Portland General Electric Company
Legal Department
121 SW Salmon Street • 1WTC1301 • Portland, OR 97204
Phone 503-464-8544 • Fax 503-464-2200
portlandgeneral.com

Erin Apperson
Assistant General Counsel II
Erin.Apperson@pgn.com

July 5, 2022

Via Electronic Filing

Public Utility Commission of Oregon
Attention: Filing Center
201 High Street Southeast, Suite 100
Post Office Box 1088
Salem, Oregon 97308-1088

Re: UM 2166 – In the Matter of Portland General Electric Company 2021 All-Source Request for Proposals – Errata Page Number Correction

Dear Filing Center:

Enclosed for filing today in the above-referenced docket is Portland General Electric Company's ("PGE") Pagination and Formatting changes to PGE's Errata filing on May 25, 2022.

It came to our attention that the page numbers and formatting were misaligned between the May 25, 2022 Errata Filing and the original May 5, 2022 filing and is making that administrative correction in this filing. PGE is making this administrative correction to the May 25, 2022 page numbers and formatting.

Thank you in advance for your assistance.

Sincerely,

Erin Apperson
Assistant General Counsel II

EA:dm
Enclosure

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

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[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 80% 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).

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 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.

metric (a cost to benefit ratio less than 100 percent). This methodology resulted in the final shortlist selection of nine renewable projects with eighteen total project variations. Considering only the best bid variants for each project, the renewable final shortlist for renewables includes enough projects to generate 434 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.

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	[redacted]	206	133
		27	Wind	WA	Hybrid	[redacted]	212	82
		28	Solar + Wind + Battery	WA	Hybrid	[redacted]	303	177
29	3	14	Solar + Battery	WA	PPA	[redacted]	37	64
		15	Solar + Battery	WA	PPA	[redacted]	41	91
	4	16	Solar + Battery	OR	PPA	[redacted]	19	34
31	1	9	Solar + Wind + Battery	WA	Hybrid	[redacted]	137	64
		10	Solar + Wind + Battery	WA	Hybrid	[redacted]	179	103
		11	Wind	WA	Hybrid	[redacted]	113	42
32	2	12	Wind	MT	Hybrid	[redacted]	136	109
43	1	17	Solar	OR	PPA	[redacted]	34	9
		18	Solar + Battery	OR	PPA	[redacted]	36	80
	2	19	Solar	OR	PPA	[redacted]	57	15
		20	Solar + Battery	OR	PPA	[redacted]	58	87
62	3	22	Solar	OR	PPA	[redacted]	11	4
		23	Solar	OR	PPA	[redacted]	11	4
	4	24	Solar + Battery	OR	PPA	[redacted]	11	16
		25	Solar + Battery	OR	PPA	[redacted]	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	[redacted]	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 40/60 price, non-price weighting. This sensitivity analysis demonstrates

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

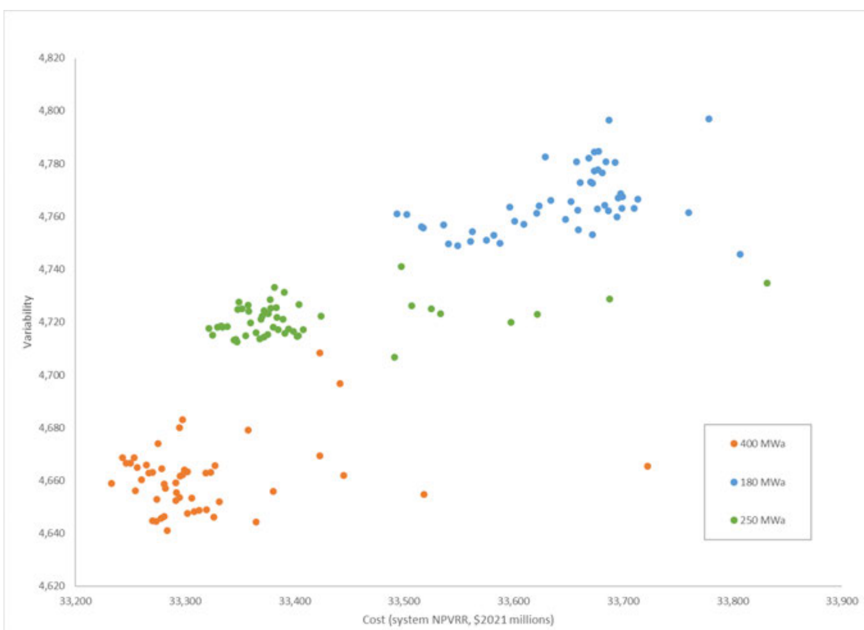
Portfolio Name	Bid Numbers Included in Portfolio	2025 MWa	Rank
	[Begin Highly Confidential]		
P_1	[redacted]	374	1
P_3	[redacted]	375	2
P_18	[redacted]	363	3
P_4	[redacted]	374	4
P_12	[redacted]	374	5
	[End Highly Confidential]		

Table 6: Renewable Bid Count in Top Performing Portfolios

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

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 most studied economic futures when compared to the "No Bid Addition" portfolio.

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

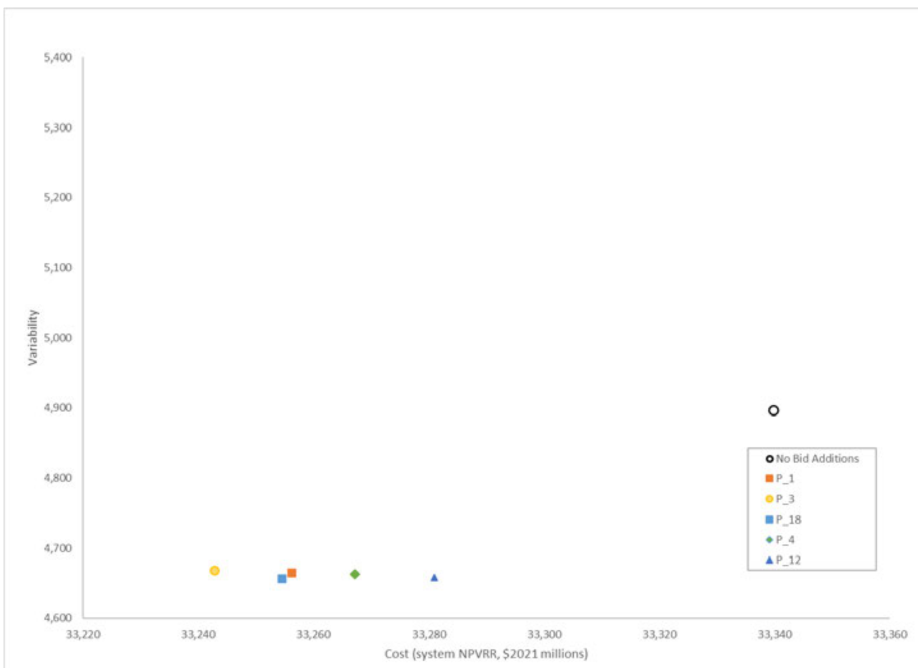
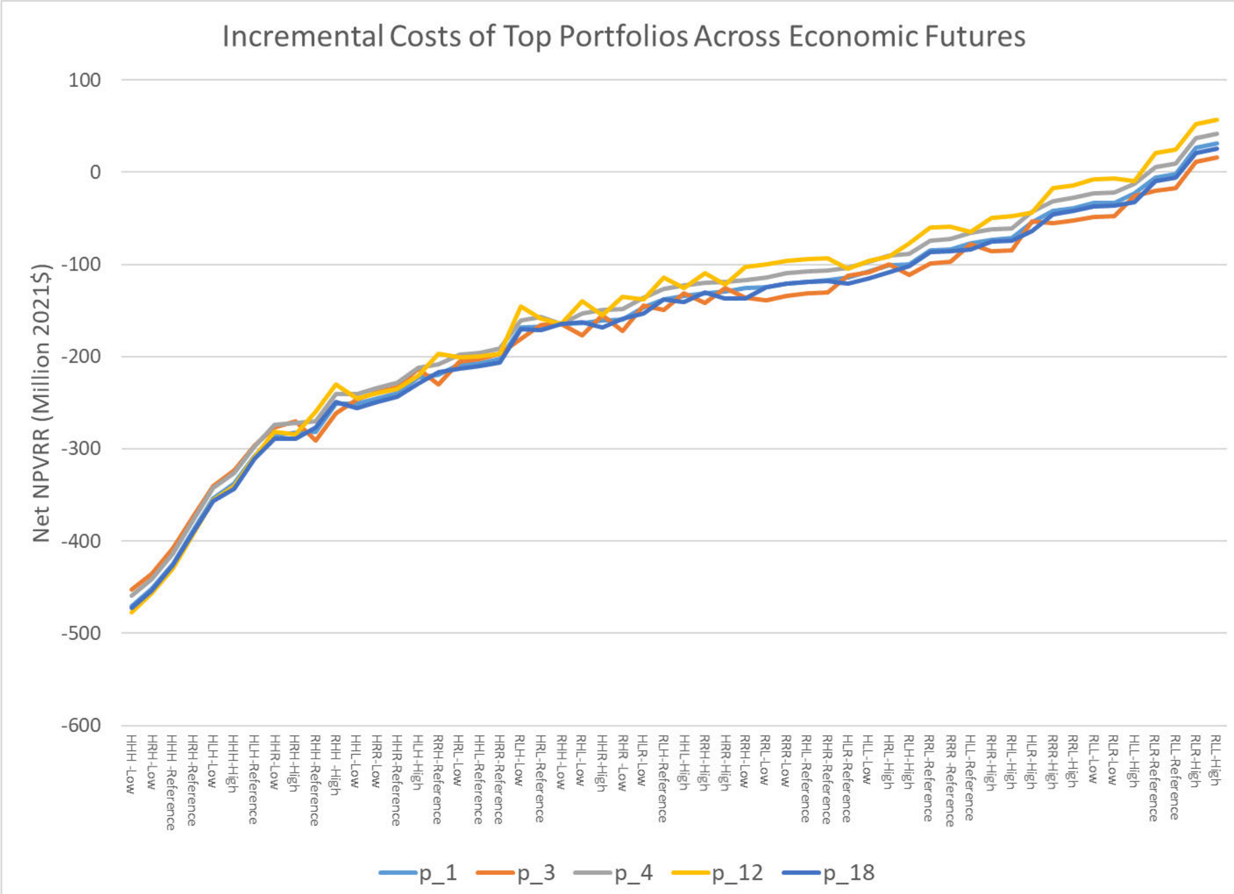


Figure 4: Top Five Portfolios Net NPVRR Across Economic Futures



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.

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[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$)	33,644	33,409	33,316	34,017	33,822	33,732
Average Variability (Million 2021$)	4,766	4,721	4,661	4,918	4,874	4,793

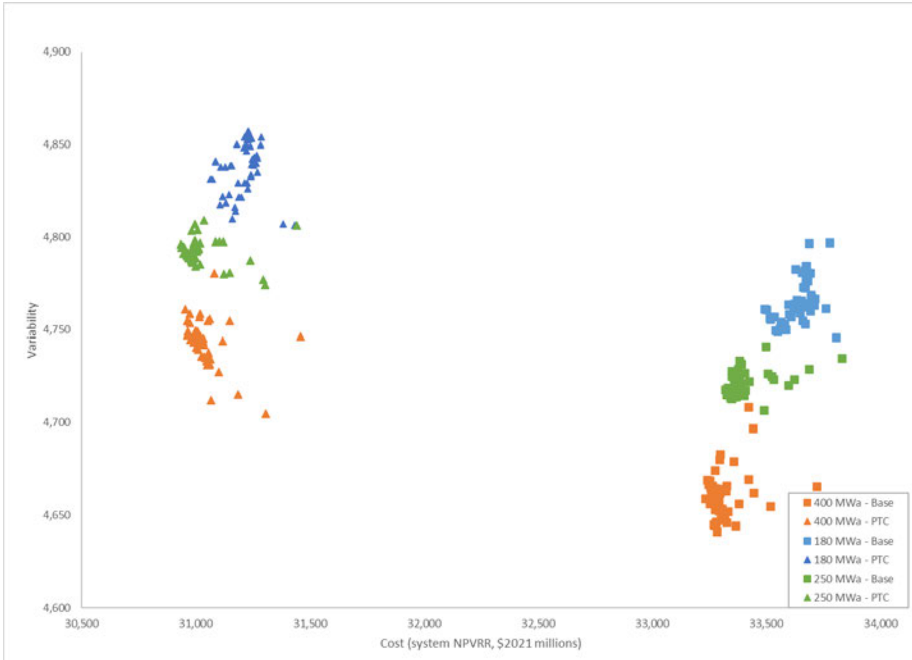
[25] The capacity fill resource is treated as a proxy to the possible cost to obtain capacity through bilateral negotiations with counterparties in the region. Capacity fill is used to ensure resource adequacy of portfolios by filling the gap between system capacity need and the amount of capacity supplied 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 7.1.% ($2,367 million), and variability is increased by 1.6% ($75 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.

[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	33,644	29,927
250 MWa	33,409	29,775
400 MWa	33,316	29,756

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	33,188	33,757	30,783	31,275	33,397	31,023
Variability	4,617	4,800	4,814	4,944	4,691	4,845
Severity	40,965	41,729	38,686	39,418	41,283	39124
2025 Bid MWa	355	354	102	239	443	232
2025 CapFill	173	129	315	163	-	-
2025 Bid MW	1,144	1,244	482	894	1,884	1,144
2030 GenWind MW	1,982	1,986	5,000	5,000	1,763	5,000
2030 Total Renewable MW	3,126	3,230	5,482	5,894	3,647	6,144
2030 CapFill	736	691	395	243	525	77
2030 GenWind MWa	789	791	1,991	1,991	702	1,991
2030 Total MWa	1,142	1,142	2,093	2,228	1,142	2,223

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 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	5.9%	5.9%	5.4%
250 MWa	5.7%	5.5%	5.4%
400 MWa	7.1%	7.1%	6.7%

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.