



Portland General Electric
121 SW Salmon Street • Portland, Ore. 97204
PortlandGeneral.com

June 29, 2018

Via E-mail and U.S. Mail

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

Re: PGE's Senate Bill 101 Estimate of 2020 CO₂ Reduction

Pursuant to Oregon Administrative Rule 860-085-0050, Portland General Electric Company (PGE) submits the attached report presenting estimates of the impacts to customer rates, including analysis methods and assumptions used, for meeting the following Oregon energy consumption-based greenhouse gas emission reduction goals by January 1, 2021,¹ pursuant to Senate Bill 101 (SB 101):

- a) 10% below 1990 levels and,
- b) 15% below 2005 levels.

The portfolios that reach the 1990 less 10% target in this report are constructed with one objective in mind – meeting the greenhouse gas reduction targets described in OAR 860-085-0050 – and do not fully take into account other important factors that must be considered, such as resource diversity, system reliability, and customer affordability. The impact to customers' rates should also consider the cost of existing and expected complementary efforts which are embedded in PGE's 2021 costs, such as RPS compliance, energy efficiency initiatives, net-metering and related programs funded by utility customers that reduce greenhouse gas emissions.

If you have any questions please call me at (503) 464-7805 or Lynn Latendresse at (503) 464-8370. All formal correspondence and requests should be directed to pge.opuc.filings@pgn.com.

Sincerely,


Stefan Brown,
Manager, Rates & Regulations

SB:np
Enclosures

¹ Pursuant to conversations with and agreement from OPUC Staff, PGE's analysis assumes a January 1, 2021, compliance date to correspond with the planned discontinuation of coal operations at Boardman by year-end 2020.

PGE's 2018 SB 101 Report

Filed Pursuant To OAR 860-085-0050

1. BASE YOUR ANALYSIS ON ATTAINING THE GREENHOUSE GAS EMISSION REDUCTION GOALS ON JANUARY 1, 2020.

Modeling approach:

- In November 2010, the OPUC acknowledged PGE's 2009 IRP Action Plan, which called for the cessation of coal-fired operations at Boardman by year-end 2020 (the "Boardman 2020" plan).
- To maintain consistency with the Boardman 2020 plan and PGE's 2016 SB 101 Report, this report presents portfolios that achieve the greenhouse gas reduction goals beginning January 1, 2021.
- PGE's acknowledged 2016 IRP identified a mix of demand-side actions, bilateral negotiations for mid-term capacity contracts, and an RFP for renewable resources to come online by 2021. In PGE's 2016 IRP Update, which was acknowledged in 2018, PGE reported that the bilateral negotiation process had successfully resulted in contracts for 300 MW of capacity and reported no need for additional actions beyond those identified in the 2016 IRP to meet resource needs in the 2021 time frame.
- Consistent with PGE's acknowledged 2016 IRP and 2016 IRP Update, the base portfolio utilized in this report incorporates the demand-side actions acknowledged in the 2016 IRP, the 300 MW of capacity contracts executed to meet the 2021 capacity needs, and a 100 MWa addition (using wind as a proxy resource) in 2021 representing PGE's acknowledged renewable action.
- In 1990, PGE served approximately 60% of its retail load from non-CO₂-emitting generation sources, specifically from nuclear and hydroelectric resources. Since then, the nuclear plant has closed and PGE has lost access to a significant portion of our mid-Columbia hydro contracts, while our retail loads increased by more than 25%. Given this background, and consistent with PGE's 2016 SB 101 Report, we also compare emissions in these portfolios to two alternative targets:
 - A '1990 less 10%' emissions goal after normalizing for these non-emitting resources by assuming their generation resulted in CO₂ emissions at the rate specified in #2 below.
 - A '2005 less 15%' emissions goal.
- The portfolio resources rely on existing technology as identified in PGE's 2016 IRP and 2016 IRP Update. The technical and financial implementation of these model portfolios for the 1990 target could, however, prove challenging due to the magnitude and type of investments.

- All predictable costs/impacts related to the assumed new resource portfolios are included; cost assumptions are based on the 2016 IRP and 2016 IRP Update.¹

2. FOR ELECTRICITY SUPPLIED THROUGH NET MARKET PURCHASES, STANDARD OFFER SALES, AND ELECTRICITY SERVICE SUPPLIERS, UTILIZE 900 POUNDS CO₂ PER MWH (LOOSELY BASED ON USEPA AP-42 FOR NATURAL GAS COMBUSTION), UNLESS A DIFFERENT SOURCE AND ENVIRONMENTAL IMPACT CAN BE DEMONSTRATED.

Modeling approach:

- 900 pounds CO₂ per MWh is used for net market purchases.

3. FOR RATE IMPACT ESTIMATION COMPARE THE PORTFOLIO WHICH MEETS THE GREENHOUSE GAS EMISSION REDUCTION GOAL (CO₂ GOAL PORTFOLIO) TO YOUR IRP PREFERRED PORTFOLIO.

Modeling approach (as detailed in #1 above):

PGE tested two Goal Portfolios, which are described below:

- Goal Portfolio 1 – this portfolio reduces emissions to 10% below 1990 levels by procuring incremental renewable resources in 2021 (248 MWh), thereby avoiding emissions through offsetting net market purchases. To estimate rate impacts, these renewables are modeled as a fixed real price PPA for wind that qualifies for 100% of the PTC.
- Goal Portfolio 2 – this portfolio reduces emissions to less than the 10% below 1990 goal by curtailing coal-fired operations at Colstrip 3&4 on December 31, 2020. For rate impact estimation, the present value of fixed revenue requirements associated with the remaining unrecovered investment as of year-end 2019 is recovered in 2020.² In addition, the cost of replacing capacity associated with Colstrip 3&4 is based on the net cost of a new simple cycle combustion turbine and the cost of replacing energy associated with Colstrip 3&4 is based on market.

4. USE THE PRICE OF CO₂ ASSUMED IN YOUR IRP PREPARATION.

Modeling approach:

- PGE's 2016 IRP and 2016 IRP Update reference case CO₂ price assumption begins in 2022, and, as such, is not included in the costs

¹ Market prices, thermal fixed costs, and renewable real-levelized costs are consistent with the Reference Case in PGE's Acknowledged 2016 IRP Update. Thermal resource dispatch parameters (including heat rates, variable O&M, start costs, and availability) are based on the 2016 IRP because dispatch of these resources was not modeled in the 2016 IRP Update.

²Colstrip capital carrying costs in the base case are consistent with the UM 1809 Settlement.

through 2021 presented in this report, nor is there an impact on the dispatch of PGE’s thermal plants prior to 2022.

5. USE CURRENT RESOURCE COSTS, INCLUDING VARIOUS INCENTIVES.

Modeling approach:

- Assumptions are consistent with those specified in PGE’s 2016 IRP Update.

6. THE CONSENSUS IS TO CALCULATE THE RATE IMPACT AS A PERCENT CHANGE IN A MANNER SIMILAR TO:

(COMPLIANCE NPVRR – PREFERRED NPVRR)/CURRENT NPVRR.

Modeling approach:

- Note that to be consistent with presenting annual rate impacts, as called for in the last bullet below, the calculation is as follows for a given year:

(Goal Portfolio Revenue Requirement in that year – Preferred Portfolio Revenue Requirement in that year) / Current Revenue Requirement with Load Growth to that year.

IN SUPPORT OF THE PUC’S PREPARATION OF THIS REPORT WE REQUEST THE FOLLOWING INFORMATION BE PROVIDED:

- **IDENTIFY WHAT TOTAL GREENHOUSE GAS EMISSIONS (IN MILLION TONS OF CARBON DIOXIDE) FOR 1990, 2005 AND 2020 WERE USED IN THE ANALYSIS.**

		1990 Emissions (short tons)	1990 Normalized Emissions (short tons)	2005 Emissions (short tons)
		5,032,856	8,226,794	9,580,952
	2021 Emissions (short tons)	Relative Reduction from Historical Emissions		
Base Portfolio	5,503,782	9%	-33%	-43%
Goal Portfolio 1	4,526,166	-10%	-45%	-53%
Goal Portfolio 2	4,057,194	-19%	-51%	-58%
Relative Reduction Goal		-10%	-10%	-15%
2021 Emissions Goal		4,529,570	7,404,115	8,143,809

- **A WRITTEN DESCRIPTION OF THE CO₂ GOAL AND PREFERRED PORTFOLIOS (OR CHANGES TO THE EXISTING SYSTEM), AND HOW THEY ARE ASSUMED TO BE OPERATED (OR CHANGES TO THE EXISTING OPERATIONS).**

Base Portfolio:

- Resource Mix: All existing, contracted, and forecasted (in the case of DERs) resources in PGE's resource portfolio, as identified in PGE's 2016 IRP Update, including the 300 MW of capacity contracts executed to meet the 2021 capacity needs, plus a 100 MWa renewable addition (using wind as the proxy) in 2021 representing PGE's acknowledged renewable action.
- All resources are economically dispatched against market under Reference Case pricing conditions without constraints on their operations based on emissions.

Goal Portfolio 1:

- Resource Mix: All resources in the Base Portfolio, plus 248 MWa of additional renewables (modeled as wind) in 2021.
- All resources are economically dispatched against market under Reference Case pricing conditions without constraints on their operations based on emissions.

Goal Portfolio 2:

- Resource Mix: All resources in the Base Portfolio, with the exception of Colstrip 3&4 beginning in 2021. In addition, this portfolio incorporates 296 MW of capacity resources in 2021 to replace capacity from Colstrip 3&4. These capacity resources are assumed to not dispatch under normal market conditions. Their cost impact is approximated by the net cost (total cost net of market revenues) of a new simple cycle frame combustion turbine. This portfolio assumes that energy otherwise provided by Colstrip 3&4 is provided with market purchases in 2021.
- All resources are economically dispatched against market under Reference Case pricing conditions without constraints on their operations based on emissions.

- **A WRITTEN DESCRIPTION OF THE ANALYSIS PERFORMED.**

Incremental rate impacts are computed relative to the forward revenue requirement estimates in PGE's 2018 Renewable Portfolio Implementation Plan. Rate impacts of the Goal Portfolios are presented as relative, or incremental, to the Base Portfolio.

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- **PRESENT THE RATE IMPACTS BOTH IN PERCENT CHANGE AS WELL AS ANNUAL AVERAGE COST CHANGE PER CUSTOMER, BOTH CUMULATIVE UP TO 2020 AND YEAR-BY-YEAR.**

The Table below provides PGE’s current estimate of the impacts through 2021:

2018 SB 101 Report: Rate Impacts of Oregon CO₂ Goal Portfolios

Base Portfolio								
	Incremental Rev Req (\$ millions)	Cumulative Rev Req (\$ millions)	Total Customers	Incremental Dollars per Customer per Year	Cumulative Dollars per Customer	Base Rev Req (\$ millions)	Annual Rate Impact (%)	Cumulative Rate Impact (%)
2019	\$ -	\$ -	895,213	\$ -	\$ -	1,918	0.0%	0.0%
2020	\$ -	\$ -	905,958	\$ -	\$ -	1,971	0.0%	0.0%
2021	\$ -	\$ -	916,749	\$ -	\$ -	2,028	0.0%	0.0%

Goal Portfolio 1								
Relative to Base Portfolio								
	Incremental Rev Req (\$ millions)	Cumulative Rev Req (\$ millions)	Total Customers	Incremental Dollars per Customer per Year	Cumulative Dollars per Customer	Base Rev Req (\$ millions)	Annual Rate Impact (%)	Cumulative Rate Impact (%)
2019	\$ -	\$ -	895,213	\$ -	\$ -	1,918	0.0%	0.0%
2020	\$ -	\$ -	905,958	\$ -	\$ -	1,971	0.0%	0.0%
2021	\$ 60	\$ 60	916,749	\$ 66	\$ 66	2,028	3.0%	3.0%

Goal Portfolio 2								
Relative to Base Portfolio								
	Incremental Rev Req (\$ millions)	Cumulative Rev Req (\$ millions)	Total Customers	Incremental Dollars per Customer per Year	Cumulative Dollars per Customer	Base Rev Req (\$ millions)	Annual Rate Impact (%)	Cumulative Rate Impact (%)
2019	\$ -	\$ -	895,213	\$ -	\$ -	1,918	0.0%	0.0%
2020	\$ 185	\$ 185	905,958	\$ 205	\$ 205	1,971	9.4%	9.4%
2021	\$ (26)	\$ 159	916,749	\$ (28)	\$ 174	2,028	-1.3%	7.9%

NOTES:

1. All portfolios: Boardman ceases operations at year-end 2020 per Boardman 2020 plan.
2. Goal Portfolio 2: 2020 reflects the accelerated recovery of the investment in Colstrip. This results in an increase in 2020, followed by a decrease in 2021 when the accelerated recovery is completed.