



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

December 31, 2015

Via Email / US Mail

Public Utility Commission of Oregon
Filing Center
PO Box 1088
Salem, OR 97308-1088

RE: UM 1755 - PGE 2016 Renewable Portfolio Standard Implementation Plan

Attention Filing Center:

Enclosed please find PGE's 2016 Renewable Portfolio Standard Implementation Plan. This Plan is pursuant to OAR 860-083-0400 and provides information about how PGE will meet its RPS requirement in the years 2017 through 2021.

OAR 860-083-0100 specifically describes how to calculate the incremental cost of renewable resources. Those cumulative incremental costs are then compared to the 4% cap as allowed in ORS 469A.100.

The confidential Work Papers containing the underlying models used to prepare the analyses presented in the 2016 RPS Implementation Plan will be provided upon issuance of the Protective Order.

Electronic notification of this filing is being provided to the UM 1683 Service List.

If you have any questions or require further information, please call Rebecca Brown at (503) 464-8545. Please direct all formal correspondence and requests to the following email address: pge.opuc.filings@pgn.com.

Sincerely,

A handwritten signature in blue ink that reads "Jay Tinker".

Jay Tinker
Director, Regulatory Policy and Affairs

JT:sp
cc: UM 1683 Service List
Encl.

Portland General Electric
2016 Renewable Portfolio Standard Implementation Plan
<2017-2021>

As an introduction and summary of PGE's 2016 Renewable Portfolio Standard Implementation Plan, answer the following questions:

Why is PGE submitting this 2016 Implementation Plan?

The Renewable Portfolio Standard (RPS), ORS 469A.052, states that at least five percent of the electricity sold by a large utility to retail electricity consumers must come from qualifying resources in each of the calendar years 2011 through 2014. In 2015 through 2019 the percentage that must come from qualifying resources increases to 15 percent. Beginning in 2020 that percentage further increases to 20 percent of retail load through 2024.

ORS 469A.075 requires electric companies subject to ORS 469A.052 to develop an implementation plan for meeting the requirements of the standard and file the plan with the Public Utility Commission. Pursuant to OAR 860-083-0400, this implementation plan covering 2017 through 2021, is due January 1, 2016.

What information was used as the basis of this implementation plan (2017-2021 Plan)?

This 2017-2021 Plan is based primarily on existing qualifying renewable resources, and on PGE's 2013 Integrated Resource Plan (IRP) Update, filed December 2, 2015.

How does the company intend to meet the RPS target?

This implementation plan describes PGE's plan to comply with ORS 469.100 for the years 2017 through 2021. For planning purposes, PGE intends to meet its RPS obligations in these years with primarily bundled RECs from existing resources. Details of PGE's 2017- 2021 Plan are given in the following sections.

Provide responses below following the citation of each element of OAR 860-083-0400.

| Implementation Plan |
|--|
| OAR 860-083-0400(2)(a) |
| The annual megawatt-hour target for compliance with the applicable renewable portfolio standard based on the forecast of electricity sales to its Oregon retail electricity customers. |

¹ Throughout this document the term 'issued' refers to generated RECs and the term 'acquired' refers to purchased RECs (unbundled or bundled).

Response:

2017 – 2,882,040 MWh
2018 – 2,890,800 MWh
2019 – 2,899,560 MWh
2020 – 3,900,096 MWh
2021 – 3,950,760 MWh

See Attachment A, which is an Excel spreadsheet, Tab 3 – “Annual Compliance by Resource”

OAR 860-083-0400(2)(b)

An accounting of the planned method to comply with the applicable renewable portfolio standard, including number of banked RECs by year of issuance, the number of other bundled and unbundled renewable energy certificates, and alternative compliance payments.

Response:

See Attachment A, which is an Excel spreadsheet, Tab 3 – “Annual Compliance by Resource” for detail by year.

| | <u>Banked</u> | <u>Bundled</u> | <u>Unbundled</u> | <u>ACP</u> |
|------|---------------|----------------|------------------|------------|
| 2017 | 2,882,040 | 2,882,040 | 0 | 0 |
| 2018 | 2,890,800 | 2,890,800 | 0 | 0 |
| 2019 | 2,899,560 | 2,899,560 | 0 | 0 |
| 2020 | 3,900,096 | 3,900,096 | 0 | 0 |
| 2021 | 3,950,760 | 3,950,760 | 0 | 0 |

OAR 860-083-0400(2)(c)

Identification of generating facilities, either owned by the company or under contract, that are expected to provide renewable energy certificates for compliance with renewable portfolio standard. Information on each generating facility must include: (A) the renewable energy source; (B) the year the facility or contract became operational or is expected to become operational; (C) the state where the facility is located or is planned to be located; and (D) expected annual megawatt-hour output for compliance from the facility for the compliance year covered by the implementation plan.

Response:

Name: Vansycle Ridge Wind Farm
Source: Wind – PPA
Year: 1997
State: Oregon
Expected MWh output: 8.12 MWa = 71,163 MWh

Name: North Fork (upgrade)
Source: Hydroelectric

Year: 2001
State: Oregon
Expected MWh output: 0.53 MWa = 4,679 MWh

Name: Faraday (upgrade)
Source: Hydroelectric
Year: various
State: Oregon
Expected MWh output: 0.52 MWa = 4,303 MWh

Name: Sullivan (upgrade)
Source: Hydroelectric
Year: various
State: Oregon
Expected MWh output: 0.80 MWa = 7,005 MWh

Name: River Mill (upgrade)
Source: Hydroelectric
Year: 1996-1997
State: Oregon
Expected MWh output: 0.17 MWa = 1,480 MWh

Name: Round Butte (upgrade)
Source: Hydroelectric
Year: 2002-2003
State: Oregon
Expected MWh output: 9.51 MWa = 83,318 MWh

Name: Klondike II Wind Farm
Source: Wind - PPA
Year: 2005
State: Oregon
Expected MWh output: 24.82 MWa = 217,434 MWh

Name: Pelton Round Butte
Source: Hydroelectric (certified low impact)
Year: 2007
State: Oregon
Expected Annual Qualifying MWh output: 50 MWa = 438,000 MWh

Name: Biglow Canyon Wind Farm (Phases 1, 2, and 3)
Source: Wind
Year: Phase 1 – 2008; Phase 2 – 2010; Phase 3 – 2011 (first full year of operation for each phase)
Expected MWh output: 205.48 MWa = 1.18 million MWh (1.18 GWh)

Name: SunWay 1 & 2
Source: Solar
Year: 2008 & 2009
State: Oregon
Expected MWh output: 0.15 MWa = 1,278 MWh

Name: SunWay 3
Source: Solar
Year: 2010
State: Oregon
Expected MWh output: 0.33 MWa = 2,896 MWh

Name: Bellevue Solar
Source: Solar
Year: 2011
State: Oregon
Expected MWh output: 0.22 MWa = 1,896 MWh

Name: Yamhill Solar
Source: Solar
Year: 2011
State: Oregon
Expected MWh output: 0.15 MWa = 1,273 MWh

Name: Tucannon River Wind Farm
Source: Wind
Year: 2014
State: Oregon
Expected MWh output: 101.91 MWa = 892,764 MWh

Name: Solar Payment Option Program (SPO)
Source: Solar
Year: 2010 – 2015
State: Oregon
Expected MWh Output: 1.86 MWa = 16,316 MWh

| |
|---|
| OAR 860-083-0400(2)(d) |
| A forecast of the expected incremental costs of new qualifying electricity for facilities or contracts planned for first operation in the compliance year, consistent with the methodology in OAR 860-083-0100. |

Response:

2017 through 2021:

N/A; PGE's recently filed 2013 IRP Update includes no new RPS resource additions through 2021. Any further RPS resource additions will be addressed in PGE's 2016 IRP Action Plans.

OAR 860-083-0400(2)(e)

A forecast of the expected incremental costs of compliance, the costs of using unbundled renewable energy certificates and alternative compliance payments for compliance, compared to annual revenue requirements, consistent with the methodologies in OAR 860-083-0100 and 860-083-0200, absent consideration of the cost limit in OAR 860-083-0100.

Response:

PGE does not plan to use Alternative Compliance Payments (ACP) in any of the compliance years, 2017 through 2021. For a forecast of the expected incremental costs of compliance and the costs of using unbundled renewable energy certificates for compliance compared to annual revenue requirements, see Attachment A, Tab 1 –“Incremental Cost Summary.”

OAR 860-083-0400(2)(f)

A forecast of the number and cost of bundled renewable energy certificates issued, consistent with the methodology in OAR 860-083-0100.

Response:

See Attachment A, Tab 5 – “RECs Generated” for a forecast of the number of bundled renewable energy certificates issued. The forecast number of bundled RECs is based on expected generation from qualifying renewable resources.

See Attachment A, Tab 2 – “Incr. Cost of RECs Generated” for a forecast of the cost of bundled renewable energy certificates issued. Bundled RECs are the RECs from each resource with incremental costs.

OAR 860-083-0400(4)

If there are material differences in the planned actions in [OAR 860-083-0400(2)] of this rule from the action plan in the most recently filed or updated integrated resource plan by the electric company, or if conditions have materially changed from the conditions assumed in such filing, the company must provide sufficient documentation to demonstrate how the implementation plan appropriately balances risks and expected costs as required by the integrated resource planning guidelines in 1.b and c. of Commission Order No. 07-047 and subsequent guidelines related to implementation plans set forth by the Commission. Unless provided in the most recently filed or updated integrated resource plan, an implementation plan for an electric company subject to ORS 469A.052 must include the following information: (a) At least two forecasts for subsections (2)(d), (e), and (f) of this rule: one forecast assuming existing government incentives continue beyond their current expiration date and another forecast assuming existing government incentives do not continue beyond their current expiration date; (b) A reasonable range of estimates for the forecasts in subsections (2)(d), (e), and (f) of this rule, consistent with subsection (4)(a) of this rule and the analyses or methodologies in the company’s most

recently filed or updated integrated resource plan.

Response:

In response to OAR 860-083-0400 (4):

There are no material differences between this 2017-2021 Plan and PGE's 2013 IRP Update and conditions have not materially changed.

In response to requirements OAR 860-083-0400 (4)(a) and (4)(b):

See Attachment A, Tab 4 – "Incremental Cost by Resource." The Biglow Canyon and Tucannon resources are assumed to receive government incentives currently in place.

OAR 860-083-0400(5)

Under the following circumstances, the electric company must, for the applicable compliance year, provide sufficient documentation or citations to demonstrate how the implementation plan appropriately balances risks and expected costs as required by the integrated resources planning guidelines in 1.b and c. of Commission Order No. 07-047 and subsequent guideline related to implementation plans set forth by the Commission.

- (a) The sum of costs in subsection (2) (e) of this rule is expected to be four percent or more of the annual revenue required in subsection (2)(e) of this rule for any compliance year covered by the implementation plan,
- (b) The company plans, for reasons other than to meet unanticipated contingencies that arise during a compliance year to use any of the following compliance methods: (A) Unbundled renewable energy certification; (B) Bundled renewable energy certificates issued between January 1 through March 31 of the year following the compliance year; or (C) Alternative compliance payment, or
- (c) The company plans to sell any bundled renewable energy certificates included in the rates of Oregon retail electricity consumers.

Response:

(a): The costs in PGE's response to OAR 860-083-0400 (2)(e) are provided in Attachment A, Tab 1 – "Incremental Cost Summary." The forecasted incremental cost of compliance will not exceed four percent of the annual revenue requirement in the reference gas/reference CO₂ scenario. Incremental cost is forecasted to exceed four percent of the annual revenue requirement in only one scenario, reference gas/no CO₂, and only in the latter years of the period reviewed. Consistent with PGE's 2013 IRP Update, we have modeled the CO₂ adder starting in 2020 and the RPS target increases in 2020.

(b): For planning purposes, PGE does not forecast the use of unbundled RECs to meet RPS compliance targets within future compliance years 2017 through 2021; however, PGE reserves the right to do so if the availability and market prices for unbundled RECs warrants it in the future. See PGE's 2013 IRP Update for further discussion.

In OPUC Order No. 14-265 acknowledging PGE's 2015-2019 Plan, filed December 31, 2013 (covering the period 2015-2019), OPUC directed PGE to include a scenario in future implementation plans under the reference case that assumes PGE uses unbundled RECs equal to 20% of its annual requirement assuming an unbundled REC price equal to the weighted average price paid for unbundled RECs used in its last compliance report for each year analyzed in the 2017-2021 Plan. Attachment B, which is confidential and subject to protective order, calculates incremental costs based on retiring unbundled RECs during the period covered.

Pursuant to OAR 860-083-0300 (3)(b)(B), an electric utility company must use, in chronological order (from first issued to last issued) its banked RECs before using, 1) RECs generated in the compliance year, and 2) RECs generated between January 1 through March 31 of the year following the compliance year.

- (c): PGE intends to continue monitoring REC markets and may purchase or sell bundled or unbundled RECs in the market when price is perceived to be a good value in relation to other means of achieving RPS compliance.

OAR 860-083-0400(6)

An implementation plan must provide a detailed explanation of how the implementation plan complies, or does not comply, with any conditions specified in a Commission acknowledgement order on the previous implementation plan and any relevant condition specified in the most recent acknowledgement order on an integrated resource plan filed or updated by the electric company.

Response:

Order 10-173 acknowledged PGE's first implementation plan, 2011-2015 Plan, filed December 31, 2009. The order contained no conditions; however, the order recommends development of a standardized template for the 2011 filing. That form was developed jointly by OPUC Staff and the parties earlier in 2011 and is the format PGE is using for this implementation plan.

Order No. 12-271, dated July 2, 2012, acknowledged PGE's second implementation plan, 2013-2017 Plan, filed December 28, 2011. OPUC required PGE to not include shaping costs in its next implementation plan (2015-2019 Plan), which we have complied with.

Order 10-457 acknowledged PGE's 2009 Integrated Resource Plan and 2010 Addendum, with conditions. No conditions pertain directly to implementation plan filing requirements. PGE filed its Draft 2013 Integrated Resource Plan on November 22, 2013.

Order 14-265, dated July 22, 2014, acknowledged PGE's 2015-2019 Plan, filed December 31, 2013. OPUC directed PGE to include a scenario in future implementation plans under the reference case that assumes PGE uses unbundled RECs equal to 20% of

its annual requirement assuming an unbundled REC price equal to the weighted average price paid for unbundled RECs used in its last compliance report for each year analyzed in the implementation plan. We have complied with that requirement in this 2017-2021 Plan.

OAR 860-083-0400(7)

If there are funds in holding accounts under ORS 469A.180(4) and if the electric company has not filed a proposal for expending such funds for the purpose allowed under ORS 469A. 180(5), the implementation plan must include the electric company's plans for expending or holding such funds. If the plan is to hold such funds, the plan should indicate under what conditions such funds should be expended.

Response:

Funds described in this rule pertain to ACP. As of December 2015, PGE has made no ACP and thus has no applicable ACP funds for disposition. The rule is not applicable to PGE at this time.

PGE 2016 RPS Implementation Plan

Attachment A

Incremental Cost of Compliance
2017-2021

Tab 1 - Incremental Cost Summary

| Base Case (RefGas-RefCO2) | Total Incremental Cost to Comply | | | | |
|--------------------------------------|----------------------------------|----------------------|----------------------|----------------------|----------------------|
| | 2017 | 2018 | 2019 | 2020 | 2021 |
| Unbundled RECS | | | | | |
| Biglow Canyon I | \$ 22,977,677 | \$ 17,778,460 | \$ 12,831,269 | \$ 17,907,753 | \$ 18,177,431 |
| Biglow Canyon II | 19,039,730 | 20,637,656 | 16,622,711 | 23,267,338 | 23,617,728 |
| Biglow Canyon III | 23,153,111 | 19,574,517 | 15,362,189 | 21,504,664 | 21,828,509 |
| Tucannon River | 194,622 | 3,807,657 | 9,343,141 | 13,278,222 | 13,478,183 |
| Purchased Bundled | 221,037 | - | - | - | - |
| Total Incremental Cost | \$ 65,586,177 | \$ 61,798,289 | \$ 54,159,310 | \$ 75,957,977 | \$ 77,101,851 |
| Revenue Requirement (\$000) | \$ 1,839,632 | \$ 1,885,037 | \$ 1,928,893 | \$ 1,975,263 | \$ 2,046,174 |
| Percentage of Rev Requirement | 3.6% | 3.3% | 2.8% | 3.8% | 3.8% |

| Case 2 (RefGas-NoCO2) | | | | | |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Unbundled RECS | | | | | |
| Biglow Canyon I | \$ 24,995,530 | \$ 19,339,728 | \$ 13,958,085 | \$ 19,480,375 | \$ 19,773,736 |
| Biglow Canyon II | 21,423,528 | 23,221,516 | 18,703,895 | 26,180,437 | 26,574,696 |
| Biglow Canyon III | 26,476,872 | 22,384,551 | 17,567,519 | 24,591,781 | 24,962,116 |
| Tucannon River | 327,740 | 6,412,022 | 15,733,673 | 22,360,275 | 22,697,005 |
| Purchased Bundled | 221,037 | - | - | - | - |
| Total Incremental Cost | \$ 73,444,706 | \$ 71,357,816 | \$ 65,963,172 | \$ 92,612,868 | \$ 94,007,554 |
| Revenue Requirement (\$000) | \$ 1,839,632 | \$ 1,885,037 | \$ 1,928,893 | \$ 1,975,263 | \$ 2,046,174 |
| Percentage of Rev Requirement | 4.0% | 3.8% | 3.4% | 4.7% | 4.6% |

| Case 3 (HighGas-NoCO2) | | | | | |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Unbundled RECS | | | | | |
| Biglow Canyon I | \$ 19,094,126 | \$ 14,773,650 | \$ 10,662,604 | \$ 14,881,090 | \$ 15,105,189 |
| Biglow Canyon II | 13,402,330 | 14,527,132 | 11,700,957 | 16,378,201 | 16,624,846 |
| Biglow Canyon III | 16,009,312 | 13,534,879 | 10,622,248 | 14,869,487 | 15,093,411 |
| Tucannon River | (56,540) | (1,106,166) | (2,714,286) | (3,857,471) | (3,915,562) |
| Purchased Bundled | 221,037 | - | - | - | - |
| Total Incremental Cost | \$ 48,670,265 | \$ 41,729,494 | \$ 30,271,523 | \$ 42,271,308 | \$ 42,907,885 |
| Revenue Requirement (\$000) | \$ 1,839,632 | \$ 1,885,037 | \$ 1,928,893 | \$ 1,975,263 | \$ 2,046,174 |
| Percentage of Rev Requirement | 2.6% | 2.2% | 1.6% | 2.1% | 2.1% |

| Case 4 (HighGas-RefCO2) | | | | | |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Unbundled RECS | | | | | |
| Biglow Canyon I | \$ 16,870,986 | \$ 13,053,545 | \$ 9,421,151 | \$ 13,148,477 | \$ 13,346,484 |
| Biglow Canyon II | 10,570,816 | 11,457,981 | 9,228,893 | 12,917,975 | 13,112,511 |
| Biglow Canyon III | 12,176,956 | 10,294,860 | 8,079,463 | 11,309,985 | 11,480,306 |
| Tucannon River | (201,663) | (3,945,398) | (9,681,127) | (13,758,559) | (13,965,753) |
| Purchased Bundled | 221,037 | - | - | - | - |
| Total Incremental Cost | \$ 39,638,133 | \$ 30,860,989 | \$ 17,048,380 | \$ 23,617,878 | \$ 23,973,547 |
| Revenue Requirement (\$000) | \$ 1,839,632 | \$ 1,885,037 | \$ 1,928,893 | \$ 1,975,263 | \$ 2,046,174 |
| Percentage of Rev Requirement | 2.2% | 1.6% | 0.9% | 1.2% | 1.2% |

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

| Base Case (RefGas-RefCO2) | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 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 |
| Total Incremental Cost | 55,059,119 | 55,059,119 | 55,059,119 | 55,209,966 | 55,059,119 |

| Case 2 (RefGas-NoCO2) | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 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 |
| Total Incremental Cost | 67,131,632 | 67,131,632 | 67,131,632 | 67,315,554 | 67,131,632 |

| Case 3 (HighGas-NoCO2) | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 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) |
| Total Incremental Cost | 30,640,903 | 30,640,903 | 30,640,903 | 30,724,850 | 30,640,903 |

| Case 4 (HighGas-RefCO2) | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 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 | 8,198,189 | 8,198,189 | 8,198,189 | 8,220,650 | 8,198,189 |
| Tucannon River | (9,973,069) | (9,973,069) | (9,973,069) | (10,000,392) | (9,973,069) |
| Total Incremental Cost | 17,119,724 | 17,119,724 | 17,119,724 | 17,166,627 | 17,119,724 |

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 | | |
|--------------------------------|------------------|------|------------------|------|------------------|------|------------------|------|------------------|------|---------|
| | Facility | MWh | Vintage | MWh | Vintage | MWh | Vintage | MWh | Vintage | MWh | Vintage |
| Unbundled RECs | - | - | - | - | - | - | - | - | - | - | - |
| Pelton-Round Butte LIH | 438,000 | 2009 | 438,000 | 2009 | 263,872 | 2009 | 439,200 | 2010 | 438,000 | 2010 | |
| Pelton-Round Butte LIH | - | 2010 | - | 2010 | 174,128 | 2010 | - | 2011 | - | 2011 | |
| Biglow Canyon I | 47,162 | 2012 | 145,661 | 2014 | 10,163 | 2015 | 15,023 | 2016 | 226,647 | 2018 | |
| Biglow Canyon II | 57,355 | 2012 | 165,864 | 2014 | 11,974 | 2015 | 19,604 | 2016 | 295,763 | 2018 | |
| Biglow Canyon III | 50,400 | 2012 | 160,830 | 2014 | 10,593 | 2015 | 17,395 | 2016 | 262,427 | 2018 | |
| Tucannon River | - | 2012 | 13,397 | 2014 | 10,741 | 2015 | 39,320 | 2016 | 593,217 | 2018 | |
| Vansycle Ridge | 9,713 | 2012 | 28,604 | 2014 | 1,910 | 2015 | 3,134 | 2016 | 47,286 | 2018 | |
| PPM Klondike II | 29,626 | 2012 | 94,986 | 2014 | 6,426 | 2015 | 9,577 | 2016 | 144,479 | 2018 | |
| Hydro Upgrades | 14,622 | 2012 | 39,541 | 2014 | 3,016 | 2015 | 5,005 | 2016 | 75,513 | 2018 | |
| Bellevue Solar | 525 | 2012 | 1,424 | 2014 | 107 | 2015 | 110 | 2016 | 1,659 | 2018 | |
| Yamhill Solar | 350 | 2012 | 1,014 | 2014 | 100 | 2015 | 161 | 2016 | 2,431 | 2018 | |
| Outback Solar | 190 | 2012 | 8,901 | 2014 | 654 | 2015 | 876 | 2016 | 13,053 | 2018 | |
| ETO and Other Solar | 1,939 | 2012 | 10,209 | 2014 | 657 | 2015 | 293 | 2016 | 4,398 | 2018 | |
| Purchased Bundled | - | 2012 | - | 2014 | - | 2015 | - | 2016 | - | 2018 | |
| Biglow Canyon I | 360,342 | 2013 | 321,505 | 2015 | 327,005 | 2016 | 341,094 | 2017 | 251,002 | 2019 | |
| Biglow Canyon II | 221,626 | 2013 | 378,794 | 2015 | 426,724 | 2016 | 445,109 | 2017 | 327,544 | 2019 | |
| Biglow Canyon III | 319,493 | 2013 | 335,117 | 2015 | 378,629 | 2016 | 394,941 | 2017 | 290,627 | 2019 | |
| Tucannon River | - | 2013 | 339,785 | 2015 | 855,890 | 2016 | 892,764 | 2017 | 656,962 | 2019 | |
| Vansycle Ridge | 63,442 | 2013 | 60,416 | 2015 | 68,223 | 2016 | 71,163 | 2017 | 52,367 | 2019 | |
| PPM Klondike II | 210,810 | 2013 | 203,300 | 2015 | 208,453 | 2016 | 217,434 | 2017 | 160,004 | 2019 | |
| Hydro Upgrades | 86,896 | 2013 | 95,405 | 2015 | 108,950 | 2016 | 113,644 | 2017 | 83,628 | 2019 | |
| Bellevue Solar | 3,646 | 2013 | 3,393 | 2015 | 2,393 | 2016 | 2,496 | 2017 | 1,837 | 2019 | |
| Yamhill Solar | 2,634 | 2013 | 3,172 | 2015 | 3,508 | 2016 | 3,659 | 2017 | 2,692 | 2019 | |
| Outback Solar | 21,352 | 2013 | 20,698 | 2015 | 19,060 | 2016 | 19,762 | 2017 | 14,368 | 2019 | |
| ETO and Other Solar | 20,070 | 2013 | 20,784 | 2015 | 6,384 | 2016 | 6,638 | 2017 | 4,855 | 2019 | |
| Purchased Bundled | 18,425 | 2013 | - | 2015 | - | 2016 | - | 2017 | - | 2019 | |
| Biglow Canyon I | 196,282 | 2014 | - | 2016 | - | 2017 | 114,446 | 2018 | - | - | |
| Biglow Canyon II | 223,506 | 2014 | - | 2016 | - | 2017 | 149,346 | 2018 | - | - | |
| Biglow Canyon III | 216,722 | 2014 | - | 2016 | - | 2017 | 132,514 | 2018 | - | - | |
| Tucannon River | 18,052 | 2014 | - | 2016 | - | 2017 | 299,547 | 2018 | - | - | |
| Vansycle Ridge | 38,544 | 2014 | - | 2016 | - | 2017 | 23,877 | 2018 | - | - | |
| PPM Klondike II | 127,996 | 2014 | - | 2016 | - | 2017 | 72,955 | 2018 | - | - | |
| Hydro Upgrades | 53,282 | 2014 | - | 2016 | - | 2017 | 38,131 | 2018 | - | - | |
| Bellevue Solar | 1,918 | 2014 | - | 2016 | - | 2017 | 838 | 2018 | - | - | |
| Yamhill Solar | 1,366 | 2014 | - | 2016 | - | 2017 | 1,228 | 2018 | - | - | |
| Outback Solar | 11,995 | 2014 | - | 2016 | - | 2017 | 6,591 | 2018 | - | - | |
| ETO and Other Solar | 13,757 | 2014 | - | 2016 | - | 2017 | 2,221 | 2018 | - | - | |
| Purchased Bundled | - | 2014 | - | 2016 | - | 2017 | - | 2018 | - | - | |
| Total Annual Compliance | 2,882,040 | | 2,890,800 | | 2,899,560 | | 3,900,096 | | 3,950,760 | | |

| Compliance Year | 2017 | 2018 | 2019 | 2020 | 2021 |
|------------------------|---------|---------|---------|-----------|-----------|
| Facility | MWh | MWh | MWh | MWh | MWh |
| Pelton-Round Butte LIH | 438,000 | 438,000 | 438,000 | 439,200 | 438,000 |
| Biglow Canyon I | 603,786 | 467,166 | 337,168 | 470,563 | 477,650 |
| Biglow Canyon II | 502,487 | 544,659 | 438,698 | 614,060 | 623,307 |
| Biglow Canyon III | 586,615 | 495,947 | 389,222 | 544,849 | 553,055 |
| Tucannon River | 18,052 | 353,182 | 866,630 | 1,231,632 | 1,250,179 |
| Vansycle Ridge | 111,700 | 89,020 | 70,133 | 98,174 | 99,652 |
| PPM Klondike II | 368,432 | 298,286 | 214,879 | 299,965 | 304,483 |
| Hydro Upgrades | 154,800 | 134,946 | 111,966 | 156,780 | 159,141 |
| Bellevue Solar | 6,090 | 4,817 | 2,500 | 3,444 | 3,496 |
| Yamhill Solar | 4,350 | 4,186 | 3,608 | 5,048 | 5,124 |
| Outback Solar | 33,537 | 29,599 | 19,714 | 27,229 | 27,421 |
| ETO and Other Solar | 35,766 | 30,993 | 7,041 | 9,152 | 9,253 |
| Purchased Bundled | 18,425 | 0 | 0 | 0 | 0 |

Tab 4 - Incremental Cost by Resource

| Expected Incremental Cost of Qualifying Electricity | | | | | | | | | |
|---|----------------------------|-----------------------------|------------------------------|--------------------------------|--------------------------------|----------------------------|-----------------------------|------------------------------|----------|
| \$/MWh | | | | 2017 Busbar Energy (MWh) | \$000's | | | | |
| Base Case RefGas- RefCO2 | Case 2 RefGas- NoCO2 | Case 3 HighGas- NoCO2 | Case 4 HighGas- RefCO2 | | Base Case RefGas- RefCO2 | Case 2 RefGas- NoCO2 | Case 3 HighGas- NoCO2 | Case 4 HighGas- RefCO2 | |
| With Government Incentives: | | | | | | | | | |
| Biglow Canyon I | 38.06 | 41.40 | 31.62 | 27.94 | 341,094 | \$ 12,981 | \$ 14,121 | \$ 10,787 | \$ 9,531 |
| Biglow Canyon II | 37.89 | 42.64 | 26.67 | 21.04 | 445,109 | 16,866 | 18,977 | 11,872 | 9,364 |
| Biglow Canyon III | 39.47 | 45.14 | 27.29 | 20.76 | 394,941 | 15,588 | 17,826 | 10,778 | 8,198 |
| Tucannon River | 10.78 | 18.16 | (3.13) | (11.17) | 892,764 | 9,625 | 16,208 | (2,796) | (9,973) |

Tab 5 - RECs Generated

| RECs Available By Vintage Year | | | | | | | | | | | | | | |
|--------------------------------|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Facility | 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 | 341,094 | 341,094 | 341,094 | 342,028 | 341,094 |
| Biglow Canyon II | - | 159,480 | 375,252 | 375,689 | 410,406 | 221,626 | 389,370 | 390,768 | 446,329 | 445,109 | 445,109 | 445,109 | 446,329 | 445,109 |
| Biglow Canyon III | - | - | 73,259 | 384,679 | 360,639 | 319,493 | 377,552 | 345,710 | 396,023 | 394,941 | 394,941 | 394,941 | 396,023 | 394,941 |
| Tucannon River | - | - | - | - | - | - | 31,449 | 350,526 | 895,210 | 892,764 | 892,764 | 892,764 | 895,210 | 892,764 |
| Vansycle Ridge | - | 59,617 | 74,902 | 81,054 | 69,504 | 63,442 | 67,148 | 62,326 | 71,358 | 71,163 | 71,163 | 71,163 | 71,358 | 71,163 |
| PPM Klondike II | - | 172,863 | 173,511 | 198,956 | 211,993 | 210,810 | 222,982 | 209,726 | 218,030 | 217,434 | 217,434 | 217,434 | 218,030 | 217,434 |
| Pelton-Round Butte LIH | 439,200 | 438,000 | 438,000 | 438,000 | 439,200 | 438,000 | 438,000 | 438,000 | 439,200 | 438,000 | 438,000 | 438,000 | 439,200 | 438,000 |
| Hydro Upgrades | - | 85,765 | 108,981 | 114,834 | 104,627 | 86,896 | 92,823 | 98,421 | 113,956 | 113,644 | 113,644 | 113,644 | 113,956 | 113,644 |
| Bellevue Solar | - | - | - | - | 3,760 | 3,646 | 3,342 | 3,500 | 2,503 | 2,496 | 2,496 | 2,496 | 2,503 | 2,496 |
| Yamhill Solar | - | - | - | - | 2,502 | 2,634 | 2,380 | 3,272 | 3,669 | 3,659 | 3,659 | 3,659 | 3,669 | 3,659 |
| Outback Solar | - | - | - | - | 1,360 | 21,352 | 20,896 | 21,352 | 19,936 | 19,762 | 19,643 | 19,526 | 19,462 | 19,292 |
| ETO and Other Solar | - | 1,079 | 2,309 | 9,146 | 13,878 | 20,070 | 23,966 | 21,441 | 6,677 | 6,638 | 6,618 | 6,598 | 108,242 | 107,926 |
| Purchased Bundled | - | - | - | - | - | 18,425 | - | - | - | - | - | - | - | - |
| Total RECs | 439,200 | 1,231,301 | 1,558,313 | 1,957,728 | 1,955,339 | 1,766,736 | 2,011,851 | 2,276,711 | 2,954,918 | 2,946,704 | 2,946,566 | 2,946,428 | 3,056,008 | 3,047,522 |

Renewables used

| Year | 2017 | | 2018 | | 2019 | | 2020 | | 2021 | |
|---------------------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|
| | MWh | Vintage | MWh | Vintage | MWh | Vintage | MWh | Vintage | MWh | Vintage |
| Banked | 438,000 | 2009 | 438,000 | 2009 | 263,872 | 2009 | 439,200 | 2010 | 438,000 | 2010 |
| | 211,883 | 2010 | 670,430 | 2014 | 174,128 | 2010 | 110,498 | 2016 | 1,666,872 | 2018 |
| | 1,328,736 | 2011 | 1,782,370 | 2015 | 56,341 | 2015 | 2,508,704 | 2017 | 1,845,888 | 2019 |
| | 903,421 | 2012 | - | 2016 | 2,405,219 | 2016 | 841,693 | 2018 | - | 2020 |
| Total Banked | 2,882,040 | | 2,890,800 | | 2,899,560 | | 3,900,096 | | 3,950,760 | |
| Bundled | 2,882,040 | | 2,890,800 | | 2,899,560 | | 3,900,096 | | 3,950,760 | |
| Unbundled | - | | - | | - | | - | | - | |
| ACP | - | | - | | - | | - | | - | |
| Total | 2,882,040 | | 2,890,800 | | 2,899,560 | | 3,900,096 | | 3,950,760 | |

Tab 6 - Energy Growth Rates

| Year | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------|-------|-------|-------|-------|-------|
| Growth Rate | 0.56% | 0.48% | 0.35% | 0.42% | 1.58% |