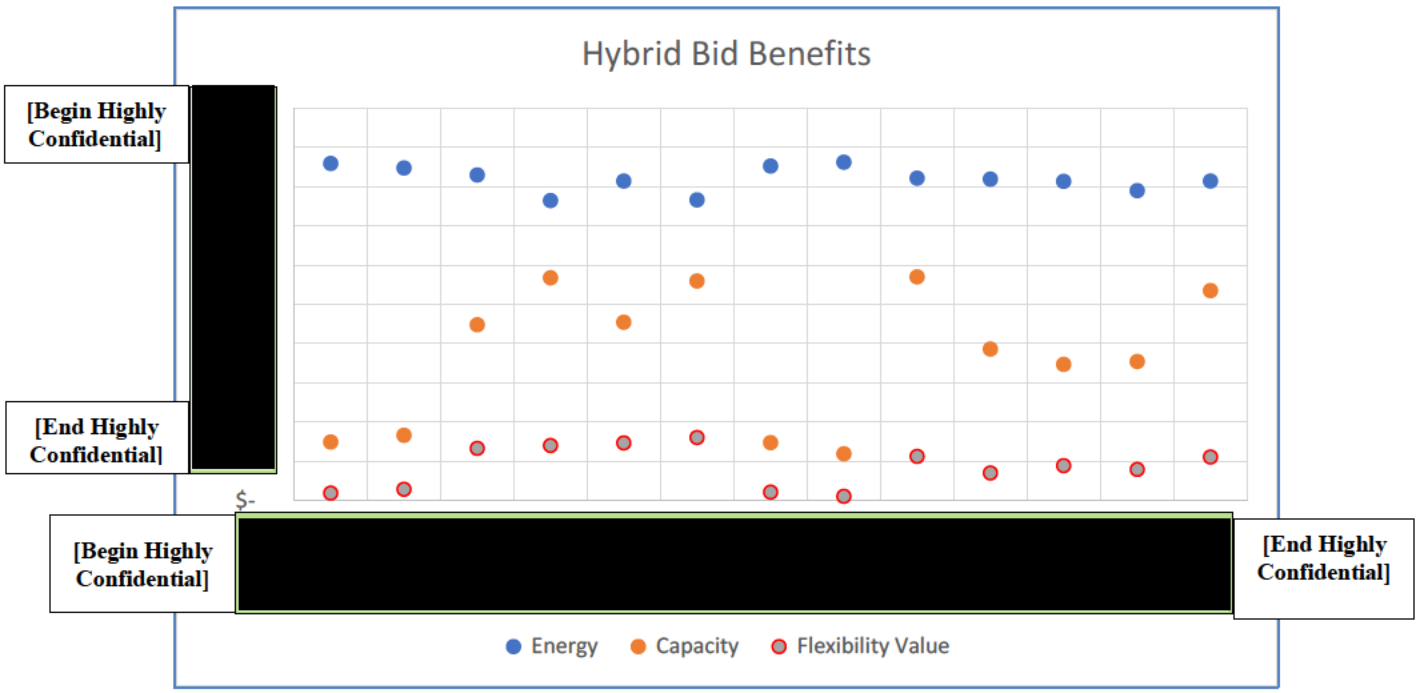


Again we see that the benefits are fairly consistent across each offer. The average energy value is a bit lower **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** than the wind offers – which are generally above **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**. The capacity contribution is also a bit more consistent and lower **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** than wind offers. This seems again to square up with PGE's Capacity Contribution Calculator, which assigns a fairly low value to standalone solar facilities (around 5%). Based on this contribution, absent any other information, we might expect solar bids to deliver lower benefits than wind offers.

The benefits for the hybrid offers are shown in the next Figure. Because these have BESS pairing they have some dispatchability function and therefore have flexibility value in addition to the energy and capacity value.[15]

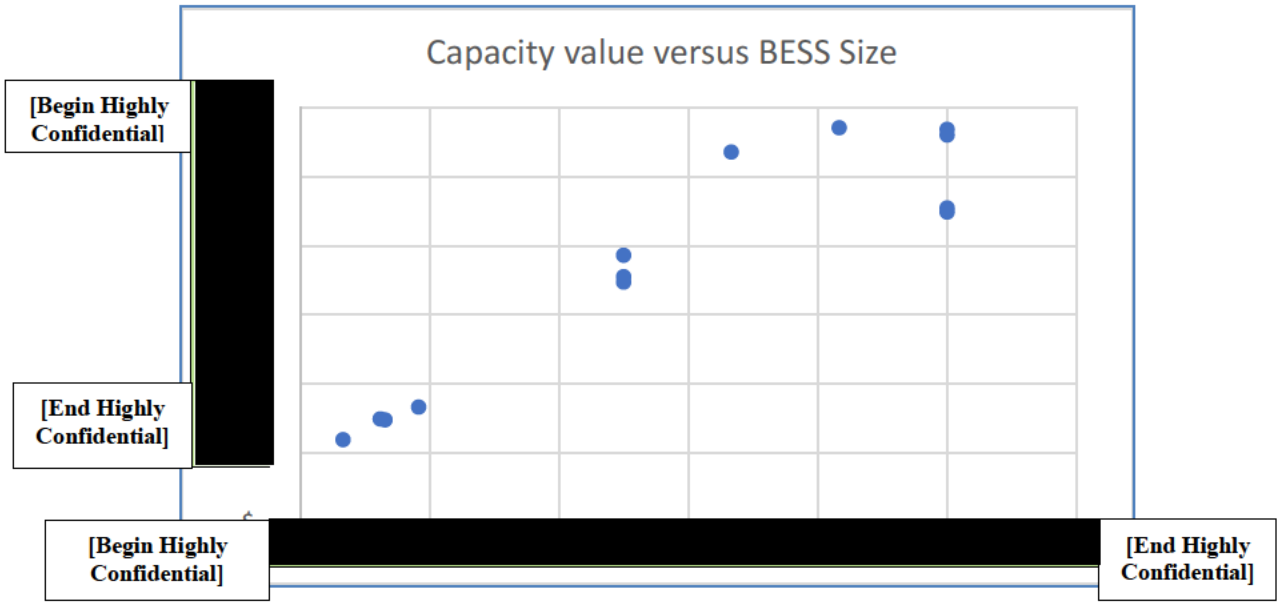
[15] Per PGE's method, BESS systems only have flexibility value when grid-charging.

Figure 3: Hybrid Offer Benefits (Real-Levelized $/MWh)



Here again the energy values are fairly consistent, but there is much more variability in the flexibility and capacity values, with some projects have low capacity values **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** and others have relatively higher values. Digging a little deeper reveals that this is generally a function of the size of the battery relative to the project as a whole. The next Figure shows the capacity value plotted against ratio of battery size to project capacity.

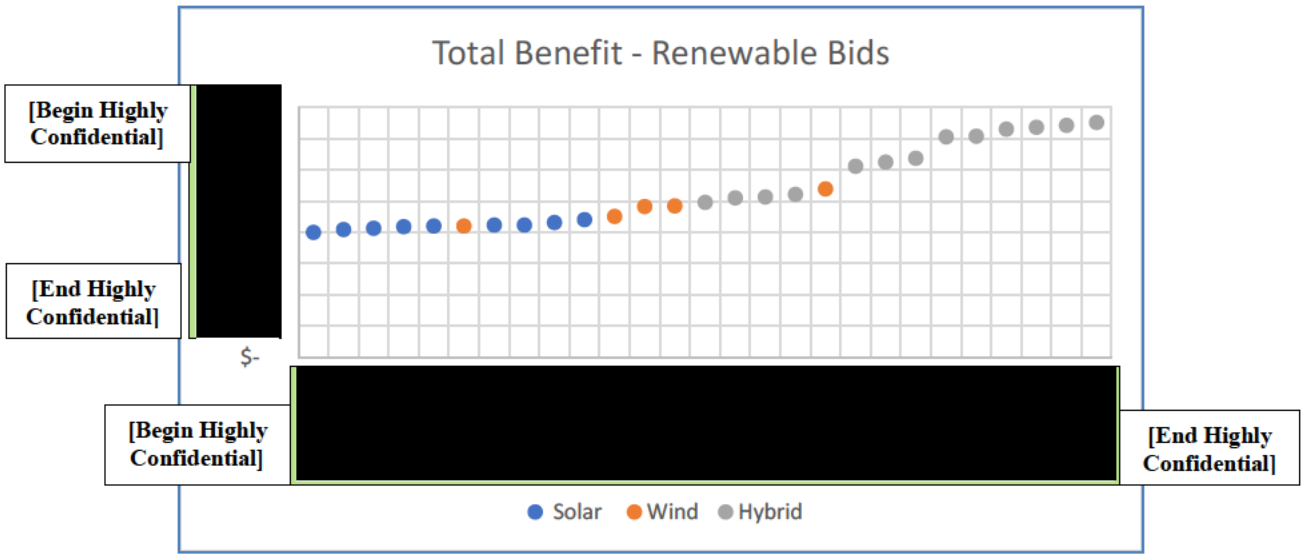
Figure 4: Capacity Value (Real-Levelized $/MWh) versus BESS size



While the relationship is not totally linear, it can be generally said that batteries which are close to the size of the generating resource deliver more value (on a per MWh basis). This is why a bid like the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

Looking at the total benefits we see that, as we might suspect, hybrid offers are generally more beneficial due to their capacity and flexibility contributions. The following Figure shows the total benefits for each offer.

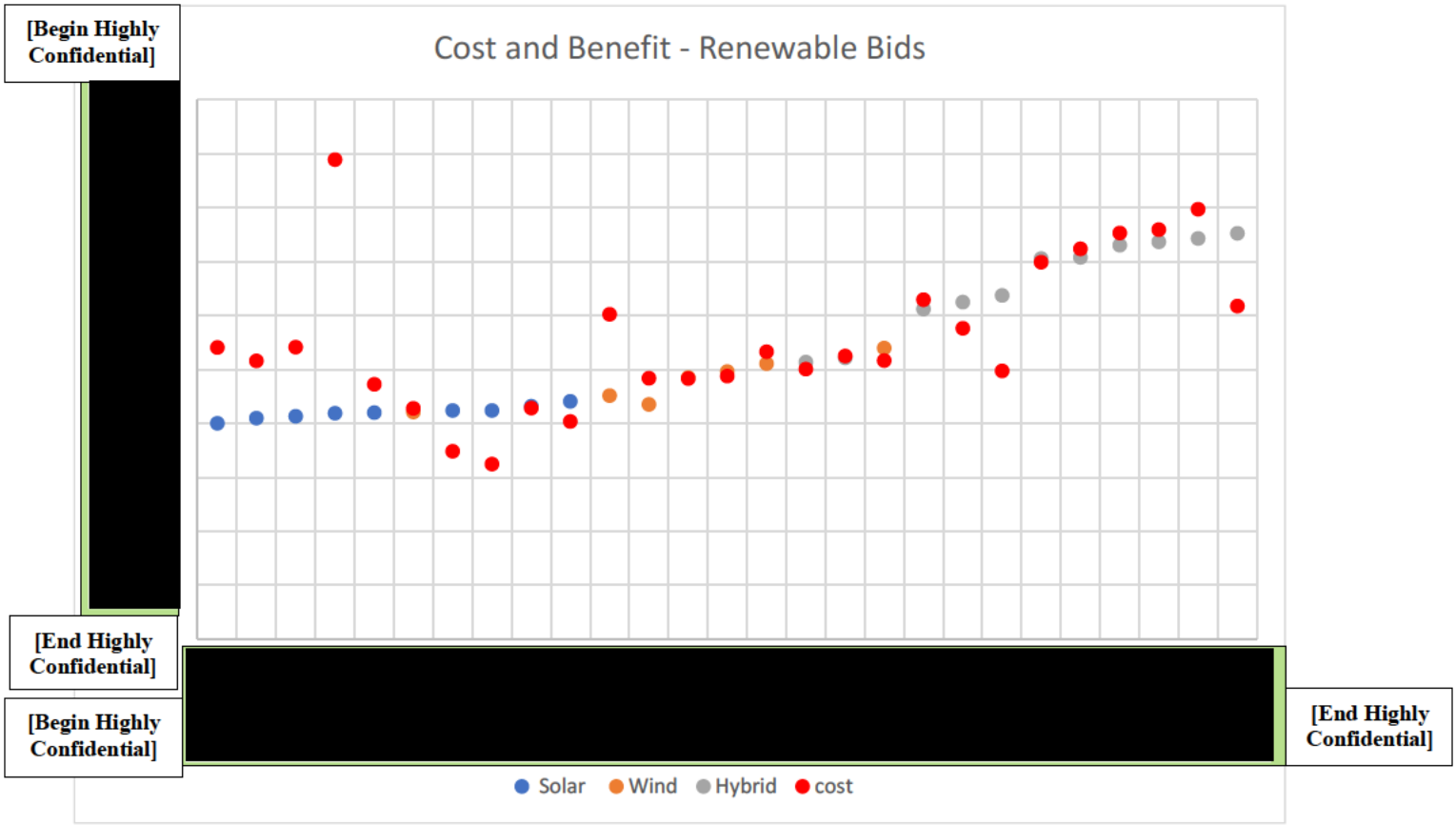
Figure 5: Total Benefits for Renewable Bids (Real-Levelized $/MWh)



The solar offers generally have the lowest benefit while the hybrid offers offer the highest benefit. Only the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** has a similar benefit to the hybrid offers due to its high capacity contribution.

Of course, this analysis does not include the cost of each offer. The next Figure adds the cost on top of this benefit.

Figure 6: Costs and Benefits for Renewable Bids (Real-Levelized $/MWh)



Here we see that costs have a rough relationship with benefits, but there are exceptions. **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

To complete its analysis PGE next converted its cost/benefit ratio to a price score, with the highest scoring bid receiving 812 points and lower scoring bids being discounted proportionately based on their difference from the lowest-scoring offer. PGE then added in the non-price score to get a total score for the offer. Non-price scores were determined by PGE's evaluation team based on the scoring metric in Appendix N. We independently scored the offers and while we had some differences between PGE's team, the differences were marginal (roughly less than 10% of the score in each direction, or about 10 points on a 1000 point scale). Putting both scores together produced the final bid rankings as shown below.

Table 5: Renewable Projects Rankings

[Begin Highly Confidential]

[redacted]

[End Highly Confidential]

PGE proposed to set the cutoff for the shortlist at the lowest scoring bid that still had a breakeven cost/benefit ratio. In this case that was bid **[Begin Highly Confidential]** [redacted]

[redacted]. **[End Highly Confidential]**

In looking at the proposed split we were looking to see that the shortlist, would; a) select the highest scoring bids per the RFP scoring rubric, b) feature a diversity of projects and bidders, c) include a mix of technologies and transaction types, d) have volume of at least 150% of the RFP need and e) feature a relatively clear split between the first and last bid selected.

We felt the proposed selection made sense as it used the RFP scoring mechanism, the scoring mechanism was reasonably applied, and it featured a mix of offers in terms of ownership, transaction and technology types. In addition, at roughly 600 MWa it more than fulfilled the RFP targets.

Because the lowest breakeven bid had a relatively weak non-price score it did open the door for some projects that have a higher cost-benefit ratio – if the bids were scored strictly on price there are six options that would not be included **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** We think this was acceptable as the bids were ranked per the RFP rules, reasonably scored, and the cutoff was more inclusive by this measure, leading to more bids on the shortlist.[16] We note that of the five included offers all but the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** have other options that would have been on the shortlist in any case.

The choice of cutoff resulted in a fairly minimal difference between the last bid in and the next project out **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** just 4 points on a scale of 1000. While this was not ideal, we think it was acceptable for a few reasons; a) the shortlist already contained a large amount of supply and a diversity of bid options and technologies, b) the rankings were done reasonably and according to the process laid out in the RFP[17] and c) subsequent portfolio modelling showed that bids in this range of cost/benefit (such as the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** options that were the last selected to the list) were generally not among the best performing options so there is minimal chance that these excluded options would have been shown to be part of the top-performing portfolios.

Per the RFP PGE also tested scoring sensitivities of 70/30 price/non-price and 90/10 price non-price. The latter resulted in no change in the top 18 selections. The former would affect one change, the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** would

[16] We also note that was in response to IE feedback. PGE had initially proposed to rank bids solely by cost-benefit ratio. We pushed them to include non-price scores per the RFP, which led to a larger shortlist.

[17] The **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** that just missed the list might have argued for a slightly higher non-price score to boost their chances but we agreed with the general range of scores that PGE determined and, in any case subsequent portfolio modelling showed they would not likely have been competitive.

replace one of the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** offers. This shows that the selection was relatively unaffected by the price/non-price split.

The renewable shortlist is below. It includes a total of 7 unique projects and represents roughly 600 MWa and 566 MW of capacity.

Table 6: Renewable Shortlist

[Begin Highly Confidential]
[redacted]
[End Highly Confidential]

B. DISPATCHABLE CATEGORY

For the dispatchable bids PGE conducted the same process. Because there were fewer offers here the scoring was a bit simpler. The table below shows the cost and benefit of the dispatchable offers. As we did with the other offers, we evaluated each offer and checked PGE's valuations with our own model. Because the bids had relatively low output our costs per MWh were a little more varied than the renewable offers, but the exercise still generally validated PGE's scoring.

Table 7: Dispatchable Offers

[Begin Highly Confidential]

Bid Number	Technology	Transaction	Capacity (MW)
16.1.Alt_1	Pumped Storage	PPA	
16.1.Alt_2	Pumped Storage	PPA	-
16.1.Base	Pumped Storage	PPA	
16.2.Alt_1	Pumped Storage	PPA	-
16.2.Base	Pumped Storage	PPA	-
43.3.Alt_1	BESS	PPA	100.00
65.1.Alt_1	Pumped Storage	BTA	400.00
65.1.Base	Pumped Storage	PPA	400.00
69.1.Alt_2	BESS	PPA	
9.3.Alt_1	BESS	PPA	175
9.3.Alt_2	BESS	PPA	150
9.3.Base	BESS	PPA	200
9.4.Alt_1	BESS	BTA	50
9.4.Base	BESS	BTA	75
9.5.Alt_1	BESS	BTA	100
9.5.Alt_2	BESS	BTA	75
9.5.Base	BESS	BTA	125

[End Highly Confidential]

From this table we can see that there were clear splits in value between the offers. The **[Begin Highly Confidential]** **[End Highly Confidential]** were clearly the lowest cost and most valuable offers. All BESS systems had similar benefits, as we would expect. The pumped storage projects have higher capacity values but also lower output. PGE shows BESS projects with an average capacity factor of about 13% versus between 3 and 10% for the pumped storage projects.

PGE then assigned price and non-price scores to the offers. The Final numbers are below.

Table 8: Dispatchable Offers

[Begin Highly Confidential]

Bid Number	Bidder	Project Name	Technology	Transaction	Capacity (MW)	Cost Benefit Ratio	Price Score	Non-price Score	Total

[End Highly Confidential]

With the inclusion of non-price scores the final ranking in the category is shown below. PGE proposed taking all battery offers from the **[Begin Highly Confidential]** **[End Highly Confidential]** This seemed reasonable as it provided an appropriate amount of capacity (about 500 MW of ELCC), there was a clear split in the scoring, and the inclusion of a pumped storage offer

provided additional diversity to the shortlist. Combined with the renewable shortlist these two lists represented 13 projects, 29 options, 599 MWa of renewable supply and 1,063 MW of capacity.

VII. PORTFOLIO MODELING

A. METHODOLOGY

While this process above lead to the shortlist that PGE is presenting for acknowledgement they did conduct additional portfolio modelling per the RFP. While PGE does not currently use the results of this modelling to narrow down their list of offers it still provides a fairly clear sense of which particular offers on the shortlist are the most valuable and what the potential benefits and risks might be for various portfolios.

Because of the sheer number of possible combinations with 29 bid offers, PGE created a methodology to narrow down the possible portfolios under consideration. They first looked at all combinations that a) contained no mutually exclusive offers (i.e. two variants from the same project), and b) did not exceed the renewable MWa target. PGE looked at three different levels of MWa target; a)180 MWa – representing the RFP target of 150 MWa plus supply for the GEAR program, b) 250 MWa, representing a Staff request made during the RFP process that looks for 215 MWa of supply plus GEAR program projects and c) a maximum amount of 400 MWa representing a more aggressive push toward meeting future renewable energy targets.

PGE used the price score of each offer to determine portfolio cost and added in generic wind (if the portfolio was short of meeting renewable targets in 2025) or capacity (if the portfolio was short of meeting capacity targets in 2025). PGE selected the top 50 performing portfolios under this method from each level of renewable supply target, for 150 portfolios overall. A final adjustment made was to ensure that each resource option on the shortlist was included at least once. The number of times each bid is selected is shown below along with its MWa (for renewable offers) or ELCC (for dispatchable offers). This can give us a rough idea of what bids we might see as being the top offers.

Table 9: Count of offers in each Portfolio

[Begin Highly Confidential]

Bid	Name	180 Mwa	250 Mwa	400 Mwa	Total	MWa/ELCC	Cost/Benefit Ratio
[redacted]							

[End Highly Confidential]

Here we see the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

On the dispatchable side the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** gets the greatest number of selections which also makes sense since it's the highest ranked battery (beyond the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**) in the cost/benefit analysis. Due to limitations on **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**, which is logical as they offer the most value.

B. MODELING RESULTS

Having selected the candidate portfolios PGE began the portfolio modelling process as described in the RFP. In this process PGE used the ROSE-E model to calculate the cost of the portfolios under a wide variety of future conditions - a process also used in the 2019 IRP. The ROSE-E model calculated the cost of a given portfolios through 2050 as a net present value of revenue requirements. Per the RFP ROSE-E was set to meet the carbon reduction goals of HB 2021 via generic wind additions as needed. The model also used generic capacity additions to meet reliability requirements.

ROSE-E looked at the costs of each of the 150 candidate portfolios under a variety of circumstances. This included reference, low and high cases for

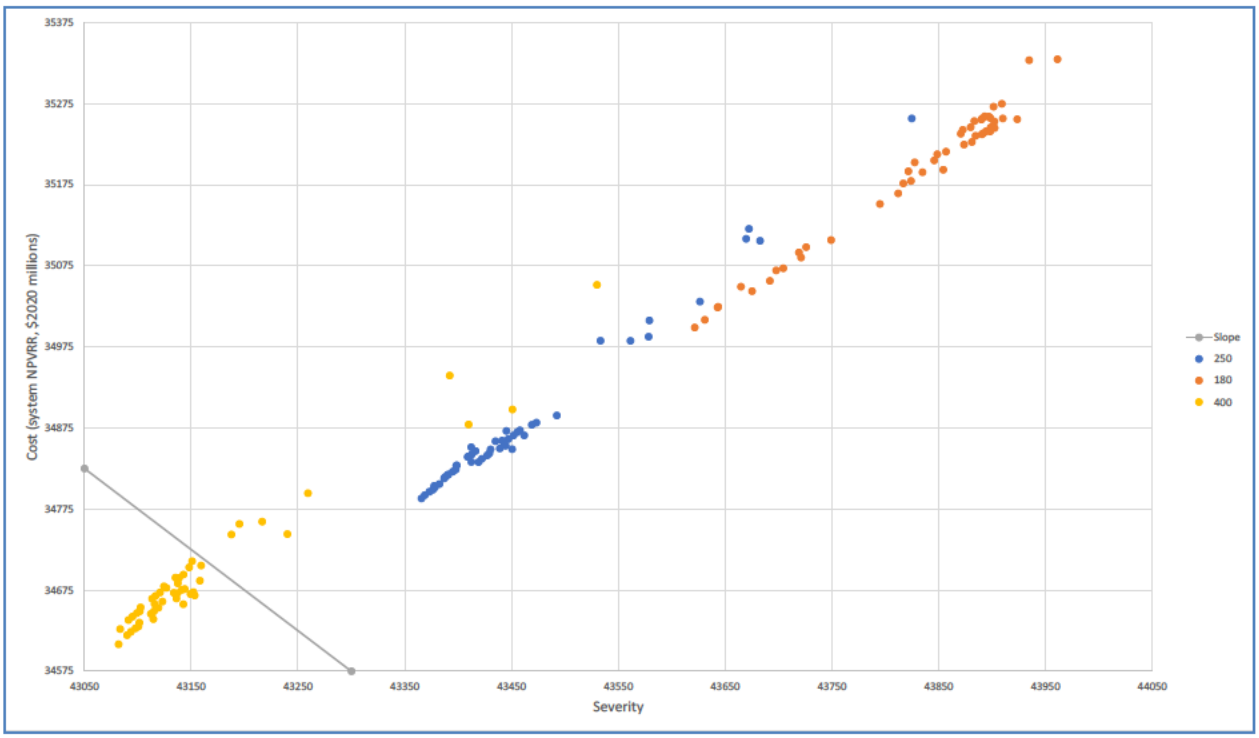
a. Load
b. Gas Prices
c. Hydro levels
d. Carbon Costs
e. Future Wind construction costs

In addition, PGE looked at reference and high cases for WECC-wide renewables buildout, which would affect wholesale market prices.

Per the RFP, PGE ranked each portfolio based on three traditional metrics, cost, variability and severity as described in the IRP.[18] As was done in the IRP, PGE created an "efficient frontier" (set with a slope of -1 to reflect an even tradeoff between risk and cost) below which would fall the best performing portfolios in terms of cost and variability. The following charts show this analysis - one graph plots the cost of each portfolio versus the severity of the portfolio (i.e. the cost at the 90th percentile). The graph uses different colors for the 180 MWa, 250 MWa and 400 MWa portfolios.

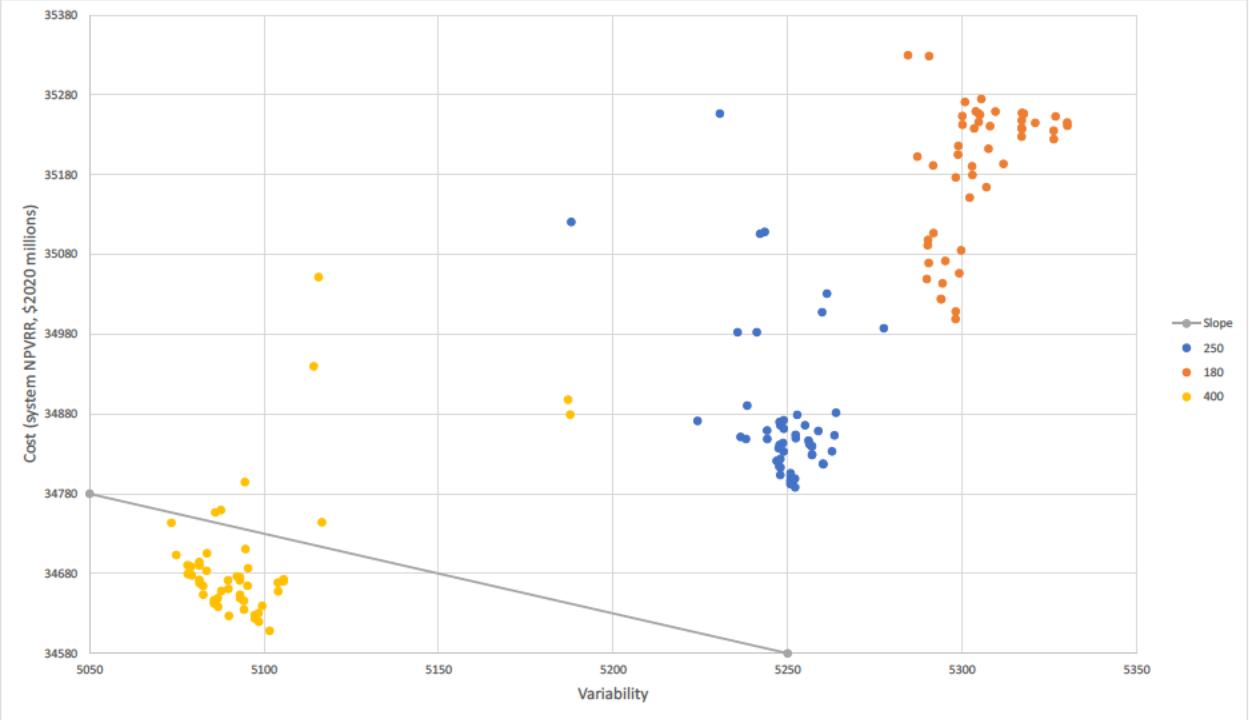
[18] IRP p 186-187.

Figure 7: Costs vs Severity for Portfolios



The next graph shows the cost versus the variability of the portfolio (i.e. the semi-deviation of the NPVRR relative to the reference case).

Figure 8: Costs vs Variability for Portfolios



Note that in both cases, the portfolios with highest levels of renewable supply had lower costs and risks than the portfolios with lower levels of supply, in fact there is a fairly visible and clear difference in the grouping of portfolios.

PGE then looked at portfolios that "passed" both tests (i.e. were under the "efficient frontier" dividing line) and ranked them on a weighed scale based 50% on reference case costs and 50% on standard deviation of costs over the sensitivity cases, assigning the best portfolio 812 points and deducting points for other portfolios based on the degree of divergence from the lowest-priced portfolio. PGE then added in the non-price scores of the bids in that portfolio (weighted by MW) to get a total portfolio score. This was all as described in Appendix N of the RFP.[19]

We note at the outset that because the portfolios made up just a small portion of PGE's supply and because many portfolios had similar resources, the differences in NPVRR were relatively small. Therefore the total scores of the portfolios were almost identical. All 41 portfolios that passed both efficient frontier tests scored within 7 points (on a scale of 0 to 1000). Below we show the top five scoring portfolios

[19] See p 18 of Appendix N. Note that this states that 700 points will be awarded for the top value portfolio, this was adjusted to 812 points to appropriately reflect the price-non-price split in the shortlist scoring process.

Table 10: Top Portfolios

[Begin Highly Confidential]

[redacted]

[End Highly Confidential]

This is generally aligned with the results from the shortlist process above. The top portfolios feature both **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** Because the renewable projects are mostly hybrid and therefore providing a good deal of capacity **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

This structure is generally followed throughout the portfolios which sit under PGE's "efficient frontier". The table below shows how many times each resource appears in an efficient frontier portfolio.

Table 11: Bids in Top Portfolios

Category	[Begin Highly Confidential] Bid	Name	Number of times in efficent frontier portfolios	Cost/Benefit Ratio
Renewable	[redacted]	[redacted]	41	96%
			40	82%
			40	78%
			34	98%
			17	102%
			13	92%
			8	103%
			8	92%
			7	100%
			6	99%
			3	99%
			1	103%
			1	77%
			1	82%
			0	104%
			0	101%
			0	100%
			0	97%
Dispatchable			18	104%
			12	103%
			11	111%
			8	135%
			0	131%
			0	135%
			0	130%
			0	101%
			0	135%
			0	139%
			0	168%
	[End Highly Confidential]			

Again, we see the same offers showing up repeatedly in the top portfolios, matching with the cost benefit analysis from earlier. The one noteworthy difference is the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

This analysis only considers larger renewable portfolios (i.e. those with 400 MWa of additions) because those have lower cost and risk per PGE's analysis. To see how bid selection might change with lower levels of renewable selection we adjusted PGE's efficient frontier lines so that more portfolios would be up for consideration. We then looked at the top scoring 250 MWa and 180 MWa portfolios. Below we show the top 5 scoring portfolios in the 250 MWa case

Table 12: Bids in Top 250 MWa Portfolios **[Begin Highly Confidential]**

[redacted]

[End Highly Confidential]

Here we see the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

We then looked at the 180 MWa offers. Here are the top five portfolios – again we note that scores were extremely close for many offers.

Table 13: Bids in Top 180 MWa Portfolios **[Begin Highly Confidential]**

[redacted]

[End Highly Confidential]

We see here the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** Interestingly, because renewable supply is more limited, the selection includes **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]**

Looking at all of this we see some general points to be made. First, the projects with the top cost/benefit ratios are generally selected first. Second, more capacity from the renewable side means less need for standalone storage. Third, at lower levels the cap on renewable supply can lead to some less straightforward decisions (e.g. using the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** as the models try and optimize the selected portfolio.

C. ADDITIONAL MODELING SENSITVITIES

The analysis furnished by PGE roughly matched the value provided by the bids in the initial scoring, showing that the bids with the lowest cost to benefit ratios were consistently the top performing portfolios. It also displayed a clear preference for a larger renewable purchase than contemplated in the RFP. To look into this a bit more closely we reviewed the detailed analysis produced by PGE.

As stated above, PGE looked at portfolio performance under a wide range of conditions, including changes in gas price, market buildout, load, technology cost and more. To see how these changes affected portfolio value we focused at a high level on the differences between the three renewable portfolio sizes (180 MWa, 250 MWa and 400 MWa).

We looked at the average net present value of revenue requirements (NPVRR) of each group of 50 portfolios under each portfolio size. The average is shown in the chart below for the reference case.

Table 14: Reference Case NPVRR - Average of 50 portfolios

Case	180	250	400
Reference	$ 35,189	$ 34,879	$ 34,694

Consistent with the findings above, we see that the 400 MWa portfolio is less expensive on a NPVRR basis than the 180 MWa case, specifically by $494 million.

We then looked at varying one element from the analysis to see what factor might most impact the optimal size of renewable purchase. The chart below shows the average NPVRR across all portfolios with the noted change from the reference case.

Table 15: Sensitivities from Reference Case - Average of 50 portfolios

Case	180	250	400	Difference (400-180)
Reference	$ 35,189	$ 34,879	$ 34,694	$ 494
Low cost wind	$ 32,434	$ 32,225	$ 32,227	$ 207
High cost wind	$ 37,771	$ 37,354	$ 36,989	$ 783
low need	$ 31,507	$ 31,192	$ 31,011	$ 496
high need	$ 39,513	$ 39,200	$ 39,013	$ 500
High WECC Buildout	$ 32,088	$ 31,870	$ 31,736	$ 352
High carbon adder	$ 34,465	$ 34,152	$ 33,958	$ 507
Low carbon adder	$ 37,583	$ 37,284	$ 37,120	$ 462
High Gas	$ 34,697	$ 34,357	$ 34,124	$ 573
Low Gas	$ 34,755	$ 34,444	$ 34,256	$ 499
Low Hydro	$ 39,215	$ 38,899	$ 38,700	$ 515
High Hydro	$ 32,134	$ 31,832	$ 31,663	$ 471

In every case the 400 MWa portfolio is, on average, the lowest cost portfolio. This does reinforce the findings of PGE, which determined that such portfolios were not only lower in cost but lower in variability and severity. Some items, while affecting overall portfolio cost, do not seem to materially change the relative difference between the portfolios. However, we see that higher WECC-wide buildouts and future lower cost wind projects do shrink the advantage of the larger portfolio by a good deal. This does make some logical sense as lower cost wind in the future (and lower market prices via a WECC wide buildout) would tend to lead toward a decision to buy less wind power now. In fact, if both effects are combined, the 250 MWa portfolio becomes the low-cost choice.

Table 16: High WECC Buildout/Low Wind cost NPVRR- Average of 50 portfolios

Case	180	250	400	Difference (400-180)
High buildout low cost wind	$ 29,537	$ 29,434	$ 29,488	$ 49

To further stress test this decision we looked at a "worst case" scenario with the above high buildout and low cost wind plus low gas prices, carbon costs and need.

Table 17: Stress Case Scenario- Average of 50 portfolios

Case	180	250	400	Difference (400-180)
Low need/low cost wind/high buildout/low gas/low carbon/high hydro	$ 26,276	$ 26,166	$ 26,261	$ 16

Here again, the 250 MWa purchase is lowest cost while the difference between the small and large portfolios is minimal. Again, this reinforces the point that certain conditions argue for a reduced renewable purchase.

PGE did conduct two additional sensitivities using the same general analysis as above. The first was to examine the effect of extending the PTC as proposed in recent legislation. This doesn't seem to affect the choice of bids, but it does have some impact on the difference in value between the three renewable purchase sizes. The table below shows the results of the reference case and each sensitivity.

Table 18: PTC Extension Results- Average of 50 portfolios

Case	180	250	400	Difference (400-180)
Reference	$ 32,118	$ 31,839	$ 31,755	$ 363
Low cost wind	$ 29,058	$ 28,849	$ 28,857	$ 201
High cost wind	$ 35,000	$ 34,651	$ 34,469	$ 532
low need	$ 29,573	$ 29,354	$ 29,423	$ 150
high need	$ 36,296	$ 36,008	$ 35,861	$ 435
High WECC Buildout	$ 29,437	$ 29,296	$ 29,336	$ 101
High carbon adder	$ 31,176	$ 30,870	$ 30,737	$ 439
Low carbon adder	$ 34,974	$ 34,755	$ 34,778	$ 196
High Gas	$ 31,321	$ 30,981	$ 30,754	$ 566
Low Gas	$ 33,018	$ 32,870	$ 32,957	$ 62
Low Hydro	$ 35,982	$ 35,679	$ 35,524	$ 458
High Hydro	$ 29,254	$ 29,002	$ 28,946	$ 309
High buildout low cost wind	$ 26,399	$ 26,314	$ 26,431	$ (33)
Low need/low cost wind/high buildout/low gas/low carbon/high hydro	$ 24,685	$ 24,675	$ 25,004	$ (319)

The reference case difference between large and small portfolios shrinks by over $130 million on a NPVRR basis. This makes sense as future wind projects would be even less expensive – removing a significant advantage that is gained in purchasing wind at the moment. The other drivers have similar effects as before. Now in the low cost wind and high buildout scenario the smaller portfolio becomes preferable to the large portfolio - though the 250 MWa purchase is better than both.

PGE also looked at a sensitivity where the cost of "fill" capacity was changed from that of a simple-cycle combustion turbine to the average cost of a BESS unit. This used data from this RFP to establish a new, and higher, cost for future capacity.

Table 19: High-capacity fill cost Results- Average of 50 portfolios

Case	180	250	400	Difference (400-180)
Reference	$ 35,540	$ 35,267	$ 35,086	$ 454
Low cost wind	$ 32,693	$ 32,514	$ 32,517	$ 176
High cost wind	$ 38,123	$ 37,742	$ 37,380	$ 743
low need	$ 31,578	$ 31,296	$ 31,118	$ 461
high need	$ 40,181	$ 39,905	$ 39,723	$ 458
High WECC Buildout	$ 32,437	$ 32,255	$ 32,124	$ 313
High carbon adder	$ 34,795	$ 34,516	$ 34,324	$ 471
Low carbon adder	$ 37,934	$ 37,672	$ 37,512	$ 423
High Gas	$ 34,955	$ 34,645	$ 34,413	$ 542
Low Gas	$ 35,106	$ 34,831	$ 34,648	$ 459
Low Hydro	$ 39,567	$ 39,287	$ 39,091	$ 475
High Hydro	$ 32,486	$ 32,220	$ 32,054	$ 431
High buildout low cost wind	$ 29,886	$ 29,819	$ 29,876	$ 10
Low need/low cost wind/high buildout/low gas/low carbon/high hydro	$ 26,347	$ 26,268	$ 26,365	$ (18)

The dynamic is similar here, though the deltas between low and high purchase cases does shrink some the general effects are similar to the other two cases.

Overall, these scenarios reinforce the risk factors inherent in the decision to purchase a greater supply of renewables at the present moment. Under general assumptions the decision would appear to be fairly simple as the larger portfolio is lower cost and generally robust. However, the risks to such a strategy hinge on the future cost and federal support of wind power and the level of market prices going forward (which would be affected by increased renewable development in the WECC). The more that we believe that wind subsidies are going away, wind prices are going up and that market buildout will not depress wholesale prices the more we would argue for a larger renewable buy.

Optimization Runs

In addition, as promised in the RFP, PGE conducted a set of what it termed "optimization runs" these are where the ROSE-E model was allowed to select a portfolio of offers from the entire candidate

list with the goal of producing the lowest cost portfolio. Under reference case assumptions the model selected the following portfolio.

Table 20: Reference Case Optimization Portfolio

[Begin Highly Confidential]

Bid Number	Name
[redacted]	

[End Highly Confidential]

This is generally as expected, the top offers in terms of value **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** are selected with the noteworthy change that the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** is now taken. As PGE's modelling was showing that more renewable supply would lower costs it is not too surprising to see this change.

As with the rest of the portfolio modelling, PGE looked at optimized portfolios under changes in load, future technology cost, carbon cost, hydro levels, WECC buildout and gas prices. PGE also examined a number of other sensitivity cases. These included the PTC extension and higher cost fill capacity (what they termed "CapFill" here) just as they did in the portfolio modelling above. In addition, they looked at combinations of PTC extension and higher cost filler capacity and scenarios where all 2025 need had to be met by resources from this RFP (here terms "No_Cap").

Table 21: Bid Count in Optimal Portfolios

[Begin Highly Confidential]

[redacted]

[End Highly Confidential]

Again, the general bid selection is something that we might have predicted looking at the cost/benefit ratios of the offers. The most selected bids are the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** Beyond this we see a few other findings.

- **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** This suggests that its selection in the 400 MWa case was more about it fitting in under the imposed renewable cap and that, at least under the model's view, even more renewable supply is preferred in many cases.
- In the PTC extension case, not only does demand for the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** but fewer bids in total are selected. In several individual cases the optimization model selects no options at all from this set of RFP bids. Those tend to be cases in which factors drive down the value of selecting renewable facilities (low future tech costs, low gas prices and need, high WECC buildout, and so forth) so this result makes intuitive sense.

- Higher costs of fill capacity also bring in more selections, all else equal. For example, the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** project is also selected often in these cases.
- When trying to fill the entire 2025 need from the bids selected the model tends to drop the **[Begin Highly Confidential]** [redacted] **[End Highly Confidential]** among other options.

Generally, these runs reinforce the results in the basic portfolio modelling as well as the shortlist modelling and ranking of the offers.

D. NON-TRADITIONAL METRICS

PGE also provided a small number of what are termed "non-traditional" metrics. These metrics come from the 2019 IRP.[20] Specifically, PGE provided a) the year 2025 rate impact in the refence case for all 150 candidate portfolios and b) the CO2 emission reductions.

PGE shows that, on average, the larger renewable portfolios will have a higher rate impact in the reference case. The table below shows the average and median rate increase in 2025 across each group of 50 candidate portfolios for a given renewable purchase level.

Table 22: 2025 Rate Impact (average across portfolios)- Reference Case

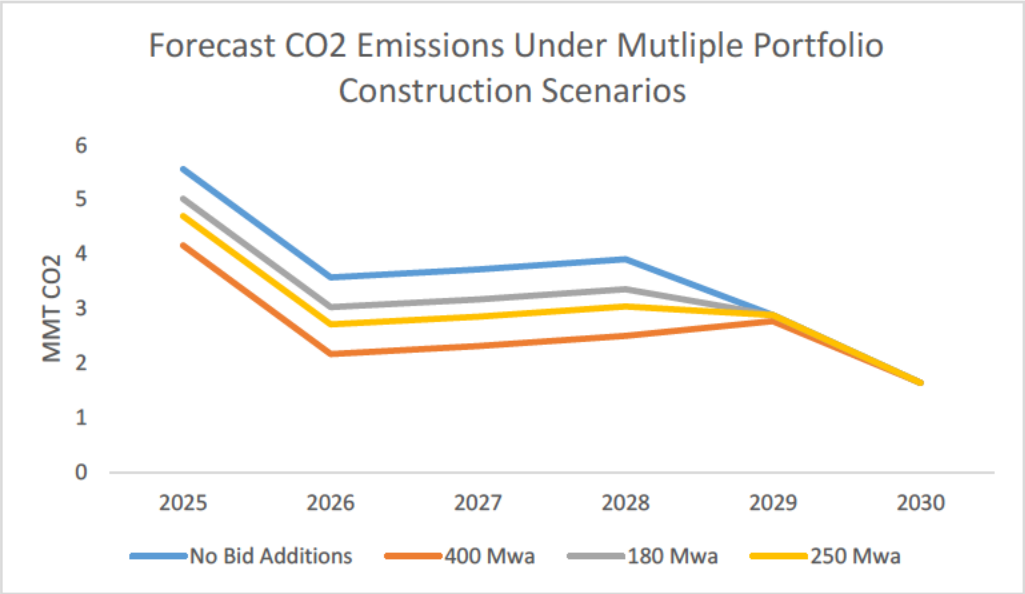
Portfolio	Average	Median
180 MWa	7.0%	6.2%
250 MWa	9.4%	9.6%
400 MWa	11.0%	11.1%

This shows that, on average, the larger renewable buy also results in the larger cost increase in the short-term. This may argue for a smaller renewable buy despite the generally larger forecast savings above. We note that this only looks at reference case conditions and it would be useful to see performance under other states of the world. We would encourage PGE to provide this data so that others can gain insight from it.

PGE also provided reductions in carbon dioxide emission across the portfolios. As expected, greater reductions come from higher renewable portfolios.

[20] 2019 IRP, p 187.

Table 23: Forecast Reference Case Reductions



Because each model run will add renewable supply to hit 2030 targets the results do converge, but reductions in the near term are greater with a larger renewable buy. Under reference case conditions, the 400 MWa portfolio reduces about 860,000 metric tons more of carbon dioxide per year than the 180 MWa portfolio.

We note that PGE's IRP also examined reductions in other GHG and new resource criteria pollutants. We would encourage PGE to provide that information in this docket as well. While the information would likely have no bearing on the rank order of bids it might shed additional light on the tradeoffs between larger and smaller renewable portfolios.

CERTIFICATE OF SERVICE

I certify that I filed a true and correct copy of **Portland General Electric Company's Request for Acknowledgment of the Final Shortlist of Bidders in the 2021 All -Source Request for Proposals and Final Closing Report prepared by Bates White, the Independent Evaluator** was served on the parties listed below via electronic mail and/or overnight delivery in compliance with OAR 860-001-0180.

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UM 2166

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Dated this 5th of May 2022.

Danielle McCain

Danielle McCain
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