



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

February 16, 2016

Via Email

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 a supplemental Attachment A, OCEP scenario, to 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. PGE initially filed its 2016 Implementation Plan on December 31, 2015. This supplemental Attachment A takes into consideration elements of House Bill 4036.

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, appearing to read "Jay Tinker", is written over the word "Sincerely,".

Jay Tinker
Director, Regulatory Policy and Affairs

JT:kr

Encl.

y:\ratecase\opuc\doctors\um-1755 (2016 rps impl plan)\suppl attach a ocep\cvrltr_supp scenario.docx

UM 1755

Supplemental Attachment A

Incremental Cost of Compliance
2017-2021

Tab 1 - Incremental Cost Summary

OECF Version w/ Unbundled RECs

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

Revenue Requirement Additions

91,375

Notes:

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

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

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

Tab 2 - Incremental Cost for RECs Generated

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
Generic RPS Resource 2020 95 Mwa	-	-	-	20,827,786	20,770,880
Total Incremental Cost	55,059,119	55,059,119	55,059,119	55,209,966	55,059,119

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 4 - Incremental Cost by Resource

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

With Government Incentives:

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

Tab 3 - Annual Compliance by Resource

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

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

Tab 5 - RECs Generated

Resource	Six-Year Life RECs Available By Vintage Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Biglow Canyon I	-	-	-	-	-	-	-	-	-	-	341,094
Biglow Canyon II	-	-	-	-	-	-	-	-	-	-	445,109
Biglow Canyon III	-	-	-	-	-	-	-	-	-	-	394,941
Tucannon River	-	-	-	-	-	-	-	-	-	-	892,764
Vansycle Ridge	-	-	-	-	-	-	-	-	-	-	71,163
PPM Klondike II	-	-	-	-	-	-	-	-	-	-	217,434
Pelton-Round Butte LIH	-	-	-	-	-	-	-	-	-	-	438,000
Hydro Upgrades	-	-	-	-	-	-	-	-	-	-	105,558
Bellevue Solar	-	-	-	-	-	-	-	-	-	-	3,659
Yamhill Solar	-	-	-	-	-	-	-	-	-	-	2,476
Outback Solar	-	-	-	-	-	-	-	-	-	-	19,762
ETO and Other Solar	-	-	-	-	-	-	-	-	-	-	22,954
Generic RPS Wind 2020	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2025	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2030	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2035	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2040	-	-	-	-	-	-	-	-	-	-	-
Purchased Bundled	-	-	-	-	-	-	-	-	-	-	-
Total RECs	-	-	-	-	-	-	-	-	-	-	2,954,914

RECs Available Less P-RB LIH	-	-	-	-	-	-	-	-	-	-	2,516,914
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Resource	Infinite Life RECs Available By Vintage Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Biglow Canyon I	-	-	314,497	312,099	355,370	337,470	360,342	341,943	331,667	342,028	-
Biglow Canyon II	-	-	159,480	375,252	375,689	410,406	221,626	389,370	390,768	446,329	-
Biglow Canyon III	-	-	-	73,259	384,679	360,639	319,493	377,552	345,710	396,023	-
Tucannon River	-	-	-	-	-	-	-	31,449	350,526	895,210	-
Vansycle Ridge	-	-	59,617	74,902	81,054	69,504	63,442	67,148	62,326	71,358	-
PPM Klondike II	-	-	172,863	173,511	198,956	211,993	210,810	222,982	209,726	218,030	-
Pelton-Round Butte LIH	-	439,200	438,000	438,000	438,000	439,200	438,000	438,000	438,000	439,200	-
Hydro Upgrades	-	-	85,765	108,981	114,834	104,627	86,896	92,823	95,052	105,847	-
Bellevue Solar	-	-	-	-	-	3,760	3,646	3,342	3,984	3,669	-
Yamhill Solar	-	-	-	-	-	2,502	2,634	2,380	2,788	2,503	-
Outback Solar	-	-	-	-	-	1,360	21,352	20,896	21,352	19,936	-
ETO and Other Solar	-	-	1,079	2,309	9,146	13,878	20,070	23,966	28,240	23,037	-
Generic RPS Wind 2020	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2025	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2030	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2035	-	-	-	-	-	-	-	-	-	-	-
Generic RPS Wind 2040	-	-	-	-	-	-	-	-	-	-	-
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	2,280,140	2,963,170	-

RECs Available Less P-RB LIH	-	793,301	1,120,313	1,519,728	1,516,139	1,328,736	1,573,851	1,842,140	2,523,970	-
From 'Supplies' w/s Difference	439,200	1,231,301	1,558,313	1,957,728	1,955,339	1,766,736	2,011,851	2,280,140	2,963,170	2,954,914

Tab 5 - RECs Generated

RECs Available By Vintage Year											
Facility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Biglow Canyon I	-	-	-	-	-	-	-	-	-	-	341,094
Biglow Canyon II	-	-	-	-	-	-	-	-	-	-	445,109
Biglow Canyon III	-	-	-	-	-	-	-	-	-	-	394,941
Tucannon River	-	-	-	-	-	-	-	-	-	-	892,764
Vansycle Ridge	-	-	-	-	-	-	-	-	-	-	71,163
PPM Klondike II	-	-	-	-	-	-	-	-	-	-	217,434
Pelton-Round Butte LIH	-	-	-	-	-	-	-	-	-	-	438,000
Hydro Upgrades	-	-	-	-	-	-	-	-	-	-	105,558
Bellevue Solar	-	-	-	-	-	-	-	-	-	-	3,659
Yamhill Solar	-	-	-	-	-	-	-	-	-	-	2,476
Outback Solar	-	-	-	-	-	-	-	-	-	-	19,762
ETO and Other Solar	-	-	-	-	-	-	-	-	-	-	22,954
Generic RPS Wind	-	-	-	-	-	-	-	-	-	-	-
Purchased Bundled	-	-	-	-	-	-	-	-	-	-	-
Total RECs	-	-	-	-	-	-	-	-	-	-	2,954,914

RECs Available Less P-RB LIH - - - - - - - - - - 2,516,914

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

RECs Available Less P-RB LIH - 793,301 1,120,313 1,519,728 1,516,139 1,328,736 1,573,851 1,842,140 2,523,970 -

2018	2019	2020	2021
341,094	341,094	342,028	341,094
445,109	445,109	446,329	445,109
394,941	394,941	396,023	394,941
892,764	892,764	895,210	892,764
71,163	71,163	71,358	71,163
217,434	217,434	218,030	217,434
438,000	438,000	439,200	438,000
105,558	105,558	105,847	105,558
3,659	3,659	3,669	3,659
2,456	2,435	2,422	2,396
19,643	19,526	19,462	19,292
22,934	22,914	124,602	124,242
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
2,954,755	2,954,597	3,064,179	3,055,651

2,516,755	2,516,597	2,624,979	2,617,651
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2018	2019	2020	2021
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-	-	-	-
-	-	834,480	832,200
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-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	834,480	832,200

-	-	834,480	832,200
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2,954,755	2,954,597	3,898,659	3,887,851
-	-	-	-

2018	2019	2020	2021
341,094	341,094	342,028	341,094
445,109	445,109	446,329	445,109
394,941	394,941	396,023	394,941
892,764	892,764	895,210	892,764
71,163	71,163	71,358	71,163
217,434	217,434	218,030	217,434
438,000	438,000	439,200	438,000
105,558	105,558	105,847	105,558
3,659	3,659	3,669	3,659
2,456	2,435	2,422	2,396
19,643	19,526	19,462	19,292
22,934	22,914	124,602	124,242
-	-	-	-
-	-	-	-
2,954,755	2,954,597	3,064,179	3,055,651

2,516,755	2,516,597	2,624,979	2,617,651
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2018	2019	2020	2021
-	-	-	-
-	-	-	-
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-	-	-	-
-	-	-	-
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-	-	-	-
-	-	-	-
-	-	834,480	832,200
-	-	-	-
-	-	834,480	832,200

-	-	834,480	832,200
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<u>2,954,755</u>	<u>2,954,597</u>	<u>3,898,659</u>	<u>3,887,851</u>
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>

Tab 6 - Energy Growth Rates

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