BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 1788

In the Matter of PUBLIC UTILITY COMMISSION OF OREGON PGE 2016 Revised Renewable Portfolio Implementation Plan for the Years 2017-2021	**Reply Comments of Portland General Electric Company**

INTRODUCTION

Portland General Electric Company (PGE) submits its reply comments to Staff of the Oregon Public Utility Commission (OPUC) and Industrial Customers of Northwest Utilities (ICNU), Northwest Energy Coalition (NWEC), Renewable Northwest (RNW), Oregon Solar Energy Industries Association (OSEIA), collectively referred to as "the Parties," regarding PGE's 2016 Renewable Portfolio Implementation Plan (2016 Revised RPIP). We address the main issues presented in Parties' comments in the sections below.

The purpose of Oregon Administrative Rules (OAR) Chapter 860 Division 83 is to implement the requirements of Oregon's renewable portfolio standards (RPS), codified in ORS 469A.005 through ORS 469A.210. In particular, the rules direct utilities to file implementation plans and to track the incremental costs of complying with the RPS. Specifically, ORS 469A.100 contains a cost of compliance limit that, if reached, exempts the utility from the requirement to comply with the annual targets set forth in ORS 469A.052.

On December 31, 2015, PGE filed its 2016 RPS Implementation Plan that included analysis and a forecast for the period 2017 through 2021. On February 16,

2016, PGE provided a supplemental RPIP, for informational purposes that included PGE's initial estimated impact of SB 1547. Subsequently, on March 8, 2016, SB 1547 was signed into law. As directed by OPUC Order No. 16-156, PGE filed a Revised 2016 RPIP on July 15, 2016, which is the subject of these comments. The primary analysis for the scenarios filed in PGE's Revised RPIP is based on IRP analysis. PGE distributed its 2016 Draft Integrated Resource Plan (2016 Draft IRP) on September 26, 2016. PGE plans to file its final 2016 IRP with the OPUC on November 15, 2016.

PGE acknowledges Parties' comments regarding aligning PGE's RPIP and IRP processes. PGE is supportive of that concept and looks forward to crafting a new process that will provide valuable incremental cost information as PGE plans for its future RPS compliance.

PGE's 2016 Revised RPIP filing

In addition to the materials required to accompany the RPIP filing, PGE provided comprehensive work papers that transparently detailed PGE's calculations supporting the RPIP. This detail included all revenue requirements models necessary to derive the incremental costs presented. PGE's work papers also contain the models used to compute REC generation, retirement, and banking; with resource-level and REC-type information provided on an annual basis through 2040. Not only do these models provide PGE's forecast sources of RECs and REC bank composition both numerically and visually, they also provide stakeholders the ability to test the effects of altering resource timing and quantity assumptions.

Alignment with acknowledged IRP or IRP Update

Staff notes that the 2016 Revised RPIP was prompted as a result of, "the departure of PGE's 2016 RPIP renewable resource addition, as filed in Docket No. UM 1755, from its 2013 IRP Update resource acquisition strategy." Presumably, Staff is referring to PGE's supplemental informational filing from February 16, 2016, which contained a number of simplifying assumptions as it was intended to provide Staff with an initial estimated impact of SB 1547, as mentioned above. That supplemental filing and PGE's 2016 Revised RPIP differ from PGE's 2013 IRP Update because the conditions influencing the procurement decision changed.

Two major developments since PGE's filing of the 2013 IRP Update include: 1) the changes to renewable resource tax incentives (PTC and ITC) contained in the Consolidated Appropriations Act of 2016; and, 2) the revisions to Oregon's RPS requirements, given the passage of SB 1547. These circumstances were central to the design and analysis of portfolios undertaken in the 2016 IRP.

In the following sections, PGE provides additional discussion of how PTC/ITC legislation necessitated a different resource strategy than had been presented in the 2013 IRP Update; provides justification for the two primary portfolios investigated in the RPIP on the basis of cost and risk; and presents a proposal for maintaining alignment between the IRP and RPIP in the future. Since the RPIP results are highly dependent on IRP analysis, we quote significantly from the 2016 Draft IRP in our comments.

Changes to PTC/ITC

PGE's 2013 IRP Update included an assumption of ongoing federal tax incentives for renewable resources. That is, the 2013 IRP Update assumed the incentives would not

expire within a time period that would affect the procurement decision. That assumption was proven incorrect shortly after PGE filed its 2013 IRP Update with the passage of the Consolidated Appropriations Act of 2016 (Act). The Act included a phasedown of the ITC and a phase-out of the PTC on a time period that could influence the procurement decision. The phase-out of the PTC has the effect of incentivizing early action relative to deferring for a period of time. Staff notes this finding as a contradiction between PGE's 2016 Revised RPIP and the 2013 IRP Update,

> PGE stated that it believed federal tax subsidies to the renewable energy sector would continue (the Consolidated Appropriations Act of 2016 passed two weeks after the Company filed its 2013 IRP Update), a position that contributed to the Company's deferred renewable resource acquisition strategy…[1]

However, Staff fails to recognize that the important factor is not the existence of the incentives, but rather the timing of their expiration or inception that can lead to differences in resource timing as varied timing brings different sets of incentives.

In response to the extension and phase-out of the PTC, PGE began testing alternative physical resource procurement timing portfolios in the IRP. The factors driving RPS decision-making were communicated with IRP stakeholders beginning with the first-scheduled IRP public meeting in 2016, Roundtable #16-1 on March 9, 2016. Candidate resource portfolio construction and composition was a topic of repeated discussion with IRP stakeholders; the topic was presented at nearly every IRP public meeting (or Roundtable discussion) over a period spanning more than a year. A suite of RPS-related portfolios were evaluated in the IRP and the resulting analysis from PGE's 2016 IRP is presented in the following section.

[1] Staff Comments, p. 3

Portfolio analysis

Both Staff and ICNU requested that PGE provide additional justification for the 175 MWa 2018 RPS addition included in the four portfolios presented in PGE's RPIP.[2] PGE agrees that the RPIP did not provide full justification on the basis of balanced cost and risk for the 2018 RPS addition, but contends that the timing of the RPIP, contemporaneous with the ongoing IRP, precluded such an analysis. In their comments, all parties acknowledged the challenges introduced by the misalignment of the RPIP filing relative to PGE's IRP process. While, at the time of filing, PGE presented the most promising renewable portfolio identified in preliminary IRP analysis ("Utilized Bank – Wind") and included sensitivities on renewable resource type ("Utilized Bank - Diverse") and the outer-year procurement timing ("Staged Build – Wind" and "Staged- Build – Diverse"), PGE acknowledges that without a full least cost least risk analysis, this portfolio selection in the RPIP lacked the type of transparency expected for the introduction of new resource strategies. While PGE maintains that the RPIP is not the appropriate venue for justifying new resource strategies on the basis of cost and risk, PGE has included a discussion of candidate renewable portfolios for the RPIP below, in the context of cost and risk based on the analysis undertaken in the 2016 IRP.

Renewable portfolio design is a primary component of PGE's 2016 IRP. As presented in the 2016 Draft IRP, PGE considered variations on physical renewable resource procurement timing, and renewable technology options. Through the IRP process, PGE engaged stakeholders in discussion of the renewable portfolio design in several public meetings and incorporated comments and requests from stakeholders into

[2] Staff Comments, p. 2

portfolio design. Below are excerpts from the 2016 Draft IRP that explore each of the RPS procurement questions.

In the 2016 IRP, two portfolios were developed as comparators in order to test various resource technology and timing options: the *RPS Wind 2018* portfolio and the *Wind 2018* portfolio. These portfolios are described below.

RPS Wind 2018

The *RPS Wind 2018* portfolio incorporates a 175 MWa Pacific Northwest Wind (PNW Wind) resource in 2018 to take full advantage of the PTC, includes PNW Wind additions in 2025 and 2040 to ensure physical compliance in those years, and makes PNW wind additions in 2030 and 2035 in order to maintain REC bank levels above the minimum REC bank. In addition, any remaining capacity needs are met with a generic capacity resource modeled in the IRP as a natural gas-fired frame combustion turbine. The cumulative resource additions for this portfolio are summarized in Table 1.

Table 1
RPS Wind 2018 cumulative resource additions, MW (IRP Table O-3)

Resource	2017	2018	2019	2020	2021	2025	2030	2035	2040
Energy Efficiency	16	61	104	144	180	297	404	490	571
DSG	4	9	13	17	22	30	39	48	57
DR	26	29	31	69	77	162	187	198	198
CVR	-	0.4	0.9	1.3	1.8	3.7	6.3	9.3	12.5
PNW Wind	-	515	515	515	515	628	755	2,511	3,074
MT Wind	-	-	-	-	-	-	-	-	-
Solar	-	-	-	-	-	-	-	-	-
Geothermal	-	-	-	-	-	-	-	-	-
Biomass	-	-	-	-	-	-	-	-	-
Efficient Capacity	-	-	-	-	-	-	-	-	-

Resource	2017	2018	2019	2020	2021	2025	2030	2035	2040
Generic Capacity	-	290	318	318	760	1,072	1,253	1,688	1,940

Wind 2018

The Wind 2018 portfolio incorporates the 175 MWa PNW Wind addition in 2018, but also contemplates an additional PNW Wind addition in 2021 that is large enough to meet PGE's total available energy deficit in 2021 (approximately 213 MWa). Additional renewables are not procured in this portfolio until 2040 in order to meet physical compliance in that year. This portfolio was designed in part to test the competitiveness of wind resources against other resources that have traditionally provided energy to the PGE system. It also serves as the comparator portfolio for an investigation across various renewable resource options in addition to PNW Wind. The cumulative resource additions for this portfolio are summarized in Table 2.

Table 2
Wind 2018 cumulative resource additions, MW (IRP Table O-3)

Resource	2017	2018	2019	2020	2021	2025	2030	2035	2040
Energy Efficiency	16	61	104	144	180	297	404	490	571
DSG	4	9	13	17	22	30	39	48	57
DR	26	29	31	69	77	162	187	198	198
CVR	-	0.4	0.9	1.3	1.8	3.7	6.3	9.3	12.5
PNW Wind	-	515	515	515	1,141	1,141	1,141	1,141	3,074
MT Wind	-	-	-	-	-	-	-	-	-
Solar	-	-	-	-	-	-	-	-	-
Geothermal	-	-	-	-	-	-	-	-	-
Biomass	-	-	-	-	-	-	-	-	-
Efficient Capacity	-	-	-	-	-	-	-	-	-

Resource	2017	2018	2019	2020	2021	2025	2030	2035	2040
Generic Capacity	-	290	318	318	760	1,072	1,253	1,688	1,940

Questions regarding the timing of RPS resource procurement were addressed in PGE's 2016 Draft IRP. The following is an excerpt from the Updated 2016 Draft IRP, Chapter 12, Section 12.3[3]:

> "When considering an incremental physical RPS-qualifying resource, early action, which captures relatively more of the available PTC prior to phase-out, is preferable to deferring action. Given the portfolios assessed in this IRP, PGE's results demonstrate that procuring 175 MWa, with a resource commercial operation date (COD) in 2018 (*RPS Wind 2018* portfolio), results in a lower NPVRR than just-in-time compliance with the RPS obligation stair-step in 2020 (*RPS Wind 2020*). Further, acquisition of the full 2025 RPS compliance quantity in 2021 (*RPS Wind 2021*), to capture the last available tranche of PTC based on PGE's modeling assumptions in this IRP, results in a lower portfolio NPVRR than deferring this same resource action a full four years until 2025 and foregoing the PTC (*RPS Wind 2025*). The portfolio representing the 2018 resource action achieves a lower NPVRR relative to the portfolio including the 2021 resource action. A facility's qualification for a certain level of tax credit in this IRP is based on the begin construction date that results from a given COD and the assumed Engineering, Procurement and Construction (EPC) duration as specified by third-party experts for this IRP (also discussed in Chapter 7 - Supply Options). These assumptions do not reflect the possibility of a facility satisfying the safe harbor for a given level of tax credit with an EPC duration greater than the IRP assumption (and thus, a later COD for the same level of tax credit).
> Table 12-1 summarizes the Reference Case NPVRR for each of the RPS timing portfolios. From these results, PGE draws the following conclusions:
>
> - Acquiring a greater quantity of PTC-qualifying resources reduces the portfolio NPVRR;
> - Capturing more of the PTC is less costly on a NPVRR-basis than deferring resource action within a reasonable time period; and

[3] Note that the IRP excerpts presented here reflect incremental updates made after publication of the 2016 Draft IRP. NPVRR data presented reflects the final IRP analysis. The final 2016 IRP is planned for filing with the OPUC on November 15, 2016.

- Achieving the greatest quantity of PTC available, for a given resource type, results in the portfolio with the best combination of cost and risk when assessed using the scoring metrics discussed later in this Chapter.

For these reasons, PGE's Action Plan considers only those portfolios that include an RPS compliance strategy consistent with the acquisition of 175 MWa of RPS-qualifying resources eligible for 100 percent PTC (in 2018 under IRP)."

Table 3
2016 IRP portfolio comparison (IRP Table 12-1)
RPS timing reference case NPVRR (2016$, millions)

RPS Wind 2018	RPS Wind 2020	RPS Wind 2021	RPS Wind 2025
$ 31,504	$ 31,630	$ 31,607	$ 31,641

Questions regarding renewable technology type were addressed in the following excerpt from the Updated 2016 Draft IRP, Chapter 12, Section 12.3[4]:

"To assess the relative economics of various renewable resources, PGE isolates each resource's costs and benefits by modeling portfolios representing different combinations of resource options. At least one portfolio isolating a specific renewable technology of those eligible for inclusion in PGE's resources portfolios is present in the portfolio analysis (also discussed in Chapter 7 -Supply Options). The renewables resources included are:

- PNW wind (Oregon Gorge)
- Montana wind
- Single-axis tracking solar PV
- Geothermal
- Biomass (Boardman Biomass Project).

For the purpose of making resource comparisons, the *Wind 2018* portfolio, which incorporates PNW wind additions of 175 MWa in 2018 and 212 MWa in 2021, serves as a basis. From this starting point, the NPVRR of four portfolios helps to draw conclusions regarding resource economics.

Two portfolios allow for comparisons with solar PV:

[4] Note that the IRP excerpts presented here reflect incremental updates made after publication of the 2016 Draft IRP. NPVRR data presented reflects the final IRP analysis.

- *Wind 2018 + Solar PV 2018* displaces 50 MWa of PNW wind with solar PV in 2018, thus foregoing the PTC in favor of capturing the full 30 percent investment tax credit (ITC); and
- *Wind 2018 + Solar PV 2021* adds 50 MWa of solar PV in lieu of wind in 2021, when wind qualifies for 40 percent PTC and solar achieves 26 percent ITC.

All portfolios achieve comparable levels of resource adequacy by incorporating the ELCC of the variable resources in each portfolio. The overnight capital cost for solar PV is forecast to decline at a more rapid rate than that of wind. The comparison of these two solar PV portfolios with the base portfolio demonstrates that, on a portfolio NPVRR basis, displacing wind with solar PV in 2018 or 2021 does not reduce portfolio NPVRR.

Geothermal and biomass resources both displace wind in 2021, with the associated adjustment to capacity, and they both increase the cost on a NPVRR bases when compared to *Wind 2018*.
"Chapter 7- Supply Options of provides additional information regarding each of the above-referenced resources. Table 12-6, below, reports the NPVRR results for these portfolios, under Reference Case conditions."

Table 4
2016 IRP portfolio comparison (IRP Table 12-6)
Renewable Resource Reference Case NPVRR (2016$, millions)

Wind 2018	Wind 2018 + Solar PV 2018	Wind 2018 + Solar PV 2021	Geothermal 2021	Boardman Biomass 2021
$ 31,652	$ 31,792	$ 31,705	$ 31,769	$ 33,173

Inclusion of alternative renewable resource technologies in the future (Use of Montana Wind)

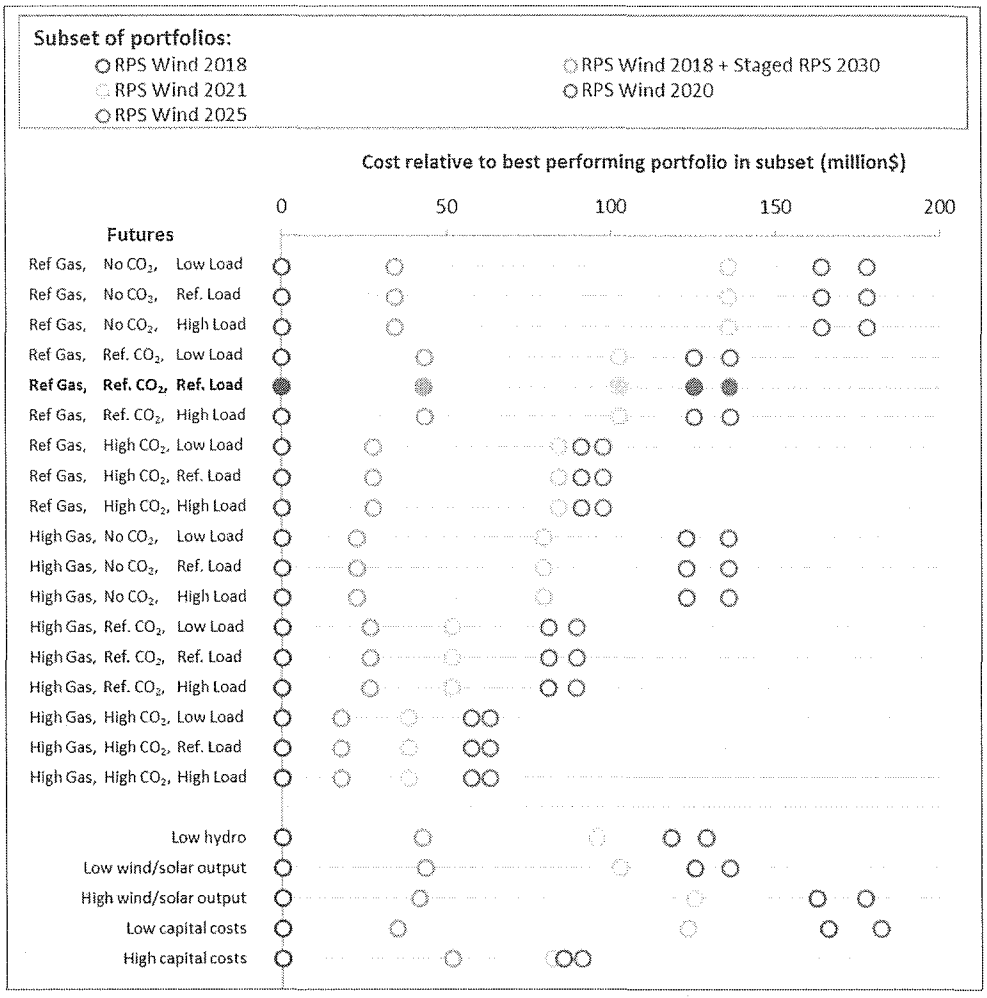
Many alternative resources may arise in the future; the use of PNW Gorge Wind is a conservative assumption representing a generic future renewable addition. Any resource with more favorable parameters relative to this generic resource would likely have a favorable effect in terms of incremental cost. As stated during PGE's IRP public process, the remote (Montana) wind resource was used for demonstrative purposes in the IRP. The purposes were to represent the potential benefits in a portfolio context, as well

as approximate a potential transmission budget. This approach was discussed on numerous occasions with stakeholders to PGE's IRP process and largely received approval. The use of a similar approach or set of assumptions in the RPIP would be inappropriate.

In addition, PGE applied the full portfolio scoring methodology to the timing portfolios considered for inclusion in the IRP. This analysis is summarized in the following excerpt from the 2016 Draft IRP Appendix L, Section L.4:

> "PGE also used the portfolio analysis in this IRP to select two renewable portfolios as the basis of the Renewable Portfolio Implementation Plan (RPIP). In addition to the RPS timing portfolios, PGE tested a variation on the *RPS Wind 2018* portfolio, *RPS Wind 2018 + Staged RPS 2030*. The renewable additions across these two portfolios are the same through 2025, but *RPS Wind 2018 + Staged RPS 2030* includes equally-sized additions in 2030 and 2035 in order to maintain REC bank levels prior to the 2040 addition. In the *RPS Wind 2018* portfolio, the early RPS procurement in 2018 allows PGE to reduce costs through the PTC and also to make use of banked RECs to defer RPS procurement from 2030 to 2035 to realize further cost reductions. In the *RPS Wind 2018 + Staged RPS 2030* portfolio, PGE tests the economic impact if these deferral savings cannot be realized due potentially to a limited ability to procure the large 2035 addition in full.
>
> As shown in Figure L-11, the *RPS Wind 2018* and *RPS Wind 2018 + Staged RPS 2030* portfolios consistently outperform the other RPS timing portfolios across all futures. This finding indicates that even if the full deferral value afforded by the 2018 early procurement cannot be realized, the value of the PTC is still large enough that 2018 RPS procurement is lower cost than RPS procurement in 2020, 2021, or 2025.

Figure 1
Relative NPRVV of portfolios considered for RPIP (IRP Figure L-11)



While least-cost, least-risk analysis is not presented in the RPIP, PGE made use of the IRP portfolio scoring methodology in order to determine the portfolios for consideration in the RPIP. This portfolio scoring is summarized in Table L-4. To show a range of possible outcomes, PGE selected the two top performing portfolios for inclusion in the RPIP (*RPS Wind 2018* and *RPS Wind 2018 + Staged RPS 2030*, or "Utilized Bank – Wind" and "Staged Build – Wind" as they are referred to in the RPIP, respectively). In addition, two portfolios in the RPIP consider the potential impact of solar procurement on incremental costs. These portfolios, "Utilized Bank – Diverse" and

"Staged Build – Diverse," were not considered in the IRP because the RPS resource comparison suggested that wind resources were more economic than solar resources in the Action Plan time horizon."

Table 5
Portfolio scoring of candidate RPIP portfolios (IRP Table L-4)

	Metric Weighting	50%	16.7%	16.7%	16.7%	100%
Rank	IRP Portfolio Name	Cost Score	Severity Score	Variability Score	Durability Score	Wtd. Score
1	RPS Wind 2018 (RPIP: "Utilized Bank – Wind")	100	100	0	100	83
2	RPS Wind 2018 + Staged RPS 2030 (RPIP: "Staged Build – Wind")	68	71	39	50	61
3	RPS Wind 2021	25	41	94	50	43
4	RPS Wind 2020	8	9	94	50	29
5	RPS Wind 2025	0	0	100	0	17

Regional developments in renewable resources

The market factors underpinning the resource economics in PGE's 2016 Revised RPIP are largely consistent with those of PGE's 2016 IRP, where possible. Factors such as increasing RPS mandates, carbon dioxide regulation, and reductions in renewable resource capital costs, among others, are all present in PGE's analysis. Staff notes that the absence of such factors is, "of particular concern."[5] Given the current structure of the incremental cost calculation, the effect of these macro considerations may be fairly muted. Nevertheless, PGE is happy to discuss this issue with Staff should questions or concerns arise regarding the assumptions embedded within PGE's modeling.

[5] Staff Comments, p. 7

Future opportunities for IRP/RPIP alignment

Comments from NWEC, RNW, & OSEIA highlight the need for future alignment between the IRP and the RPIP. PGE supports review of the RPIP intent and process and ensuring alignment between the RPIP and IRP processes. The RPIP was initially designed to forecast the incremental cost of renewable resources and monitor the utilities' approach to the four percent incremental cost cap imposed by ORS 469A.100(1). The RPIP was never designed to be a substitute for the prudence review of a near-term renewable resource that would otherwise occur within an IRP. Staff noted in their comments, in response to the lack of least cost, least risk analysis in the RPIP that: "In this proceeding, Staff therefore views this analysis as supplemental to what will come in the IRP…" PGE appreciates Staff's interpretation of the RPIP as supplemental to the IRP. Staff's comment highlights that the primary challenge is not that the RPIP excludes least cost, least risk analysis, but that the RPIP was filed prior to the filing of a consistent IRP analysis.

PGE believes that the responsibility of evaluating renewable resource options on the basis of cost and risk to customers should remain fully within the scope of the IRP. To ensure that the RPIP represents an effective opportunity to understand the impact of renewable procurement strategies on the incremental cost cap, PGE proposes that future RPIP cycle be tied directly to future IRP cycles, that the RPIP should be based on the renewable portfolios evaluated in the IRP, and that the RPIP should be incorporated into the IRP as an appendix or addendum. In evaluating options for the role of the RPIP in relation to the IRP, PGE does not consider the RPIP to be a replacement for the process

of designing and evaluating renewable portfolios due to the misalignment between the incremental cost calculation and the true cost and risk impacts of renewable resource procurement decisions on customers. PGE considers the net present value revenue requirement to be the appropriate cost metric to compare renewable resource procurement options.

REC retirement strategy

Staff expressed concern that the REC retirement heuristic applied in the RPIP may introduce the risk of exceeding the cost cap in later years and suggests optimizing REC retirement to "distribute[] costs over multiple years." PGE agrees that an optimization model could be used to reduce the net present value of incremental costs associated with REC retirements relative to the heuristic strategy employed by PGE in the RPIP. Furthermore, PGE believes that the significant effort required to build optimization models while maintaining transparency would be better directed toward minimizing the impacts of renewable procurement decisions on costs to customers in the form of the net present value of revenue requirement impacts, rather than minimizing some function based on the incremental cost construct as it is applied in the RPIP. PGE also notes that a full accounting of the revenue requirement impact of renewable resource acquisitions as they are considered within an IRP cannot be reasonably captured within a procurement optimization framework due to computational limitations. If such a method were to be employed in the future, it would therefore not represent a substitute for the least cost, least risk analysis that occurs within an IRP.

With respect to the REC retirement strategy that PGE employed in the RPIP, PGE acknowledges that the strategy of retiring the lowest incremental cost RECs first does

introduce a risk that higher incremental cost RECs may be retired in future years. This strategy was intentionally selected to conservatively identify the potential risks in outer years, when compliance obligations increase substantially and the presence of higher incremental cost RECs in the bank may increase the likelihood of exceeding the cost cap. The heuristic was also chosen for its simplicity and transparency. In practice, PGE can deviate from the retirement heuristic employed in the RPIP in a given compliance year. For example, PGE could consider a strategy in which higher incremental cost RECs are intentionally retired in earlier years in order to hit the incremental cost cap in anticipation of future years when higher compliance obligations may make it more difficult to stay within the incremental cost cap.

Staff also notes that in PGE's REC retirement heuristic, "...RPS compliance incremental costs are disconnected from the actual costs to ratepayers, who are paying for a resource regardless of whether that resource's associated REC is retired." PGE agrees that this observation is generally true given the incremental cost construct in the RPIP and that the disconnect between ratepayer impacts and incremental cost accounting has the potential to be larger than it has historically been with the cessation of first-in, first-out REC retirement rules. This is a primary justification for not using the incremental cost construct as a proxy for ratepayer impact and for continuing to rely on the IRP for the selection of an RPS strategy that ensures balanced cost and risk to customers.

Incremental Cost Calculation

ICNU raises the argument that "the incremental cost of compliance must be based on the cost of RECs generated in the compliance year, not the cost of RECs retired in the

compliance year." [6] ICNU also notes that this is the same position it advocated in UM 1783 (PGE's 2015 RPS Compliance Report). In UM 1783, Commission Order 16-416 adopted the Staff Report, which found that PGE correctly determined the incremental cost under the directive in the current administrative rules. PGE similarly followed the administrative rule requirements with respect to the incremental cost calculation for the current RPIP. In the UM 1783 Staff Report, Staff also pointed out that both utilities and stakeholders had "agreed that discussions should commence to address this and other issues related to RPS compliance in anticipation of the upcoming RPS rulemaking."[7]

Rather than engaging in a continuing statutory construction battle, which likely will only result in a finding of ambiguity, PGE believes parties should work through this issue in the context of the upcoming RPS rulemaking. The fact is that PGE calculates both the incremental cost of RECs generated and RECs retired in each Implementation Plan since 2011[8]. However, to ameliorate any immediate concerns, Attachment A (to these comments) provides the calculation of incremental cost using the cost of RECs generated in the compliance year. Like the method followed by PGE and the administrative rules of using the costs of RECs retired in the compliance year, the result, in the reference case, is still that the 4% cap is not reached. Staff's comments on this matter were similar, "At this point in time, Staff believes any aspect of RPS compliance or implementation addition to incremental cost calculation is ripe for review; five years of filings are available for review and the RPS paradigm has changed with SB 1547."

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[6] ICNU Comments, page 14.
[7] OPUC Order No. 16-416, Appendix A, page 6.
[8] Tab '2-Incremental Cost of RECs Generated' of Attachment A in Docket Nos. UM 1466, 1568, 1683, 1755, and 1788.

Resource for capacity-equivalence

As stated previously, PGE supports a review of the Rules surrounding the RPIP in general and the associated incremental cost calculation framework. PGE's approach for determining the cost of an energy- and capacity-equivalent Proxy CCCT correctly implements Order No. 14-034 and the Stipulation among parties in Docket No. UM 1616 (Staff, CUB, ICNU, ODOE, PacifiCorp, PGE, NWEC, and RNP). Among other issues, that Order and Stipulation provided clarity regarding the method for adjusting the costs of the Proxy CCCT to achieve capacity equivalence with the RPS resource. Order No. 14-034 describes the capacity-equivalence adjustment as accounting for "differences in resource capacity values, the parties agree that the Proxy CCCT would be modified to reflect the costs of the same capacity value as the RPS Resource" (emphasis added).[9] Despite the clarity in the Commission's language, ICNU asserts the opposite is true with regard to the inclusion of capacity resource being used "to create capacity equivalence with the proxy CCCT".[10] PGE notes that the costs associated with variable energy resources in PGE's 2016 Revised RPIP include the estimated variable system costs of integrating those resources. These costs (applicable to wind and solar) are consistent with the study and findings reported during PGE's 2016 IRP process.

PGE's analysis includes an estimation of variable resource capacity contribution based on an effective load carrying capacity (ELCC) methodology, consistent with PGE's positions in OPUC Docket No. UM 1719 and PGE's 2016 IRP. The ELCC varies by technology type, the year and size of the addition, due to portfolio effects. This approach

[9] Public Utility Commission of Oregon Order No. 14-034 (UM 1616), p. 3
[10] Comments of ICNU, p. 19.

is consistent with ICNU's suggestions for determining the capacity contribution of variable resources.[11]

PGE's filing complies with the Rules established by the Commission for performing the incremental cost calculation and all attributes of that calculation. The fixed costs of a SCCT are an appropriate measure of the cost of capacity, and can be used to adjust the capacity value of a resource. The fixed costs of either the more expensive reciprocating engine or aeroderivative technologies may be an appropriate measure of the cost of *flexible* capacity. However, the capacity adjustment contemplated in the Stipulation relates specifically to creating a Proxy CCCT representing the same capacity value as the RPS resource.

Unbundled REC treatment

OPUC Staff recognized PGE's compliance with the Order acknowledging PGE's 2014 Implementation Plan (Order No. 14-265 in Docket No. UM 1683), which required providing a scenario using the full 20% of unbundled RECs at a price equal to the weighted average price paid for unbundled RECs used for compliance in its last compliance report. This was provided as Attachment B in PGE's filing. PGE's 2016 IRP includes an appropriate calculation of the unbundled REC break-even price between two variations of the preferred portfolio ("Efficient Capacity 2021") under Reference Case conditions. The portfolios test the present value cost effect of deferring incremental RPS resource action by drawing from the projected REC bank ("Efficient Capacity 2021 Minimum REC Bank"), relative to a state in which incremental RPS resource action is further delayed given the availability of unbundled RECs in a quantity equivalent to 20%

[11] Comments of ICNU, p. 22.

compliance for a period of six years from 2016 through 2021 ("Efficient Capacity 2021 Minimum REC Bank"). The results from this specific portfolio analysis suggest that under the conditions modeled, the break-even unbundled REC price is approximately $15 per REC (in 2016).[12] It should be noted that PGE's analysis of these portfolios indicates that deferring incremental RPS resource additions consistent with the acquisition of 20% unbundled RECs and maintaining the recommended minimum REC bank balance may not result in the lowest cost outcome if it means foregoing 100% PTC.

Table 6
2016 IRP Portfolio Comparison (IRP Table 12-2)
Banked and unbundled RECs reference case NPVRR (2016$, millions)

Efficient Capacity 2021	Efficient Capacity 2021 Minimum REC Bank	Efficient Capacity 2021 20% Unbundled RECs
$ 31,319	$ 31,446	$31,392

The break-even unbundled REC price derived by ICNU ("tipping point") appears to be associated with a strategy largely based on an expectation that sufficient unbundled RECs will be available in the market to satisfy 20% of PGE's annual compliance obligations through 2070. This is not a "near-term" strategy.[13] The unbundled RECs to be acquired under ICNU's proposal equate to approximately one million unbundled RECs for RPS compliance in 2028 and more than 2.3 million unbundled RECs in 2040. While PGE recognizes that the purchase of unbundled RECs can deliver value to customers by diminishing RPS compliance needs and delaying the timing of incremental resources, it simply would not be prudent from a long-term planning standpoint to rely on

[12] PGE's 2016 Integrated Resource Plan, Chapter 12, Section 12.3.2. Similar results were reported in PGE's 2016 Draft IRP.
[13] Comments of ICNU, p. 7

the future availability of the significant quantities of unbundled RECs required to fulfill 20% of the annual RPS target for a period of more than 50 years.

In this case, the break-even (or tipping-point) price is illustrative, not prescriptive. PGE's RPIP makes no statements regarding the potential for unbundled RECs to reduce the incremental cost of compliance, but rather questions the appropriateness of developing a long-term resource plan that relies on a resource for which there is no supply-certainty. Ultimately, the cost-effective threshold for unbundled RECs must be made at the time of procurement given the alternatives available at that time. It should be reinforced again that the framework for establishing portfolio costs in the IRP setting is not the same as that used for purposes of assessing the incremental cost in the RPIP.

The market for RECs remains illiquid and fragmented. PGE expects increasing uncertainty in REC markets due to increasing RPS requirements in states across the Western Electricity Coordinating Council (WECC) region. It may not prove to be cost effective to meet RPS requirements with unbundled RECs if there were a requirement to use 20% unbundled RECs. Should opportunities continue to avail themselves in the REC market, PGE will continue to act appropriately to balance risks and expected costs.

Additional modeling

While PGE is happy to review assumptions and methodologies with stakeholders, and accommodate requests to the extent practicable, the RPIP should not serve as a forum for stakeholders to mandate additional analyses in other dockets. As noted previously, PGE's position is that the RPIP should flow from the IRP. PGE's IRP includes a robust public process with ample opportunity for interested parties to provide feedback regarding all aspects of the modeling and underlying assumptions. For the 2016 IRP, an

online feedback form was advertised to stakeholders as a convenient means to supply this feedback outside of other channels (including at PGE's IRP public meetings and round tables). To the extent that parties want additional information or analysis to occur in PGE's IRP, those requests should be made within the IRP process itself.

As mentioned previously, the information and assumptions used to develop PGE's 2016 Revised RPIP are largely consistent with PGE's 2016 IRP, where possible. ICNU would like PGE to provide a low gas price sensitivity. PGE'S 2016 IRP does not include scenario analysis using a low gas price sensitivity. Given historically low gas prices, PGE IRP deemed that a low gas price sensitivity would not provide additional, actionable results.

CONCLUSION

PGE believes it has met the requirements of OAR 860-083-0400 and its 2016 Revised Implementation Plan is consistent with the requirements of OAR 860-083-0100, which directs the utility how to calculate incremental cost. PGE looks forward to continued work with the Parties in the future as we plan to meet Oregon's future RPS requirements.

DATED this 7th day of November, 2016.

Respectfully submitted,

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Tab 2 - Incremental Cost for RECs Generated

Staged Build - Diverse Resources - No Unbundled RECs

Base Case (RefGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260
Biglow Canyon II	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682
Biglow Canyon III	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704
Tucannon River	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858
Generic Wind Resource 2018	-	-	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)
Generic Wind Resource 2025	-	-	-	-	-	-	-	-	-	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687
Generic Solar Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,310,426	17,310,426	17,357,852	17,310,426	17,310,426	17,310,426	17,357,852	17,310,426	17,310,426	17,310,426	17,357,852
Generic Solar Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(33,954)	(34,047)	(33,954)	(33,954)	(33,954)	(34,047)
Generic Solar Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(37,761,010)
Total Incremental Cost	**38,372,504**	**38,267,661**	**37,701,984**	**37,701,984**	**37,805,277**	**37,701,984**	**37,701,984**	**37,701,984**	**37,805,277**	**41,171,166**	**41,171,166**	**41,171,166**	**41,283,964**	**41,171,166**	**58,481,592**	**58,481,592**	**58,641,816**	**58,481,592**	**58,481,592**	**58,447,638**	**58,607,769**	**58,447,638**	**58,447,638**	**58,447,638**	**20,846,759**
Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,047,619	$ 2,081,500	$ 2,116,258	$ 2,180,847	$ 2,240,635	$ 2,302,725	$ 2,372,603	$ 2,471,672	$ 2,545,222	$ 2,617,788	$ 2,771,394	$ 2,853,669	$ 3,186,819	$ 3,235,051	$ 3,298,490	$ 3,367,175	$ 3,452,261	$ 3,765,354	$ 3,825,991	$ 3,901,290	$ 3,988,885	$ 4,074,139	$ 4,540,289
Percentage of Rev Requirement	**2.1%**	**2.0%**	**1.8%**	**1.8%**	**1.8%**	**1.7%**	**1.7%**	**1.6%**	**1.6%**	**1.7%**	**1.6%**	**1.6%**	**1.5%**	**1.4%**	**1.8%**	**1.8%**	**1.8%**	**1.7%**	**1.7%**	**1.6%**	**1.5%**	**1.5%**	**1.5%**	**1.4%**	**0.5%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719
Biglow Canyon II	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193
Biglow Canyon III	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839
Tucannon River	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517
Generic Wind Resource 2018	-	-	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790
Generic Wind Resource 2025	-	-	-	-	-	-	-	-	-	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025
Generic Solar Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83,250,625	83,250,625	83,478,709	83,250,625	83,250,625	83,250,625	83,478,709	83,250,625	83,250,625	83,250,625	83,478,709
Generic Solar Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88,417,588	88,659,828	88,417,588	88,417,588	88,417,588	88,659,828
Generic Solar Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	144,925,449
Total Incremental Cost	**48,606,267**	**48,473,463**	**65,834,688**	**65,834,688**	**66,015,057**	**65,834,688**	**65,834,688**	**65,834,688**	**66,015,057**	**77,154,700**	**77,154,700**	**77,154,700**	**77,366,083**	**77,154,700**	**160,405,325**	**160,405,325**	**160,844,791**	**160,405,325**	**160,405,325**	**248,822,913**	**249,504,620**	**248,822,913**	**248,822,913**	**248,822,913**	**394,430,069**
Revenue Requirement ($000)	1,839,632	1,886,948	2,047,619	2,081,500	2,116,258	2,180,847	2,240,635	2,302,725	2,372,603	2,471,672	2,545,222	2,617,788	2,771,394	2,853,669	3,186,819	3,235,051	3,298,490	3,367,175	3,452,261	3,765,354	3,825,991	3,901,290	3,988,885	4,074,139	4,540,289
Percentage of Rev Requirement	**2.6%**	**2.6%**	**3.2%**	**3.2%**	**3.1%**	**3.0%**	**2.9%**	**2.9%**	**2.8%**	**3.1%**	**3.0%**	**2.9%**	**2.8%**	**2.7%**	**5.0%**	**5.0%**	**4.9%**	**4.8%**	**4.6%**	**6.6%**	**6.5%**	**6.4%**	**6.2%**	**6.1%**	**8.7%**

Case 3 (HighGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882
Biglow Canyon II	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406
Biglow Canyon III	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215
Tucannon River	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)
Generic Wind Resource 2018	-	-	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)
Generic Wind Resource 2025	-	-	-	-	-	-	-	-	-	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)
Generic Solar Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(736,996)	(736,996)	(739,015)	(736,996)	(736,996)	(736,996)	(739,015)	(736,996)	(736,996)	(736,996)	(739,015)
Generic Solar Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(28,285,479)	(28,362,974)	(28,285,479)	(28,285,479)	(28,285,479)	(28,362,974)
Generic Solar Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(88,564,452)
Total Incremental Cost	**13,825,336**	**13,787,562**	**(6,819,024)**	**(6,819,024)**	**(6,837,707)**	**(6,819,024)**	**(6,819,024)**	**(6,819,024)**	**(6,837,707)**	**(9,832,984)**	**(9,832,984)**	**(9,832,984)**	**(9,859,923)**	**(9,832,984)**	**(10,569,980)**	**(10,569,980)**	**(10,598,939)**	**(10,569,980)**	**(10,569,980)**	**(38,855,459)**	**(38,961,913)**	**(38,855,459)**	**(38,855,459)**	**(38,855,459)**	**(127,526,365)**
Revenue Requirement ($000)	1,839,632	1,886,948	2,047,619	2,081,500	2,116,258	2,180,847	2,240,635	2,302,725	2,372,603	2,471,672	2,545,222	2,617,788	2,771,394	2,853,669	3,186,819	3,235,051	3,298,490	3,367,175	3,452,261	3,765,354	3,825,991	3,901,290	3,988,885	4,074,139	4,540,289
Percentage of Rev Requirement	**0.8%**	**0.7%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.4%**	**-0.4%**	**-0.4%**	**-0.4%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-1.0%**	**-1.0%**	**-1.0%**	**-1.0%**	**-1.0%**	**-2.8%**

Case 4 (HighGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345
Biglow Canyon II	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695
Biglow Canyon III	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884
Tucannon River	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)
Generic Wind Resource 2018	-	-	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)
Generic Wind Resource 2025	-	-	-	-	-	-	-	-	-	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939
Generic Solar Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40,239,200	40,239,200	40,349,445	40,239,200	40,239,200	40,239,200	40,349,445	40,239,200	40,239,200	40,239,200	40,349,445
Generic Solar Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37,482,954	37,585,647	37,482,954	37,482,954	37,482,954	37,585,647
Generic Solar Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46,493,367
Total Incremental Cost	**31,160,744**	**31,075,606**	**30,535,990**	**30,535,990**	**30,619,650**	**30,535,990**	**30,535,990**	**30,535,990**	**30,619,650**	**35,801,502**	**35,801,502**	**35,801,502**	**35,899,589**	**35,801,502**	**76,040,703**	**76,040,703**	**76,249,033**	**76,040,703**	**76,040,703**	**113,523,656**	**113,834,680**	**113,523,656**	**113,523,656**	**113,523,656**	**160,328,047**
Revenue Requirement ($000)	1,839,632	1,886,948	2,047,619	2,081,500	2,116,258	2,180,847	2,240,635	2,302,725	2,372,603	2,471,672	2,545,222	2,617,788	2,771,394	2,853,669	3,186,819	3,235,051	3,298,490	3,367,175	3,452,261	3,765,354	3,825,991	3,901,290	3,988,885	4,074,139	4,540,289
Percentage of Rev Requirement	**1.7%**	**1.6%**	**1.5%**	**1.5%**	**1.4%**	**1.4%**	**1.4%**	**1.3%**	**1.3%**	**1.4%**	**1.4%**	**1.4%**	**1.3%**	**1.3%**	**2.4%**	**2.4%**	**2.3%**	**2.3%**	**2.2%**	**3.0%**	**3.0%**	**2.9%**	**2.8%**	**2.8%**	**3.5%**

Tab 2 - Incremental Cost for RECs Generated

Utilized REC Bank - Diverse Resources (no Unbundled RECs)

Base Case (RefGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260
Biglow Canyon II	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682
Biglow Canyon III	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704
Tucannon River	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858
Generic RPS Resource 2018	-	-	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(3,535,895)	(3,535,895)	(3,545,583)	(3,535,895)	(3,535,895)	(3,535,895)	(3,545,583)	(3,535,895)	(3,535,895)	(3,535,895)	(3,545,583)
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,593,597	3,603,443	3,593,597	3,593,597	3,593,597	3,603,443
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(20,286,316)
Total Incremental Cost	**38,372,504**	**38,267,661**	**37,701,984**	**37,701,984**	**37,805,277**	**37,701,984**	**37,701,984**	**37,701,984**	**37,805,277**	**41,171,166**	**41,171,166**	**41,171,166**	**41,283,964**	**41,171,166**	**37,635,271**	**37,635,271**	**37,738,382**	**37,635,271**	**37,635,271**	**41,228,869**	**41,341,824**	**41,228,869**	**41,228,869**	**41,228,869**	**21,055,508**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267	$ 2,184,452	$ 2,241,327	$ 2,307,664	$ 2,402,053	$ 2,470,236	$ 2,540,165	$ 2,687,479	$ 2,765,455	$ 2,878,134	$ 2,956,190	$ 3,042,961	$ 3,125,315	$ 3,220,531	$ 3,722,347	$ 3,777,428	$ 3,799,340	$ 3,859,115	$ 3,910,250	$ 4,113,066
Percentage of Rev Requirement	**2.1%**	**2.0%**	**1.9%**	**1.8%**	**1.8%**	**1.8%**	**1.7%**	**1.7%**	**1.6%**	**1.7%**	**1.7%**	**1.6%**	**1.5%**	**1.5%**	**1.3%**	**1.3%**	**1.2%**	**1.2%**	**1.2%**	**1.1%**	**1.1%**	**1.1%**	**1.1%**	**1.1%**	**0.5%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719
Biglow Canyon II	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193
Biglow Canyon III	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839
Tucannon River	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517
Generic RPS Resource 2018	-	-	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,893,415	8,893,415	8,917,780	8,893,415	8,893,415	8,893,415	8,917,780	8,893,415	8,893,415	8,893,415	8,917,780
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	235,590,161	236,235,614	235,590,161	235,590,161	235,590,161	236,235,614
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72,446,104
Total Incremental Cost	**48,606,267**	**48,473,463**	**65,834,688**	**65,834,688**	**66,015,057**	**65,834,688**	**65,834,688**	**65,834,688**	**66,015,057**	**77,154,700**	**77,154,700**	**77,154,700**	**77,366,083**	**77,154,700**	**86,048,115**	**86,048,115**	**86,283,863**	**86,048,115**	**86,048,115**	**321,638,276**	**322,519,476**	**321,638,276**	**321,638,276**	**321,638,276**	**394,965,581**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267	$ 2,184,452	$ 2,241,327	$ 2,307,664	$ 2,402,053	$ 2,470,236	$ 2,540,165	$ 2,687,479	$ 2,765,455	$ 2,878,134	$ 2,956,190	$ 3,042,961	$ 3,125,315	$ 3,220,531	$ 3,722,347	$ 3,777,428	$ 3,799,340	$ 3,859,115	$ 3,910,250	$ 4,113,066
Percentage of Rev Requirement	**2.6%**	**2.6%**	**3.3%**	**3.2%**	**3.2%**	**3.1%**	**3.0%**	**2.9%**	**2.9%**	**3.2%**	**3.1%**	**3.0%**	**2.9%**	**2.8%**	**3.0%**	**2.9%**	**2.8%**	**2.8%**	**2.7%**	**8.6%**	**8.5%**	**8.5%**	**8.3%**	**8.2%**	**9.6%**

Case 3 (HighGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882
Biglow Canyon II	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406
Biglow Canyon III	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215
Tucannon River	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)
Generic RPS Resource 2018	-	-	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)	(20,606,586)	(20,606,586)	(20,663,042)
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)	(3,013,959)	(3,013,959)	(3,013,959)	(3,022,217)
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(12,141,903)	(12,141,903)	(12,175,169)	(12,141,903)	(12,141,903)	(12,141,903)	(12,175,169)	(12,141,903)	(12,141,903)	(12,141,903)	(12,175,169)
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(136,891,959)	(137,267,006)	(136,891,959)	(136,891,959)	(136,891,959)	(137,267,006)
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(72,854,846)
Total Incremental Cost	**13,825,336**	**13,787,562**	**(6,819,024)**	**(6,819,024)**	**(6,837,707)**	**(6,819,024)**	**(6,819,024)**	**(6,819,024)**	**(6,837,707)**	**(9,832,984)**	**(9,832,984)**	**(9,832,984)**	**(9,859,923)**	**(9,832,984)**	**(21,974,887)**	**(21,974,887)**	**(22,035,092)**	**(21,974,887)**	**(21,974,887)**	**(158,866,846)**	**(159,302,098)**	**(158,866,846)**	**(158,866,846)**	**(158,866,846)**	**(232,156,944)**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267	$ 2,184,452	$ 2,241,327	$ 2,307,664	$ 2,402,053	$ 2,470,236	$ 2,540,165	$ 2,687,479	$ 2,765,455	$ 2,878,134	$ 2,956,190	$ 3,042,961	$ 3,125,315	$ 3,220,531	$ 3,722,347	$ 3,777,428	$ 3,799,340	$ 3,859,115	$ 3,910,250	$ 4,113,066
Percentage of Rev Requirement	**0.8%**	**0.7%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.4%**	**-0.4%**	**-0.4%**	**-0.4%**	**-0.4%**	**-0.8%**	**-0.7%**	**-0.7%**	**-0.7%**	**-0.7%**	**-4.3%**	**-4.2%**	**-4.2%**	**-4.1%**	**-4.1%**	**-5.6%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345
Biglow Canyon II	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695
Biglow Canyon III	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884
Tucannon River	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)	(339,250)	(339,250)	(339,250)	(340,180)
Generic RPS Resource 2018	-	-	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	781,234	781,234	783,375	781,234	781,234	781,234	783,375	781,234	781,234	781,234	783,375
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101,998,444	102,277,892	101,998,444	101,998,444	101,998,444	102,277,892
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22,480,790
Total Incremental Cost	**31,160,744**	**31,075,606**	**30,535,990**	**30,535,990**	**30,619,650**	**30,535,990**	**30,535,990**	**30,535,990**	**30,619,650**	**35,801,502**	**35,801,502**	**35,801,502**	**35,899,589**	**35,801,502**	**36,582,737**	**36,582,737**	**36,682,963**	**36,582,737**	**36,582,737**	**138,581,181**	**138,960,855**	**138,581,181**	**138,581,181**	**138,581,181**	**161,441,645**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267	$ 2,184,452	$ 2,241,327	$ 2,307,664	$ 2,402,053	$ 2,470,236	$ 2,540,165	$ 2,687,479	$ 2,765,455	$ 2,878,134	$ 2,956,190	$ 3,042,961	$ 3,125,315	$ 3,220,531	$ 3,722,347	$ 3,777,428	$ 3,799,340	$ 3,859,115	$ 3,910,250	$ 4,113,066
Percentage of Rev Requirement	**1.7%**	**1.6%**	**1.5%**	**1.5%**	**1.5%**	**1.4%**	**1.4%**	**1.4%**	**1.3%**	**1.5%**	**1.4%**	**1.4%**	**1.3%**	**1.3%**	**1.3%**	**1.2%**	**1.2%**	**1.2%**	**1.1%**	**3.7%**	**3.7%**	**3.6%**	**3.6%**	**3.5%**	**3.9%**

Tab 2 - Incremental Cost for RECs Generated

Staged Build - All Wind Resources - No Unbundled RECs

Base Case (RefGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Biglow Canyon I	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142
Biglow Canyon II	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787
Biglow Canyon III	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484
Tucannon River	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249
Generic Wind Resource 2018	-	-	(565,677)	(565,677)	(567,227)	(565,677)
Generic Wind Resource 2025	-	-	-	-	-	-
Generic Solar Resource 2030	-	-	-	-	-	-
Generic Solar Resource 2035	-	-	-	-	-	-
Generic Solar Resource 2040	-	-	-	-	-	-
Total Incremental Cost	**38,372,504**	**38,267,661**	**37,701,984**	**37,701,984**	**37,805,277**	**37,701,984**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267
Percentage of Rev Requirement	**2.1%**	**2.0%**	**1.9%**	**1.8%**	**1.8%**	**1.8%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Unbundled RECS						
Biglow Canyon I	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864
Biglow Canyon II	13,943,706	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378
Biglow Canyon III	16,529,556	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410
Tucannon River	7,678,299	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811
Generic Wind Resource 2018	-	-	17,361,225	17,361,225	17,408,790	17,361,225
Generic Wind Resource 2025	-	-	-	-	-	-
Generic Solar Resource 2030	-	-	-	-	-	-
Generic Solar Resource 2035	-	-	-	-	-	-
Generic Solar Resource 2040	-	-	-	-	-	-
Total Incremental Cost	**49,810,279**	**48,473,463**	**65,834,688**	**65,834,688**	**66,015,057**	**65,834,688**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267
Percentage of Rev Requirement	**2.7%**	**2.6%**	**3.3%**	**3.2%**	**3.2%**	**3.1%**

Case 3 (HighGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Biglow Canyon I	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715
Biglow Canyon II	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569
Biglow Canyon III	7,228,215	7,208,466	7,208,466	7,208,466	7,228,215	7,208,466
Tucannon River	(9,874,167)	(9,847,189)	(9,847,189)	(9,847,189)	(9,874,167)	(9,847,189)
Generic Wind Resource 2018	-	-	(20,606,586)	(20,606,586)	(20,663,042)	(20,606,586)
Generic Wind Resource 2025	-	-	-	-	-	-
Generic Solar Resource 2030	-	-	-	-	-	-
Generic Solar Resource 2035	-	-	-	-	-	-
Generic Solar Resource 2040	-	-	-	-	-	-
Total Incremental Cost	**13,825,336**	**13,787,562**	**(6,819,024)**	**(6,819,024)**	**(6,837,707)**	**(6,819,024)**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267
Percentage of Rev Requirement	**0.8%**	**0.7%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Biglow Canyon I	10,050,160	10,022,700	10,022,700	10,022,700	10,050,160	10,022,700
Biglow Canyon II	11,027,887	10,997,756	10,997,756	10,997,756	11,027,887	10,997,756
Biglow Canyon III	10,464,913	10,436,320	10,436,320	10,436,320	10,464,913	10,436,320
Tucannon River	(311,533)	(310,682)	(310,682)	(310,682)	(311,533)	(310,682)
Generic Wind Resource 2018	-	-	(617,799)	(617,799)	(619,492)	(617,799)
Generic Wind Resource 2025	-	-	-	-	-	-
Generic Solar Resource 2030	-	-	-	-	-	-
Generic Solar Resource 2035	-	-	-	-	-	-
Generic Solar Resource 2040	-	-	-	-	-	-
Total Incremental Cost	**31,231,427**	**31,146,095**	**30,528,296**	**30,528,296**	**30,611,935**	**30,528,296**

Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,050,947	$ 2,084,809	$ 2,147,267
Percentage of Rev Requirement	**1.7%**	**1.7%**	**1.5%**	**1.5%**	**1.5%**	**1.4%**

Tab 2 - Incremental Cost for RECs Generated

Utilized REC Bank - All Wind (no Unbundled RECs)

Base Case (RefGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260	10,628,142	10,628,142	10,628,142	10,657,260
Biglow Canyon II	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682	13,101,787	13,101,787	13,101,787	13,137,682
Biglow Canyon III	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704	12,125,484	12,125,484	12,125,484	12,158,704
Tucannon River	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858	2,412,249	2,412,249	2,412,249	2,418,858
Generic RPS Resource 2018	-	-	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)	(565,677)	(565,677)	(565,677)	(567,227)
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687	3,469,182	3,469,182	3,469,182	3,478,687
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	587,244	587,244	588,853	587,244	587,244	587,244	587,244	587,244	588,853	587,244	587,244	587,244	588,853
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(40,289,150)	(40,399,531)	(40,289,150)	(40,289,150)	(40,289,150)	(40,399,531)
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(29,591,889)
Total Incremental Cost	**38,372,504**	**38,267,661**	**37,701,984**	**37,701,984**	**37,805,277**	**37,701,984**	**37,701,984**	**37,701,984**	**37,805,277**	**41,171,166**	**41,171,166**	**41,171,166**	**41,283,964**	**41,171,166**	**41,758,411**	**41,758,411**	**41,872,817**	**41,758,411**	**41,758,411**	**1,469,261**	**1,473,286**	**1,469,261**	**1,469,261**	**1,469,261**	**(28,118,603)**
Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,003,450	$ 1,987,472	$ 1,974,537	$ 1,941,911	$ 1,927,706	$ 1,920,264	$ 1,939,970	$ 1,929,528	$ 1,918,355	$ 1,981,501	$ 1,971,769	$ 1,993,260	$ 1,976,182	$ 1,964,296	$ 1,946,607	$ 1,937,979	$ 2,332,462	$ 2,262,429	$ 2,159,045	$ 2,091,605	$ 2,013,215	$ 2,083,510
Percentage of Rev Requirement	**2.1%**	**2.0%**	**1.9%**	**1.9%**	**1.9%**	**1.9%**	**1.9%**	**2.0%**	**2.0%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.2%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**-1.3%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719	11,626,864	11,626,864	11,626,864	11,658,719
Biglow Canyon II	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193	14,167,378	14,167,378	14,167,378	14,206,193
Biglow Canyon III	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839
Tucannon River	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517
Generic RPS Resource 2018	-	-	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13,023,711	13,023,711	13,059,392	13,023,711	13,023,711	13,023,711	13,059,392	13,023,711	13,023,711	13,023,711	13,059,392
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	191,707,414	192,232,640	191,707,414	191,707,414	191,707,414	192,232,640
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63,140,531
Total Incremental Cost	**48,606,267**	**48,473,463**	**65,834,688**	**65,834,688**	**66,015,057**	**65,834,688**	**65,834,688**	**65,834,688**	**66,015,057**	**77,154,700**	**77,154,700**	**77,154,700**	**77,366,083**	**77,154,700**	**90,178,411**	**90,178,411**	**90,425,475**	**90,178,411**	**90,178,411**	**281,885,825**	**282,658,115**	**281,885,825**	**281,885,825**	**281,885,825**	**345,798,646**
Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,003,450	$ 1,987,472	$ 1,974,537	$ 1,941,911	$ 1,927,706	$ 1,920,264	$ 1,939,970	$ 1,929,528	$ 1,918,355	$ 1,981,501	$ 1,971,769	$ 1,993,260	$ 1,976,182	$ 1,964,296	$ 1,946,607	$ 1,937,979	$ 2,332,462	$ 2,262,429	$ 2,159,045	$ 2,091,605	$ 2,013,215	$ 2,083,510
Percentage of Rev Requirement	**2.6%**	**2.6%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.4%**	**3.4%**	**3.4%**	**4.0%**	**4.0%**	**4.0%**	**3.9%**	**3.9%**	**4.5%**	**4.6%**	**4.6%**	**4.6%**	**4.7%**	**12.1%**	**12.5%**	**13.1%**	**13.5%**	**14.0%**	**16.6%**

Case 3 (HighGas-RefCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882	8,455,715	8,455,715	8,455,715	8,478,882
Biglow Canyon II	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406	7,970,569	7,970,569	7,970,569	7,992,406
Biglow Canyon III	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839	13,661,410	13,661,410	13,661,410	13,698,839
Tucannon River	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517	9,017,811	9,017,811	9,017,811	9,042,517
Generic RPS Resource 2018	-	-	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790	17,361,225	17,361,225	17,361,225	17,408,790
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025	11,320,011	11,320,011	11,320,011	11,351,025
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13,023,711	13,023,711	13,059,392	13,023,711	13,023,711	13,023,711	13,059,392	13,023,711	13,023,711	13,023,711	13,059,392
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	191,707,414	192,232,640	191,707,414	191,707,414	191,707,414	192,232,640
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63,140,531
Total Incremental Cost	**39,212,644**	**39,105,505**	**56,466,730**	**56,466,730**	**56,621,434**	**56,466,730**	**56,466,730**	**56,466,730**	**56,621,434**	**67,786,742**	**67,786,742**	**67,786,742**	**67,972,459**	**67,786,742**	**80,810,453**	**80,810,453**	**81,031,851**	**80,810,453**	**80,810,453**	**272,517,867**	**273,264,491**	**272,517,867**	**272,517,867**	**272,517,867**	**336,405,022**
Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,003,450	$ 1,987,472	$ 1,974,537	$ 1,941,911	$ 1,927,706	$ 1,920,264	$ 1,939,970	$ 1,929,528	$ 1,918,355	$ 1,981,501	$ 1,971,769	$ 1,993,260	$ 1,976,182	$ 1,964,296	$ 1,946,607	$ 1,937,979	$ 2,332,462	$ 2,262,429	$ 2,159,045	$ 2,091,605	$ 2,013,215	$ 2,083,510
Percentage of Rev Requirement	**2.1%**	**2.1%**	**2.8%**	**2.8%**	**2.8%**	**2.9%**	**2.9%**	**2.9%**	**2.9%**	**3.5%**	**3.5%**	**3.5%**	**3.4%**	**3.4%**	**4.1%**	**4.1%**	**4.1%**	**4.2%**	**4.2%**	**11.7%**	**12.1%**	**12.6%**	**13.0%**	**13.5%**	**16.1%**

Case 2 (RefGas-NoCO2)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Biglow Canyon I	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345	10,016,902	10,016,902	10,016,902	10,044,345
Biglow Canyon II	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695	10,978,617	10,978,617	10,978,617	11,008,695
Biglow Canyon III	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884	10,419,338	10,419,338	10,419,338	10,447,884
Tucannon River	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)	(33,925)	(33,925)	(33,925)	(34,018)
Generic RPS Resource 2018	-	-	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)	(539,616)	(539,616)	(539,616)	(541,094)
Generic RPS Resource 2025	-	-	-	-	-	-	-	-	-	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939	5,265,513	5,265,513	5,265,513	5,279,939
Generic RPS Resource 2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,911,531	4,911,531	4,924,987	4,911,531	4,911,531	4,911,531	4,924,987	4,911,531	4,911,531	4,911,531	4,924,987
Generic RPS Resource 2035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	58,115,697	58,274,918	58,115,697	58,115,697	58,115,697	58,274,918
Generic RPS Resource 2040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13,176,892
Total Incremental Cost	**31,466,906**	**31,380,931**	**30,841,315**	**30,841,315**	**30,925,812**	**30,841,315**	**30,841,315**	**30,841,315**	**30,925,812**	**36,106,828**	**36,106,828**	**36,106,828**	**36,205,751**	**36,106,828**	**41,018,358**	**41,018,358**	**41,130,737**	**41,018,358**	**41,018,358**	**99,134,055**	**99,405,656**	**99,134,055**	**99,134,055**	**99,134,055**	**112,582,548**
Revenue Requirement ($000)	$ 1,839,632	$ 1,886,948	$ 2,018,865	$ 2,003,450	$ 1,987,472	$ 1,974,537	$ 1,941,911	$ 1,927,706	$ 1,920,264	$ 1,939,970	$ 1,929,528	$ 1,918,355	$ 1,981,501	$ 1,971,769	$ 1,993,260	$ 1,976,182	$ 1,964,296	$ 1,946,607	$ 1,937,979	$ 2,332,462	$ 2,262,429	$ 2,159,045	$ 2,091,605	$ 2,013,215	$ 2,083,510
Percentage of Rev Requirement	**1.7%**	**1.7%**	**1.5%**	**1.5%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.9%**	**1.9%**	**1.9%**	**1.8%**	**1.8%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**	**4.3%**	**4.4%**	**4.6%**	**4.7%**	**4.9%**	**5.4%**