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REPORT NAME: Biennial Greenhouse Gas Emissions Rate Impact Report

COMPANY NAME: Pacific Power

DOES REPORT CONTAIN CONFIDENTIAL INFORMATION? [ ]No [X]Yes

If yes, please submit only the cover letter electronically. Submit confidential information as directed in OAR 860-001-0070 or the terms of an applicable protective order.

If known, please select designation: [X]RE (Electric) [ ]RG (Gas) [ ]RW (Water) [ ]RO (Other)

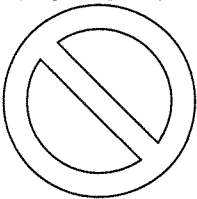
Report is required by: [X]OAR 860-085-0050
[ ]Statute
[ ]Order
[ ]Other

Is this report associated with a specific docket/case? [ ]No [X]Yes

If yes, enter docket number: RE-84

List applicable Key Words for this report to facilitate electronic search:
Greenhouse Gas Emissions Rate Impact Report

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825 NE Multnomah, Suite 2000  
Portland, Oregon 97232

July 1, 2014

***VIA ELECTRONIC FILING  
AND OVERNIGHT DELIVERY***

Public Utility Commission of Oregon  
3930 Fairview Industrial Dr. SE  
Salem, OR 97302-1166

Attention: Filing Center

**Re: Biennial Greenhouse Gas Emissions Rate Impact Report**

Pursuant to OAR 860-085-0050, PacifiCorp d/b/a Pacific Power (Company) hereby submits for filing its Biennial Greenhouse Gas Emissions Rate Impact Report.

The confidential information in this report is provided under separate cover per OAR 860-001-0070.

It is respectfully requested that all formal data requests regarding this filing be addressed to:

By e-mail (preferred): [datarequest@pacificorp.com](mailto:datarequest@pacificorp.com)

By regular mail: Data Request Response Center  
PacifiCorp  
825 NE Multnomah, Suite 2000  
Portland, Oregon 97232

Informal inquiries regarding this filing may be directed to Natasha Siores at (503) 813-6583.

Sincerely,

R. Bryce Dalley  
Vice President, Regulation

Enclosures

# **Rate Impacts of Meeting Oregon SB 101 Carbon Dioxide Emission Goals**

**July 1, 2014**

## **STUDY DESIGN**

PacifiCorp conducted its analysis of Oregon SB 101 using its capacity expansion optimization model, System Optimizer (SO), to develop a base resource portfolio and two resource portfolios that result in reductions of CO<sub>2</sub> emissions that are 10 percent below 1990 levels by 2020 and 15 percent below 2005 levels by 2020. To develop the two portfolios that achieve targeted CO<sub>2</sub> emission reductions, the SO model was set up with hard annual CO<sub>2</sub> emissions caps that constrain the model to solve for the least-cost resource expansion plan that does not exceed the physical CO<sub>2</sub> emission limits across PacifiCorp's multi-state system in each year of the simulation. Portfolio costs from the SO model studies were used in a revenue requirement model to calculate estimates of rate impacts associated with achieving the targeted CO<sub>2</sub> emission reductions.

PacifiCorp initiated its analysis from its 2013 Integrated Resource Plan Update (2013 IRP Update), updated to reflect the most recent official forward price curve dated March 31, 2014. The 2013 IRP Update portfolio was re-optimized to account for the impact of updated market prices, and the re-optimized portfolio is used as the base portfolio. Potential expansion resource options available in the current study are the same as those used in the development of the 2013 IRP Update. No retirements and/or conversion of coal units to operate as natural gas fired facilities beyond those in the 2013 IRP Update are included in the analysis. Similarly, resources that are not currently commercially available or financially viable are not included in the resource portfolios during the 2014 through 2020 study period covered by this analysis.<sup>1</sup>

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<sup>1</sup> Instructions from Oregon commission staff: "to the extent feasible, the compliance resource portfolio assumed in the analysis should be reasonable, in that the assumed technologies (or changes to the existing system) should be commercially, regulatorily and financially viable (i.e. no silver bullets)."



## ASSUMPTIONS

**Table 1 - Study Assumptions**

| Assumption                                | Base Case | Hard Cap Scenarios  | Comments  |
|---|-----------|---|---|
| Revenue requirement forecast              |           |   | Fall 2013 ten-year business plan <sup>2</sup> forecast of multi-state process base line revenue requirement (millions of dollars).  |
| Oregon customer forecast                  |           | 2014 566,245<br>2015 570,051<br>2016 574,040<br>2017 578,152<br>2018 582,345<br>2019 586,544<br>2020 590,674  | Fall 2013 ten-year business plan annual forecast of Oregon customers.   |
| CO <sub>2</sub> : 1990 baseline emissions | N/A       | <ul style="list-style-type: none"> <li>Emissions from owned generation per actual 1990 CO<sub>2</sub> emissions from fossil units.</li> <li>Emissions from market purchases are estimated assuming a CO<sub>2</sub> emission rate of 900 lbs/MWh.</li> </ul>                            | <p>The 1990 CO<sub>2</sub> emissions baseline accounts for sale of Centralia and changes in other ownership positions.</p> <p>The emission rate for market purchases reflects Oregon Commission Staff study preparation guidelines.</p> |
| CO <sub>2</sub> : 2005 baseline emissions | N/A       | <ul style="list-style-type: none"> <li>Emissions for owned generation and purchases per 2005 California Climate Action Registry (CCAR) filing.</li> <li>CO<sub>2</sub> emissions from market purchases are estimated assuming a CO<sub>2</sub> emission rate of 900 lbs/MWh.</li> </ul> | The emission rate for market purchases reflects Oregon Commission Staff study preparation guidelines.   |

<sup>2</sup> The 2013 ten-year business plan, which covers the 2014 to 2023 planning horizon, was finalized in the fall of 2013.

| Assumption                                 | Base Case  | Hard Cap Scenarios   | Comments |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
|--|--|--|----------|------------|------------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|--|
| CO <sub>2</sub> : yearly emissions targets | None   | <p>Modeled as annual emission limits starting 2014.</p> <p>Annual Emission Limits (thousands of tons)</p> <table border="1" data-bbox="349 724 678 1144"> <thead> <tr> <th>Year</th> <th>Scenario 1</th> <th>Scenario 2</th> </tr> </thead> <tbody> <tr> <td>2014</td> <td>54,144</td> <td>54,144</td> </tr> <tr> <td>2015</td> <td>52,601</td> <td>53,753</td> </tr> <tr> <td>2016</td> <td>51,059</td> <td>53,362</td> </tr> <tr> <td>2017</td> <td>49,517</td> <td>52,972</td> </tr> <tr> <td>2018</td> <td>47,974</td> <td>52,581</td> </tr> <tr> <td>2019</td> <td>46,432</td> <td>52,190</td> </tr> <tr> <td>2020</td> <td>44,890</td> <td>51,800</td> </tr> </tbody> </table> | Year     | Scenario 1 | Scenario 2 | 2014 | 54,144 | 54,144 | 2015 | 52,601 | 53,753 | 2016 | 51,059 | 53,362 | 2017 | 49,517 | 52,972 | 2018 | 47,974 | 52,581 | 2019 | 46,432 | 52,190 | 2020 | 44,890 | 51,800 | <p>2014 starting value for scenarios is the sum of generator and purchases emissions from base case study.</p> <p>Yearly targets represent a linear reduction from 2014 values to the 2020 target.</p> <ul style="list-style-type: none"> <li>Scenario 1 is based on Oregon HB 3543 emission level targets (10 percent below 1990 levels).</li> <li>Scenario 2 reflects Western Climate Initiative (WCI) emission targets (15 percent below 2005 levels).</li> </ul> |
| Year                                       | Scenario 1   | Scenario 2   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2014                                       | 54,144   | 54,144   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2015                                       | 52,601   | 53,753   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2016                                       | 51,059   | 53,362   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2017                                       | 49,517   | 52,972   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2018                                       | 47,974   | 52,581   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2019                                       | 46,432   | 52,190   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| 2020                                       | 44,890   | 51,800   |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| Existing and expansion resources           | Existing and expansion resources have CO <sub>2</sub> emission assumptions specific to the particular technology of each resource. |  |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| Market sales and purchases                 | Market purchases have a CO <sub>2</sub> emission rate of 900 lbs/MWh that applies toward the cap.                                  |  |          |            |            |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |

## STUDY RESULTS

### Estimated Revenue Requirement Impacts

Table 2 presents the customer impact for the study period of 2014 through 2020, on total and average annual basis for the two reduction scenarios: Scenario 1 (10 percent below 1990 levels by 2020), and Scenario 2 (15 percent below 2005 levels by 2020). The baseline revenue requirement forecast is based on the Company’s 2013 ten-year business plan. The determination of customer impact assumes that all costs incurred to reach the Oregon goals set in Scenario 1 and Scenario 2 would be recovered from customers in Oregon. Appendix A provides a line item breakdown of portfolio costs from the SO model. Note that these rate impacts do not include potential costs associated with failing to meet applicable minimum-take provisions in the Company’s coal supply contracts when coal generation is potentially reduced beyond the minimum-take levels.

**Table 2 – Customer Impact of Scenarios 1 and 2**

|                               |                | <b>Scenario 1</b> | <b>Scenario 2</b> |
|-------------------------------|----------------|-------------------|-------------------|
| Customer Impact (%)           | 2014-2020      | 5.67%             | 0.45%             |
|                               | Average Annual | 0.81%             | 0.06%             |
| Customer Impact (\$/customer) | 2014-2020      | 506.41            | 39.95             |
|                               | Average Annual | 72.34             | 5.71              |

### Portfolio Resource Selection and Utilization

Tables 3 through 5 report the resources in each of the three portfolios (Base, Scenario 1, and Scenario 2). Tables 6 and 7 summarize differences between portfolios by year and cumulative differences in resources over the seven-year study period.

Model results show that the CO<sub>2</sub> emission reduction goals for Scenarios 1 and 2 are met largely through changes in the dispatch of existing and expansion resources along with incremental acquisition of demand side management (DSM) resources and front office transactions (FOTs).

Coal and gas units are dispatched economically by the model subject to the system-wide CO<sub>2</sub> emission constraints. As expected, average coal unit capacity factors are lower in the scenario studies than in the base study. Table 8 shows simple average annual capacity factors for coal resources and CCCT resources.

**Table 3 - Base Resource Portfolio (MW)**

| Resource                                      |  | 2014  | 2015  | 2016 | 2017 | 2018  | 2019  | 2020  | Resource Totals 1/<br>7-year |
|---|--|-------|-------|------|------|-------|-------|-------|------------------------------|
| <b>East</b>                                   | <b>Existing Plant Retirements/Conversions</b>      |       |       |      |      |       |       |       |                              |
|   | Carbon1 (Early Retirement/Conversion)              | -     | (67)  | -    | -    | -     | -     | -     | (67)                         |
|   | Carbon2 (Early Retirement/Conversion)              | -     | (105) | -    | -    | -     | -     | -     | (105)                        |
|   | Cholla4 (Early Retirement/Conversion)              | -     | -     | -    | -    | (387) | -     | -     | (387)                        |
|   | Naughton3 (Early Retirement/Conversion)            | -     | (330) | -    | -    | -     | -     | -     | (330)                        |
|   | Coal Ret_UT - Gas RePower                          | -     | -     | -    | -    | 387   | -     | -     | 387                          |
|   | Coal Ret_WY - Gas RePower                          | -     | 338   | -    | -    | -     | -     | -     | 338                          |
|   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |       |                              |
|   | Lake Side II                                       | 645   | -     | -    | -    | -     | -     | -     | 645                          |
|   | CHP - Biomass                                      | 0.2   | 0.2   | 0.2  | 0.2  | 0.2   | 0.2   | 0.2   | 1.1                          |
|   | CHP - Other  | -     | -     | -    | 0.4  | 0.4   | 0.4   | -     | 1.1                          |
|   | DSM, Class 2, ID                                   | 2     | 2     | 2    | 2    | 2     | 2     | 2     | 14                           |
|   | DSM, Class 2, UT                                   | 8     | 13    | 14   | 16   | 16    | 16    | 13    | 96                           |
|   | DSM, Class 2, WY                                   | 4     | 4     | 5    | 5    | 5     | 6     | 6     | 34                           |
|   | DSM, Class 2 Total                                 | 13    | 19    | 21   | 23   | 24    | 24    | 21    | 144                          |
|   | Utah Blue Sky Solar                                | -     | 2     | -    | -    | -     | -     | -     | 2                            |
|   | Micro Solar - PV                                   | 11.0  | 14.2  | 16.4 | 17.0 | -     | -     | -     | 59                           |
|   | Micro Solar - Water Heating                        | -     | -     | -    | -    | 1.2   | 0.5   | 0.6   | 2.2                          |
|   | FOT Mona Q3  | -     | -     | -    | -    | -     | -     | 138   | 20                           |
| <b>West</b>                                   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |       |                              |
|   | CHP - Biomass                                      | 0.6   | 0.6   | 0.6  | 0.6  | 0.6   | 0.6   | 0.6   | 3.9                          |
|   | DSM, Class 2, CA                                   | 0     | 0     | 0    | 0    | 0     | 0     | 0     | 3                            |
|   | DSM, Class 2, OR                                   | 19    | 13    | 12   | 11   | 10    | 8     | 7     | 80                           |
|   | DSM, Class 2, WA                                   | 3     | 3     | 3    | 3    | 3     | 3     | 3     | 21                           |
|   | DSM, Class 2 Total                                 | 22    | 16    | 16   | 14   | 13    | 12    | 11    | 104                          |
|   | OR Solar (Util Cap Standard & Cust Incentive Prgm) | 1.0   | -     | -    | -    | -     | -     | -     | 1                            |
|   | Signed Contract - OR Solar                         | 5.0   | 1.7   | -    | -    | -     | -     | -     | 6.7                          |
|   | FOT COB Q3   | -     | -     | -    | -    | 89    | 193   | 297   | 83                           |
|   | FOT NOB Q3   | -     | -     | -    | 81   | 100   | 100   | 100   | 54                           |
|   | FOT MidColumbia Q3                                 | 400   | 400   | 400  | 400  | 400   | 400   | 400   | 400                          |
| FOT MidColumbia Q3 - 2                        | 55   | 197   | 319   | 375  | 375  | 375   | 375   | 296   |                              |
| <b>Existing Plant Retirements/Conversions</b> |  | -     | (164) | -    | -    | -     | -     | -     |                              |
| <b>Annual Additions, Long Term Resources</b>  |  | 698   | 53    | 53   | 55   | 39    | 37    | 33    |                              |
| <b>Annual Additions, Short Term Resources</b> |  | 455   | 597   | 719  | 856  | 964   | 1,068 | 1,311 |                              |
| <b>Total Annual Additions</b>                 |  | 1,153 | 650   | 772  | 911  | 1,003 | 1,105 | 1,344 |                              |

1/ Front office transaction amounts reflect one-year transaction periods, are not additive.

**Table 4 - Scenario 1 Portfolio (MW)**  
(90% of 1990 Co2 Emissions)

|   |  | 2014  | 2015  | 2016 | 2017 | 2018  | 2019  | 2020 | Resource Totals 1/<br>7-year |
|---|--|-------|-------|------|------|-------|-------|------|------------------------------|
| <b>East</b>                                   | <b>Existing Plant Retirements/Conversions</b>      |       |       |      |      |       |       |      |                              |
|   | Carbon1 (Early Retirement/Conversion)              | -     | (67)  | -    | -    | -     | -     | -    | (67)                         |
|   | Carbon2 (Early Retirement/Conversion)              | -     | (105) | -    | -    | -     | -     | -    | (105)                        |
|   | Cholla4 (Early Retirement/Conversion)              | -     | -     | -    | -    | (387) | -     | -    | (387)                        |
|   | Naughton3 (Early Retirement/Conversion)            | -     | (330) | -    | -    | -     | -     | -    | (330)                        |
|   | Coal Ret_UT - Gas RePower                          | -     | -     | -    | -    | 387   | -     | -    | 387                          |
|   | Coal Ret_WY - Gas RePower                          | -     | 338   | -    | -    | -     | -     | -    | 338                          |
|   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |      |                              |
|   | Lake Side II                                       | 645   | -     | -    | -    | -     | -     | -    | 645                          |
|   | CHP - Biomass                                      | 0.2   | 0.2   | 0.2  | 0.2  | 0.2   | 0.2   | 0.2  | 1.1                          |
|   | CHP - Other  | 0.4   | 0.4   | 0.4  | 0.4  | 0.4   | 0.4   | 0.4  | 2.5                          |
|   | DSM, Class 2, ID                                   | 2     | 2     | 2    | 2    | 2     | 2     | 2    | 14                           |
|   | DSM, Class 2, UT                                   | 11    | 15    | 17   | 18   | 18    | 19    | 16   | 114                          |
|   | DSM, Class 2, WY                                   | 4     | 4     | 5    | 6    | 6     | 6     | 6    | 36                           |
|   | DSM, Class 2 Total                                 | 16    | 21    | 23   | 26   | 26    | 27    | 24   | 164                          |
|   | Utah Blue Sky Solar                                | -     | 2     | -    | -    | -     | -     | -    | 2                            |
|   | Micro Solar - PV                                   | 11.0  | 14.2  | 16.4 | 17.0 | -     | -     | -    | 59                           |
| Micro Solar - Water Heating                   | -  | -     | -     | 0.8  | 0.4  | 0.5   | 0.6   | 2.2  |                              |
| FOT Mona Q3                                   | -  | -     | -     | -    | -    | 15    | 114   | 18   |                              |
| <b>West</b>                                   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |      |                              |
|   | CHP - Biomass                                      | 0.6   | 0.6   | 0.6  | 0.6  | 0.6   | 0.6   | 0.6  | 3.9                          |
|   | DSM, Class 2, CA                                   | 0     | 0     | 0    | 0    | 1     | 1     | 1    | 3                            |
|   | DSM, Class 2, OR                                   | 19    | 13    | 12   | 13   | 12    | 10    | 9    | 87                           |
|   | DSM, Class 2, WA                                   | 3     | 3     | 3    | 3    | 3     | 3     | 3    | 22                           |
|   | DSM, Class 2 Total                                 | 23    | 16    | 16   | 17   | 15    | 14    | 13   | 112                          |
|   | OR Solar (Util Cap Standard & Cust Incentive Prgm) | 1.0   | -     | -    | -    | -     | -     | -    | 1                            |
|   | Signed Contract - OR Solar                         | 5.0   | 1.7   | -    | -    | -     | -     | -    | 6.7                          |
|   | FOT COB Q3   | -     | -     | -    | -    | 72    | 156   | 297  | 75                           |
|   | FOT NOB Q3   | -     | -     | -    | 68   | 100   | 100   | 100  | 53                           |
|   | FOT MidColumbia Q3                                 | 400   | 400   | 400  | 400  | 400   | 400   | 400  | 400                          |
|   | FOT MidColumbia Q3 - 2                             | 50    | 190   | 310  | 375  | 375   | 375   | 375  | 293                          |
| <b>Existing Plant Retirements/Conversions</b> | -  | (164) | -     | -    | -    | -     | -     | -    |                              |
| <b>Annual Additions, Long Term Resources</b>  | 702  | 56    | 56    | 61   | 43   | 43    | 39    |      |                              |
| <b>Annual Additions, Short Term Resources</b> | 450  | 590   | 710   | 843  | 947  | 1,047 | 1,286 |      |                              |
| <b>Total Annual Additions</b>                 | 1,152  | 646   | 766   | 904  | 990  | 1,089 | 1,325 |      |                              |

1/ Front office transaction amounts reflect one-year transaction periods, are not additive.



**Table 5 - Scenario 2 Portfolio (MW)**  
(85% of 2005 Co2 Emissions)

|   |  | 2014  | 2015  | 2016 | 2017 | 2018  | 2019  | 2020 | Resource Totals 1/<br>7-year |
|---|--|-------|-------|------|------|-------|-------|------|------------------------------|
| <b>East</b>                                   | <b>Existing Plant Retirements/Conversions</b>      |       |       |      |      |       |       |      |                              |
|   | Carbon1 (Early Retirement/Conversion)              | -     | (67)  | -    | -    | -     | -     | -    | (67)                         |
|   | Carbon2 (Early Retirement/Conversion)              | -     | (105) | -    | -    | -     | -     | -    | (105)                        |
|   | Cholla4 (Early Retirement/Conversion)              | -     | -     | -    | -    | (387) | -     | -    | (387)                        |
|   | Naughton3 (Early Retirement/Conversion)            | -     | (330) | -    | -    | -     | -     | -    | (330)                        |
|   | Coal Ret_UT - Gas RePower                          | -     | -     | -    | -    | 387   | -     | -    | 387                          |
|   | Coal Ret_WY - Gas RePower                          | -     | 338   | -    | -    | -     | -     | -    | 338                          |
|   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |      |                              |
|   | Lake Side II                                       | 645   | -     | -    | -    | -     | -     | -    | 645                          |
|   | CHP - Biomass                                      | 0.2   | 0.2   | 0.2  | 0.2  | 0.2   | 0.2   | 0.2  | 1.1                          |
|   | CHP - Other  | 0.4   | 0.4   | 0.4  | 0.4  | 0.4   | 0.4   | 0.4  | 2.5                          |
|   | DSM, Class 2, ID                                   | 2     | 2     | 2    | 2    | 2     | 2     | 2    | 14                           |
|   | DSM, Class 2, UT                                   | 11    | 13    | 14   | 16   | 16    | 18    | 15   | 104                          |
|   | DSM, Class 2, WY                                   | 4     | 4     | 5    | 5    | 5     | 6     | 6    | 35                           |
|   | DSM, Class 2 Total                                 | 16    | 19    | 21   | 23   | 24    | 26    | 24   | 152                          |
|   | Utah Blue Sky Solar                                | -     | 2     | -    | -    | -     | -     | -    | 2                            |
|   | Micro Solar - PV                                   | 11.0  | 14.2  | 16.4 | 17.0 | -     | -     | -    | 59                           |
|   | Micro Solar - Water Heating                        | -     | -     | -    | 0.8  | 0.4   | 0.5   | 0.6  | 2.2                          |
| FOT Mona Q3                                   | -  | -     | -     | -    | -    | -     | -     | 127  |                              |
| 127   | 18   |       |       |      |      |       |       |      |                              |
| <b>West</b>                                   | <b>Expansion Resources</b>                         |       |       |      |      |       |       |      |                              |
|   | CHP - Biomass                                      | 0.6   | 0.6   | 0.6  | 0.6  | 0.6   | 0.6   | 0.6  | 3.9                          |
|   | DSM, Class 2, CA                                   | 0     | 0     | 0    | 0    | 0     | 0     | 0    | 3                            |
|   | DSM, Class 2, OR                                   | 19    | 13    | 12   | 11   | 10    | 8     | 9    | 82                           |
|   | DSM, Class 2, WA                                   | 3     | 3     | 3    | 3    | 3     | 3     | 3    | 21                           |
|   | DSM, Class 2 Total                                 | 23    | 16    | 16   | 14   | 13    | 12    | 12   | 105                          |
|   | OR Solar (Util Cap Standard & Cust Incentive Prgm) | 1.0   | -     | -    | -    | -     | -     | -    | 1                            |
|   | Signed Contract - OR Solar                         | 5.0   | 1.7   | -    | -    | -     | -     | -    | 6.7                          |
|   | FOT COB Q3   | -     | -     | -    | -    | 83    | 185   | 297  | 81                           |
|   | FOT NOB Q3   | -     | -     | -    | 75   | 100   | 100   | 100  | 54                           |
|   | FOT MidColumbia Q3                                 | 400   | 400   | 400  | 400  | 400   | 400   | 400  | 400                          |
|   | FOT MidColumbia Q3 - 2                             | 50    | 192   | 313  | 375  | 375   | 375   | 375  | 294                          |
| <b>Existing Plant Retirements/Conversions</b> | -  | (164) | -     | -    | -    | -     | -     | -    |                              |
| <b>Annual Additions, Long Term Resources</b>  | 702  | 54    | 54    | 56   | 38   | 39    | 37    |      |                              |
| <b>Annual Additions, Short Term Resources</b> | 450  | 592   | 713   | 850  | 958  | 1,060 | 1,300 |      |                              |
| <b>Total Annual Additions</b>                 | 1,152  | 645   | 767   | 906  | 997  | 1,099 | 1,337 |      |                              |

1/ Front office transaction amounts reflect one-year transaction periods, are not additive.

**Table 6 - Resource Differences, Scenario 1 Portfolio minus Base Portfolio (MW)**

| Resource                               |                                       | 2014 | 2015 | 2016 | 2017 | 2018  | 2019 | 2020 | Resource Totals 1/<br>7-year |
|--|---------------------------------------|------|------|------|------|-------|------|------|------------------------------|
| <b>East</b>                            | <b>Expansion Resources</b>            |      |      |      |      |       |      |      |                              |
|  | CHP - Other                           | 0.4  | 0.4  | 0.4  | -    | -     | -    | 0.4  | 1.4                          |
|  | DSM, Class 2, ID                      | -    | -    | -    | -    | -     | -    | -    | 0.1                          |
|  | DSM, Class 2, UT                      | 2.8  | 2.2  | 2.3  | 2.3  | 2.2   | 3.0  | 3.0  | 17.8                         |
|  | DSM, Class 2, WY                      | 0.2  | 0.2  | 0.2  | 0.7  | 0.4   | 0.4  | 0.4  | 2.5                          |
|  | DSM, Class 2 Total                    | 3.0  | 2.4  | 2.5  | 3.0  | 2.6   | 3.4  | 3.5  | 20.3                         |
|  | Micro Solar - PV                      | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | Micro Solar - Water Heating           | -    | -    | -    | 0.8  | (0.8) | -    | -    | -                            |
| FOT Mona Q3                            | -                                     | -    | -    | -    | -    | 15    | (25) | (1)  |                              |
| <b>West</b>                            | <b>Expansion Resources</b>            |      |      |      |      |       |      |      |                              |
|  | DSM, Class 2, CA                      | -    | -    | -    | -    | 0.2   | 0.2  | 0.2  | 0.6                          |
|  | DSM, Class 2, OR                      | -    | -    | -    | 2.1  | 1.9   | 1.5  | 1.3  | 6.8                          |
|  | DSM, Class 2, WA                      | 0.2  | 0.2  | -    | 0.1  | 0.1   | 0.3  | 0.5  | 1.2                          |
|  | DSM, Class 2 Total                    | 0.1  | 0.2  | -    | 2.2  | 2.2   | 2.0  | 2.0  | 8.6                          |
|  | FOT COB Q3                            | -    | -    | -    | -    | (17)  | (36) | -    | (8)                          |
|  | FOT NOB Q3                            | -    | -    | -    | (13) | -     | -    | -    | (2)                          |
|  | FOT MidColumbia Q3                    | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | FOT MidColumbia Q3 - 2                | (5)  | (7)  | (9)  | -    | -     | -    | -    | (3)                          |
|  | Existing Plant Retirements            | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | Annual Additions, Long Term Resources | 3    | 3    | 3    | 6    | 4     | 5    | 6    |                              |
| Annual Additions, Short Term Resources | (5)                                   | (7)  | (9)  | (13) | (17) | (21)  | (25) |      |                              |
| Total Annual Additions                 | (1)                                   | (4)  | (6)  | (7)  | (13) | (15)  | (19) |      |                              |

1/ Front office transaction amounts reflect one-year transaction periods, are not additive.

**Table 7 - Resource Differences, Scenario 2 Portfolio minus Base Portfolio (MW)**

| Resource                               |                             | 2014 | 2015 | 2016 | 2017 | 2018  | 2019 | 2020 | Resource Totals 1/<br>7-year |
|--|-----------------------------|------|------|------|------|-------|------|------|------------------------------|
| <b>East</b>                            | <b>Expansion Resources</b>  |      |      |      |      |       |      |      |                              |
|  | CHP - Other                 | 0.4  | 0.4  | 0.4  | -    | -     | -    | 0.4  | 1.4                          |
|  | DSM, Class 2, ID            | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | DSM, Class 2, UT            | 2.8  | -    | -    | -    | -     | 2.2  | 2.3  | 7.3                          |
|  | DSM, Class 2, WY            | -    | 0.2  | 0.2  | 0.3  | -     | -    | 0.4  | 1.2                          |
|  | DSM, Class 2 Total          | 2.8  | 0.2  | 0.2  | 0.3  | -     | 2.2  | 2.8  | 8.5                          |
|  | Micro Solar - Water Heating | -    | -    | -    | 0.8  | (0.8) | -    | -    | -                            |
| FOT Mona Q3                            | -                           | -    | -    | -    | -    | -     | (11) | (2)  |                              |
| <b>West</b>                            | <b>Expansion Resources</b>  |      |      |      |      |       |      |      |                              |
|  | DSM, Class 2, CA            | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | DSM, Class 2, OR            | -    | -    | -    | -    | -     | -    | 1.3  | 1.3                          |
|  | DSM, Class 2, WA            | 0.2  | 0.2  | -    | -    | -     | -    | 0.1  | 0.4                          |
|  | DSM, Class 2 Total          | 0.1  | 0.2  | -    | -    | -     | -    | 1.4  | 1.7                          |
|  | FOT COB Q3                  | -    | -    | -    | -    | (6)   | (8)  | -    | (2)                          |
|  | FOT NOB Q3                  | -    | -    | -    | (6)  | -     | -    | -    | (1)                          |
|  | FOT MidColumbia Q3          | -    | -    | -    | -    | -     | -    | -    | -                            |
|  | FOT MidColumbia Q3 - 2      | (5)  | (5)  | (6)  | -    | -     | -    | -    | (2)                          |
|  | Existing Plant Retirements  | -    | -    | -    | -    | -     | -    | -    | -                            |
| Annual Additions, Long Term Resources  | 3                           | 1    | 1    | 1    | (1)  | 2     | 5    |      |                              |
| Annual Additions, Short Term Resources | (5)                         | (5)  | (6)  | (6)  | (6)  | (8)   | (11) |      |                              |
| Total Annual Additions                 | (1)                         | (4)  | (5)  | (5)  | (7)  | (5)   | (7)  |      |                              |

1/ Front office transaction amounts reflect one-year transaction periods, are not additive.

**Table 8 - Average Annual Capacity Factors for Coal and Gas Resources (%)**

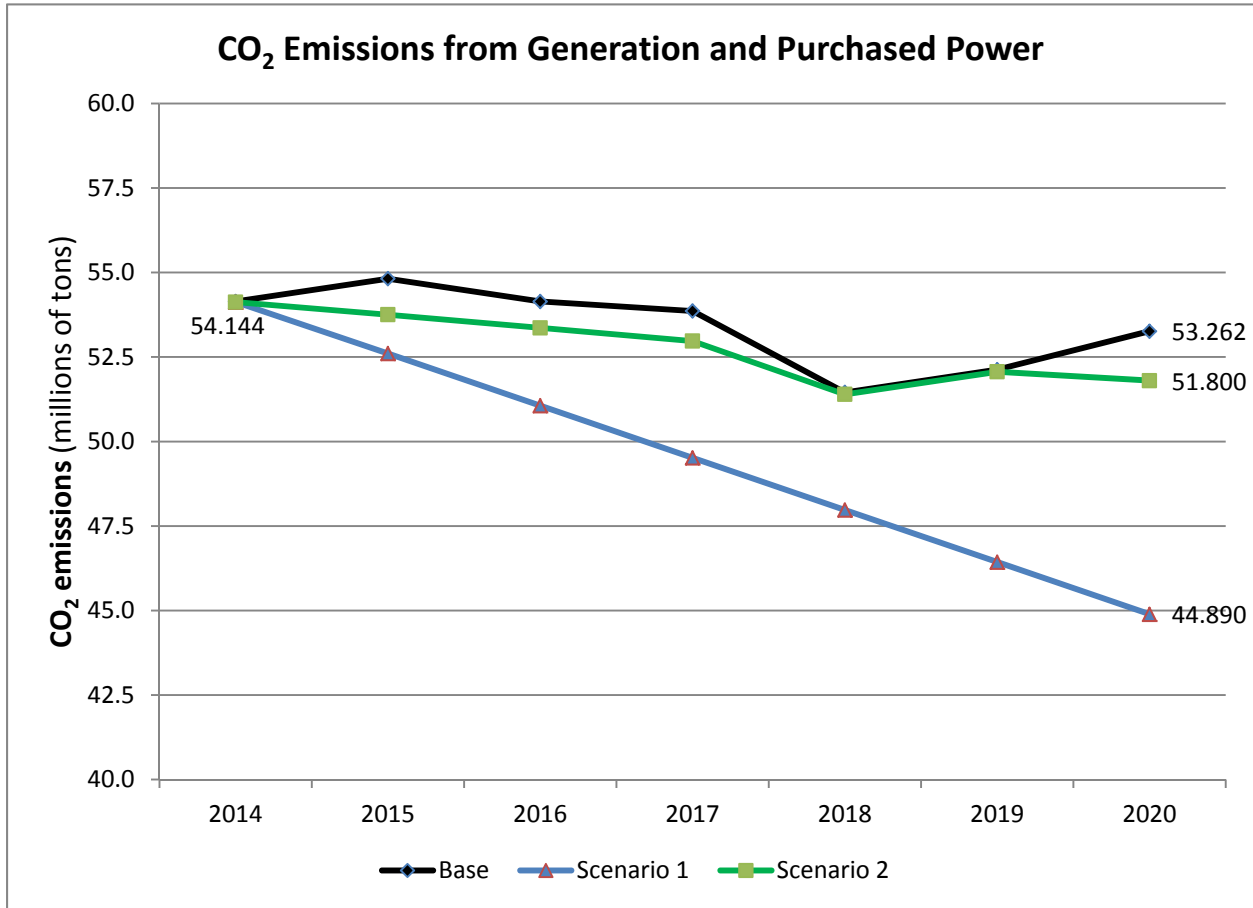
| <b>Coal Resources</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Base                  | 83.1        | 87.1        | 86.1        | 87.9        | 88.0        | 88.6        | 90.7        |
| Scenario 1            | 83.0        | 82.4        | 78.1        | 73.4        | 74.5        | 68.7        | 61.4        |
| Scenario 2            | 83.0        | 85.3        | 84.5        | 84.3        | 88.0        | 88.6        | 83.2        |

| <b>CCCT resources</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Base                  | 40.4        | 46.5        | 40.1        | 41.0        | 50.1        | 50.8        | 51.6        |
| Scenario 1            | 40.3        | 44.4        | 40.0        | 47.8        | 54.0        | 65.7        | 69.7        |
| Scenario 2            | 40.3        | 44.5        | 38.8        | 41.8        | 49.8        | 50.3        | 51.5        |

## Carbon Dioxide Emissions

For portfolio development, the annual emission reduction levels serve as upper-bound constraints on the sum of emissions from owned generation and purchased power. CO<sub>2</sub> emissions are capped every year to reach the required levels by 2020. Figure 1 shows the CO<sub>2</sub> emission levels for the base case and CO<sub>2</sub> reduction scenarios. Credits from wholesale sales are not included.

**Figure 1 - CO<sub>2</sub> Emissions**



## Appendix A

### Scenario PVRR Costs and Comparisons to the Base (System Optimizer Model Output)

| 7-year PVRR @ 6.88%                       |                   |                   |                   |
|---|-------------------|-------------------|-------------------|
| Cost Components (millions)                | Base              | Scenario 1        | Scenario 2        |
| Existing Station Fuel Costs               | \$ 5,460          | \$ 5,010          | \$ 5,357          |
| Existing Station Variable O&M Costs       | \$ 529            | \$ 594            | \$ 536            |
| Existing Station Emission Costs           | \$ -              | \$ -              | \$ -              |
| Existing Station Dispatch Adder Costs     | \$ -              | \$ -              | \$ -              |
| Existing Price Station Contract Costs     | \$ 16             | \$ 16             | \$ 16             |
| Existing Station Fixed Costs              | \$ 2,715          | \$ 2,715          | \$ 2,715          |
| Existing Station Demand Charges           | \$ -              | \$ -              | \$ -              |
| Existing Station Decomm. Costs            | \$ 31             | \$ 31             | \$ 31             |
| Proposed Station Fuel Costs               | \$ 732            | \$ 768            | \$ 726            |
| Proposed Station Variable O&M Costs       | \$ 64             | \$ 71             | \$ 65             |
| Proposed Station Emission Costs           | \$ -              | \$ -              | \$ -              |
| Proposed Station Dispatch Adder Costs     | \$ -              | \$ -              | \$ -              |
| Proposed Price Station Contract Costs     | \$ -              | \$ -              | \$ -              |
| Proposed Station Fixed Costs              | \$ 163            | \$ 164            | \$ 164            |
| Proposed Station Demand Charges           | \$ -              | \$ -              | \$ -              |
| Proposed Station Capital Costs            | \$ 307            | \$ 309            | \$ 309            |
| <b>Station Total Costs</b>                | <b>\$ 10,018</b>  | <b>\$ 9,678</b>   | <b>\$ 9,919</b>   |
| Existing Transmission Variable Costs      | \$ 8              | \$ 5              | \$ 8              |
| Existing Transmission Fixed Costs         | \$ -              | \$ -              | \$ -              |
| Proposed Transmission Variable Costs      | \$ -              | \$ -              | \$ -              |
| Proposed Transmission Fixed Costs         | \$ 43             | \$ 43             | \$ 43             |
| Proposed Transmission Capital Costs       | \$ 282            | \$ 282            | \$ 282            |
| <b>Transmission Total Costs</b>           | <b>\$ 333</b>     | <b>\$ 330</b>     | <b>\$ 332</b>     |
| Existing DSM Program Energy Costs         | \$ -              | \$ -              | \$ -              |
| Existing DSM Program Payback Energy Costs | \$ 4              | \$ 4              | \$ 4              |
| Existing DSM Program Capacity Costs       | \$ -              | \$ -              | \$ -              |
| Proposed DSM Program Energy Costs         | \$ 66             | \$ 84             | \$ 73             |
| Proposed DSM Program Payback Energy Costs | \$ -              | \$ -              | \$ -              |
| Proposed DSM Program Capacity Costs       | \$ -              | \$ -              | \$ -              |
| Proposed DSM Program Capital Costs        | \$ -              | \$ -              | \$ -              |
| <b>DSM Program Total Costs</b>            | <b>\$ 70</b>      | <b>\$ 88</b>      | <b>\$ 77</b>      |
| Existing Contract Energy Costs            | \$ 1,443          | \$ 1,444          | \$ 1,444          |
| Existing Contract Capacity Costs          | \$ -              | \$ -              | \$ -              |
| Existing Contract Premium Costs           | \$ -              | \$ -              | \$ -              |
| Proposed Contract Energy Costs            | \$ -              | \$ -              | \$ -              |
| Proposed Contract Capacity Costs          | \$ -              | \$ -              | \$ -              |
| Proposed Contract Premium Costs           | \$ -              | \$ -              | \$ -              |
| <b>Contract Total Costs</b>               | <b>\$ 1,443</b>   | <b>\$ 1,444</b>   | <b>\$ 1,444</b>   |
| Spot Mkt Purchase Costs                   | \$ 279            | \$ 346            | \$ 289            |
| Spot Mkt Sale Revenues                    | \$ 1,896          | \$ 1,438          | \$ 1,799          |
| <b>Spot Net Purchase Costs</b>            | <b>\$ (1,617)</b> | <b>\$ (1,093)</b> | <b>\$ (1,509)</b> |
| Unserviced Energy Costs                   | \$ -              | \$ -              | \$ -              |
| Unserviced Capacity Costs                 | \$ -              | \$ -              | \$ -              |
| <b>Unserviced Total Costs</b>             | <b>\$ -</b>       | <b>\$ -</b>       | <b>\$ -</b>       |
| <b>Total Costs</b>                        | <b>\$ 10,246</b>  | <b>\$ 10,447</b>  | <b>\$ 10,262</b>  |

**Difference of 7-year PVRR @ 6.88% (Scenario minus Base)**

| <b>Cost Components (millions)</b>         | <b>Scenario 1</b> | <b>Scenario 2</b> |
|---|-------------------|-------------------|
| Existing Station Fuel Costs               | \$ (450)          | \$ (103)          |
| Existing Station Variable O&M Costs       | \$ 66             | \$ 7              |
| Existing Station Emission Costs           | \$ -              | \$ -              |
| Existing Station Dispatch Adder Costs     | \$ -              | \$ -              |
| Existing Price Station Contract Costs     |                   |                   |
| Existing Station Fixed Costs              | \$ -              | \$ -              |
| Existing Station Demand Charges           |                   |                   |
| Existing Station Decomm. Costs            | \$ -              | \$ -              |
| Proposed Station Fuel Costs               | \$ 36             | \$ (6)            |
| Proposed Station Variable O&M Costs       | \$ 7              | \$ 1              |
| Proposed Station Emission Costs           | \$ -              | \$ -              |
| Proposed Station Dispatch Adder Costs     | \$ -              | \$ -              |
| Proposed Price Station Contract Costs     |                   |                   |
| Proposed Station Fixed Costs              | \$ 0              | \$ 0              |
| Proposed Station Demand Charges           |                   |                   |
| Proposed Station Capital Costs            | \$ 2              | \$ 2              |
| <b>Station Total Costs</b>                | <b>\$ (339)</b>   | <b>\$ (99)</b>    |
| Existing Transmission Variable Costs      | \$ (3)            | \$ (1)            |
| Existing Transmission Fixed Costs         | \$ -              | \$ -              |
| Proposed Transmission Variable Costs      | \$ -              | \$ -              |
| Proposed Transmission Fixed Costs         | \$ -              | \$ -              |
| Proposed Transmission Capital Costs       | \$ -              | \$ -              |
| <b>Transmission Total Costs</b>           | <b>\$ (3)</b>     | <b>\$ (1)</b>     |
| Existing DSM Program Energy Costs         | \$ -              | \$ -              |
| Existing DSM Program Payback Energy Costs |                   |                   |
| Existing DSM Program Capacity Costs       | \$ -              | \$ -              |
| Proposed DSM Program Energy Costs         | \$ 17             | \$ 7              |
| Proposed DSM Program Payback Energy Costs |                   |                   |
| Proposed DSM Program Capacity Costs       | \$ -              | \$ -              |
| Proposed DSM Program Capital Costs        | \$ -              | \$ -              |
| <b>DSM Program Total Costs</b>            | <b>\$ 18</b>      | <b>\$ 8</b>       |
| Existing Contract Energy Costs            | \$ 1              | \$ 1              |
| Existing Contract Capacity Costs          | \$ -              | \$ -              |
| Existing Contract Premium Costs           | \$ -              | \$ -              |
| Proposed Contract Energy Costs            | \$ -              | \$ -              |
| Proposed Contract Capacity Costs          | \$ -              | \$ -              |
| Proposed Contract Premium Costs           | \$ -              | \$ -              |
| <b>Contract Total Costs</b>               | <b>\$ 1</b>       | <b>\$ 1</b>       |
| Spot Mkt Purchase Costs                   | \$ 67             | \$ 10             |
| Spot Mkt Sale Revenues                    | \$ (458)          | \$ (97)           |
| <b>Spot Net Purchase Costs</b>            | <b>\$ 525</b>     | <b>\$ 108</b>     |
| Unserviced Energy Costs                   | \$ -              | \$ -              |
| Unserviced Capacity Costs                 | \$ -              | \$ -              |
| <b>Unserviced Total Costs</b>             | <b>\$ -</b>       | <b>\$ -</b>       |
| <b>Total Costs</b>                        | <b>\$ 201</b>     | <b>\$ 16</b>      |