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April 15, 2016

## *Via Electronic Filing*

Public Utility Commission of Oregon  
Attn: Filing Center  
201 High St. SE, Suite 100  
Salem OR 97301

Re: PORTLAND GENERAL ELECTRIC COMPANY  
2017-2021 Renewable Portfolio Standard Implementation Plan  
**Docket No. UM 1755**

Dear Filing Center:

Enclosed for filing in the above-referenced docket, please find the Supplemental Comments of the Industrial Customers of Northwest Utilities.

Thank you for your assistance. If you have any questions, please do not hesitate to call.

Sincerely,

/s/ Jesse O. Gorsuch  
Jesse O. Gorsuch

Enclosure

**BEFORE THE PUBLIC UTILITY COMMISSION**

**OF OREGON**

**UM 1755**

In the Matter of	)	
	)	
PORTLAND GENERAL ELECTRIC	)	SUPPLEMENTAL COMMENTS OF
COMPANY	)	THE INDUSTRIAL CUSTOMERS
	)	OF NORTHWEST UTILITIES
2016 Renewable Portfolio Implementation	)	
Plan.	)	
_____	)	

**I. INTRODUCTION**

Pursuant to the Administrative Law Judge’s March 18, 2016 ruling in the above-referenced docket, the Industrial Customers of Northwest Utilities (“ICNU”) submits these Supplemental Comments addressing Supplemental Attachment A to the 2016 Renewable Portfolio Implementation Plan (“Implementation Plan”) of Portland General Electric Company (“PGE” or the “Company”).

In summary, ICNU considers Supplemental Attachment A to be insufficient to reasonably identify what the Company’s incremental cost of compliance will be under Senate Bill (“SB”) 1547. Moreover, the Company’s filing appears to have revealed a fundamental flaw in how it is calculating its incremental cost of renewable portfolio standard (“RPS”) compliance. Because PGE is approaching the statutory incremental cost cap, and may have already reached it, ICNU recommends that the Oregon Public Utility Commission (“Commission”) initiate a process, potentially through a separate investigation, designed to thoroughly understand and

determine PGE’s likely incremental cost of RPS compliance during the compliance period, as well as whether the Company should be relieved from future RPS compliance under ORS 469A.100(1).

## II. BACKGROUND

Supplemental Attachment A to PGE’s Implementation Plan presents assumptions about the Company’s incremental cost of compliance with Oregon’s RPS assuming the Oregon Clean Electricity Plan (“OCEP”) became law. At the time PGE filed Supplemental Attachment A, the OCEP was embodied in House Bill 4036 and was being considered by the legislature. The OCEP, with some amendments, has now been enacted into law as SB 1547.

Among other things, SB 1547 eliminates most coal-fired generation from Oregon rates by 2030 and increases RPS requirements to 50% by 2040.<sup>1/</sup> Neither of these provisions, however, will impact rates or the cost of RPS compliance during the 2017-2021 Implementation Plan study period. One provision of SB 1547 that may impact RPS compliance during the study period, however, makes changes to renewable energy certificate (“REC”) banking provisions.<sup>2/</sup>

Prior to SB 1547, PGE could bank RECs indefinitely.<sup>3/</sup> Now, REC banking is a bit more complicated. Any RECs PGE currently has in the bank it can continue to hold indefinitely.<sup>4/</sup> New RECs generated from existing resources, or from resources with which PGE has a power purchase agreement (“PPA”) of less than 20 years, can only be banked for five years.<sup>5/</sup> Additionally, RECs generated from resources built after 2022 can be banked for five

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<sup>1/</sup> SB 1547 §§ 1, 5.

<sup>2/</sup> *Id.* § 7.

<sup>3/</sup> ORS 469A.140(2).

<sup>4/</sup> SB 1547 § 7(3)(a).

<sup>5/</sup> *Id.* § 7(3)(b).

years.<sup>6/</sup> However, resources built between SB 1547's effective date and December 31, 2022, or PPAs of 20 years or longer executed during this period, can bank RECs indefinitely for the first five years of their lives.<sup>7/</sup> Additionally, under prior law, PGE had to use banked RECs to meet at least 20 percent of its RPS requirements before it could use other RECs, and the oldest banked RECs had to be used first.<sup>8/</sup> Now, there is no requirement that PGE use banked RECs, and no requirement that older RECs be used before newer RECs.<sup>9/</sup>

Supplemental Attachment A presents an "OCEP scenario" that "takes into consideration elements of" the OCEP with respect to the Company's incremental cost of compliance with the RPS between 2017 and 2021.<sup>10/</sup> The attachment does not, however, identify what elements it takes into consideration. In fact, it contains no narrative analysis at all. In response to data requests seeking clarification of the assumptions the Company used in Supplemental Attachment A, PGE stated that the OCEP scenario "was an illustrative look at PGE's RPS compliance under SB 1547."<sup>11/</sup> Confirming ICNU's assumption, the Company noted that its OCEP scenario assumed it would use RECs as they were generated in the compliance year and purchase unbundled RECs to cover any additional requirement.<sup>12/</sup> This is different from the assumptions the Company made under the initial Implementation Plan where

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<sup>6/</sup> *Id.* § 7(3)(e).

<sup>7/</sup> *Id.* §§ 7(c)-(d).

<sup>8/</sup> ORS 469A.140(2)(a)-(b).

<sup>9/</sup> SB 1547 § 7(2).

<sup>10/</sup> Cover Letter to Supplemental Attachment A.

<sup>11/</sup> *See* Attachment 1 to these Supplemental Comments at 1 (PGE's Response to ICNU DR 003) (emphasis in original) ("ICNU Attachment 1").

<sup>12/</sup> *Id.* at 1-2.

### PAGE 3 – SUPPLEMENTAL COMMENTS OF ICNU

it forecasted that it would meet its 2017-2021 RPS obligations entirely with banked bundled RECs.<sup>13/</sup>

Additionally, in its initial Implementation Plan, the Company noted that its 2013 integrated resource plan showed no need for a new RPS resource through 2021.<sup>14/</sup> In Supplemental Attachment A, however, the Company assumes a new RPS resource in 2020 “to take advantage of” expiring production tax credits and the ability to generate RECs that can be banked indefinitely in the first five years of this resource’s life.<sup>15/</sup>

Despite these changes, the Company forecasts in Supplemental Attachment A that its incremental costs of RPS compliance will range from 2.2% to 2.8% between 2017 and 2021 under the “Base Case” scenario, which uses the reference gas price from the 2013 IRP and a reference carbon price.<sup>16/</sup> This compares to an incremental cost of compliance under the initial Implementation Plan that ranges from 2.8% to 3.8% under the “Base Case” scenario.<sup>17/</sup> Supplemental Attachment A does not consider any of the other scenarios the initial Implementation Plan did, but in response to a data request, the Company performed this additional analysis.<sup>18/</sup> As with its original Implementation Plan, there has been no consideration given to a low gas price scenario despite the fact that gas prices are currently below \$2/mmbtu. In the Company’s recently filed annual power cost update, it preliminarily estimates a reduction of over \$32 million in power costs, based primarily on reduced costs from contract and market

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<sup>13/</sup> Implementation Plan at 2.

<sup>14/</sup> *Id.* at 4.

<sup>15/</sup> Supplemental Attachment A at 2; ICNU Attachment 1 at 7-8 (PGE’s Response to ICNU DR 007).

<sup>16/</sup> Supplemental Attachment A at 1.

<sup>17/</sup> Implementation Plan, Attach. A at 1.

<sup>18/</sup> ICNU Attachment 1 at 16-22 (PGE’s First Supplemental Response to ICNU DR 006 and Attachment 006-A).

purchases, the price of which is largely due to this historically low gas price.<sup>19/</sup> If the Company were to consider a low gas price scenario – the scenario that actually exists today – it is possible, if not likely, that the Company’s incremental cost of RPS compliance would exceed the 4% incremental cost cap under ORS 469A.100(1) (“4% Cap”). As discussed in ICNU’s initial comments, the Company’s initial filing contained incremental costs very near to, and likely exceeding, the 4% Cap even without considering current historically low gas prices.<sup>20/</sup>

### III. SUPPLEMENTAL COMMENTS

PGE’s Supplemental Attachment A is inadequate for the Commission to determine the impacts of SB 1547 on the 4% Cap calculation and is even more inadequate to be used as a potential justification for a major new RPS resource addition in the study period. The Company states that this attachment is an “illustrative” look at its incremental cost of RPS compliance under SB 1547.<sup>21/</sup> It is not entirely clear what the Company means by this, but it suggests that the Company’s attempt to demonstrate an “OCEP scenario” did not represent its best effort. Indeed, it was particularly surprising to see that compliance with SB 1547 actually appeared to result in a reduction to the Company’s incremental costs, relative to the Company’s initial filing.

It is difficult to understand how that could be possible. A law that makes REC banking more restrictive should mean that there is no circumstance under which SB 1547 could result in a reduction to the incremental cost of compliance calculations in the study period. The

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<sup>19/</sup> Docket No. UE 308, PGE/400 at 32 (Table 6).

<sup>20/</sup> ICNU Comments at 2-4.

<sup>21/</sup> ICNU Attachment 1 at 1 (PGE’s Response to ICNU DR 003) (emphasis in original).

new law will have no impact on the amount that customers are currently paying in rates for existing RPS resources. In addition, the Company's OCEP scenario forecasts the addition of a new RPS resource in 2020, which was not forecast in its original Implementation Plan, yet there appears to be no incremental cost to customers associated with this new resource.<sup>22/</sup>

It appears from the Company's supplemental filing and responses to data requests that there is a fundamental flaw in its incremental cost calculations, a flaw which may be present in PacifiCorp's calculations as well. Specifically, when comparing the incremental cost of RPS resources to its annual revenue requirement, the Company only included the incremental cost of a resource when the RECs from that resource are retired for compliance purposes.<sup>23/</sup> This is an incorrect implementation of ORS 469A.100. Rather, the calculation should be based on the levelized cost of a resource over its useful life, the period in which the cost of the RPS resource is reflected in rates.

As stated by the Company, "[t]he amounts on page 1 of supplemental Attachment A represent the incremental costs in each compliance year based on the RECs that are expected to be retired in those years."<sup>24/</sup> This interpretation, however, directly contradicts the statute and the Commission's rules on this matter. ORS 469A.100(4) defines the incremental cost of compliance with the RPS as "the difference between the levelized annual **delivered** cost of the qualifying electricity and the levelized annual delivered cost of an equivalent amount of reasonably available electricity that is not qualifying electricity."<sup>25/</sup> OAR 860-083-0100(1)(c)

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<sup>22/</sup> Supplemental Attachment A at 2; ICNU Attachment 1 at 7-8 (PGE's Response to ICNU DR 007).

<sup>23/</sup> ICNU Attachment 1 at 4-5 (PGE's Response to ICNU DR 005.a).

<sup>24/</sup> *Id.* at 5 (PGE's Response to ICNU DR 005.b).

<sup>25/</sup> ORS 469A.100(4) (emphasis added).

further specifies that “[t]he incremental cost under ORS 469A.100(4) for long-term qualifying electricity is the difference between the levelized annual cost of qualifying electricity **delivered** in a compliance year and the levelized annual cost of an equivalent amount of electricity delivered from the corresponding proxy plant.”<sup>26/</sup> The rule goes on to require that an electric company “must forecast the levelized incremental cost of long-term qualifying electricity in the following manner: (a) For each generation source of qualifying electricity, the electric company must estimate the **delivered** cost of qualifying electricity for each year over the time horizon of the qualifying electricity.”<sup>27/</sup> Finally, the rule makes clear that “[i]ncremental cost estimates for an electric company must be based on the likely impacts on the rates of its Oregon retail electricity customers.”<sup>28/</sup> Thus, the Company’s interpretation that incremental cost is only applied in the year that the RECs are retired is wrong.<sup>29/</sup> Rather, incremental costs are supposed to be calculated based on the year in which the electricity is delivered—that is, the year in which the RECs are generated and the resource is reflected in revenue requirement.

Moreover, comparing the revenue requirement to incremental cost based on the timing of when RECs are retired would be inconsistent with the purpose of ORS 469A.100,

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<sup>26/</sup> OAR 860-083-100(1)(c) (emphasis added).

<sup>27/</sup> OAR 860-083-0100(2)(a) (emphasis added).

<sup>28/</sup> OAR 860-083-0100(1)(h).

<sup>29/</sup> ICNU notes that the Commission’s rules define the “incremental cost of compliance” as “the cost of bundled renewable energy certificates used for compliance for a compliance year as calculated pursuant to OAR 860-083-0100.” OAR 860-083-0010(19). PGE could be basing its incremental cost calculations on this definition. However, the “cost of bundled renewable energy certificates” is defined as “the levelized incremental cost of the qualifying electricity associated with the bundled renewable energy certificate.” OAR 860-083-0010(12). Thus, these definitions read together would still appear to support ICNU’s position that the cost of compliance must be measured in the year the RECs are generated, not in the year they are retired. Moreover, to the extent the definition of “incremental cost of compliance” can be read to support PGE’s method of calculating the incremental cost in the year RECs are retired, this would be inconsistent with the statutory requirement to calculate incremental cost based on the annual “delivered” cost of qualifying electricity. ORS 469A.100(4).



which is to protect ratepayers from paying more than a certain amount in rates related to the costs associated with meeting RPS requirements. Under the Company’s interpretation, it could build a new RPS resource at great cost to customers, without having any impact on incremental cost calculations simply because the RECs generated from that resource were being banked and not retired. This sort of scenario is inaccurate and unfair; yet, it is precisely the scenario presented by the Company in Supplemental Attachment A. Despite the fact that its “OCEP scenario” projects the addition of a major new RPS resource in 2020 – one that generates 95 average megawatts – this resource will, under PGE’s reasoning, have no impact on incremental costs in 2020 or 2021 because the Company will bank all RECs generated by this resource in these years.<sup>30/</sup> ICNU assumes, however, that the Company will not forego its opportunity to seek cost recovery for this resource from its customers in 2020 and 2021. Again, “[i]ncremental cost estimates for an electric company **must** be based on the likely impacts on the rates of its Oregon retail electricity customers.”<sup>31/</sup>

Ratepayers incur costs for the RPS resources when the RECs from the resources are generated. They do not pay the cost of RPS resources only when the RECs from the resources are retired. Certainly, if the Company were to adopt a form of deferred accounting to allow customers to only have to pay for a renewable resource when the RECs are retired for compliance, the Company’s current approach of only counting the incremental cost in the years of retirement might make more sense. Under the existing regulatory framework, however, the Company’s approach should be rejected.

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<sup>30/</sup> Supplemental Attachment A at 1-2; ICNU Attachment 1 at 7-8 (PGE’s Response to ICNU DR 007).  
<sup>31/</sup> OAR 860-083-0100(1)(h) (emphasis added).

ICNU recommends, therefore, that the Commission undertake a thorough examination of how PGE is calculating its incremental cost of RPS compliance in order to better understand what that incremental cost is. This would include considering the issues ICNU raised in its initial comments, particularly an examination of a low gas price scenario and whether using a frame simple-cycle combustion turbine in the incremental cost calculation continues to be warranted considering the resources PGE is actually building to integrate its RPS resources.<sup>32/</sup> ICNU notes that it attempted to correct the Company's filing by considering the delivered cost of its RPS resources. As discussed in ICNU's initial comments, however, the Company's workpapers were inoperable and impossible to review.<sup>33/</sup> The files provided by the Company contained so many reference (“#REF”) errors that none of the incremental cost calculations performed by the Company could be reproduced or understood. Given the fact that the Company is now considering an RPS resource addition in 2020, working copies of the files need to be produced and the calculations need to be reviewed. In any instance, the Company needs to correct its incremental cost calculations to be based on the timing of when RECs are generated, not when they are retired.

#### IV. CONCLUSION

ICNU appreciates the opportunity to provide these comments to the Commission on the Company's Supplemental Attachment A. In summary, the Company's supplemental filing is based on a flawed understanding of incremental cost calculation, only including incremental costs when a REC is expired, not when it is generated. The fact that Supplemental

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<sup>32/</sup> See ICNU Comments at 4-8.

<sup>33/</sup> *Id.* at 9.

Attachment A shows a lower incremental cost of RPS compliance than its initial Implementation Plan, despite considering more restrictive REC banking requirements, alone indicates that something is wrong. The filing also contains no explanation for the changes made to the calculations, responses to data requests state that this attachment is merely “illustrative,” and the workpapers that the Company provided are largely inoperable. Most importantly, Supplemental Attachment A should not provide a justification for the Company to pursue another major RPS resource in the study period. ICNU continues to believe that the Company has effectively reached the 4% Cap, or at a minimum, is very close to reaching it. Understanding precisely how close is critical to ensuring customers are protected from excessive and unlawful cost increases as the Company pursues its long-term resource procurement strategy.

Dated this 15th day of April, 2016.

Respectfully submitted,

/s/ Tyler C. Pepple

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April 5, 2016

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FROM: Patrick G. Hager  
Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE Response to ICNU Data Request No. 003  
Dated March 22, 2016**

**Request:**

**Referring to page 1 of PGE's Supplemental Attachment A, ICNU's interpretation of this page is that, under the "OCEP scenario," PGE intends to comply with the RPS by using RECs generated from its RPS-compliant resources in the year they are generated and purchasing unbundled RECs to cover any additional requirement, rather than using existing banked RECs. Please confirm or clarify ICNU's understanding.**

**Response:**

The OCEP scenario that PGE filed was an illustrative look at PGE's RPS compliance under SB 1547. In the "OCEP scenario," PGE intends to comply with the RPS requirements by using a combination of RECs generated from RPS-compliant resources and purchasing unbundled RECs to cover any additional requirement. To the extent that unbundled RECs are needed to meet the requirement, PGE would determine if, and in what quantity, unbundled RECS or alternative compliance payments are an economically feasible option at the time. PGE's RPS compliance strategy will consider and evaluate all information as provided in SB 1547 as well as changes to tax incentives in PGE's 2016 IRP.

UM 1755 PGE Response to ICNU DR No. 003

April 5, 2016

Page 2

In this implementation plan, PGE plans to comply with 2017 RPS using RECs generated in 2017. For 2018 RPS compliance PGE will use RECs generated in 2017 and 2018. For 2019 RPS compliance PGE will use RECs generated in 2018 and 2019. For 2020 RPS compliance PGE plans to use RECs generated in 2018, 2019, and 2020. Finally for 2021 RPS compliance PGE will use RECs generated in 2018, 2019, 2020, and 2021. In future years, as RPS requirements increase, the REC generation and usage will be more closely matched by year.

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April 5, 2016

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FROM: Patrick G. Hager  
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**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE Response to ICNU Data Request No. 004  
Dated March 22, 2016**

**Request:**

**ICNU understands that the only provision in SB 1547 that results in changes to PGE's incremental cost of RPS compliance under the "OCEP scenario" and its initial filing are the changes to REC banking requirements. Please confirm or clarify ICNU's understanding.**

**Response:**

The changes to the REC banking requirements in SB 1547 was not the only provision that results in changes to PGE's incremental cost. The production tax credit extension was also a factor. The OCEP scenario that PGE filed was an illustrative look at PGE's RPS compliance under SB 1547. See PGE's Response to ICNU Data Request No. 003. To meet RPS requirements, PGE will consider and evaluate all information as provided in SB 1547 as well as changes to tax incentives in PGE's 2016 IRP. PGE believes that taking advantage of the PTCs as well as managing its REC bank, that will now contain unlimited life RECs and RECs with expiration dates, is important in providing long-term price stability and least cost and least risk resources to customers.

April 5, 2016

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FROM: Patrick G. Hager  
Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE Response to ICNU Data Request No. 005  
Dated March 22, 2016**

**Request:**

Reference page 1 of Supplemental Attachment A:

- a. **Please state whether the resource costs identified on this page represent the levelized cost of these resources.**
- b. **If they do not represent the levelized cost of the resources, please explain what these costs represent.**
- c. **If they do represent the levelized cost of the resources, please explain why those costs differ from the costs PGE identified for these resources in the Base Case scenario of its initial filing (Page 1 of Attachment A).**

**Response:**

- a. Page 1 of Supplemental Attachment A does not represent the levelized costs of resources. The amounts shown on page 1 are incremental costs based on the number of RECs we plan to retire in each of the compliance years.

UM 1755 PGE Response to ICNU DR No. 005

April 5, 2016

Page 2

Page 4 of Attachment A (Incremental Cost by Resource) contains the levelized cost of PGE's renewable resources. The amounts are derived from base spreadsheets which were supplied as PGE's work papers and are used to calculate the incremental costs on page 1 of Supplemental Attachment A.

- b. The amounts on page 1 of supplemental Attachment A represent the incremental costs in each compliance year based on the RECs that are expected to be retired in those years.
- c. See PGE's response to part (a) above.

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April 5, 2016

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FROM: Patrick G. Hager  
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**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE Response to ICNU Data Request No. 006  
Dated March 22, 2016**

**Request:**

**Please identify PGE's incremental cost of RPS compliance under the "OCEP scenario" under the alternative scenarios (i.e., RefGas-NoCo2; HighGas-NoCo2; and HighGas-RefCO2) the Company analyzed in its initial filing.**

**Response:**

PGE objects to this request on the grounds that it is unduly burdensome. Subject to and without waiving its objection, PGE responds as follows:

PGE filed the OCEP scenario under Reference Gas-Reference CO2 only. PGE has not performed analyses under alternative scenarios and doing so would require new analysis. However, in the interest of providing all available information for analyses, PGE will provide the additional scenarios by Tuesday, April 12, 2016.

April 5, 2016

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FROM: Patrick G. Hager  
Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE Response to ICNU Data Request No. 007  
Dated March 22, 2016**

**Request:**

**Reference page 2 of Supplemental Attachment A:**

- a. This page assumes a new RPS resource in 2020. Please confirm this assumption is being made solely due to the RECs with an unlimited life that this resource could generate for its first five years of operation under SB 1547.**
- b. If the assumption in subpart a is not correct, please explain.**
- c. Please explain why page 1 of Supplemental Attachment A does not include the same generic RPS resource in 2020 and 2021.**

**Response:**

- a. The OCEP scenario that PGE filed on February 16, 2016 assumed a 2020 resource; that changes the revenue requirement amount on page 1 of supplemental Attachment A. PGE included this resource to take advantage of the production tax credits which decline in future years, however, since the RECs produced from the 2020 resource will have unlimited lives, PGE does not use the RECs from the 2020 resource until

UM 1755 PGE Response to ICNU DR No. 007  
April 5, 2016  
Page 2

after 2021. For convenience purposes PGE is providing the OCEP scenarios as Attachment 007-A.

- b. See PGE's response to part (a) above.
- c. See PGE's response to part (a) above.

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## Tab 1 - Incremental Cost Summary OECP Version w/ Unbundled RECs

Base Case (RefGas-RefCO2)	Total Incremental Cost to Comply				
	2017	2018	2019	2020	2021
Unbundled RECS	\$ 323,250	\$ 324,232	\$ 325,215	\$ 437,435	\$ 443,117
Biglow Canyon I	9,632,077	9,668,619	9,705,167	13,677,556	13,500,582
Biglow Canyon II	12,514,847	12,562,326	12,609,812	17,771,092	17,541,151
Biglow Canyon III	11,566,754	11,610,636	11,654,525	16,424,800	16,212,279
Tucannon River	7,141,982	7,169,078	7,196,177	10,141,620	10,010,398
<b>Total Incremental Cost</b>	<b>\$ 41,178,910</b>	<b>\$ 41,334,891</b>	<b>\$ 41,490,896</b>	<b>\$ 58,452,504</b>	<b>\$ 57,707,527</b>
Revenue Requirement (\$000)	\$ 1,805,242	\$ 1,849,798	\$ 1,892,835	\$ 2,052,161	\$ 2,125,833
<b>Percentage of Rev Requirement</b>	<b>2.3%</b>	<b>2.2%</b>	<b>2.2%</b>	<b>2.8%</b>	<b>2.7%</b>

Revenue Requirement Additions

91,375

Notes:

Although the SunWay, Bellevue and Yamhill solar projects produce RECs that PGE uses for compliance, until the sum of these projects is 20 MW, they are not included in the incremental cost calculation (pursuant to OAR 860-083-0100(13)(a))

In addition, the following RPS resources are deemed to be zero incremental cost because they are either low-impact hydro or had an in-service date prior to June 6, 2007 (pursuant to OAR 860-083-0100(1)(i)):

- North Fork Upgrade
- Faraday Upgrade
- Round Butte Upgrade
- Pelton-Round Butte Low-Impact Hydro
- PPM Klondike II
- Vansycle Ridge

## Tab 2 - Incremental Cost for RECs Generated

<b>Base Case (RefGas-RefCO2)</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Biglow Canyon I	12,980,666	12,980,666	12,980,666	13,016,229	12,980,666
Biglow Canyon II	16,865,630	16,865,630	16,865,630	16,911,837	16,865,630
Biglow Canyon III	15,587,933	15,587,933	15,587,933	15,630,640	15,587,933
Tucannon River	9,624,891	9,624,891	9,624,891	9,651,260	9,624,891
Generic RPS Resource 2020 95 Mwa	-	-	-	20,827,786	20,770,880
<b>Total Incremental Cost</b>	<b>55,059,119</b>	<b>55,059,119</b>	<b>55,059,119</b>	<b>76,037,752</b>	<b>75,829,999</b>

**Notes:**

Although the SunWay, Bellevue and Yamhill solar projects produce RECs that PGE uses for compliance, until the sum of these projects is 20 MW, they are not included in the incremental cost calculation (pursuant to OAR 860-083-0100(13)(a))

In addition, the following RPS resources are deemed to be zero incremental cost because they are either low-impact hydro or had an in-service date prior to June 6, 2007 (pursuant to OAR 860-083-0100(1)(i)):

- North Fork Upgrade
- Faraday Upgrade
- Round Butte Upgrade
- Pelton-Round Butte Low-Impact Hydro
- PPM Klondike II
- Vansycle Ridge

**Tab 3 - Annual Compliance by Resource**

Compliance Year	2017		2018		2019		2020		2021	
	MWh	Vintage	MWh	Vintage	MWh	Vintage	MWh	Vintage	MWh	Vintage
Unbundled RECs	576,408		578,160		579,912		780,019		790,152	
Pelton-Round Butte LIH	438,000	2017	438,000	2017	86,819	2017	-	2017	172,437	2018
Pelton-Round Butte LIH	-	2018	-	2018	351,181	2018	439,200	2018	265,563	2019
Biglow Canyon I	253,103	2017	87,991	2017	175,022	2018	261,092	2019	243,715	2020
Biglow Canyon II	330,285	2017	114,824	2017	228,394	2018	340,712	2019	318,035	2020
Biglow Canyon III	293,059	2017	101,882	2017	202,652	2018	302,310	2019	282,189	2020
Tucannon River	662,460	2017	230,304	2017	458,095	2018	683,372	2019	637,888	2020
Vansycle Ridge	52,805	2017	18,358	2017	36,515	2018	54,472	2019	50,846	2020
PPM Klondike II	161,343	2017	56,091	2017	111,570	2018	166,436	2019	155,358	2020
Hydro Upgrades	78,327	2017	27,231	2017	54,164	2018	80,800	2019	75,422	2020
Bellevue Solar	2,715	2017	944	2017	1,877	2018	2,801	2019	2,614	2020
Yamhill Solar	1,837	2017	639	2017	1,260	2018	1,864	2019	1,726	2020
Outback Solar	14,664	2017	5,098	2017	10,079	2018	14,946	2019	13,868	2020
ETO and Other Solar	17,033	2017	5,921	2017	11,768	2018	17,540	2019	88,786	2020
Purchased Bundled	-	2017	-	2017	-	2018	-	2019	-	2020
Biglow Canyon I	-	2018	166,072	2018	80,001	2019	98,314	2020	111,041	2021
Biglow Canyon II	-	2018	216,715	2018	104,397	2019	128,294	2020	144,903	2021
Biglow Canyon III	-	2018	192,289	2018	92,631	2019	113,834	2020	128,571	2021
Tucannon River	-	2018	434,669	2018	209,392	2019	257,322	2020	290,634	2021
Vansycle Ridge	-	2018	34,648	2018	16,691	2019	20,511	2020	23,167	2021
PPM Klondike II	-	2018	105,864	2018	50,998	2019	62,671	2020	70,784	2021
Hydro Upgrades	-	2018	51,394	2018	24,758	2019	30,425	2020	34,364	2021
Bellevue Solar	-	2018	1,781	2018	858	2019	1,055	2020	1,191	2021
Yamhill Solar	-	2018	1,196	2018	571	2019	696	2020	780	2021
Outback Solar	-	2018	9,564	2018	4,580	2019	5,594	2020	6,280	2021
ETO and Other Solar	-	2018	11,166	2018	5,374	2019	35,816	2020	40,446	2021
Purchased Bundled	-	2018	-	2018	-	2019	-	2020	-	2021
Biglow Canyon I	-	2019	-	2019	-	2020	-	2021	-	2022
Biglow Canyon II	-	2019	-	2019	-	2020	-	2021	-	2022
Biglow Canyon III	-	2019	-	2019	-	2020	-	2021	-	2022
Tucannon River	-	2019	-	2019	-	2020	-	2021	-	2022
Vansycle Ridge	-	2019	-	2019	-	2020	-	2021	-	2022
PPM Klondike II	-	2019	-	2019	-	2020	-	2021	-	2022
Hydro Upgrades	-	2019	-	2019	-	2020	-	2021	-	2022
Bellevue Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Yamhill Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Outback Solar	-	2019	-	2019	-	2020	-	2021	-	2022
ETO and Other Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Purchased Bundled	-	2019	-	2019	-	2020	-	2021	-	2022
<b>Totals</b>	<b>2,882,040</b>		<b>2,890,800</b>		<b>2,899,560</b>		<b>3,900,096</b>		<b>3,950,760</b>	

<b>Compliance Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Resource</b>	<b>MWh</b>	<b>MWh</b>	<b>MWh</b>	<b>MWh</b>	<b>MWh</b>
Unbundled RECs	576,408	578,160	579,912	780,019	790,152
Biglow Canyon I	253,103	254,063	255,023	359,406	354,756
Biglow Canyon II	330,285	331,539	332,792	469,006	462,937
Biglow Canyon III	293,059	294,171	295,283	416,144	410,760
Tucannon River	662,460	664,973	667,487	940,694	928,522
Vansycle Ridge	52,805	53,005	53,206	74,983	74,013
PPM Klondike II	161,343	161,955	162,567	229,107	226,143
Pelton-Round Butte LIH	438,000	438,000	438,000	439,200	438,000
Hydro Upgrades	78,327	78,625	78,922	111,225	109,786
Bellevue Solar	2,715	2,725	2,736	3,855	3,805
Yamhill Solar	1,837	1,834	1,831	2,560	2,506
Outback Solar	14,664	14,662	14,659	20,540	20,148
ETO and Other Solar	17,033	17,088	17,142	53,356	129,233
Purchased Bundled	-	-	-	-	-

### Tab 4 - Incremental Cost by Resource

Expected Incremental Cost of Qualifying Electricity						
\$/MWh			\$000's			
Base Case			2017	Base Case		
RefGas-			Busbar	RefGas-		
RefCO2			Energy (MWh)	RefCO2		

**With Government Incentives:**

Biglow Canyon I	38.056	341,094	\$ 12,981
Biglow Canyon II	37.891	445,109	\$ 16,866
Biglow Canyon III	39.469	394,941	\$ 15,588
Tucannon River	10.781	892,764	\$ 9,625
Generic RPS Resource 2020	24.959	0	\$ -



Tab 5 - RECs Generated

Resource	Six-Year Life RECs Available By Vintage Year														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Biglow Canyon I	-	-	-	-	-	-	-	-	-	-	341,094	341,094	341,094	342,028	341,094
Biglow Canyon II	-	-	-	-	-	-	-	-	-	-	445,109	445,109	445,109	446,329	445,109
Biglow Canyon III	-	-	-	-	-	-	-	-	-	-	394,941	394,941	394,941	396,023	394,941
Tucannon River	-	-	-	-	-	-	-	-	-	-	892,764	892,764	892,764	895,210	892,764
Vansycle Ridge	-	-	-	-	-	-	-	-	-	-	71,163	71,163	71,163	71,358	71,163
PPM Klondike II	-	-	-	-	-	-	-	-	-	-	217,434	217,434	217,434	218,030	217,434
Pelton-Round Butte LIH	-	-	-	-	-	-	-	-	-	-	438,000	438,000	438,000	439,200	438,000
Hydro Upgrades	-	-	-	-	-	-	-	-	-	-	105,558	105,558	105,558	105,847	105,558
Bellevue Solar	-	-	-	-	-	-	-	-	-	-	3,659	3,659	3,659	3,669	3,659
Yamhill Solar	-	-	-	-	-	-	-	-	-	-	2,476	2,456	2,435	2,422	2,396
Outback Solar	-	-	-	-	-	-	-	-	-	-	19,762	19,643	19,526	19,462	19,292
ETO and Other Solar	-	-	-	-	-	-	-	-	-	-	22,954	22,934	22,914	124,602	124,242
Generic RPS Wind 2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Purchased Bundled	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total RECs</b>	-	-	-	-	-	-	-	-	-	-	<b>2,954,914</b>	<b>2,954,755</b>	<b>2,954,597</b>	<b>3,064,179</b>	<b>3,055,651</b>
RECs Available Less P-RB LIH		-	-	-	-	-	-	-	-	-	2,516,914	2,516,755	2,516,597	2,624,979	2,617,651

Resource	Infinite Life RECs Available By Vintage Year														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Biglow Canyon I	-	-	314,497	312,099	355,370	337,470	360,342	341,943	331,667	342,028	-	-	-	-	-
Biglow Canyon II	-	-	159,480	375,252	375,689	410,406	221,626	389,370	390,768	446,329	-	-	-	-	-
Biglow Canyon III	-	-	-	73,259	384,679	360,639	319,493	377,552	345,710	396,023	-	-	-	-	-
Tucannon River	-	-	-	-	-	-	-	31,449	350,526	895,210	-	-	-	-	-
Vansycle Ridge	-	-	59,617	74,902	81,054	69,504	63,442	67,148	62,326	71,358	-	-	-	-	-
PPM Klondike II	-	-	172,863	173,511	198,956	211,993	210,810	222,982	209,726	218,030	-	-	-	-	-
Pelton-Round Butte LIH	-	439,200	438,000	438,000	438,000	439,200	438,000	438,000	438,000	439,200	-	-	-	-	-
Hydro Upgrades	-	-	85,765	108,981	114,834	104,627	86,896	92,823	95,052	105,847	-	-	-	-	-
Bellevue Solar	-	-	-	-	-	3,760	3,646	3,342	3,984	3,669	-	-	-	-	-
Yamhill Solar	-	-	-	-	-	2,502	2,634	2,380	2,788	2,503	-	-	-	-	-
Outback Solar	-	-	-	-	-	1,360	21,352	20,896	21,352	19,936	-	-	-	-	-
ETO and Other Solar	-	-	1,079	2,309	9,146	13,878	20,070	23,966	28,240	23,037	-	-	-	-	-
Generic RPS Wind 2020	-	-	-	-	-	-	-	-	-	-	-	-	-	834,480	832,200
Generic RPS Wind 2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Purchased Bundled	-	-	-	-	-	-	18,425	-	-	-	-	-	-	-	-
<b>Total RECs</b>	-	<b>439,200</b>	<b>1,231,301</b>	<b>1,558,313</b>	<b>1,957,728</b>	<b>1,955,339</b>	<b>1,766,736</b>	<b>2,011,851</b>	<b>2,280,140</b>	<b>2,963,170</b>	-	-	-	<b>834,480</b>	<b>832,200</b>
RECs Available Less P-RB LIH		-	793,301	1,120,313	1,519,728	1,516,139	1,328,736	1,573,851	1,842,140	2,523,970	-	-	-	834,480	832,200

From 'Supplies' w/s Difference	439,200	1,231,301	1,558,313	1,957,728	1,955,339	1,766,736	2,011,851	2,280,140	2,963,170	2,954,914	2,954,755	2,954,597	3,898,659	3,887,851
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**Tab 6 - Energy Growth Rates**

Year	2016	2017	2018	2019	2020	2021
Growth Rate	0.43%	0.56%	0.48%	0.35%	0.42%	1.58%

April 12, 2016

TO: Tyler Pepple  
[tcp@dvclaw.com](mailto:tcp@dvclaw.com)  
Jesse Cowell  
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Bradley Mullins  
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FROM: Patrick G. Hager  
Manager, Regulatory Affairs

**PORTLAND GENERAL ELECTRIC  
UM 1755  
PGE's First Supplemental Response to ICNU Data Request No. 006  
Dated March 22, 2016**

**Request:**

**Please identify PGE's incremental cost of RPS compliance under the "OCEP scenario" under the alternative scenarios (i.e., RefGas-NoCo2; HighGas-NoCo2; and HighGas-RefCO2) the Company analyzed in its initial filing.**

*PGE's Initial Response (dated April 5, 2016):*

PGE objects to this request on the grounds that it is unduly burdensome. Subject to and without waiving its objection, PGE responds as follows:

PGE filed the OCEP scenario under Reference Gas-Reference CO2 only. PGE has not performed analyses under alternative scenarios and doing so would require new analysis. However, in the interest of providing all available information for analyses, PGE will provide the additional scenarios by Tuesday, April 12, 2016.

*PGE's First Supplemental Response (dated April 12, 2016):*

Attachment 006-A contains the alternative scenario results as requested.

**Tab 1 - Incremental Cost Summary**  
OECP Version w/ Unbundled RECs

Base Case (RefGas-RefCO2)	Total Incremental Cost to Comply				
	2017	2018	2019	2020	2021
Unbundled RECS	\$ 323,250	\$ 324,232	\$ 325,215	\$ 437,435	\$ 443,117
Biglow Canyon I	9,632,077	9,668,619	9,705,167	13,677,556	13,500,582
Biglow Canyon II	12,514,847	12,562,326	12,609,812	17,771,092	17,541,151
Biglow Canyon III	11,566,754	11,610,636	11,654,525	16,424,800	16,212,279
Tucannon River	7,141,982	7,169,078	7,196,177	10,141,620	10,010,398
<b>Total Incremental Cost</b>	<b>\$ 41,178,910</b>	<b>\$ 41,334,891</b>	<b>\$ 41,490,896</b>	<b>\$ 58,452,504</b>	<b>\$ 57,707,527</b>
Revenue Requirement (\$000)	\$ 1,805,242	\$ 1,849,798	\$ 1,892,835	\$ 2,029,713	\$ 2,102,578
<b>Percentage of Rev Requirement</b>	<b>2.3%</b>	<b>2.2%</b>	<b>2.2%</b>	<b>2.9%</b>	<b>2.7%</b>

Revenue Requirement Additions

91,375

Case 2 (RefGas-NoCO2)	2017	2018	2019	2020	2021
Unbundled RECS	323,250	324,232	325,215	437,435	443,117
Biglow Canyon I	10,791,034	10,831,973	10,872,919	15,323,277	15,125,008
Biglow Canyon II	14,907,435	14,963,991	15,020,555	21,168,569	20,894,668
Biglow Canyon III	5,320,490	5,340,675	5,360,863	7,555,100	7,457,344
Tucannon River	23,797,555	23,887,838	23,978,135	33,792,545	33,355,302
<b>Total Incremental Cost</b>	<b>55,139,764</b>	<b>55,348,709</b>	<b>55,557,687</b>	<b>78,276,926</b>	<b>77,275,440</b>
Revenue Requirement (\$000)	\$ 1,805,242	\$ 1,849,798	\$ 1,892,835	\$ 2,029,713	\$ 2,102,578
<b>Percentage of Rev Requirement</b>	<b>3.1%</b>	<b>3.0%</b>	<b>2.9%</b>	<b>3.9%</b>	<b>3.7%</b>

Case 3 (HighGas-NoCO2)	2017	2018	2019	2020	2021
Unbundled RECS	323,250	324,232	325,215	437,435	443,117
Biglow Canyon I	8,004,120	8,034,486	8,064,857	11,365,857	11,218,794
Biglow Canyon II	8,809,374	8,842,795	8,876,221	12,509,318	12,347,460
Biglow Canyon III	7,997,879	8,028,222	8,058,569	11,356,994	11,210,046
Tucannon River	(2,074,825)	(2,082,697)	(2,090,569)	(2,946,253)	(2,908,131)
<b>Total Incremental Cost</b>	<b>23,059,798</b>	<b>23,147,039</b>	<b>23,234,293</b>	<b>32,723,351</b>	<b>32,311,285</b>
Revenue Requirement (\$000)	\$ 1,805,242	\$ 1,849,798	\$ 1,892,835	\$ 2,029,713	\$ 2,102,578
<b>Percentage of Rev Requirement</b>	<b>1.3%</b>	<b>1.3%</b>	<b>1.2%</b>	<b>1.6%</b>	<b>1.5%</b>

Case 4 (HighGas-RefCO2)	2017	2018	2019	2020	2021
Unbundled RECS	323,250	324,232	325,215	437,435	443,117
Biglow Canyon I	7,072,196	7,099,027	7,125,861	10,042,524	9,912,583
Biglow Canyon II	6,948,216	6,974,576	7,000,940	9,866,471	9,738,809
Biglow Canyon III	6,081,858	6,104,931	6,128,008	8,636,243	8,524,498
Tucannon River	(7,400,342)	(7,428,417)	(7,456,497)	(10,508,491)	(10,372,521)
<b>Total Incremental Cost</b>	<b>13,025,177</b>	<b>13,074,348</b>	<b>13,123,527</b>	<b>18,474,182</b>	<b>18,246,486</b>
Revenue Requirement (\$000)	\$ 1,805,242	\$ 1,849,798	\$ 1,892,835	\$ 2,029,713	\$ 2,102,578
<b>Percentage of Rev Requirement</b>	<b>0.7%</b>	<b>0.7%</b>	<b>0.7%</b>	<b>0.9%</b>	<b>0.9%</b>

Notes:

Although the SunWay, Bellevue and Yamhill solar projects produce RECs that PGE uses for compliance, until the sum of these projects is 20 MW, they are not included in the incremental cost calculation (pursuant to OAR 860-083-0100(13)(a))

In addition, the following RPS resources are deemed to be zero incremental cost because they are either low-impact hydro or had an in-service date prior to June 6, 2007 (pursuant to OAR 860-083-0100(1)(i)):

- North Fork Upgrade
- Faraday Upgrade
- Round Butte Upgrade
- Pelton-Round Butte Low-Impact Hydro
- PPM Klondike II
- Vansycle Ridge

**Tab 2 - Incremental Cost for RECs Generated**

<b>Base Case (RefGas-RefCO2)</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Biglow Canyon I	12,980,666	12,980,666	12,980,666	13,016,229	12,980,666
Biglow Canyon II	16,865,630	16,865,630	16,865,630	16,911,837	16,865,630
Biglow Canyon III	15,587,933	15,587,933	15,587,933	15,630,640	15,587,933
Tucannon River	9,624,891	9,624,891	9,624,891	9,651,260	9,624,891
Generic RPS Resource 2020	-	-	-	20,827,786	20,770,880
<b>Total Incremental Cost</b>	<b>55,059,119</b>	<b>55,059,119</b>	<b>55,059,119</b>	<b>76,037,752</b>	<b>75,829,999</b>

<b>Case 2 (RefGas-NoCO2)</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Biglow Canyon I	14,120,601	14,120,601	14,120,601	14,159,288	14,120,601
Biglow Canyon II	18,977,227	18,977,227	18,977,227	19,029,220	18,977,227
Biglow Canyon III	17,825,670	17,825,670	17,825,670	17,874,507	17,825,670
Tucannon River	16,208,134	16,208,134	16,208,134	16,252,539	16,208,134
Generic RPS Resource 2020				29,977,025	29,895,121
<b>Total Incremental Cost</b>	<b>67,131,632</b>	<b>67,131,632</b>	<b>67,131,632</b>	<b>97,292,579</b>	<b>97,026,752</b>

<b>Case 3 (HighGas-NoCO2)</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Biglow Canyon I	10,786,750	10,786,750	10,786,750	10,816,303	10,786,750
Biglow Canyon II	11,871,951	11,871,951	11,871,951	11,904,476	11,871,951
Biglow Canyon III	10,778,339	10,778,339	10,778,339	10,807,869	10,778,339
Tucannon River	(2,796,137)	(2,796,137)	(2,796,137)	(2,803,798)	(2,796,137)
Generic RPS Resource 2020				7,865,808	7,844,317
<b>Total Incremental Cost</b>	<b>30,640,903</b>	<b>30,640,903</b>	<b>30,640,903</b>	<b>38,590,659</b>	<b>38,485,220</b>

<b>Case 4 (HighGas-RefCO2)</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Biglow Canyon I	9,530,843	9,530,843	9,530,843	9,556,955	9,530,843
Biglow Canyon II	9,363,761	9,363,761	9,363,761	9,389,415	9,363,761
Biglow Canyon III	8,196,214	8,196,214	8,196,214	8,218,669	8,196,214
Tucannon River	(9,973,069)	(9,973,069)	(9,973,069)	(10,000,392)	(9,973,069)
Generic RPS Resource 2020				(1,520,423)	(1,516,268)
<b>Total Incremental Cost</b>	<b>17,117,749</b>	<b>17,117,749</b>	<b>17,117,749</b>	<b>15,644,224</b>	<b>15,601,481</b>

**Notes:**

Although the SunWay, Bellevue and Yamhill solar projects produce RECs that PGE uses for compliance, until the sum of these projects is 20 MW, they are not included in the incremental cost calculation (pursuant to OAR 860-083-0100(13)(a))

In addition, the following RPS resources are deemed to be zero incremental cost because they are either low-impact hydro or had an in-service date prior to June 6, 2007 (pursuant to OAR 860-083-0100(1)(i)):

- North Fork Upgrade
- Faraday Upgrade
- Round Butte Upgrade
- Pelton-Round Butte Low-Impact Hydro
- PPM Klondike II
- Vansycle Ridge

**Tab 3 - Annual Compliance by Resource**

Resource	2017		2018		2019		2020		2021	
	MWh	Vintage	MWh	Vintage	MWh	Vintage	MWh	Vintage	MWh	Vintage
Unbundled RECs	576,408		578,160		579,912		780,019		790,152	
Pelton-Round Butte LIH	438,000	2017	438,000	2017	86,819	2017	-	2017	172,437	2018
Pelton-Round Butte LIH	-	2018	-	2018	351,181	2018	439,200	2018	265,563	2019
Biglow Canyon I	253,103	2017	87,991	2017	175,022	2018	261,092	2019	243,715	2020
Biglow Canyon II	330,285	2017	114,824	2017	228,394	2018	340,712	2019	318,035	2020
Biglow Canyon III	293,059	2017	101,882	2017	202,652	2018	302,310	2019	282,189	2020
Tucannon River	662,460	2017	230,304	2017	458,095	2018	683,372	2019	637,888	2020
Vansycle Ridge	52,805	2017	18,358	2017	36,515	2018	54,472	2019	50,846	2020
PPM Klondike II	161,343	2017	56,091	2017	111,570	2018	166,436	2019	155,358	2020
Hydro Upgrades	78,327	2017	27,231	2017	54,164	2018	80,800	2019	75,422	2020
Bellevue Solar	2,715	2017	944	2017	1,877	2018	2,801	2019	2,614	2020
Yamhill Solar	1,837	2017	639	2017	1,260	2018	1,864	2019	1,726	2020
Outback Solar	14,664	2017	5,098	2017	10,079	2018	14,946	2019	13,868	2020
ETO and Other Solar	17,033	2017	5,921	2017	11,768	2018	17,540	2019	88,786	2020
Purchased Bundlec	-	2017	-	2017	-	2018	-	2019	-	2020
Biglow Canyon I	-	2018	166,072	2018	80,001	2019	98,314	2020	111,041	2021
Biglow Canyon II	-	2018	216,715	2018	104,397	2019	128,294	2020	144,903	2021
Biglow Canyon III	-	2018	192,289	2018	92,631	2019	113,834	2020	128,571	2021
Tucannon River	-	2018	434,669	2018	209,392	2019	257,322	2020	290,634	2021
Vansycle Ridge	-	2018	34,648	2018	16,691	2019	20,511	2020	23,167	2021
PPM Klondike II	-	2018	105,864	2018	50,998	2019	62,671	2020	70,784	2021
Hydro Upgrades	-	2018	51,394	2018	24,758	2019	30,425	2020	34,364	2021
Bellevue Solar	-	2018	1,781	2018	858	2019	1,055	2020	1,191	2021
Yamhill Solar	-	2018	1,196	2018	571	2019	696	2020	780	2021
Outback Solar	-	2018	9,564	2018	4,580	2019	5,594	2020	6,280	2021
ETO and Other Solar	-	2018	11,166	2018	5,374	2019	35,816	2020	40,446	2021
Purchased Bundlec	-	2018	-	2018	-	2019	-	2020	-	2021
Biglow Canyon I	-	2019	-	2019	-	2020	-	2021	-	2022
Biglow Canyon II	-	2019	-	2019	-	2020	-	2021	-	2022
Biglow Canyon III	-	2019	-	2019	-	2020	-	2021	-	2022
Tucannon River	-	2019	-	2019	-	2020	-	2021	-	2022
Vansycle Ridge	-	2019	-	2019	-	2020	-	2021	-	2022
PPM Klondike II	-	2019	-	2019	-	2020	-	2021	-	2022
Hydro Upgrades	-	2019	-	2019	-	2020	-	2021	-	2022
Bellevue Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Yamhill Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Outback Solar	-	2019	-	2019	-	2020	-	2021	-	2022
ETO and Other Solar	-	2019	-	2019	-	2020	-	2021	-	2022
Purchased Bundlec	-	2019	-	2019	-	2020	-	2021	-	2022
<b>Totals</b>	<b>2,882,040</b>		<b>2,890,800</b>		<b>2,899,560</b>		<b>3,900,096</b>		<b>3,950,760</b>	

Resource	2017	2018	2019	2020	2021
Unbundled RECs	576,408	578,160	579,912	780,019	790,152
Biglow Canyon I	253,103	254,063	255,023	359,406	354,756
Biglow Canyon II	330,285	331,539	332,792	469,006	462,937

**Tab 4 - Incremental Cost by Resource**

Expected Incremental Cost of Qualifying Electricity									
\$/MWh						\$000's			
Base Case RefGas- RefCO2	Case 2 RefGas- NoCO2	Case 3 HighGas- NoCO2	Case 4 HighGas- RefCO2	2017 Busbar Energy (MWh)	Base Case RefGas- RefCO2	Case 2 RefGas- NoCO2	Case 3 HighGas- NoCO2	Case 4 HighGas- RefCO2	
<b>With Government Incentives:</b>									
Biglow Canyon I	38.056	41.398	31.624	27.942	341,094	\$ 12,981	\$ 14,121	\$ 10,787	\$ 9,531
Biglow Canyon II	37.891	42.635	26.672	21.037	445,109	\$ 16,866	\$ 18,977	\$ 11,872	\$ 9,364
Biglow Canyon III	39.469	45.135	27.291	20.753	394,941	\$ 15,588	\$ 17,826	\$ 10,778	\$ 8,196
Tucannon River	10.781	18.155	(3.132)	(11.171)	892,764	\$ 9,625	\$ 16,208	\$ (2,796)	\$ (9,973)
Generic RPS Resource 2020	24.959	35.923	9.426	(1.822)		\$ -	\$ -	\$ -	\$ -
Generic RPS Resource 2025	35.239	50.046	20.809	5.687		\$ -	\$ -	\$ -	\$ -
Generic RPS Resource 2030	36.093	55.123	23.237	3.895		\$ -	\$ -	\$ -	\$ -
Generic RPS Resource 2035	37.102	60.437	25.523	1.871		\$ -	\$ -	\$ -	\$ -
Generic RPS Resource 2040	39.828	66.786	28.361	1.060		\$ -	\$ -	\$ -	\$ -





**Tab 6 - Energy Growth Rates**

Year	2016	2017	2018	2019	2020	2021
Growth Rate	0.43%	0.56%	0.48%	0.35%	0.42%	1.58%