

October 18, 2021

Public Utility Commission of Oregon Attn: Filing Center 201 High Street, S.E. P.O. Box 1088 Salem, OR 97308-1088

RE: UM 1893 – PGE's Energy Efficiency Avoided Cost Submission

Portland General Electric Company (PGE) submits this compliance filing pursuant to Oregon Administrative Rule (OAR) 860-030-0011. Please see the attached pages for PGE's energy efficiency avoided cost submission. This filing updates for final PGE 2019 Update Integrated Resource Plan inputs. PGE also appreciates Staff's understanding of the circumstances of this compliance filing being late.

Please direct any questions or comments regarding this filing to Santiago Beltran Laborde at (503) 464-7902.

Please direct all formal correspondence and requests to the following email address pge.opuc.filings@pgn.com.

Sincerely,

\s\ Robert Macfarlane

Robert Macfarlane Manager, Pricing & Tariffs

Enclosure cc: Anna Kim, OPUC

INSTRUCTIONS Page 1

Energy Efficiency Avoided Cost Submission Template - Electric

Utility Name: PGE

Submission Date: 18-Oct-21

Instructions and Definitions

- Please fill out this workbook completely and per the instructions and submit via electronic filing to docket UM 1893. Submissions are due October 15 of each year.
- Inputs will be reviewed and approved by the OPUC before being sent to the Energy Trust of Oregon for use in Avoided Cost development
- Provide as much detail as possible when sourcing data inputs, including the link to the source (if available), page number and table or graph number.
 This will increase the efficiency of this process and require less iteration during the OPUC review period.

Required pages 1,2,3,4 refer to data presented in the most recently acknowledged IRP, IRP Update, or General Rate Case unless otherwise noted.

1) Global Inputs - IRP

- Most components of the avoided costs are input into this tab including inflation/discount rates, line losses, risk reduction values, T&D deferral values, and generation deferral values
- Identify the winter & summer peak periods for Transmission and Distribution. The Generation LOLP Map will be utilized for generation peak definitions.
- <> If necessary, Energy Trust will work with each utility about sector definitions for T&D for which values to provide for Res, Com, and Ind
- Ensure that the dollar years of the data inputs match the source Energy Trust will inflate to the proper year
- Please provide the values in the most recently acknowledged IRP

2) Forward Market Prices - IRP

- Provide forward market price forecast by month for both high load hours and low load hours
- Please provide the dollar amount of these prices that is associated with carbon costs (or %). If it is a dollar value, this is a subset of the total prices provided The total forward market prices should be the FULL price, including carbon
- Indicate if the forecast is in nominal or real dollars (and what dollar year if real)
- Please provide the values in the most recently acknowledged IRP

3) LOLP - IRP

- Input a 12x24 Loss of Load Probability heat map per the example in the worksheet
- These will be potentially utilized in future iterations of avoided cost updates pending outcome of UM1893
- Include heat maps for all days, weekdays only, and weekends only
- Please provide the values in the most recently acknowledged IRP

4) RPS Compliance - IRP

- Input RPS compliance costs by year
- Please provide the values in the most recently acknowledged IRP

1a, 2a, 3a, 4a) Alternative Submissions

- Use these worksheets to provide alternative values to the most recently acknowledged IRP values
- Provide a rationale for submitting the alternative values in the box provided at the top of each alternative worksheet
- If a second set of alternative values is submitted, simply copy the alt tabs necessary and rename to 1b, alt 2 in the tab name

October 18, 2021 1) Global Inputs IRP Page 2

Global Assumptions Inputs				SOURCING									
	Units	Value	Dollar	Sauras	Saures Dage #		vith sourcing including a link. Ensure that dollar years listed here are the same as	the source. Source Notes					
Avoided Cost Element	Units	value	Year	Source	Source Page #	Table # (if applicable)	Source Link or File Name	Source Notes					
Inflation Rate	Percent	2.05%	N/A	2019 IRP	341	I-4	https://www.portlandgeneral.com/-/media/public/our-company/energy- strategy/documents/2019-integrated-resource-plan.pdf?la=en	Second Quarter 2018 Global Insight long-term forecast					
Real Discount Rate	Percent	4.41%	N/A	2019 IRP	341	1-4	https://www.portlandgeneral.com/-/media/public/our-company/energy-strategy/documents/2019-integrated-resource-plan.pdf?la=en	After-Tax Real Cost of Capital, calculated from Nominal Weighted After-Tax Cost of Capital and Long-Term General Inflation.					
Designal Act Credit	Doroont	10.00%	N/A										
Regional Act Credit	Percent	10.00%	N/A										
Transmission Loss Factor	Percent	1.90%	N/A	BPA Open Access Transmission Tariff, Effective Date: October 1, 2019	143		https://www.bpa.gov/transmission/Doing%20Business/Tariff/Documents/bpa- oatt-TC-20-settlement-tariff-100119.pdf	Real Power Loss factor for one segment of BPA transmission. This factor is for the losses external to PGE's system for avoided energy purchases, generation capacity, and risk value. Thi factor does not apply to the PGE Tranmission in the Transmission Deferral Credit.					
Distribution Loss Factor, Commercial	Percent	4.15%	N/A	2015 GRC (UE 283) Line Loss Study (the most recent loss study)			Workpaper "LineLoss2015GRC_Dist_Commercial.xlsx"	Internal loss factor for Commercial loads based on weighted average of primary and secondary losses from the 2015 GRC Line Loss Study.					
Distribution Loss Factor, Industrial	Percent	1.45%	N/A	2015 GRC (UE 283) Line Loss Study (the most recent loss study)	1		"2015 GRC losses.pdf"	Internal loss factor from study for loads with subtranmission delivery voltage.					
Distribution Loss Factor, Residential	Percent	4.74%	N/A	2015 GRC (UE 283) Line Loss Study (the most recent loss study)	1		"2015 GRC losses.pdf"	Internal loss factor for loads with secondary delivery voltage.					
Risk Reduction Value	\$/MWh	\$3.00	2020	2019 IRP			Workpaper "EE_RiskCalc_2019IRP.xlsx"	Risk reduction value calculated from 2019 IRP values.					
Nisk Reddelion value	P/1414411	75.00	2020	F-9-2			Trompage: EE_marcare_E025mi .nax	NANT COURT OF THE CONTROL OF THE CON					
Transmission Deferral Credit	\$/kW-yr	\$9.38	2019	2019 GRC (UE 335)			Workpaper "T&D 2019.xlsx"	2019 GRC, most recently approved GRC filing. TransmissionDeferralCredit = (TransmissionRevReq/TransmissionCOSPeak)					
Seasonal Capacity Split - Summer	Percent	50.00%	N/A	PGE analysis			Workpaper "Alt T&D Seasonal Capacity Split Calculation.xlsx"	PGE analysis of month-hour average net system load					
Seasonal Capacity Split - Winter	Percent	50.00%	N/A	PGE analysis			Workpaper "Alt T&D Seasonal Capacity Split Calculation.xlsx"	PGE analysis of month-hour average net system load					
Summer Peak Period Definition	Month/Day/Hour	N/A	N/A					Day is intended to be weekday or weekend					
Winter Peak Period Definition	Month/Day/Hour	N/A	N/A					Day is intended to be weekday or weekend					
Deficiency start year	Year	2022	N/A	See Source Note				The year 2022 reflects PGE's understanding of the default value being the first year of Energy Trust's EE calculations. PGE may calculate an alternative transmission deficiency start year for future filings, but did not for this filing.					
								2019 GRC, most recently approved GRC filing.					
Distribution Deferral Credit	\$/kW-yr	\$24.39	2019	2019 GRC (UE 335)			Workpaper "T&D 2019.xlsx"	Distribution Deferral Credit = (Subtransmission Rateclass Peak) + (Substation Marginal Cost Revenues/Subtransmission Rateclass Peak) + (Substation Rateclass Peak) + (Substation Rateclass Peak)					
Seasonal Capacity Split - Summer	Percent	50.00%	N/A	PGE analysis			Workpaper "Alt T&D Seasonal Capacity Split Calculation.xlsx"	PGE analysis of month-hour average net system load					
Seasonal Capacity Split - Winter	Percent	50.00%	N/A	PGE analysis			Workpaper "Alt T&D Seasonal Capacity Split Calculation.xlsx"	PGE analysis of month-hour average net system load					
Summer Peak Period Definition	Month/Day/Hour	N/A	N/A					Day is intended to be weekday or weekend					
Winter Peak Period Definition	Month/Day/Hour	N/A	N/A					Day is intended to be weekday or weekend					
Deficiency start year	Year	2022	N/A	See Source Note				The year 2022 reflects PGE's understanding of the default value being the first year of Energy Trust's EE calculations. PGE may calculate an alternative distribution deficiency start year for future filings, but did not for this filing.					
Generation Capacity Credit	\$/kW-yr	\$109.74	2020	2019 IRP Update	Appendix D pg. 66			2019 IRP Update net cost of capacity.					
	Percent	50.00%	N/A	Per previous assumption.				This is the seasonal capacity split used by Staff in the December 2018 process. PGE may calculate an alternative seasonal capacity split for future filings, but did not for this filing.					
Seasonal Capacity Split - Winter	Percent	50.00%	N/A	Per previous assumption.				This is the seasonal capacity split used by Staff in the December 2018 process. PGE may calculate an alternative seasonal capacity split for future filings, but did not for this filing.					
Deficiency start year	Year	2022	N/A	2019 IRP	288	Table G-2		2019 IRP Reference Case and not before the first year of Energy Trust's calculations.					
				1									
RPS Compliance Cost	\$/MWh	\$ -	2020	2019 IRP Errata Filing	5	Figure ES-3		In the 2019 IRP, there was no incremental cost of wind (SE Washington) net of capacity value and energy value. Figure ES-3 is a correction to Figure 6-8 (2019 IRP, pg 169).					
Avoided RPS Compliance Obligation	%	0.00%	N/A										

Forward Price Inputs

Real or Nominal?	Nominal	
Dollar Year:	n/a	
Carbon Prices Additive?	Embedded in Market Prices	
Carbon Value Units (\$/MWh or \$/Ton)		NOTES:
Source and Pg #:		Please provide notes as to how this value relates to forward market prices. It can be expressed as a percentage of forward market prices, a set \$/MWh, or
Source Link or File Name:	https://assets.ctfassets.net/416ywc1laqmd/7JkfpRUwMrqCwfKsxAPG3g/9703398aa3212f8532ffb5ced616af87/2019- irp-update-04-20-2021.pdf https://downloads.ctfassets.net/416ywc1laqmd/6KTPcOKFILvXpf18xKNseh/271b9b966c913703a5126b2e7bbbc37a/2019-Integrated-Resource-Plan.pdf	
Source Hotesi	Reference Case wholesale market energy prices. Reference Case carbon prices based on revised 2017 IEPR GHG Price Projections published 1-16-18. Monthly wholesale electricity prices provided in a separate confidential file.	

		MONTHLY	MONTHLY	MONTHLY	MONTHLY			ANNUAL		ANNUAL	AN	INUAL
Year	Date	Wholesale Market Energy HLH Total (\$/MWh)	Wholesale Market Energy LLH Total (\$/MWh)	HLH Carbon Cost (\$/MWh) (OR % of HLH Price that accounts for Carbon?)	LLH Carbon Cost (\$/MWh) (OR % of LLH Price that accounts for Carbon?)	Year	Wholesale ! HLH Total (\$	Market Energy 5/MWh)	Wholesale (LLH Total (\$	Market Energy /MWh)	Carbon emissions pr	rice (2016\$ per metric
	2021	1/1/2021 See annual values in column J.	See annual values in column K.	See annual values in column L.	See annual values in column L.		2021 \$	22.24370	\$	20.35362	\$	19.23
	2021	2/1/2021					2022 \$	27.57735	\$	25.56327	\$	21.54
	2021	3/1/2021					2023 \$	29.33467	\$	27.13473	\$	24.12
	2021	4/1/2021					2024 \$	30.05606	\$	27.99766	\$	27.00
	2021	5/1/2021					2025 \$	34.63262	\$	32.44540	\$	30.23
	2021	6/1/2021					2026 \$	38.43854	\$	36.48604	\$	33.85
	2021	7/1/2021					2027 \$	41.17516	\$	39.60451	\$	37.89
	2021	8/1/2021					2028 \$	43.63792	\$	41.42858	\$	42.41
	2021	9/1/2021					2029 \$	48.73010	\$	46.53935	\$	47.47
	2021	10/1/2021					2030 \$	53.38453	\$	51.00181	\$	53.16
	2021	11/1/2021					2031 \$	57.11590	\$	54.42091	\$	53.16
	2021	12/1/2021					2032 \$	58.55053	\$	56.39139	\$	53.16
	2022	1/1/2022					2033 \$	61.35701	\$	59.22680	\$	53.16
	2022	2/1/2022					2034 \$	62.48383	\$	60.59137	\$	53.16
	2022	3/1/2022					2035 \$	65.14589	\$	63.66627	\$	53.16
	2022	4/1/2022					2036 \$	66.72611	\$	63.86703	\$	53.16
	2022	5/1/2022					2037 \$	70.04333	\$	67.72553	\$	53.16
	2022	6/1/2022					2038 \$	72.49436	\$	70.18811	\$	53.16
	2022	7/1/2022					2039 \$	77.49499	\$	74.82826	\$	53.16
	2022	8/1/2022					2040 \$	81.02692	\$	78.27897	\$	53.16
	2022	9/1/2022					2041 \$	83.42006	\$	81.53713	\$	53.16
	2022	10/1/2022					2042 \$	84.52806	\$	82.37352	\$	53.16
	2022	11/1/2022					2043 \$	87.12884	\$	84.74205	\$	53.16
	2022	12/1/2022					2044 \$	87.80494	\$	84.90371	\$	53.16
	2023	1/1/2023					2045 \$	90.66831	\$	88.32225	\$	53.16
	2023	2/1/2023					2046 \$	91.82549	\$	89.46242	\$	53.16
	2023	3/1/2023					2047 \$	94.69240	\$	91.31284	\$	53.16
	2023	4/1/2023					2048 \$	94.65621	\$	92.90396	\$	53.16
	2023	5/1/2023					2049 \$	98.43631	\$	96.35654	\$	53.16
	2023	6/1/2023					2050 \$	99.90013	\$	96.53753	\$	53.16

Loss of Load Probability Heat Map Input

NOTE: This is utilitized for generation defferals only.

Source and page #:2019 IRP Update

Source Link or File Name:

https://assets.ctfassets.net/416ywc1laqmd/1P08IYJsHee3RCPYsjbuaL/b80c9d6277e678a845451eb89f4ade2e/2019-IRP-update.pdf

Source Notes: Page 36

Heatmap for Weekdays/Weekends only was developed using a heuristic approach, since Sequoia does not explicitly report weekdays or weekends. It is assumed that ratio of LOLP for Total to Weekday/Weekend remains **Notes:** constant

WEEKDAYS & WEEKENDS

Hr Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0.513086	0.156428571	0.003129	0	0	0	0	0	0	0	0.031286	0.544371
8	1.571586	0.5183	0.002086	0	0	0	0	0	0	0	0.081343	1.297314
9	2.166014	0.469285714	0.001043	0	0	0	0	0	0	0	0.083429	1.651886
10	1.294186	0.183542857	0	0	0	0	0_	0	0	0	0.041714	0.938571
11	0.874957	0.064657143	0	0	0	0_	0	0.001043	0	0	0.027114	0.669514
12	0.543329	0.031285714	0	0	0	0	0.001043	0.015643	0.002086	0	0.022943	0.468243
13	0.2774	0.011471429	0	0	0	0.001043	0.005214	0.101157	0.006257	0	0.012514	0.307643
14	0.184586	0.008342857	0	0	0	0.006257	0.025029	0.314943	0.022943	0	0.011471	0.231514
15	0.171029	0.020857143	0	0	0	0.0146	0.0949	1.045986	0.056314	0	0.018771	0.209614
16	0.307643	0.028157143	0	0	0.001043	0.018771	0.129314	0.471371	0.158514	0	0.025029	0.378557
17	1.420371	0.090728571	0	0	0.001043	0.028157	0.263843	0.793614	0.126186	0	0.1752	1.998114
18	1.882357	0.322242857	0.001043	0	0.001043	0.0292	0.283657	1.217014	0.305557	0	0.307643	1.864629
19	3.119186	0.6716	0.002086	0	0.001043	0.047971	0.5037	1.996029	0.507871	0	0.538114	2.691614
20	2.907486	0.679942857	0.003129	0	0.002086	0.063614	0.772757	1.609129	0.331629	0	0.451557	2.228586
21	1.882357	0.482842857	0	0	0.001043	0.037543	0.440086	2.468443	0.1387	0	0.261757	1.310871
22	0.930229	0.2555	0	0	0	0.008343	0.113671	0.825943	0.133486	0	0.106371	0.558971
23	0.002086	0.001042857	0	0	0	0	0	0	0	0	0	0
24	0.001043	0	0	0	0	0	0	0	0	0	0	0

WEEKDAYS Only

Hr Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0.508234	0.155487	0.003115	0	0	0	0	0	0	0	0.031137	0.540174
8	1.54312	0.51077	0.002069	0	0	0	0	0	0	0	0.080532	1.280774
9	2.117069	0.459104	0.001016	0	0	0	0	0	0	0	0.081533	1.618816
10	1.238941	0.176406	0	0	0	0	0	0	0	0	0.039842	0.891276
11	0.818175	0.060685	0	0	0	0	0	0.001038	0	0	0.024994	0.618687
12	0.503758	0.029075	0	0	0	0	0.001039	0.015578	0.00208	0	0.020245	0.427774
13	0.255865	0.010792	0	0	0	0.001021	0.005187	0.100475	0.006228	0	0.010583	0.278757
14	0.171245	0.007946	0	0	0	0.006025	0.024877	0.311518	0.022791	0	0.009279	0.211503
15	0.160479	0.0201	0	0	0	0.013831	0.093963	1.026834	0.055599	0	0.015126	0.189735
16	0.286755	0.027152	0	0	0.001025	0.016906	0.126917	0.438964	0.154873	0	0.02007	0.34353
17	1.329749	0.087402	0	0	0.001019	0.024593	0.257117	0.729432	0.118066	0	0.150819	1.862281
18	1.716832	0.31054	0.000892	0	0.001005	0.024453	0.275115	1.103164	0.285886	0	0.261222	1.673774
19	2.85104	0.645542	0.001759	0	0.000993	0.03731	0.483693	1.791974	0.476035	0	0.475261	2.489665
20	2.689007	0.650377	0.002625	0	0.001944	0.047292	0.740465	1.445216	0.308874	0	0.406445	2.082508
21	1.761215	0.461851	0	0	0.000942	0.028648	0.42169	2.329396	0.133209	0	0.234777	1.234341
22	0.878129	0.244935	0	0	0	0.005461	0.109755	0.787174	0.131679	0	0.094529	0.529693
23	0.002056	0.000966	0	0	0	0	0	0	0	0	0	0
24	0.001028	0	0	0	0	0	0	0	0	0	0	0

WEEKENDS Only

Hr Ending	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0.004851	0.000942	1.33E-05	0	0	0	0	0	0	0	0.000149	0.004198
8	0.028466	0.00753	1.63E-05	0	0	0	0	0	0	0	0.000811	0.01654
9	0.048945	0.010182	2.67E-05	0	0	0	0	0	0	0	0.001895	0.033069
10	0.055245	0.007137	0	0	0	0	0	0	0	0	0.001872	0.047295
11	0.056782	0.003972	0	0	0	0	0	4.93E-06	0	0	0.00212	0.050827
12	0.03957	0.00221	0	0	0	0	4.08E-06	6.44E-05	5.91E-06	0	0.002697	0.040468
13	0.021535	0.000679	0	0	0	2.18E-05	2.7E-05	0.000682	2.92E-05	0	0.001931	0.028886
14	0.013341	0.000397	0	0	0	0.000232	0.000152	0.003425	0.000152	0	0.002193	0.020011
15	0.010549	0.000758	0	0	0	0.000769	0.000937	0.019152	0.000716	0	0.003645	0.01988
16	0.020887	0.001005	0	0	1.77E-05	0.001865	0.002397	0.032408	0.003641	0	0.004959	0.035027
17	0.090623	0.003327	0	0	2.42E-05	0.003564	0.006726	0.064183	0.00812	0	0.024381	0.135834
18	0.165525	0.011703	0.000151	0	3.83E-05	0.004747	0.008543	0.11385	0.019671	0	0.046421	0.190855
19	0.268146	0.026058	0.000327	0	4.96E-05	0.010661	0.020007	0.204054	0.031837	0	0.062853	0.201949
20	0.218479	0.029566	0.000503	0	0.000142	0.016323	0.032293	0.163913	0.022754	0	0.045112	0.146077
21	0.121143	0.020992	0	0	0.000101	0.008895	0.018395	0.139047	0.005491	0	0.02698	0.076531
22	0.0521	0.010565	0	0	0	0.002882	0.003916	0.038769	0.001806	0	0.011843	0.029279
23	2.99E-05	7.72E-05	0	0	0	0	0	0	0	0	0	0
24	1.52E-05	0	0	0	0	0	0	0	0	0	0	0

RPS Compliance Inputs IRP

Real or Nominal?	Real
Dollar Year:	2020
Source and Pg #:	2019 IRP Errata Filing, pg 5, Figure ES-3. This is a correction to Figure 6-8 in the 2019 IRP (pg 169).
Source Link or File Name:	https://www.portlandgeneral.com/-/media/public/our-company/energy-strategy/documents/2019-integrated-resource-plan.pdf?la=en
Source Notes:	In the 2019 IRP, there was no incremental cost of wind (SE Washington) net of capacity value and energy value.

	RPS Compliance Cost (\$/MWh)	Avoided RPS Compliance Obligation (%)
202	1\$	20.00
202	2 \$	20.00
202	23 \$	20.00
202	.4 \$	20.00
202	25 \$	27.00
202	16 \$ ·	27.00
202	.7 \$	27.00
202	28\$	27.00
202	9\$	27.00
203	30 \$	35.00
203	1\$	35.00
203	32 \$	35.00
203	33\$	35.00
203	34 \$	35.00
203	15 \$	45.00
203	36 \$	45.00
203	37 \$	45.00
203	88\$	45.00
203	9 \$	45.00
204	10\$	50.00
204	11\$	50.00
204	12 \$	50.00
204	13 \$	50.00
204	14 \$	50.00
204	15 \$	50.00
204	16 \$	50.00
204	17 \$	50.00
204	18 \$	50.00
204	19 \$	50.00
205	50 \$	50.00